UNIVERSAL
LIBRARY
OU_170083
UNIVERSAL
LIBRARY

OSMANIA UNIVERSITY LIBRARY

Call No. 910.L11R Accession No. 29379

Author Lockay, Earl, E.

Title Regions and realms of the wo

This book should be returned on or before the date last marked below.

Regions and Nations of the World

REGIONS AND NATIONS OF THE WORLD

by Earl E. Lackey

ASSOCIATE PROFESSOR OF GEOGRAPHY

THE UNIVERSITY OF NEBRASKA

and Esther S. Anderson

ASSISTANT PROFESSOR OF GEOGRAPHY

THE UNIVERSITY OF NEBRASKA

D. VAN NOSTRAND COMPANY, INC.

TORONTO NEW YORK LONDON

NEW YORK
D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York 3

TORONTO
D. Van Nostrand Company (Canada), Ltd., 228 Bloor Street, Toronto

LONDON
Macmillan & Company, Ltd., St. Martin's Street, London, W.C. 2

COPYRIGHT, 1946
BY
D. VAN NOSTRAND COMPANY, INC.

All Rights Reserved

This book, or any parts thereof, may not be reproduced in any form without written permission from the authors and the publishers.

First Published December 1946
Reprinted February 1947, September 1948

PRINTED IN THE UNITED STATES OF AMERICA

PREFACE

This book is unusual in approach. It is designed for classroom use in those colleges and universities which offer a single semester or one-year course in world geography.

One of the important considerations in the study of landscape phenomena is the physiographic region. So significant is this that the authors have made the physiographic unit the basis of their geographic descriptions and interpretations. Although there is some disagreement among geographers as to boundaries between physiographic regions, the authors have sought for enough homogeneity to satisfy the exigencies of the present work. Within this physiographic framework the landscape features of the earth are stressed, more especially those basic factors that contribute to an understanding of the mosaic of countries presented.

The content and organization of *Regions and Nations of the World* have evolved through the teaching of the material by the authors for more than a decade. The book contains a carefully selected body of essential geographic material, requiring few if any additional references or assigned reading to be provided by the instructor. The treatment is consistent throughout and the coverage is comprehensive enough to serve the purposes of general education or the urgent need for an intensive survey or a rapid review. In short, the construction of the volume is such that the necessity for supplementary teaching aids is reduced to a minimum.

Within the United States the treatment centers primarily around physiographic units, but in other parts of the earth the physiographic regions are explored as a preliminary approach to the introduction of the more complete treatment by nations. This seemed desirable because most of the reporting on world affairs and a very large percentage of our thinking gravitates around countries and nationalities. However, the organization is such that the shifting of political boundaries does not have a great deal of bearing on the effectiveness of treatment. In other words, there are not many places in the world where shifts in the boundaries of countries would modify materially the narrative in this book.

The intricate relations that exist between the landscape and human activities are convincing evidence that much of the geography of a country today becomes the history of tomorrow; that associating historical episodes with the regions and nations in which they transpired helps to focus attention on the areas under consideration; that the human drama on the world stage today is only a brief interlude between yesterday and tomorrow; and that the book, *Regions and Nations of the World*, is more than a study of just the interlude—it has its roots deep in the landscapes of yesteryear and it reaches forward to the prospects of the years to come.

The numerous scenery-type maps are provided to accentuate and clarify key concepts—a visual aid found in only a few books, especially in such considerable numbers.

The frequent appearance of reading references associated with the text will furnish some of the stimulating and pertinent details that a brief treatise is obliged to omit.

The two types of foreign trade graphs are unique. One type shows the total imports and exports in dollars for numerous countries, and also

the percentages shared by various other countries. Easy computations may render comparisons of imports of different countries an attractive exercise. The second type of graph portrays data similarly for the principal commodities. Because World War II severely dislocated the usual channels of trade, the graphs represent average conditions just preceding the global conflict. For purposes of comparison, however, tables in the appendix of the book show trade conditions by countries and commodities for the most recent year in which reliable data are available.

The increasing emphasis on urban life and the extensive role that cities play in our complex economy today are reflected in the care with which the sites and situations of many scores of cities have been presented.

The concluding paragraph about each country, in which a short appraisal is made of some of the critical problems facing the people, is a distinctive feature in the book. The habit of trying thus to understand the difficulties confronting people everywhere should serve as a corrective antidote to some of the serious misunderstandings that torment the world today.

The regional maps in the appendices, displaying the climates, the soils, and the natural vegetation of the continents, together with the associated narratives, are designed to assist the student in a well integrated understanding of the regions and nations introduced in the body of the text.

Many valuable suggestions and constructive criticisms from students and fellow-teachers have contributed immeasurably to needed modifications and improvements. To the good friends and worthy colleagues who thus have offered encouragement and words of counsel the authors are truly grateful. Acknowledgment hereby is tendered to the numerous government and private agencies that have furnished pictures for illustrative purposes and valuable data for the construction of charts, maps, and graphs.

E. E. L.
E. S. A.

Lincoln, Nebraska
August, 1946

CONTENTS

THE NATURE OF REGIONAL GEOGRAPHY 1

PART ONE: North America

INTRODUCTION 11

Anglo-America, the Largest Aggregate of English-Speaking People—14

The United States—16

1 THE COASTAL PLAINS 17

Atlantic and Gulf Coastal Plains—17

2 APPALACHIAN HIGHLANDS 24

The Blue Ridge and the Piedmont Upland—25

3 APPALACHIAN HIGHLANDS (CONTINUED) 36

Appalachian Plateaus, and the Appalachian Ridges and Valleys—36

4 APPALACHIAN HIGHLANDS (CONCLUDED) 44

New England-Acadian Upland and the Adirondack Mountains [1]—44

5 INTERIOR PLAINS 51

Glaciated Lowland and Associated Superior Upland [2]—51, Great Plains—58

6 SOUTHERN INTERIOR HIGHLANDS 65

Ozark Plateau, Ouachita Mountains, and Associated Features—65

7 THE ROCKY MOUNTAINS 69

Rocky Mountain Sub-sections and their Characteristics—69

[1, 2] Regionally parts of the Laurentian Upland, but included here because they are in the United States (see pages 49-50 and 107).

8 THE INTERMONTANE HIGHLANDS 75
Plateaus, Basins, and Ranges of the United States—75

9 PACIFIC MOUNTAINS AND LOWLANDS 84
Pacific Mountains of the United States—84, Puget Sound Lowland—89, The California Valley—92, Southern California Lowlands and Associated Features—95

10 ALASKA 100

11 BRITISH AND DANISH NORTH AMERICA 105
Dominion of Canada—105, Laurentian Peneplain and Associated Features—105, Yukon-Canadian Intermontane Plateaus—108
Newfoundland and Labrador—117
Danish North America—118, Greenland—118

12 SPANISH NORTH AMERICA 119
Physical Features—119, Mexican Plateau—119, Central American Highlands—120, West Indian Archipelago—121
Countries of Spanish North America—123, Mexico—123, Central American Countries—125, West Indian Countries and Dependencies—130

PART TWO: South America

INTRODUCTION 137

13 ANDEAN HIGHLANDS AND ASSOCIATED FEATURES 142
Divisions and Regions—142, Caribbean Lowlands—142, Andes Mountains—144, Pacific Slope Lands—147

14 ANDEAN HIGHLANDS AND ASSOCIATED FEATURES (CONCLUDED) 149
Countries Associated with the Andean Highlands—149, Colombia—149, Ecuador—153, Peru—155, Bolivia—158, Chile—161

15 INTERIOR LOWLANDS AND ASSOCIATED UPLANDS 166
Division and Regions—166, Interior Plains—166, Argentinian Uplands—168
Countries in the Interior Plains and Associated Uplands—169, Argentina—169, Venezuela—176, Paraguay—179

16 EASTERN HIGHLANDS AND ASSOCIATED PLAINS 181

Divisions and Regions—181, *Eastern Highlands and Coastal Features*—181, Guiana Highlands and Coastal Plain—181, East Brazilian Highlands and Coastal Plain—182, Interior Brazilian Plateaus—182

Countries Dominated by the Eastern Highlands—183, Brazil—183, The Guianas—190, Uruguay—192

PART THREE: Eurasia

INTRODUCTION 197

17 THE CENTRAL EURASIAN BARRIER AND GATEWAYS 200

Trend of Major Relief Features—200, *Some Characteristics of the Central Barrier*—200

Gateways in the West—201, The Carcassonne Gap—201, The Rhone-Saone Corridor—202, The Croatian Gateway—202, The Vardar-Morava Gateway—203, The Bosporus-Dardanelles Gateway—204

Gateways in the East—205, The Khyber Gateway—206, The Sian Gateway—206, The Kalgan Gateway—206

Physiographic Divisions and Regions of Eurasia—208

18 CENTRAL EURASIAN BARRIER 210

Divisions and Regions—210, *The Central Barrier in Europe*—211, The Pyrenees Mountains—211, The Central Plateau of France—211, The Alpine Highlands—211

Countries Associated Chiefly with the Barrier in Europe—212, Switzerland—212, Yugoslavia—214, Bulgaria—215, Albania—216

Divisions and Regions—217, *The Central Barrier in Asia*—217, Anatolian Plateau—217, Armenian Plateau—218, Iranian Plateau—219, Tibetan Plateau—219, Mongolian Plateaus and Basins—220, Tarim Basin and Associated Basins—221

Countries Within the Barrier in Asia—221, Turkey—221, Iran (Persia)—226, Afghanistan—227

19 LANDS SOUTH AND EAST OF THE CENTRAL EURASIAN BARRIER 229

Divisions and Regions—229, *Mediterranean Peninsulas and Associated Islands*—229, The Iberian Peninsula—229, The Italian Peninsula and Associated Islands—230, The Grecian Peninsula and Associated Islands—230

European Countries South of the Central Eurasian Barrier—231, Spain—231, Portugal—234, Italy—235, Greece—241

20 LANDS SOUTH AND EAST OF THE CENTRAL EURASIAN BARRIER (CONTINUED) 245

Divisions and Regions—245, *Indian Ocean Borderlands*—245, Syrian-Arabian Plateau—245, Mesopotamian Valley—246, Indian Plains and Plateau—246

Countries Associated with the Indian Ocean Borderlands—247, Arabian Plateau Countries—247, Syria and Associated Countries—250, Iraq—253, India—255

21 LANDS SOUTH AND EAST OF THE CENTRAL EURASIAN BARRIER (CONCLUDED) 263

Divisions and Regions—263, *Pacific Ocean Borderlands*—263, Indo-Chinese Peninsula (Including Malay Peninsula)—263, Chinese Plains and Uplands—264, Manchurian Plains and Uplands—265, Volcanic Islands and Peninsulas—265

Countries Associated with the Pacific Ocean Borderlands—266, Siam (Thailand)—267, Burma—269, Malay States—270, French Indo-China—271, Republic of China—272, Manchuria (Manchukuo)—277, Korea (Chosen)—279, Japan—280

22 LANDS NORTH OF THE CENTRAL EURASIAN BARRIER 287

Divisions and Regions—287, *Northwest Highlands*—287, British Isles and Brittany—287, Scandinavian Highlands and Finnish Peneplain—288

Countries within the Northwest Highlands—290, The United Kingdom—290, Irish Free State (Eire)—294, Norway—295, Sweden—298, Finland—300

23 LANDS NORTH OF THE CENTRAL EURASIAN BARRIER (CONTINUED) 303

Divisions and Regions—303, *West Central Highlands and Associated Lowlands*—303, Rhenish Highlands—303, German Uplands and Bohemian Plateau—304, Carpathian-Transylvania Highland—305, Hungarian Plains—305

Countries of the West Central Highlands and Associated Lowlands—306, Czechoslovakia—307, Austria—308, Hungary—310, Romania—312

24 LANDS NORTH OF THE CENTRAL EURASIAN BARRIER (CONTINUED) 315
Divisions and Regions—315, *Interior and Northern Plains and Uplands*—315, Central Plains of Europe—315
Countries of the Interior and Northern Plains and Uplands—316, France—316, Germany—320
Low Countries of the North Sea Coast—325, Denmark—325, The Netherlands—327, Belgium—328, Poland—330

25 LANDS NORTH OF THE CENTRAL EURASIAN BARRIER (CONCLUDED) 334
Countries of the Interior and Northern Plains and Uplands (Continued)—334, *Soviet Europe* (*Russia*)—334, The Baltic Soviets (Lithuania, Latvia, and Estonia)—338
Soviet Asia—340, Turanian Plain—340, Siberian Plain—343, Siberian Uplands—346

PART FOUR: Africa

INTRODUCTION 351

26 THE NORTHERN HIGHLANDS AND ASSOCIATED BASINS 356
Regions and Associated Countries and Dependencies—356, Atlas Mountains and Associated Features—356, Sudan-Saharan Tablelands and Associated Basins—360, Lower Nile Valley and its Margins—366

27 EASTERN HIGHLANDS AND ALLIED FEATURES 371
Regions and Associated Countries and Dependencies—371, Ethiopian Highland—371, Eastern Plateaus, Mountains, and Plains—373, Madagascar—376

28 SOUTHERN HIGHLANDS AND BASINS 379
Regions and Associated Countries and Dependencies—379, Congo Basin and its Margins—379, South African Highlands and Basins—382

PART FIVE: Australasia and Antarctica

INTRODUCTION 389

29 AUSTRALIAN CONTINENT AND COMMONWEALTH 391
Western Plateau—392, Eastern Highlands and Tasmania—395, Central Lowlands—400

30 PACIFIC ISLANDS AND ANTARCTICA 403
Dominion of New Zealand—403, East Indies—407, Other Islands of the Pacific (Oceania)—411, Antarctica—414

APPENDIX A. Climates of the Earth 419

APPENDIX B. The Earth's Garment of Vegetation 426

APPENDIX C. Mature Soil Groups of the World 431

APPENDIX D. Measures of the Spread of Precipitation 435

APPENDIX E. Some General References 436

APPENDIX F. Some Important Mineral Resources of the World 438

INDEX 441

ILLUSTRATIONS

PHYSIOGRAPHIC SKETCHES

1	The Promised Land	2
2	Three Landscape Levels	3
17	The Appalachian Highlands and Gateways	25
18	Section Across the Appalachian Highlands	26
32	Terrain and Cities in the Vicinity of the Great Lakes	55
35	Structure of the Black Hills and Adjacent Great Plains	60
40	A Sketch Across the Ozarks	66
43	Rocky Mountain Region of the United States	70
48	The Grand Coulee Project	76
54	Pacific Mountains, Ranges, and Valleys	85
60	A Surficial and Vertical Sketch Across California	93
61	San Francisco and Environs	94
68	Diagrammatic Sketch of the Laurentian Upland	106
76	Central America and the West Indies	120
93	Northern South America	144
94	West Coast of South America	146
131	Central Plateau of France	202
132	Secondary Gateways and Passes in Europe	203
134	The Plateau of Iran	205
135	Southeastern Asia	207
140	Peninsula of Anatolia	218
141	Plateau of Tibet	219
143	The Tarim Basin	221
146	Iberian Peninsula	230
150	Italian Peninsula	236
153	Greece	242
155	Mesopotamia, Syria, and Egypt	246
158	India	256

162	Indo-China and Malaya	264
175	British Isles	289
184	Rhenish Highlands	304
185	German Uplands and Bohemian Plateau	305
186	Carpathian Mountains and Plains of Hungary	306
199	Turanian Plain	341
204	Configuration of Africa	352
207	Atlas Region	357
212	East Africa	367
231	The Hawaiian Islands	411
233	The Polar Hemispheres	415

PICTURES

12	Mining Phosphates	18
16	Soil Erosion Menace	23
20	Strip-Cropping Cotton and Small Grain	29
21	New York City	31
23	Washington	34
24	Natural Bridge in Virginia	37
27	Pittsburgh	42
28	Hardwood Trees About Sixty Years Old	45
29	"Thousand Islands" International Bridge	50
34	Devil's Tower	59
36	Dust Storms	61
38	Contour Basin Listing in Kansas	62
44	The Grand Tetons	71
45	How Folded Mountains Are Made	72
46	Some Alpine Peaks in Glacier Park	73
47	Steamboat Rock	76
49	The San Francisco Mountains	77
50	A Block Mountain	77
51	Rich Yakima Valley	79
52	Boulder Dam from an Airplane	80
55	Mt. Rainier	86
56	Crater Lake	86
57	Yosemite Falls	87
58	Loading Lumber	90

59	Bonneville Power, Navigation, and Irrigation Project	91
62	Santa Ana Valley, California	96
63	Farming in Imperial Valley	97
65	Mt. McKinley	102
66	Village of Unalaska	103
67	The Klondike News	103
69	Lumbering in Southeastern Canada	110
70	In the Annapolis Valley in Nova Scotia	110
74	The City of Quebec	114
75	Vancouver	116
77	Santa Maria Volcano	121
78	Hauling Mahogany Logs	122
79	Sisal Harvest in Central America	124
80	Oxcart Transportation	126
84	Miraflores Locks	129
87	Going to Market	133
88	The Pan American Union	137
89	Cotopaxi	138
95	Strait of Magellan	147
96	A Native's Hut on the Caribbean Coast	150
97	Barranca Bermeja	150
98	Istmina on the Upper Course of the San Juan River in Colombia	151
101	Machu Picchu	156
102	Ears of Cuzco Corn	157
103	A Caravan of Llamas Crossing a Stream in Peru	157
105	La Paz, Capital of Bolivia	160
106	A Rural Scene in Chile	162
108	A Corner of Santiago, Chile	164
109	Lakes and Mountains in Argentina	169
110	Typical Vegetation in Western Argentina	170
111	Bags of Wool at Rio Gallegos	170
112	A Camp of Comodoro Rivadavia Oil Field	171
113	Quebracho	172
115	Buenos Aires	174
119	A Plantation of Yerba Maté	180
120	Hydro-electric Development in the Rio São Joao	182
121	Iguassu Falls on a Tributary of the Parana	183
122	Railroad from Santos to São Paulo	184
125	Rio de Janeiro from Corcovado Mountains	187
126	Rubber Plantation on the Tapajoz River	188
127	Manaus, Showing Wharves, Boats, and Harbor Equipment	189

133	The Iron Gate	204
139	A Bulgarian Farmer	216
142	A Stone Basket Bridge	220
147	Threshing Scene in Spain	232
149	Sheep in the Foothills of the Pyrenees	233
151	Highway in the Alps	237
156	A Nazareth Threshing Floor	252
157	Pontoon Bridge at Baghdad	255
163	Ancient Temple of Indo-China	267
166	A House Boat in Saigon	271
167	Section of the Great Chinese Wall	273
169	Willow Pattern Tea House	276
170	Chinese-Manchurian Boys	278
171	Gathering Oranges	283
172	Port Misumi	283
176	Sheep in Wicker Pens in Southern England	291
178	Stacking Peat	295
179	A Lapland Landscape	296
181	Rural Landscape in Sweden	299
187	A Summer Resort	313
190	Cultivated Slopes along the Moselle in Germany	322
191	The Walhalla	322
195	A Raft of Lumber on the Volga	335
196	Straw-thatched Log House	336
200	Cotton Pickers	342
201	Mountain Weather Station	342
202	Icebreakers in the Arctic	346
203	Siberian Furs	347
209	Canyon in the Sandstones in the Ahaggar Mountains	361
210	Mixed Farming	363
214	The Zambezi Gorge	374
215	An Ostrich Farm	384
218	Some Native Australians	391
223	Sydney Harbor	399
224	Rose Bay Flying Base at Sydney	400
225	A Sales Yard in New South Wales	401
227	Mitre Peak and Milford Sound, New Zealand	404
229	The Remarkables in South Island, New Zealand	406
230	Outrigger Boats	409
232	A Pineapple Field	413
234	Mt. Czegka and Mt. Jessie O'Keefe	416

GRAPHS AND DIAGRAMS

8	Foreign Trade of Different Countries Compared	13
13	World's Petroleum Production	18
14	World's Cotton Production	20
19	World's Tobacco Production	28
22	Global Trade of the United States and the United Kingdom	32
25	World's Coal Production	39
30	World's Production of Corn	53
31	World's Pig Iron Production	54
33	Foreign Trade of the United States	56
37	World's Production of Wheat	61
41	World's Production of Lead	66
42	World's Zinc Production	68
53	World's Copper Production	82
71	Canada's Foreign Trade	111
72	Global Trade of Canada and Mexico	112
81	Guatemala's Foreign Trade	127
82	Global Trade of Guatemala and Cuba	127
83	Global Trade of Honduras and Costa Rica	128
85	World's Cane Sugar Production	131
86	Cuba's Foreign Trade	132
100	Ecuador's Foreign Trade	151
104	Global Trade of Peru and Chile	158
107	Chile's Foreign Trade	163
114	Global Trade of Argentina and Brazil	173
116	Argentina's Foreign Trade	175
117	Venezuela's Foreign Trade	177
118	Global Trade of Venezuela and Uruguay	178
123	World's Coffee Production	185
124	Brazil's Foreign Trade	186
137	Global Trade of Switzerland and Italy	213
141	Turkey's Foreign Trade	223
148	Global Trade of Spain and Portugal	233
152	Italy's Foreign Trade	238
154	Greece's Foreign Trade	243
159	World's Rice Production	258
160	India's Foreign Trade	259

161	Global Trade of India and Japan	260
164	Global Trade of Siam (Thailand) and China	268
165	World's Rubber Production	270
168	China's Foreign Trade	275
173	World's Silk Production	284
174	Japan's Foreign Trade	284
177	United Kingdom's Foreign Trade	292
180	Global Trade of Norway and Sweden	297
182	Sweden's Foreign Trade	300
183	Finland's Foreign Trade	301
188	France's Foreign Trade	319
189	Global Trade of France and Germany	319
192	Global Trade of Denmark and The Netherlands	326
193	Belgium's Foreign Trade	330
194	Poland's Foreign Trade	332
197	World's Raw Beet Sugar Production	337
198	World's Potato Production	337
208	Morocco's Foreign Trade	359
213	Egypt's Foreign Trade	369
216	Foreign Trade of the Union of South Africa	385
219	Australia's Foreign Trade	392
222	World's Wool Production	398
226	Global Trade of Australia and New Zealand	402
228	New Zealand's Foreign Trade	405

MAPS

3	The Physiographic Divisions of the Continents	4
4	Ptolemaic Map of the Ancient World	5
5	Ocean and Inter-Oceanic Gateways	6
6	Arctic-Centered Map of the World	7
7	Mean Annual Rainfall for North America and the Monthly Distribution of Temperature and Rainfall for Selected Stations	12
9	Distribution of the Population of the World	14
10	Physiographic Divisions and Regions of North America	15
11	Physiographic Regions of the United States	16
15	Cities of the United States	21

26	Cities of Northeastern United States	41
39	Distribution of Towns on the Great Plains	63
64	Air-Age Map Centered on Fairbanks, Alaska	101
73	Some Cities of North America	113
90	Mean Annual Rainfall of South America and the Monthly Distribution of Temperature and Rainfall	139
91	Physiographic Divisions and Regions of South America	140
92	Stellar Polar Map	143
99	Some Cities of South America	152
128	Mean Annual Rainfall of Europe and the Monthly Distribution of Temperature and Rainfall for Selected Stations	197
129	Mean Annual Rainfall of Asia, and the Monthly Distribution of Temperature and Rainfall for Selected Stations	198
130	Central Eurasian Barrier and Gateways	201
136	Physiographic Divisions and Regions of Eurasia	208
138	Cities of Europe	214
145	Cities of Asia	224
205	Mean Annual Rainfall of Africa and the Monthly Distribution of Temperature and Rainfall	353
206	Physiographic Divisions and Regions of Africa	355
211	Cities of Africa	365
217	Physiographic Divisions and Regions of Australia	389
220	Mean Annual Rainfall of Australasia and the Monthly Distribution of Temperature and Rainfall	394
221	Australasian Cities and Places	396
235	Temperature and Climatic Belts	420
236	Climatic Regions of the World	421
237	Natural Vegetation of the World	428
238	Distribution of the Mature Soils of the World	432

The Nature of Regional Geography

THE LAND is flowing with milk and honey."[1] How these words must have gripped the minds and thrilled the hearts of the land-hungry Israelites who had recently escaped from bondage in Egypt. Yes, the twelve men selected by Moses to make a reconnaissance survey of the Promised Land had just returned with their geographic report concerning the landscape, both in its natural and cultural aspects. They had traveled northward from the Desert of Zin through Hebron, along the Jordan River, and had returned by way of the Mediterranean Coast through the land of the Amalekites--covering a distance of some 400 miles in their forty days of observation and study (Fig. 1).

An average distance of 10 miles per day on a survey trip seems very slow indeed as contrasted with the reconnaissance field studies made today by use of the automobile, the airplane, and the finest of photographic equipment and other scientific instruments. Nevertheless, the twelve men did essentially the three things that every geographer does when preparing a report concerning regions and countries—namely, (1) they observed the landscape phenomena of the area; (2) they described or recorded what they saw; and (3) they interpreted or explained the interrelated phenomena in the light of the facts they had gathered. The same three stages—*observing*, *describing*, and *interpreting*—are essential in the approach to any science. The effectiveness of scientific study depends, largely, on how persistently these three stages are pursued and integrated.

[1] Holy Bible, Numbers 13.

THREE STAGES IN THE GEOGRAPHIC STUDY OF REGIONS AND COUNTRIES

The foregoing episode epitomizes the procedure usually followed in geographic studies.

OBSERVING THE LANDSCAPE. The twelve men surveying the Promised Land noted carefully the *natural features of the landscape,* such as land forms, climate, soil, and natural vegetation. The men studied also the *cultural features of the landscape,* noting what crops the people produced, the animals they possessed, the fields they cultivated, the towns, cities, and roadways they had constructed, and the kinds of shelter that were prevalent in the region.

DESCRIBING THE LANDSCAPE. When the men returned, they reported concerning both the natural and cultural phenomena which they had observed. Oral and written descriptions, maps, graphs, and tables of data, no doubt, were included in their records. Even illustrative materials were brought back--for example, grapes, figs, and pomegranates.

INTERPRETING OR EXPLAINING THE LANDSCAPE. When the men were asked by Moses to state whether or not in their judgments the chosen people should move into the Promised Land, there seemed to be complete agreement on one factor—they said, "The land is flowing with milk and honey." However, they did not agree with reference to some of the other factors involved. For example, they could not agree as to when they should enter the Promised Land, two preferring immediate entrance, and ten counseling delay. Differences of opinion were due to a combination of conditions such as prejudices, fears, training, and to the relative values to be attached to various other items involved in the whole situation.

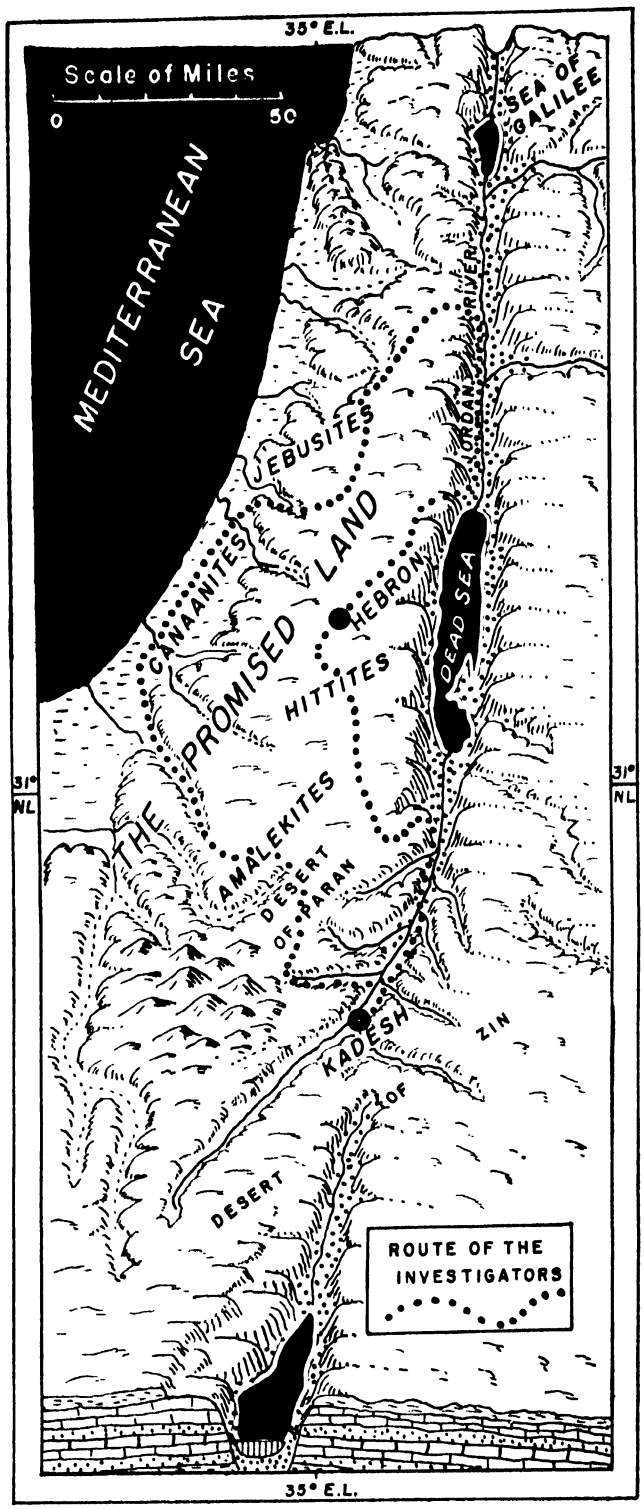


FIG. 1. THE PROMISED LAND. In the ancient world this was a choice area lying on the eastern margin of the Mediterranean Sea, having a climate similar to that of California with rainy winters and dry summers. (Also see Fig. 155.)

GEOGRAPHY AS ORGANIZED KNOWLEDGE

This Biblical story is an intriguing narration covering 40 years of delay, discouragement, wandering, sacrifice and maneuvering, and a final glorious entry into the Promised Land, but the details cannot be given here. However, the story should help one to understand what the major considerations are in a study of regions and countries—the observing, the describing, and the interpreting of landscape phenomena within selected areas.

In the physical and biological laboratories the scientist usually can exercise a large measure of control over the variable factors in the problem with which he is dealing. For this reason, the observed factors may be measured with a high percentage of accuracy, the description may be stated with nearly 100 per cent precision, and the interpretations may have high validity.

It should be remembered that the data used by the geographer are secured chiefly from nature's laboratory, the great out-of-doors. He has little or no control over the variable factors in his laboratory. It is not possible for him to make all of his own observations; but, nevertheless, the landscape phenomena with which he deals may be observed, and described with high fidelity—not 100 per cent, of course. The complexity of factors involved in the problems of the geographer and his lack of control over the variable features connected with landscape study naturally make the geographer's task of explaining more difficult than that involved in the problems of the physical and biological laboratories.

THE MATERIALS OF REGIONAL GEOGRAPHY

The observable details within any selected region or country constitute the materials with which the geographer works. He seeks to explain the relations that these details bear to one another and by so doing he aspires to understand the ensemble of characteristics that gives the area unity.

In a typical region three levels of landscape phenomena should be studied or investigated—*surface features, subsurface features,* and *atmospheric features.* Each of these levels include two essential

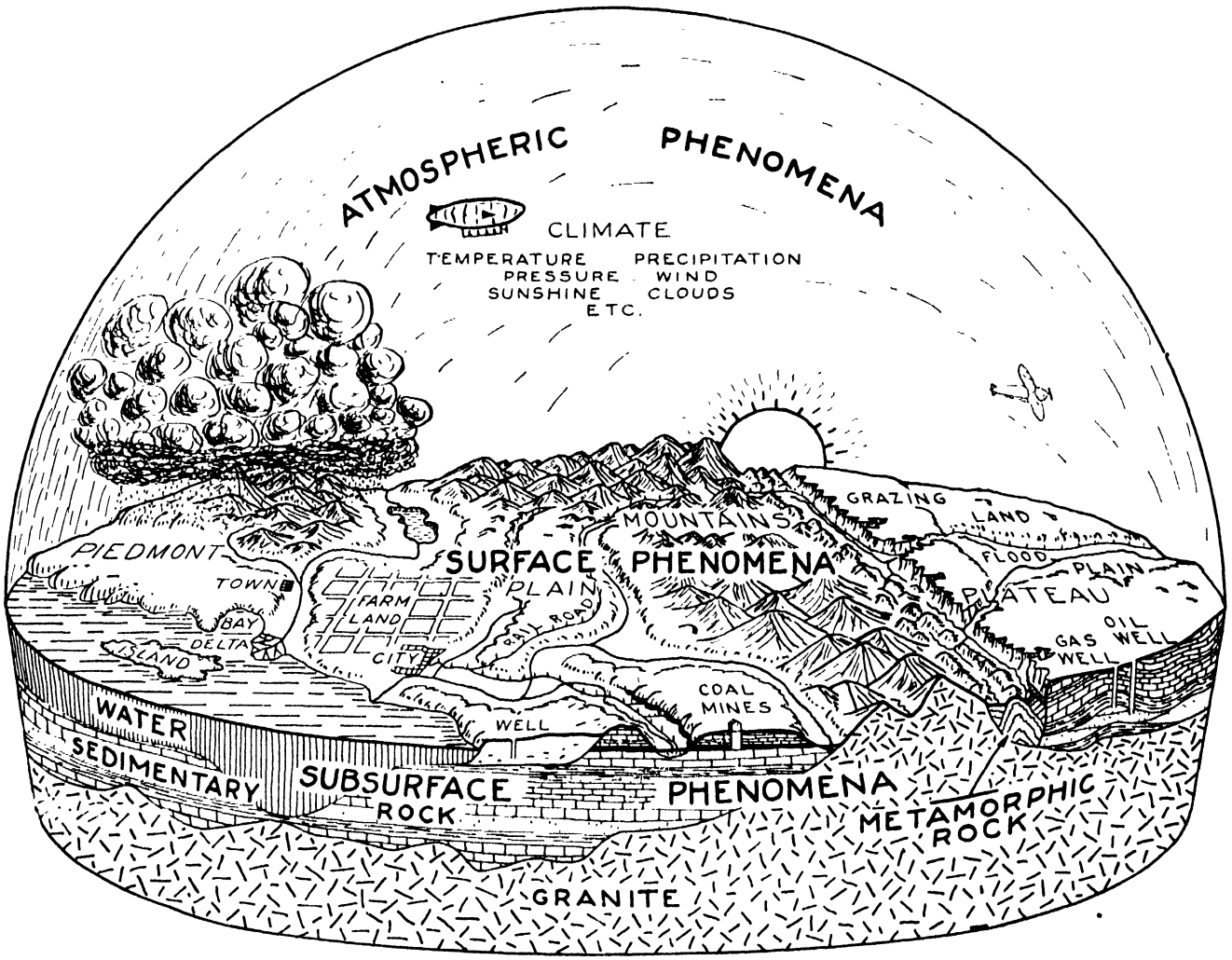


FIG. 2. THREE LANDSCAPE LEVELS. This composite diagram represents some of the geographic phenomena that are associated with landscape study. Note that both cultural and natural features appear in each of the three levels. The arch over the area represents the sky dome as the observer might see it day by day.

parts—namely, (1) the natural and (2) the cultural (Fig. 2).

The *natural phenomena* in the landscape include (*a*) surface features such as rivers, plains, plateaus, mountains, grasslands, and forests; (*b*) subsurface features such as ground water, coal beds, oil pools, natural gas, building stones, and soils; and (*c*) atmospheric features among which are wind, clouds, sunshine, thunderstorms, rainfall, and temperature.

The *cultural phenomena* in the landscape include (*a*) surface features among which are roads, cities, irrigation works, and farmlands; (*b*) subsurface features represented by coal mines, tunnels, subways, oil and gas wells, bomb shelters, and submarines; and (*c*) atmospheric features such as airplanes, dirigibles, blimps, sounding balloons, and radiosondes.

PHYSIOGRAPHIC DIVISIONS OF THE CONTINENTS

A *physiographic division* is an area which has broad unity in physical characteristics, especially as to land forms, but which at the same time has considerable diversity of detail and for this reason may be divided into smaller units called regions. The *physiographic region* as a rule possesses a large measure of unity as to subsurface features

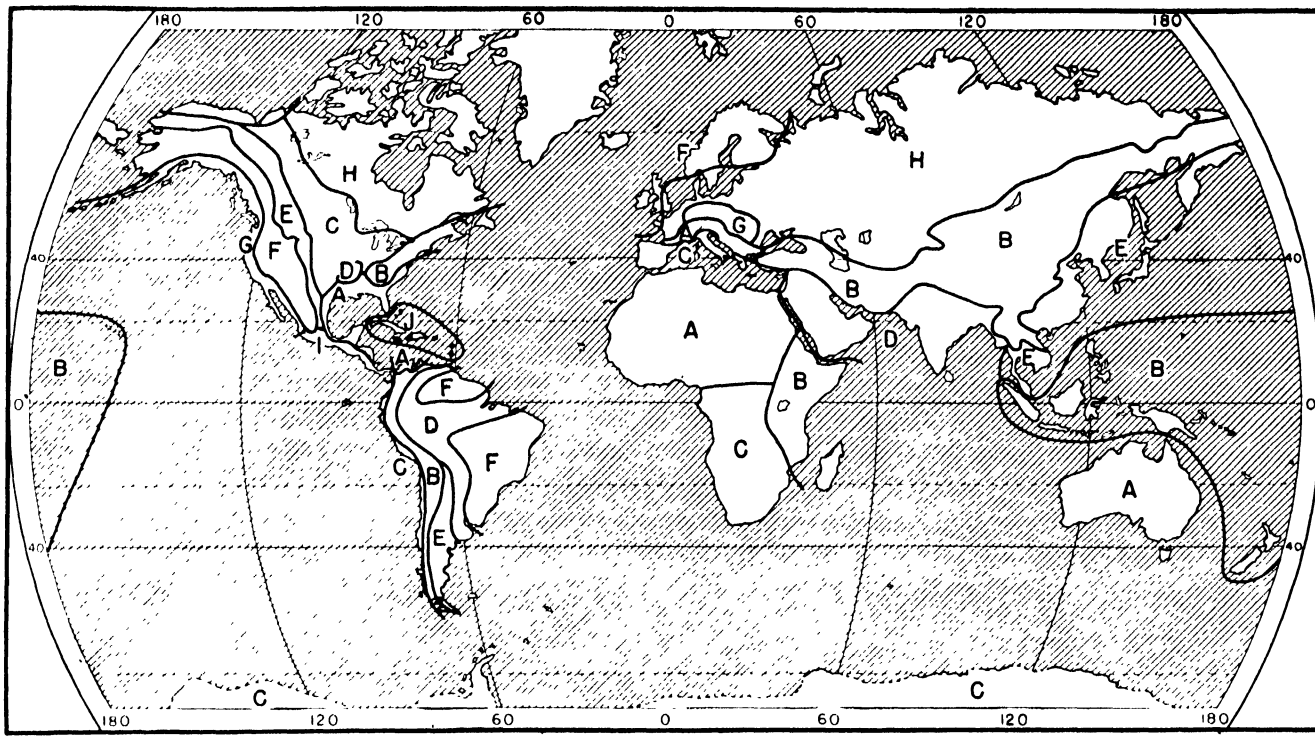


FIG. 3. THE PHYSIOGRAPHIC DIVISIONS OF THE CONTINENTS. The divisions correspond to the classification shown in the outline below. For purposes of this study a separate map of each continent has been constructed which indicates that most of the divisions are composed of several regions.

and topography.[1] A maze of factors confronts one who aspires to divide the continents into physiographic divisions and regions, and the delineations here used may need to be modified or refined when more specialized studies are undertaken. However, for purposes of the present treatment of *Regions and Nations of the World*, the following major divisions of the continents will be recognized (Fig. 3).

I. NORTH AMERICA
- A. Coastal Plains
- B. Appalachian Highlands
- C. Interior Plains
- D. Southern Interior Highlands
- E. Rocky Mountains
- F. Intermontane Highlands
- G. Pacific Mountains and Lowlands
- H. Laurentian Peneplain and Associated Features
- I. Central American Highlands
- J. West Indian Archipelago

II. SOUTH AMERICA
- A. Caribbean Lowlands
- B. Andes Mountains
- C. Pacific Slope Lands
- D. Interior Plains
- E. Argentinian Uplands
- F. Eastern Highlands and Associated Features

III. EURASIA
- A. Central Barrier in Europe
- B. Central Barrier in Asia
- C. Mediterranean Peninsulas and Associated Islands
- D. Indian Ocean Borderlands
- E. Pacific Ocean Borderlands
- F. Northwest Highlands
- G. West Central Highlands and Associated Lowlands
- H. Interior and Northern Plains and Uplands

IV. AFRICA
- A. Northern Highlands and Associated Basins
- B. Eastern Highlands and Allied Features
- C. Southern Highlands and Basins

V. AUSTRALASIA AND ANTARCTICA
- A. Australia
- B. Pacific Islands
- C. Antarctica

[1] Topography in this book is interpreted in general to mean land forms. In order to avoid the monotonous repetition of the terms division and region, it should be noted that such words as area, section, etc., are frequently used.

REGIONS AND NATIONS INTEGRATED

One of the problems confronting the geographer when writing about *regions* and *nations* is the fact that the boundaries of the two may not coincide. The country under consideration may occupy only a part of a region, or it may include the whole or parts of several regions. In the book, *Regions and Nations,* this apparent difficulty is turned into an advantage, inasmuch as nearly every part of the world receives double consideration, first, through a survey of physiographic regions and, second, through a study of countries in which an integration of the natural features with the cultural is undertaken. For this reason the physiographic divisions and regions as a rule are described briefly without regard to the countries into which they may extend. For example, the Atlantic Plain of North America extends into several countries—the United States, Mexico, Honduras, etc. However, when a country is considered, each of the regions associated with it receives its share of attention as a part of an integrated political unit.

INTERREGIONAL RELATIONS

On Friday, September 28, 1945, a great silver bird, the C-54 "Globester," soared out of the National Airport at Washington, D. C., on a mission of goodwill and the inauguration of a weekly (150-hour) globe-girdling schedule with regular stops. Just a week before, three giant Superfortresses had made an almost non-stop flight from Hokkaido, Japan, to Washington, D. C., in less than 29 hours. These events together with the superior accomplishments of the Army Air Forces in World War II and the great achievements of civilian aviation in recent years leave little doubt that one of the architects of our changing world is the airplane, and that global transportation by air is destined to be a major factor in drawing nations, previously scattered and self-centered, into mutually helpful

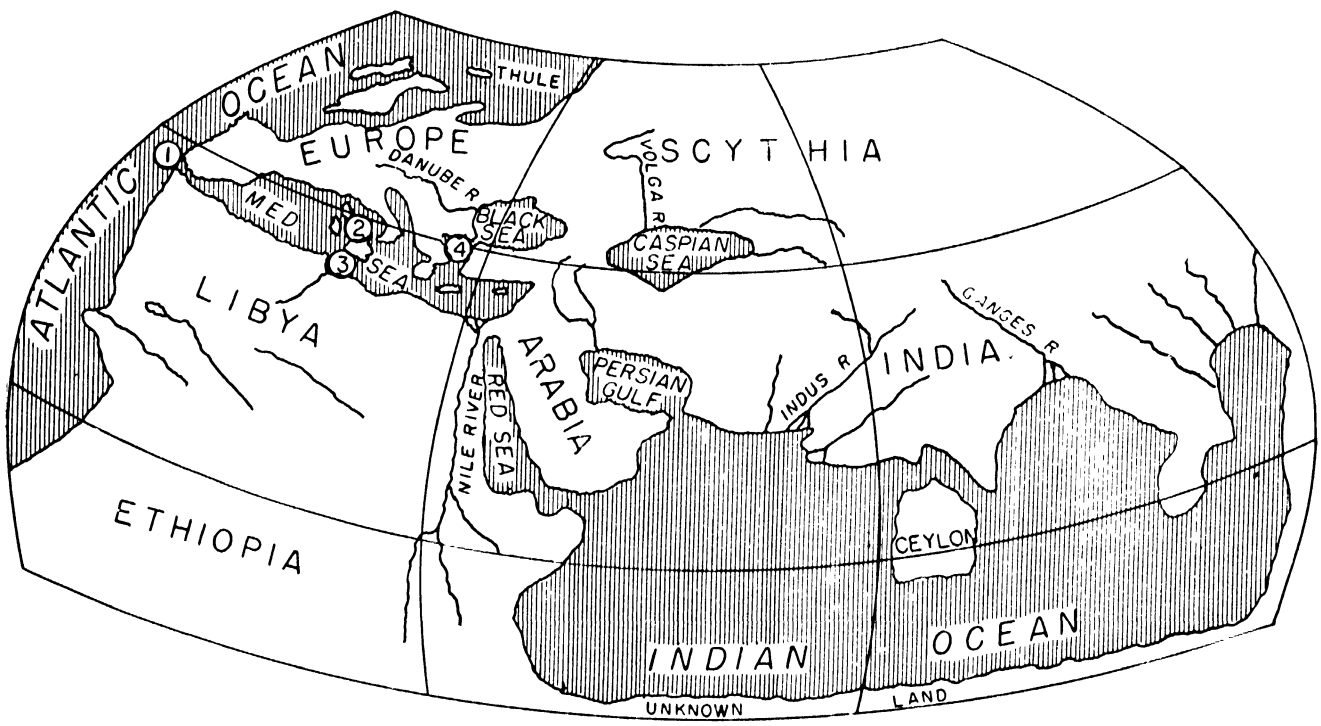


FIG. 4. PTOLEMAIC MAP OF THE ANCIENT WORLD. Most travel and trade during the age of Claudius Ptolemy was overland. However, by the beginning of the Christian Era the Mediterranean Sea had become an important waterway, and already much strife over strategic routes had been started. Four of these gateways were (1) Strait of Gibraltar, (2) Strait of Messina, (3) Inter-Mediterranean Straits, and (4) Bosporus-Dardanelles route. All of these are critical today, 1800 years later.

neighborhoods, wherein people will live more happily than ever before. Men have striven for thousands of years for this objective.

From remotest times the people of the various regions and countries of the world have found it advantageous whenever possible to exchange some of the products of their home region for goods

THE EXPANDING WORLD. As civilization advanced westward from Egypt and Mesopotamia, and encircled the great intercontinental sea (Mediterranean Sea), water transportation between the regions and countries of the ancient world became more and more important. Thus, numerous water gateways in and about the Mediterranean became

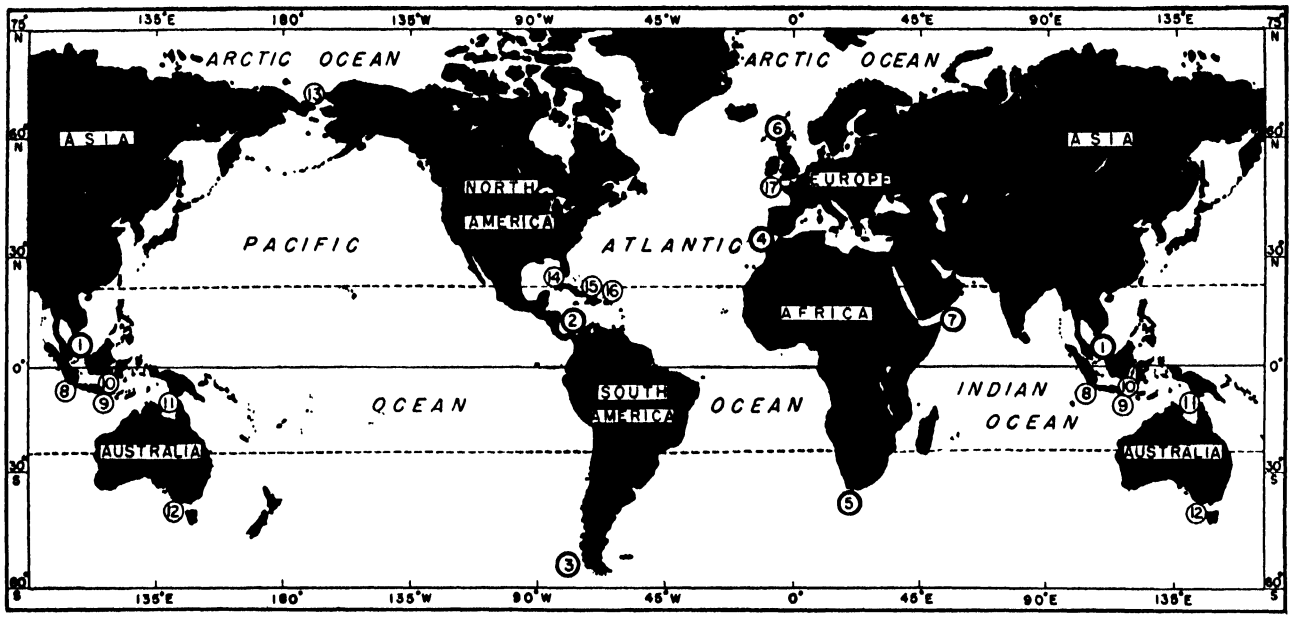


FIG. 5. OCEAN AND INTER-OCEANIC GATEWAYS. The gateways into and out of the oceans shown on this map became more difficult to defend in a world of mighty battle fleets in the air. Following the voyages of Vasco da Gama, Columbus, and Magellan the oceans rapidly became of major consequence in inter-continental relations. The improved sailing vessels and later the steam boat lent added significance to the importance of oceans and ocean gateways. The present war caught people everywhere unaware of the difficulty in defending ocean routes and gateways from onslaughts from the air. The names of the more important gatways on the map, (1 to 7, inclusive) are indicated by double circles, and the ones of lesser importance by a single circle: (1) Strait of Malacca, (2) Panama Canal, (3) Cape Horn and Strait of Magellan, (4) Strait of Gibraltar, (5) Cape of Good Hope, (6) Norwegian Sea and Cape North, (7) Strait of Bab-el-Mandeb and Suez Canal, (8) Sunda Strait, (9) Lombok Strait, (10) Makasser Strait, (11) Torres Strait, (12) Bass Strait, (13) Bering Strait, (14) Strait of Florida, (15) Windward Passage, (16) Mona Passage. (Note that the repetition of Australia and eastern Asia on this map furnishes an intact delineation of each of the major continents and oceans.)

produced by people of other areas. The commodities exchanged in the ancient world were usually transported by animal or human carriers. The camel caravan was common in North Africa and southwest Asia, and human carriers were even more common in China and Japan. No less compelling in its significance through the centuries has been the exchange of ideas—formerly by the slow laborious process of reading books or of travel, but now by the rapid operation of the press, teletype, telephone, radio and radio-photography.

strategic, for example, the straits of Gibraltar, Bosporus, Dardanelles, Otranto, Bonifacio, and Messina (Fig. 4).

The epoch-making sea journeys of Bartolomeu Dias and Vasco da Gama around the Cape of Good Hope, and the trail-blazing voyages of Christopher Columbus across the Atlantic opened new possibilities for interregional relations. No longer did Ptolemy's map satisfy the needs of an expanding world. Within a few years daring voyagers were sailing east and west 25,000 miles and more, and

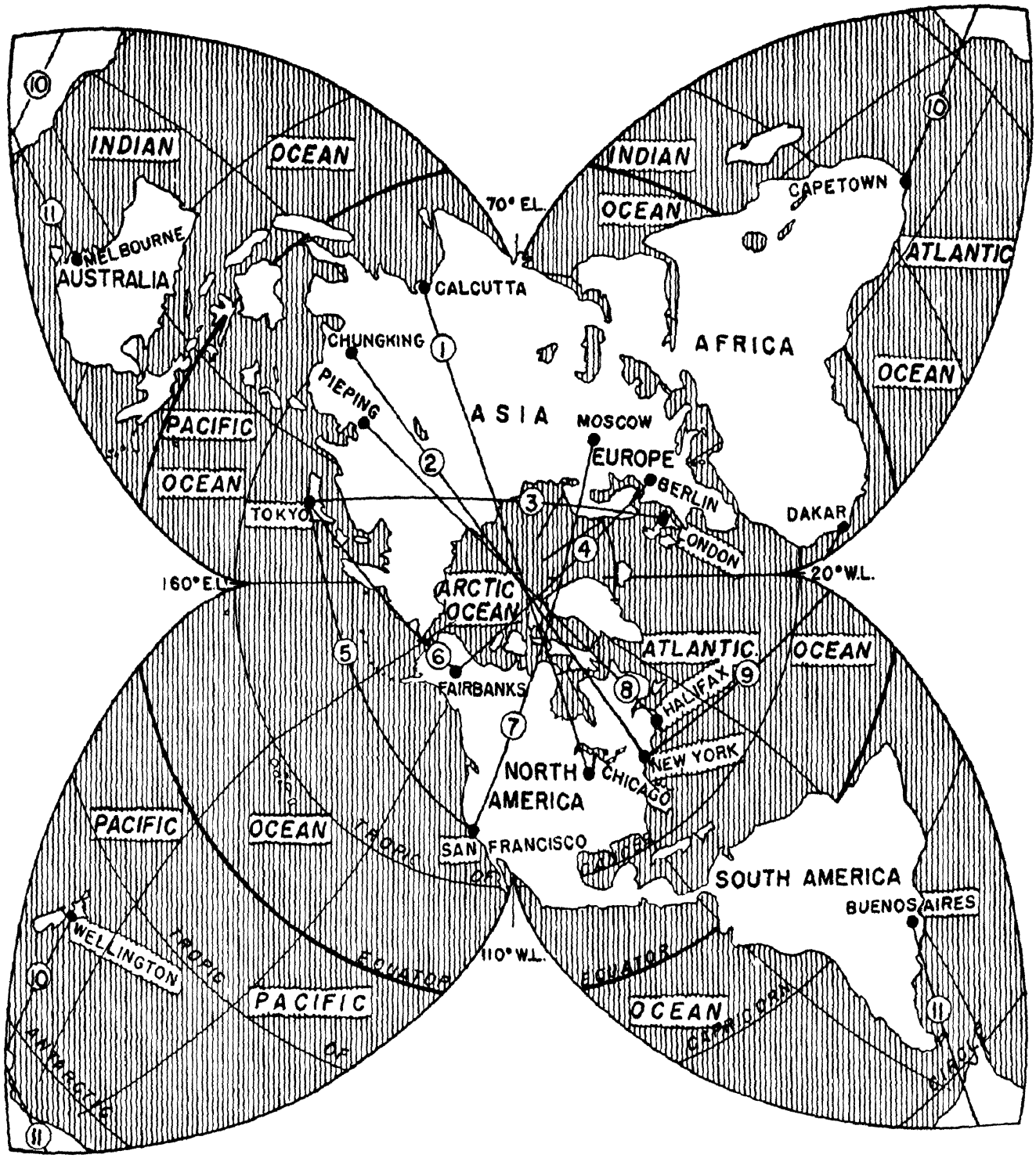


FIG. 6. ARCTIC-CENTERED MAP OF THE WORLD. The shortest distances between places on the earth are arcs of great circles. That is why the shortest route from New York to Chungking (2), from San Francisco to Moscow (7), from Chicago to Calcutta (1), and from Fairbanks to Berlin (4) pass within sight of the North Pole. However, this fact had little significance before such travel and transportation became possible by use of the airplane. The points of the stellar polar map show some short routes across Antarctica also (10 and 11).

the Mercator map was soon invented to meet the new demand (Fig. 5). Thus three great oceans (Atlantic, Pacific, and Indian) became inviting "highways" between and among regions and countries. Inevitably, ocean travel and transportation emphasized certain strategic routes and gateways, because the sea lanes not only could cut directly across the oceans but had to follow devious routes around continents, peninsulas, and islands. For this reason, sea travel often was long, arduous, dangerous, and expensive.

THE SHRINKING WORLD. As long as travel, transportation, and communication were tied to land and water, distances between regions and countries were often long and time-consuming. But the radio has all but annihilated the time element in communication, and airplanes have so reduced the distance factor, not only by their great speed but by their great circle travel, that the remotest parts of the earth now are accessible easily and quickly (Fig. 6). No longer do passes and gateways on the land direct all of man's travel and trade interests as they did in the ancient world, or condemn him to travel through a multiplicity of bottlenecks on the ocean. The "Ships of the Skies" already are carrying freight and passengers by sky routes in the stratosphere, not only faster but in some cases perhaps cheaper than by locomotive, automobile, or steamship. "The Air Age" has nearly outmoded some of the conventional maps and today the *Arctic Centered* map is receiving much emphasis, because many of the important regions and countries of the world lie in the Northern Hemisphere and the great circle routes between them pass over the north polar wastes.

A consideration of Interregional Relations should help one to envision the supreme importance of land, sea, and sky routes between and among regions and nations, serving to unite the peoples of the world in bonds of mutual confidence and good will.

Part One

NORTH AMERICA

Introduction

NORTH AMERICA! What a panorama of views and impressions passes before the mind. One visions the old stone walls of New England and the rocky hills covered with forests; the rugged irregular coasts of Maine, of eastern Canada, and of British Columbia, and the wide beaches along the Atlantic and Gulf Coastal Plains; the moderately high forest-covered mountains and hills of the Appalachian Highlands, and the vast central plains with their flat or gently rolling topography, fields of grain, haylands, pastures, and prairies, large herds of cattle, and thousands of swine. Beyond the plains appear the high, majestic, snow- and ice-covered crags and peaks of the Rocky Mountains, the Sierra Nevadas, and Cascades; the garden spots of irrigated districts with their abundance of fruits, cotton, sugar beets, alfalfa, and potatoes; and in the far south the tropical areas of Central America with their plantations of bananas, rubber and cocoanut trees, and with their valuable woods.

Climatic contrasts are equally remarkable. One senses the severe cold blasts of the northern tundra and the frigid Arctic; the chilly raw winter winds of the Atlantic seaboard in Canada, Newfoundland, and northern New England. On the other hand one may bask in the mild winter climate of southern California and in the balmy winters of southern Florida, or perspire in sluggish idleness in the warm, muggy summers of the Coastal Plains. The interior of the continent is noted for its climatic variability—great contrasts in summer and winter temperatures, and equally great contrasts in rainfall and aridity. Devastating droughts may alternate with torrential rains; the desiccating desert conditions of the Great Basin contrast sharply with the humid climate of the corn belt; or possibly the occasional dust storm of spring or summer in the semiarid plains may be replaced by piercing snow blizzards of winter (Figs. 7 and 8).

Thus is sketched in barest outline a word picture of some of the natural features of the vast continent of North America. However, the picture is yet incomplete, for the landscape presents innumerable details that only careful study brings into view. The interplay between natural conditions and human activities on the continent are so pronounced and important that their relationships merit considerable attention in this study. A glance at a population map of North America discloses at once that the people are widely but unevenly distributed (Fig. 9). In the southeastern part of the continent are many millions of people and hundreds of cities. Pennsylvania alone has about one hundred cities each with more than ten thousand people. That part of the continent north of the sixtieth parallel has only two cities (Anchorage and Fairbanks) with more than two thousand inhabitants, whereas the total population in Canada north of this parallel is less than fifteen thousand. Between the Rocky Mountains on the east and the Sierra Nevada-Cascade ranges on the west is an immense area with comparatively few inhabitants except where irrigation is practiced. Nevada, with an area about twice that of Pennsylvania, has less than one tenth as many people.

Varying conditions of natural environment are responsible for much of this uneven distribution of population. A study of human occupancy as related to latitude, temperature, precipitation, soils, natural vegetation, and topographic features is certain to disclose some important principles

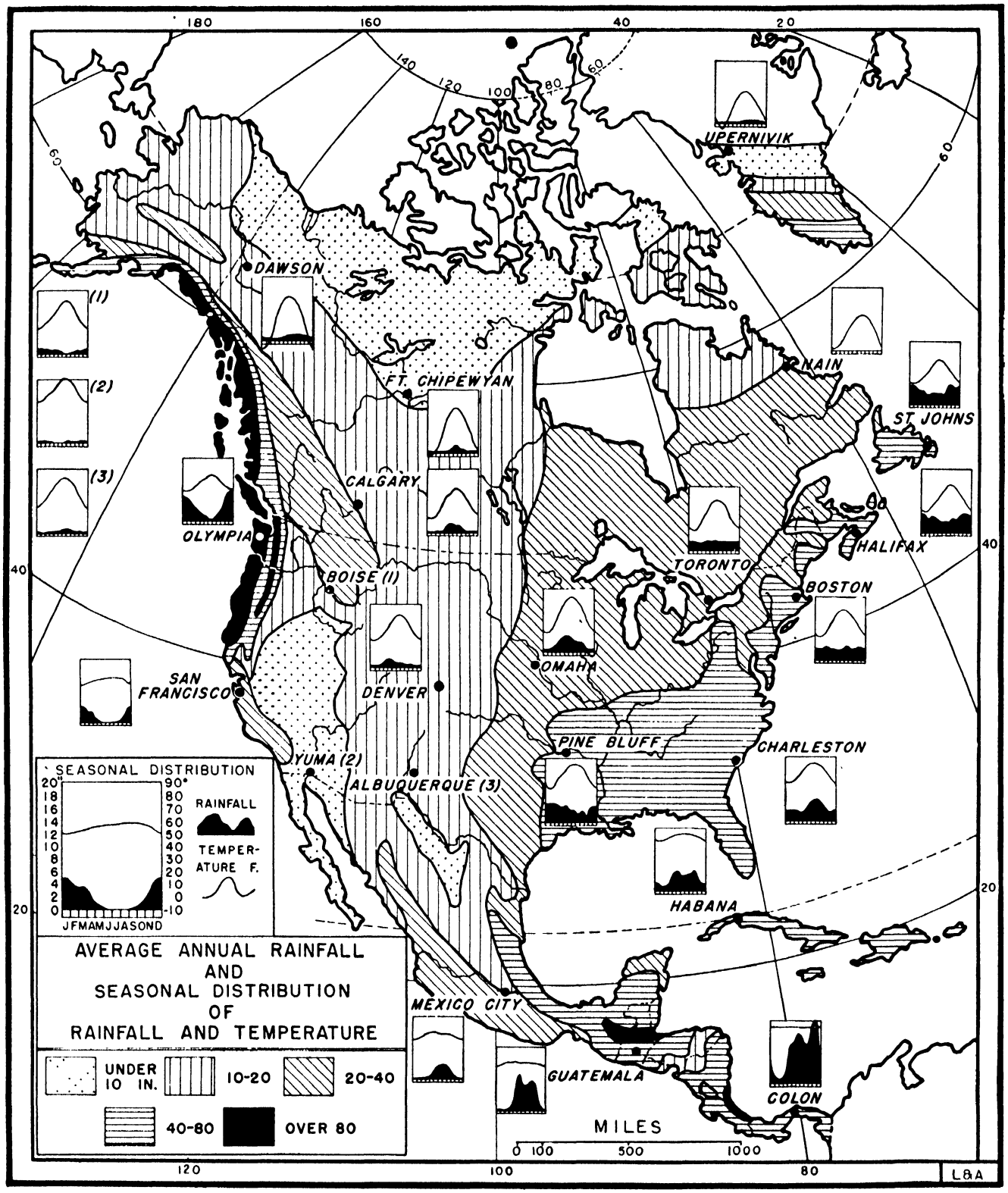


FIG. 7. MEAN ANNUAL RAINFALL FOR NORTH AMERICA AND THE MONTHLY DISTRIBUTION OF TEMPERATURE AND RAINFALL FOR SELECTED STATIONS. On the left margin, the graph for San Francisco has been enlarged for convenience in the interpretation of the graphs of other stations.

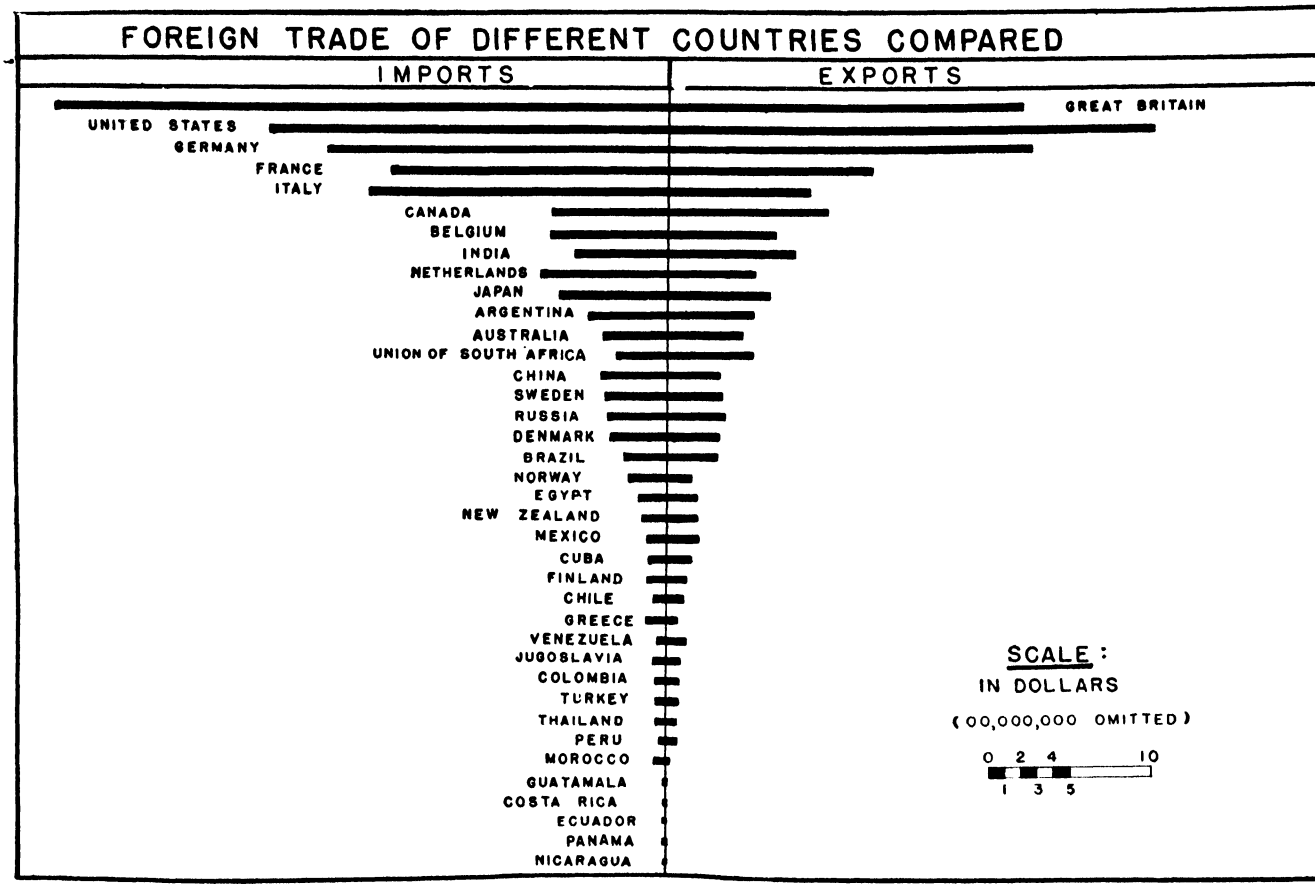


FIG. 8. FOREIGN TRADE OF DIFFERENT COUNTRIES COMPARED. At appropriate places in this book the foreign trade of many of the countries of the world is shown in considerable detail, but on a percentage scale. It would be well when referring to the detailed graphs to return to this one for comparison with other countries. Averages include a number of years just preceding World War II.

concerning the varying intensity with which men have utilized different parts of the North American continent.

DIVISIONS AND REGIONS

North America is third in size among the continents. It may be separated on the basis of relief into three parts—a large western highland, a smaller eastern highland, and a central lowland. Each of the three areas is made up of one or more divisions (Fig. 10), and for purposes of this study the divisions may be separated into smaller areas called regions.[1] The divisions and regions of North America may be designated as follows:

[1] Lobeck, Armin K., "Physiographic Diagram of the United States," The Geographical Press, Columbia University, New York, 1943.

A. COASTAL PLAINS
- Atlantic and Gulf Coastal Plains

B. APPALACHIAN HIGHLANDS
- Blue Ridge and Piedmont Upland
- Appalachian Plateaus, and Appalachian Ridge and Valley Region
- New England—Acadian Upland and the Adirondack Mountains

C. INTERIOR PLAINS
- Glaciated Lowland and Associated Superior Upland
- Great Plains

D. SOUTHERN INTERIOR HIGHLANDS
- Ozark Upland and Ouachita Mountains

E. ROCKY MOUNTAINS
- Canadian, Northern, Central, Southern, and Mexican

F. INTERMONTANE HIGHLANDS
- Plateaus, Basins, and Ranges of the United States Mexican, Yukon, and Canadian Plateaus

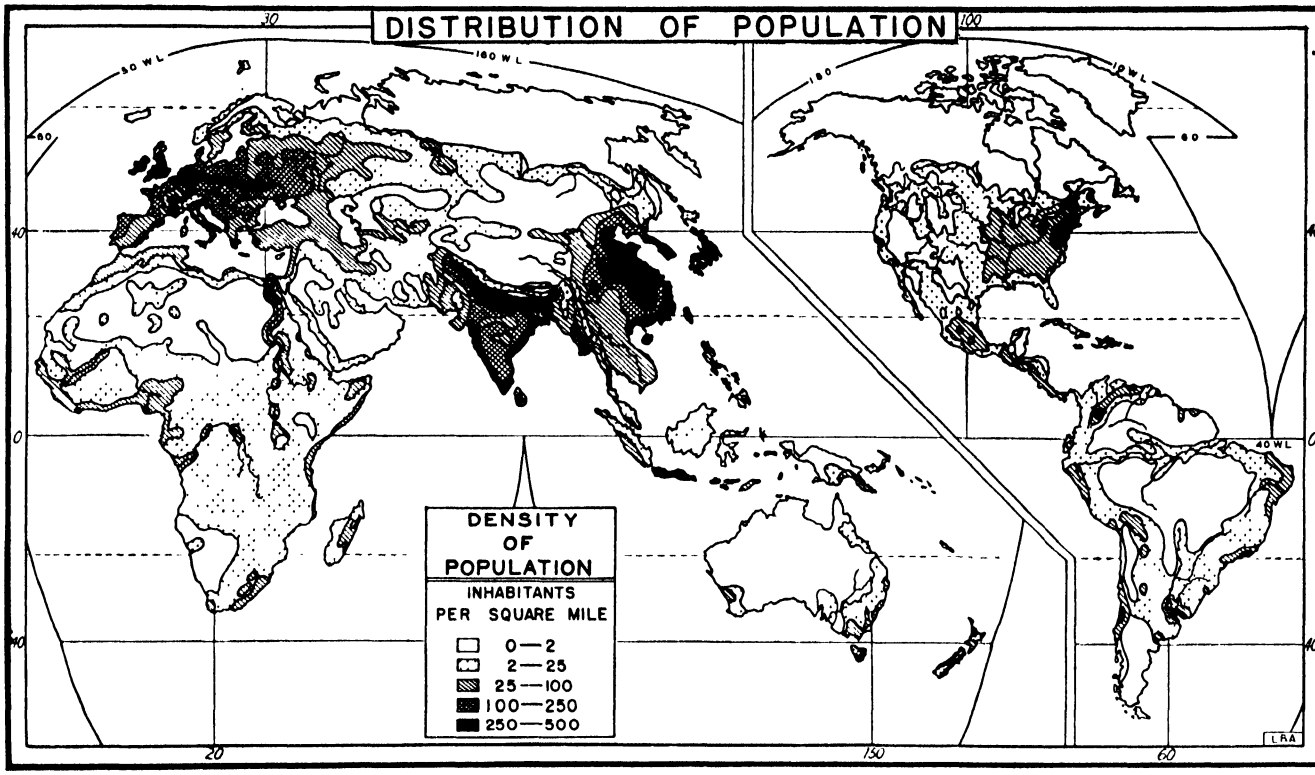


FIG. 9. DISTRIBUTION OF THE POPULATION OF THE WORLD. The differences in density of population furnish hints as to the location of some of the choice areas for human occupancy. Note that this is an equal area map.

G. PACIFIC MOUNTAINS AND LOWLANDS
Sierra Nevada, Cascade, Sierra Madre, and the Coastal Ranges
California Valleys and Puget Sound Lowland

H. LAURENTIAN PENEPLAIN AND ASSOCIATED FEATURES
Laurentian Upland
Hudson Bay Lowland
St. Lawrence Lowland
Adirondack Mountains
Superior Upland

I. CENTRAL AMERICAN HIGHLANDS

J. WEST INDIAN ARCHIPELAGO

COUNTRIES AND PEOPLES

North America is dominated almost wholly by the people of two language groups—the English and the Spanish. They took possession of those portions of the continent that approximated the climate, soils, natural vegetation, and terrain of the lands of their forebears in Europe. Florida and the lands to the southward and westward from Florida were claimed and settled chiefly by the Spanish, and the remainder of the Atlantic coast and all the lands westward were claimed and settled largely by northern Europeans. These conditions warrant the division of North America into two groups of countries, namely, *Anglo-America*,[1] and *Spanish North America*.

Anglo-America is composed of the United States (including Alaska), and two units of the British Empire—namely, the Dominion of Canada and Newfoundland and Labrador. Together these countries contain nearly 150,000,000 people, twice as many as all the other English-speaking countries combined. Most of us are not aware of the fact that there are nearly three times as many English-speaking people in the United States as there are in the British homeland. It is appropriate that the present study of *Regions and Nations of the World* should begin with a survey of the United States of America.

[1] British Guiana is the only Anglo-American area in South America, a continent dominated mostly by Portuguese- and Spanish-speaking peoples.

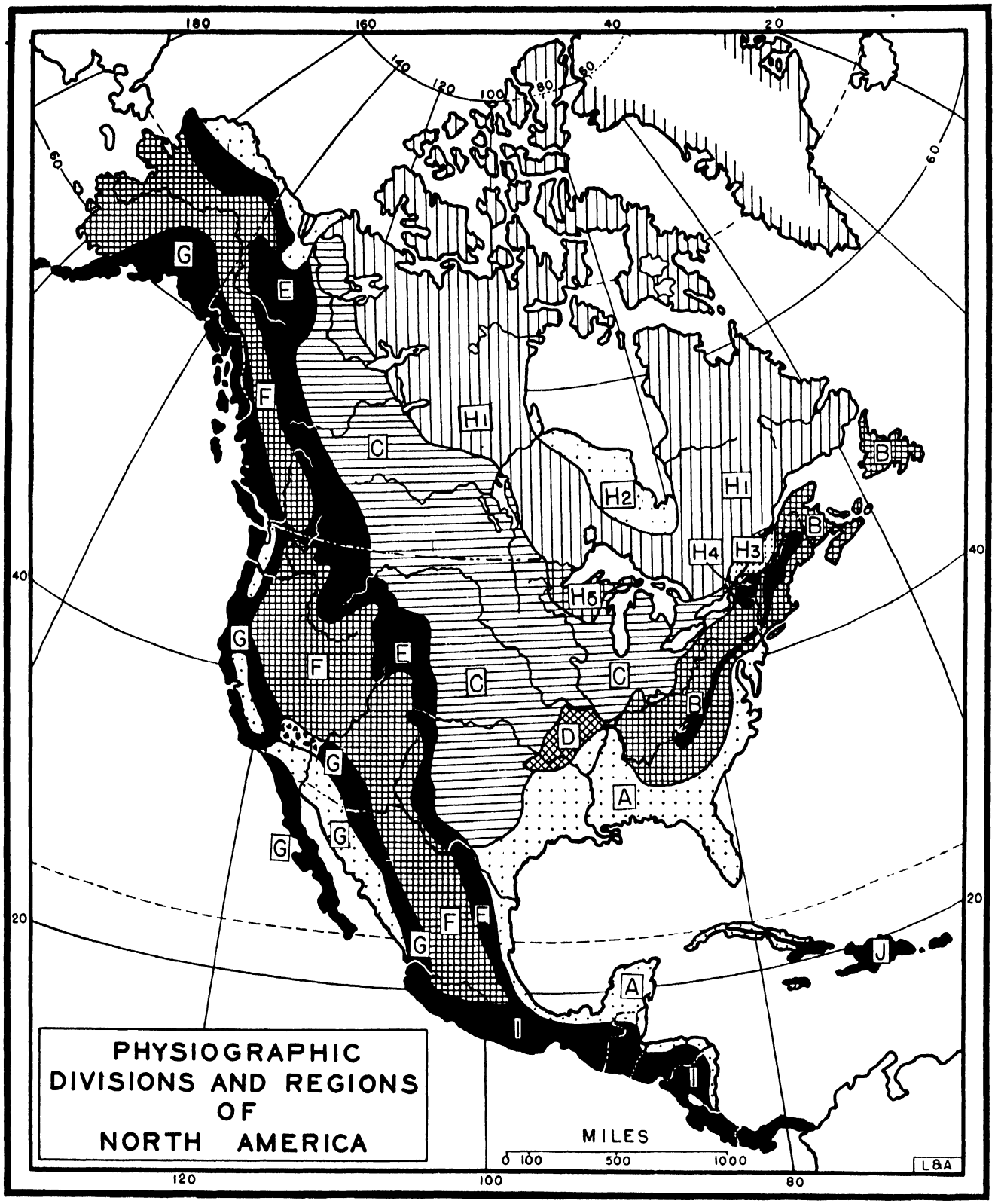


FIG. 10. PHYSIOGRAPHIC DIVISIONS AND REGIONS OF NORTH AMERICA. This map is similar to North America in Fig. 3, but more details are shown. (See page 4 and also pages 13 and 14 for names of divisions.)

THE UNITED STATES

The United States of America (E pluribus unum) has evolved in one hundred and seventy years from a loose confederation of thirteen mutually suspicious groups into a closely integrated union of forty-eight interdependent states. The distance from Portland, Me., to Los Angeles, Calif., is approximately 2800 miles; and it is about the same distance from Key West, Fla., to Seattle, Wash. In area the United States is not as large as Brazil or Canada, but it is 82 per cent as large as all of Europe. Most of the country is in middle latitude—not extending far enough equatorward for one to be enervated by incessant heat, nor far enough poleward to be numbed by excessive cold.

The country that sustains us is a fascinating abode—the majesty of its mountains and forests; the grand sweep of its plains and grasslands; the charm of its extensive deserts and oases; the spell of its meandering streams and enchanting lakes; the lure of its crystal caverns and subsurface riches; the sky, the clouds, the sunshine, and the showers. Apathetic, indeed, is he who is not twice thrilled when contemplating the luxuriance and natural beauty of this splendid inheritance.

The United States has been divided into physiographic regions, with emphasis continually being placed upon the type of features suggested in the preceding paragraph (Fig. 11). The first ten chapters are devoted to continental United States.

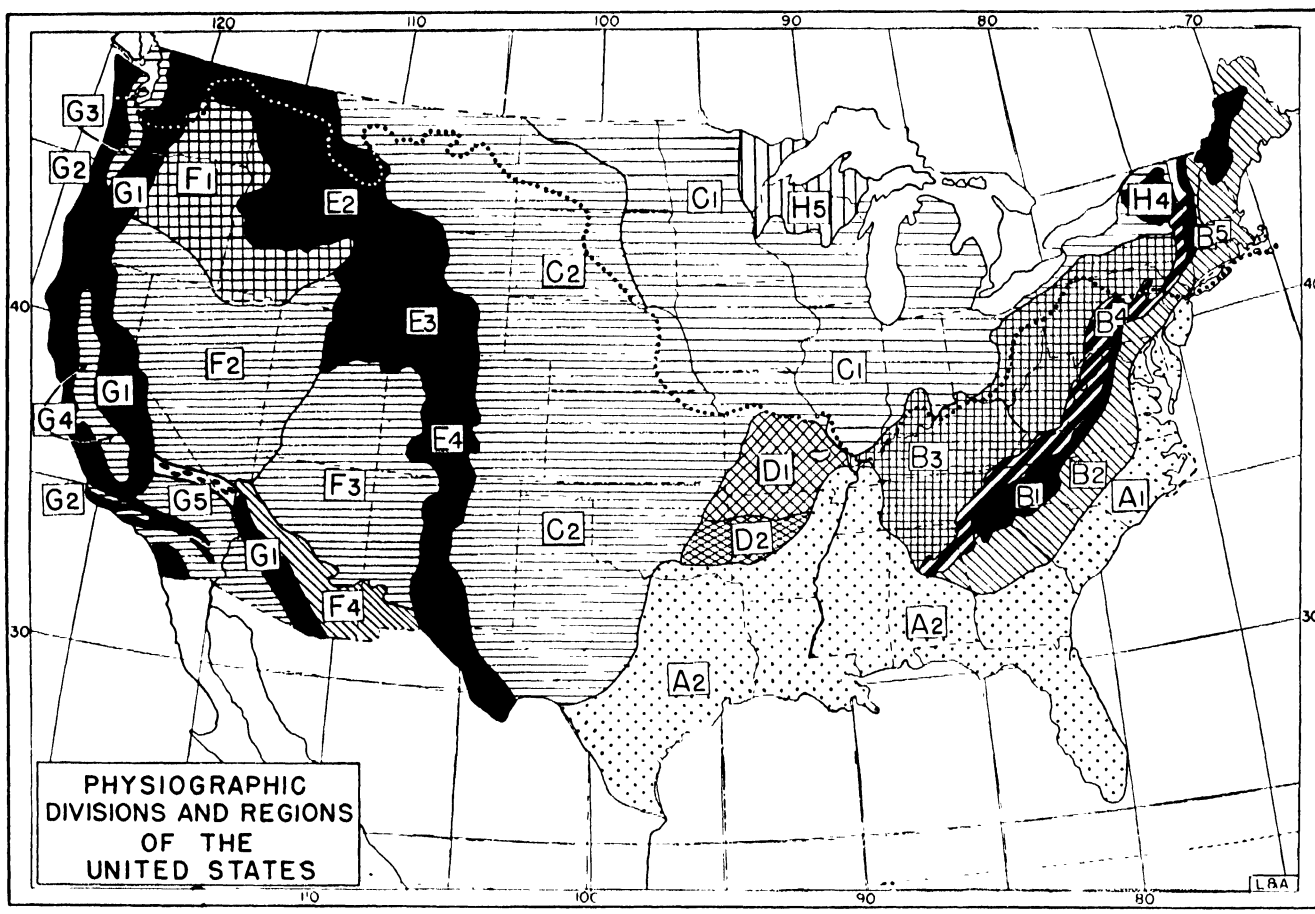


FIG. 11. PHYSIOGRAPHIC REGIONS OF THE UNITED STATES. A1. Atlantic Coastal Plain; A2. Gulf Coastal Plain; B1. Blue Ridge; B2. Piedmont Upland; B3. Appalachian Plateaus; B4. Ridge and Valley Region; B5. New England-Acadian Upland; C1. Glaciated Lowland; C2. Great Plains; D1. Ozark Plateau; D2. Ouachita Mountains; E2. Northern Rockies; E3. Central Rockies; E4. Southern Rockies; F1. Columbia Plateau; F2. Great Basin; F3. Colorado Plateau; F4. Mexican Plateau; G1. Sierra Nevada-Cascade Mountains; G2. Coastal Ranges; G3. Puget Sound Lowland; G4. California Valley; G5. Southern California Lowlands; H4. Adirondack Mountains; H5. Superior Upland.

1

The Coastal Plains

TO ONE looking for a variety of relief and of coastal features, a cruise along eastern North America from Cape Cod to Yucatan might not be very satisfying. Not a mountain or sea cliff of any significance would be seen in the whole journey of nearly 5000 miles. Viewed at a distance of a few miles the sky line over the land would not differ much from that over the sea. At certain places, as along the coast of New Jersey where the sea floor has been emerging, the coastline is monotonously even, sandy, and featureless; at other places where the land is sinking, as it is along the coast of the Carolinas, the shoreline is very irregular and swampy with numerous drowned valleys, and long low peninsulas jutting into the sea. This extensive strip of low land is the *Atlantic Coastal Plain* of North America, and it varies in width from a few miles in the north to several hundred miles in the vicinity of Mississippi and Louisiana. For purposes of this discussion the portion bordering the Gulf of Mexico will be called the *Gulf Coastal Plain*, and that bordering the ocean directly, the *Atlantic Coastal Plain*.

ATLANTIC AND GULF COASTAL PLAINS

Two factors are important in accounting for the Atlantic and Gulf Coastal Plains of North America. For countless centuries rivers have been carrying their loads of detritus from the Appalachian Highlands and depositing them in the ocean, thus building up the sea floor bordering the continent (continental shelf). In addition, the continental shelf has been elevated above sea level from Cape Cod to Yucatan, and, consequently, what was formerly sea floor has become coastal plain. Formerly, the seashore was at the *Fall Line* (see page 26), but largely because of the two factors mentioned (deposition and elevation), the shore in some places is three or four hundred miles from the landward margin of the Coastal Plains.

Natural Features of the Landscape[1]

The Atlantic and Gulf Coastal Plains are similar in many respects. Both are relatively flat with streams not deeply entrenched and many of them with but few tributaries. Swamp lands are characteristic of areas in the so-called *Flatwoods Country*, which extends from New Jersey and Delaware to southern Florida and varies in width from 20 to 40 miles. On the seaward margin of this area the drainage is poor and the streams are sluggish. The *Dismal Swamp* in Virginia and the *Everglades* in Florida are the largest swamps. On the landward side drainage is generally adequate. The middle and southern portions of the Atlantic Coastal Plain have two unique types of topography: (1) the sand hills located near the landward margin, sandy due to the nature of the underlying bedrock; and (2) the lime-sink area extending from southeastern Georgia into central Florida. In the latter area drainage is largely subterranean and sinkholes occur where the underground waters have removed some of the limestone. Westward and southward along the Gulf Coast much of the land is well drained. The Mississippi embayment, formerly an arm of the Gulf of Mexico extending northward to the mouth of the Ohio River, contains both swamp and well-drained areas. Along the Mississippi are the famous natural levees which in many places provide excellent lands for

[1] See explanation on pages 1 and 3.

truck gardens and fruit growing, although living on the levees is often dangerous because of floods. The Coastal Plains in southern Texas, as a rule, are well-drained. The bedrock of loosely consolidated sedimentaries lies in gently tilted positions with some slight folding.

In parts of the Coastal Plains, ordinary wells and artesian wells furnish excellent water in large

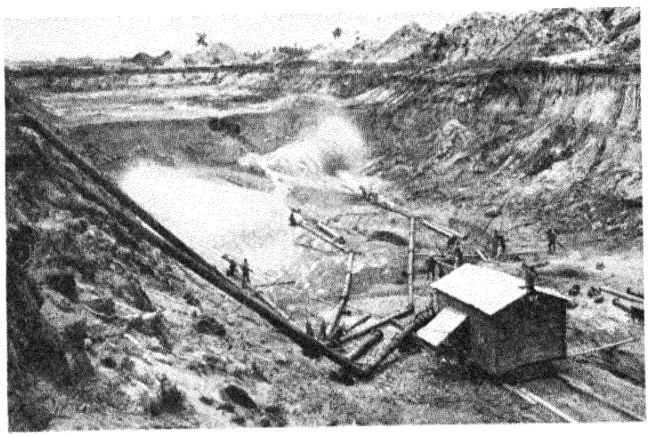


FIG. 12. MINING PHOSPHATES. A large quantity of overburden must be removed first and then the hydraulic process is used in recovering the phosphates. (Courtesy U. S. Department of Agriculture)

quantities from underlying sandstones (Fig. 35). However, in many places in the floodplains and in the swamp land, the water table is so near the surface that the ground water may be polluted. In such places the people must depend upon cistern water or upon river water that has been purified. It may be interesting to note that during the extreme droughts in the interior of the continent in 1934 and 1936, an unusual problem arose in the lower Mississippi Valley as far north as New Orleans, La., in that the river water was salty from the tides of the Gulf of Mexico.

Among the most important mineral products of the Coastal Plains are the extensive phosphate deposits in Florida, this section of the United States being surpassed in output only by North Africa (Fig. 12). In the Coastal Plains of Texas and Louisiana is the leading sulphur-producing district of the world. Sicily, which formerly was first, now ranks second. Salt is abundant and is shipped to many sections of the United States. In the Coastal Plains of Texas and Louisiana are also enormous supplies of petroleum and natural gas. Much of the petroleum is refined in or near the producing fields but more is transported by rail, pipe lines, and tankers for refining at distant centers (Fig. 13). The so-called "Big Inch" pipe line was constructed from Texas to the eastern seaboard as a war emergency measure by the United States government. New Jersey and Pennsylvania have many large refineries. In addition to the minerals mentioned, the Gulf Coastal Plain has large reserves of coal, mostly lignite, which at present are not much exploited.

Residual and alluvial surface materials occur throughout this region. The only section having any glacial drift is in the north and includes Long Island in New York, Martha's Vineyard and Nantucket islands, and Cape Cod in Massachusetts. In many places on the Coastal Plains because of the weathering of underlying rock formations, soils have a belted arrangement. The red and yellow soils of the pedalferic group are most abundant (Fig. 238). In the north, podzolic soils prevail on Cape Cod, on Long Island, and in New Jersey. The reddish appearance of many of the soils is characteristic of the well-leached soils in the subtropical humid climates. The most extensive soils of alluvial origin are in the Mississippi, Rio Grande, and Savannah river valleys. Since the region has abundant rain-

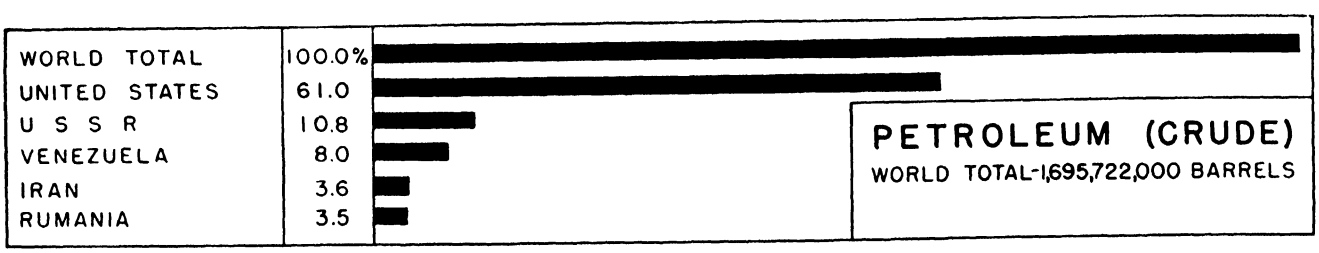


FIG. 13. WORLD'S PETROLEUM PRODUCTION. A 7-year average just preceding World War II. (Data from *Foreign Commerce Yearbook*)

fall many of the soils require commercial fertilizers and lime. (See Appendix C, p. 431.)

Several types of climate are represented in the Coastal Plains of North America, two of which are in the United States—namely, the continental humid with long summers in the north, and the subtropical humid in the south (Fig. 236). The growing season varies from 125 to 130 days in the north, to 250 or more days in southern United States, and to frost-free lands in eastern Mexico. The tropical wet and dry climate covers the southern tip of Florida and the Gulf Coast in Mexico, thus promoting a continuous growing season. The rainfall is abundant throughout the year, ranging from 30 to 60 inches with a maximum during the summer months. The annual median rainfall at Charleston, S. C., according to a 103-year record, is about 46 inches, and three fourths of the time it is 38 inches or more.[1] At Atlantic City, N. J., the annual median rainfall, according to a 61-year record, is 39 inches, and it is 36 inches or more three fourths of the time (Fig. 7).[2] (See Appendix A, p. 419.)

The native vegetation in the northern part of the Atlantic Coastal Plain consists of grasses and of broad-leaved deciduous and coniferous forests. Farther south long needled or loblolly pines are abundant together with some hardwoods such as oak, ash, chestnut, hickory, and maple. In the swamp lands cypress and mangrove trees abound. Tropical plants are typical of southern Florida, and palms and other subtropical vegetation are characteristic along the southern part of the Gulf Coastal Plain. Heavy streamers of Spanish moss hang from the live oaks and some of the other trees in the South. Farther westward where the rainfall diminishes, forests give way to prairies (Fig. 237). (See Appendix B, p. 426.)

Cultural Features

The Atlantic and Gulf Coastal Plains are closely associated with the early history of the United States. Many of the first settlements in North America were made on the estuaries of the rivers in the Coastal Plains.[3] St. Augustine, Fla., said to be the oldest settlement in the United States, was settled by the Spanish in 1565. In 1607 the English settled on the estuary of the James River at Jamestown, Va. Even though the Pilgrims were not the first to visit Cape Cod, they stopped at the site of Provincetown on Cape Cod before they settled at Plymouth, Mass., in 1620. The French and the Spanish made early explorations and settled in the southern Coastal Plains in the eighteenth century. The concluding battle of the Revolutionary War was fought at Yorktown, Va. In the War of 1812 the British sailed up the Chesapeake Bay to Washington, D. C., and in the War between the States, the Battle of the Wilderness took place on the Coastal Plains. The pioneers found this area difficult to occupy except near the streams because the large swamp lands were infested with mosquitoes and consequently malarial fever was prevalent among sailors and settlers. The dense forest growths on the interfluves (more or less level areas between streams) were also difficult to penetrate.

The large variety of interests of the people on the Coastal Plains is in part a response to the diversity of peoples from many parts of Europe who settled there, and also to the differences in climate and topography. The fishermen of New England and the people of the northern part of the Coastal Plains developed traditions of fraternity and equality associated with the sea. Farther south in the tobacco and cotton belts wide differences evolved in the status of the people socially, industrially, and educationally. Tobacco and cotton culture developed an aristocracy of landlords with such concomitants as early slave labor, the more recent share-cropper, tenancy, and the ruinous one-crop system of farming. This system of farm management turned out to be disastrous in the expansion of agriculture in the Southland.[4]

Throughout the long period of occupancy since

[1] See Appendix D for explanation and significance of quartile deviation.

[2] Post, Lauren C., "The Landscape in Its Annual Cycle on the Prairies of Southwest Louisiana," *Journal of Geography*, October, 1939, Vol. 38, pp. 267-275.

[3] Atwood, Albert W., "Tidewater Virginia, Where History Lives," *National Geographic Magazine*, May, 1942, Vol. 81, pp. 617-656. Reveals factors of early adjustment to Coastal Plains environment.

[4] Chambers, William T., "Life in a Cotton Farming Community," *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp. 152-158.

the coming of white men into the Coastal Plains, agriculture has been the paramount human interest. Cotton and tobacco became the two principal cash crops south of Chesapeake Bay (Fig. 14). The overproduction of cotton during the last decade has resulted in low prices, and the cotton boll weevil has been so destructive that many farmers have changed to diversified methods of farming. Now, for example, on the southern Atlantic Coastal Plain, winter and early spring garden crops and fruits are shipped to the northern markets weeks before the growing season opens in the north.[1] Later in the spring and summer, the people on

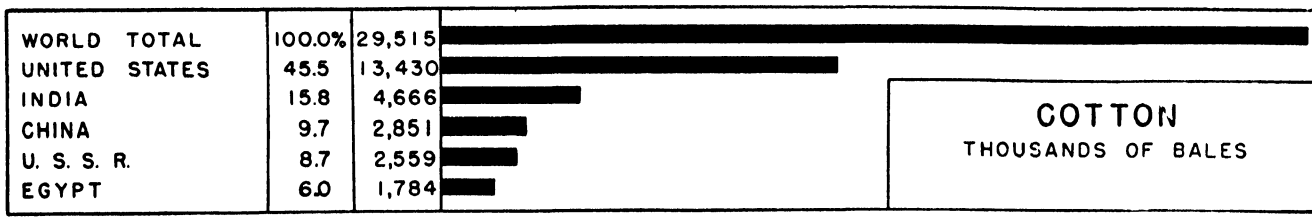


FIG. 14. WORLD'S COTTON PRODUCTION. An 8-year average prior to World War II. (From *Foreign Commerce Yearbook*)

Louisiana, although not nearly enough oil is produced to supply the demand.

The many resorts on and near the coast are attracting tourists and vacationists from all parts of America in both winter and summer. It is probably true that the Coastal Plains, because of their great linear extent, their wide variety of climates and soils, their rich mineral deposits, and their nearness to the sea, support more varied human activities than any other of the physiographic regions of the United States.

URBAN CENTERS. Since the Coastal Plains were occupied so early by white men, the cities reflect the nationalities and characteristics of the people who founded them. In the north it is evident that the cities were developed by the English, the Dutch, and the Swedes, whereas in the south the influence of the French and the Spanish is plainly seen.

The cities of the Coastal Plains may be classified into three general groups: (1) the coastal cities on the tidal bays and rivers which are generally commercial ports and resorts; (2) the cities on the western margin of the Atlantic Coastal Plain which are principally manufacturing and distributing centers; and (3) the smaller trade centers on the interior of the plains. The second group will be discussed in connection with the Piedmont Upland.

There are only three cities of more than 100,000 people on the Atlantic Coastal Plain from Cape Cod to the Straits of Florida, but on the Gulf Coast there are at least five cities of this size or larger. These larger cities and some others will be discussed in sequence from north to south (Fig. 15).

Atlantic City, N. J., one of the most famous resort cities in eastern United States, is on the Atlantic Coast about 135 miles southwest of New York City. It is built on a sandy beach island and

the northern part of the Coastal Plains produce their own vegetables and fruits. The lower Rio Grande Valley is an irrigated area of the Gulf Coastal Plain in which cotton, citrus fruits, and vegetables are produced in abundance.

The continental shelf and river estuaries provide a rich harvest of fish, oysters, and other sea foods. The forests furnish lumber for manufacturing, and are sources of turpentine and other naval stores. Many building materials are fabricated from wood, sugar cane bagasse, and other products. Tobacco products are processed in large quantities in Virginia and North Carolina. A great variety of finished products such as cotton and leather goods, cane sugar, cottonseed cake, and steel and its products characterizes the manufactures of the Coastal Plains. A new industry that has sprung up in recent years is the processing of tung oil, said to be more valuable in the paint industry than linseed oil. Until recently the United States has secured its supplies of tung oil from China; now the tung tree is grown in Florida, Alabama, and

[1] Wann, John L., "Where Florida Truck Crops Are Grown," *Economic Geography,* January, 1933, Vol. 9, pp. 85-103.

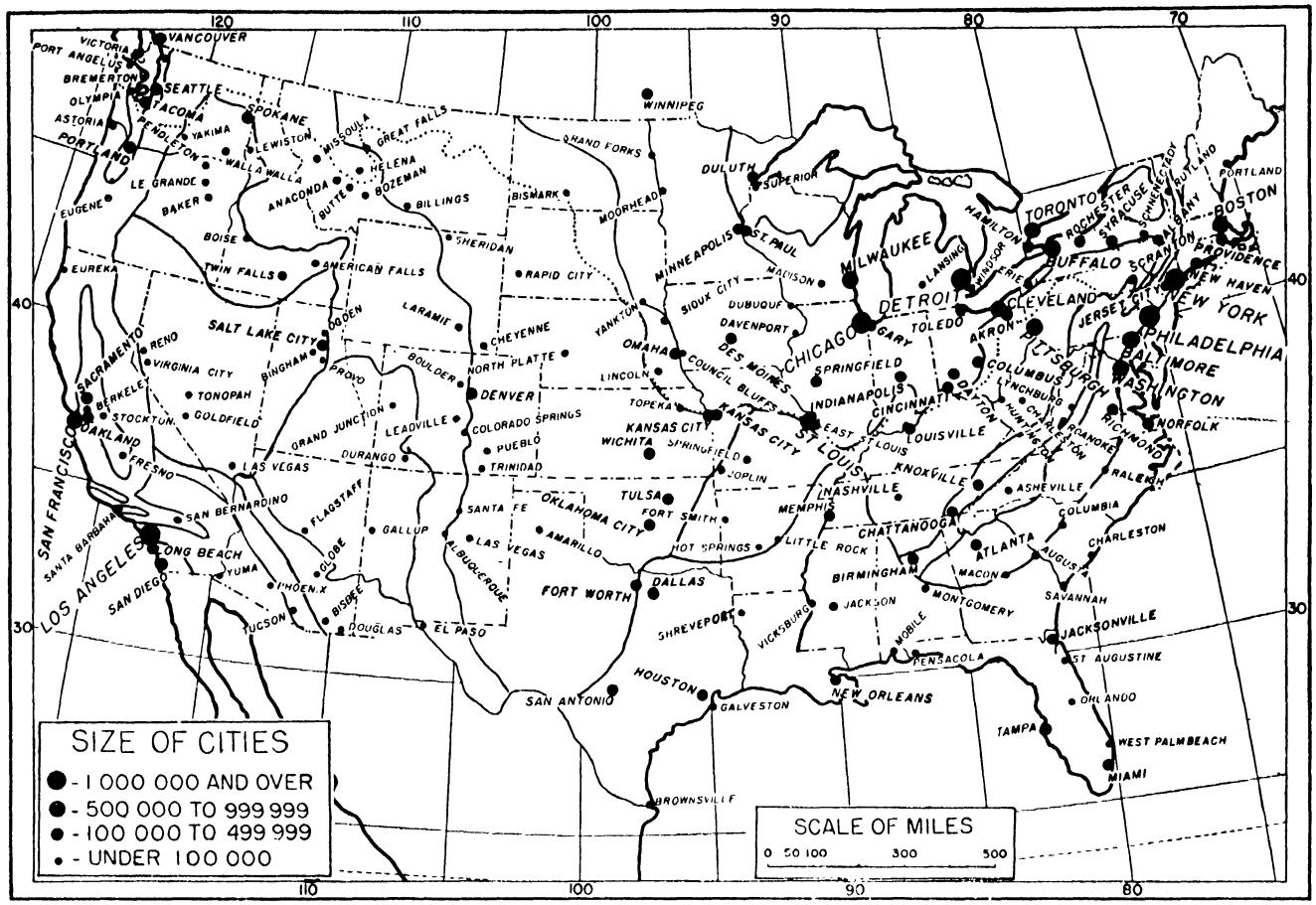


FIG. 15. CITIES OF THE UNITED STATES. The cities on this map are the ones mentioned in the textual reading matter. For cities in northeastern part of the country, see Fig. 26. Note that the physiographic regions and southern limits of glaciation are shown on this map. (See Fig. 11.)

stretches along the coast for 10 miles. The average width of the island is three fourths of a mile. Hundreds of thousands of people spend their vacations here every summer. It is easily accessible from the mainland by boat, by rail, and by excellent motor highways.

Norfolk, Va., a seaport on the Elizabeth River 100 miles southeast of Richmond, has a fine natural harbor with 50 miles of water front. It is one of the leading peanut markets of the world and ranks high among the cotton ports of the United States.

Newport News and *Portsmouth,* Va., on a portion of the estuary of the James River near Norfolk, were first set up as naval bases. Now they are also important coal-shipping centers. Portsmouth, in addition to being a naval station, is the terminus of a number of transatlantic and coastwise steamship lines, and is reached by several railroads.

Charleston, S. C., a city with a foreign atmosphere, was settled by the English in 1670 and named after King Charles II. Forts Moultrie and Sumter are located at Charleston and it was at the latter that the first shots were fired in the War between the States. Three main railroads serve Charleston and coastwise trade is of considerable significance.

Savannah, Ga., founded by James Oglethorpe in 1733 and located at the mouth of the Savannah River, is one of the leading cotton ports on the Atlantic Coast, ranking next to New Orleans. In addition to cotton, lumber, tobacco, fertilizers, and naval stores are leading exports.

Because of its mild winter, southern Florida has become a winter playground. Here thousands of

the Gulf of Mexico and the Rio Grande. Part of its agricultural hinterland is irrigated, and large quantities of citrus fruit and garden products are shipped to northern markets. It is the headquarters of the principal customs district on the Mexican border. In the war for Texan independence, eight battles were fought in the vicinity, and it was here the famous "Siege of the Alamo" took place in 1836.

Galveston, Tex., a prominent port and resort city on a Gulf Coast island, is connected with the mainland by two major causeways. A sea wall 17 feet high and 7½ miles long has been constructed along the south side of the city to prevent, as far as possible, the destructive effects of hurricanes which sometimes strike the coast in the autumn.

AN APPRAISAL OF CURRENT PROBLEMS. Much of the Coastal Plains has been farmed intensively since colonial days. Soil depletion and soil erosion have become a serious menace because of unsound agricultural practices (Fig. 16). Much is being done now to correct these conditions but eternal vigilance is the price that must be paid for continued productivity. The many swamps are now breeding places for mosquitoes, barriers to road construction, and generally a liability. Inadequate housing for underprivileged Negroes and whites, and poor educational advantages for both children and adults are serious handicaps. However, opportunities for education in the Southland are being multiplied, and increasing numbers are eagerly seizing the chance to go to school.

Since transportation facilities are inadequate in many areas, improvements in both rail and highway development are needed in order that surplus products of the South may reach markets, and so that resort areas may be more accessible. The large swamp and poorly drained areas, and other regions where the water table is near the surface often have water of poor quality, insufficient in amount, and frequently polluted. Thus it is seen that progress in some parts of the Coastal Plains awaits the solution of the problem of a domestic water supply.

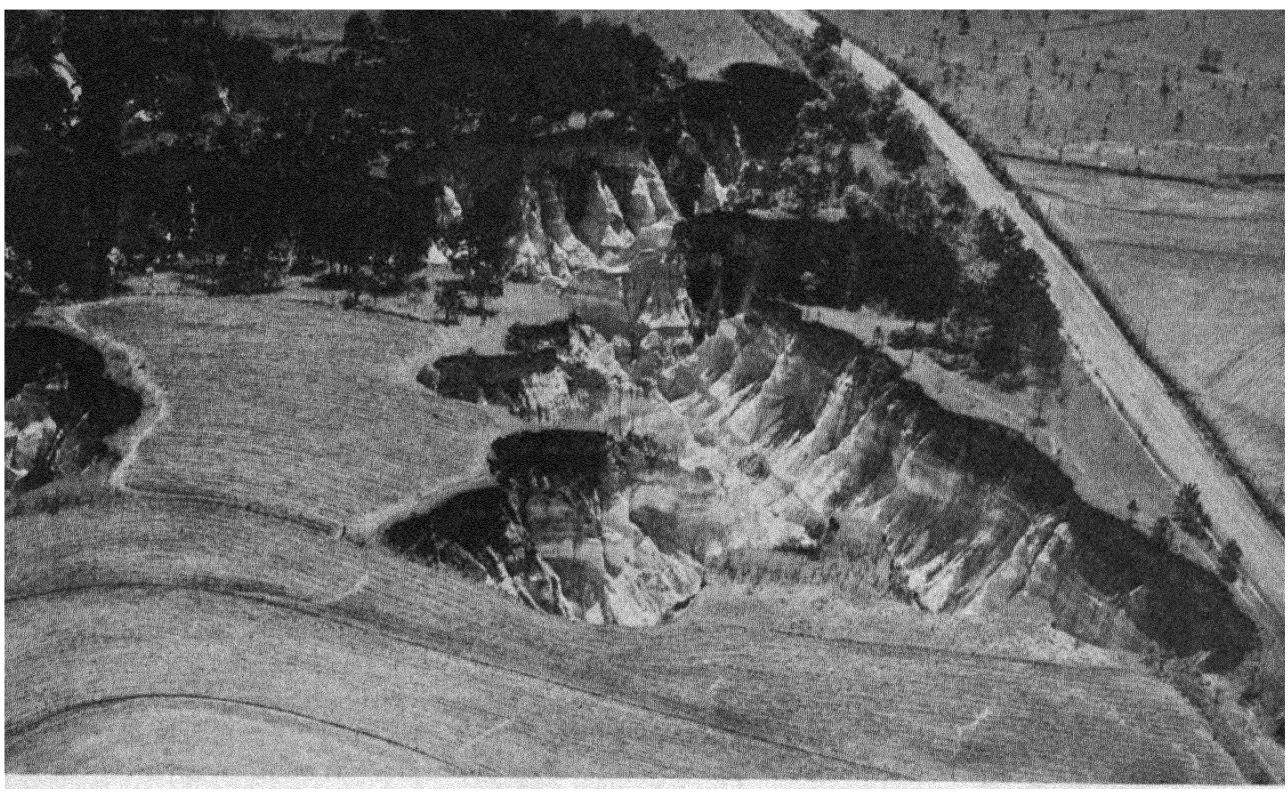


FIG. 16. SOIL EROSION MENACE. Headward extension of these deep gullies in Georgia threatens the roads and fields in numerous places. This illustrates the dangers from uncontrolled erosion in numerous other places in the world.

2

Appalachian Highlands

NO OTHER physiographic division in the United States has had a more profound influence on the settlement and subsequent development of the country than have the Appalachian Highlands. Some parts of the area produce large quantities of coal; some have quarries of granite, marble, and slate; some have wells rich in petroleum; other sections are characterized by intensive manufactures; and still others by general or specialized types of agriculture. On the other hand, making a living is difficult in certain sections of this large domain, the people barely being able to eke out a precarious existence—their bodies undernourished and insufficiently clothed, and their minds poorly informed and inadequately schooled.

Yet, in many sections beautiful forests cover the mountains and rugged hills; delightful sites abound for recreation, touring, and hiking; numerous springs provide sparkling water for drinking purposes; and the many streams furnish good fishing and an abundance of hydroelectric power.[1]

Except for the passes through the mountains and ridges, the Appalachian Highlands form a considerable barrier between the coastal lands and the interior plains of North America. Superb gorges that now serve as highways through the highlands were carved by the *Hudson*, the *Susquehanna*, the *Potomac*, and the *James* rivers. The route that has played the leading role in connecting the Atlantic seaboard with the rich interior of the continent is the famous Hudson-Mohawk Valley. Early in the eighteenth century, passenger and freight boats began carrying their loads on the waters of the Hudson and Mohawk rivers, continuing their trip through the Erie Canal (completed in 1825) to *Lake Erie*. However, today ship traffic through this valley is negligible, for nearly all travel and transportation are by railroads, automobiles, and air carriers—all shuttling back and forth with incredible speed and in ever-increasing numbers (Fig. 17). The *Delaware* River, flowing out of the Appalachian Plateaus, has carved the picturesque Delaware Water Gap, and today an important coal-hauling railroad, the Delaware and Lackawanna, follows this route. One of the easiest routes through this highland was made by the Susquehanna River which is utilized at present by the Pennsylvania Railroad. The valley of the Potomac which crosses the *Blue Ridge* in a narrow gorge at historic *Harper's Ferry* is one of the best-known routes, and this gateway is traversed by the oldest railroad in the United States, the Baltimore and Ohio. Farther south the Chesapeake and Ohio uses the route across the Blue Ridge made by the James River. The southernmost breach across the Appalachians was cut by the *Roanoke* River and today is followed by the Southern Railroad.

The land forms of the Appalachian Highlands have been etched simultaneously. However, a striking diversity of physiographic features has resulted from differences in bedrock and substructure. A part of the area is underlain by ancient crystalline rocks, in some places massive and in other areas intricately folded and metamorphosed. In some sections the bedrock is sedimentary with the strata lying horizontally, some are undulating, or folded, and in others they are metamorphosed (Fig. 18).

[1] Rich, John L., "A Bird's Eye Cross Section of the Central Appalachian Mountains and Plateaus," *Geographical Review*, October, 1939, Vol. 29, pp. 561-586. A marvelous series of aerial photographs with descriptions.

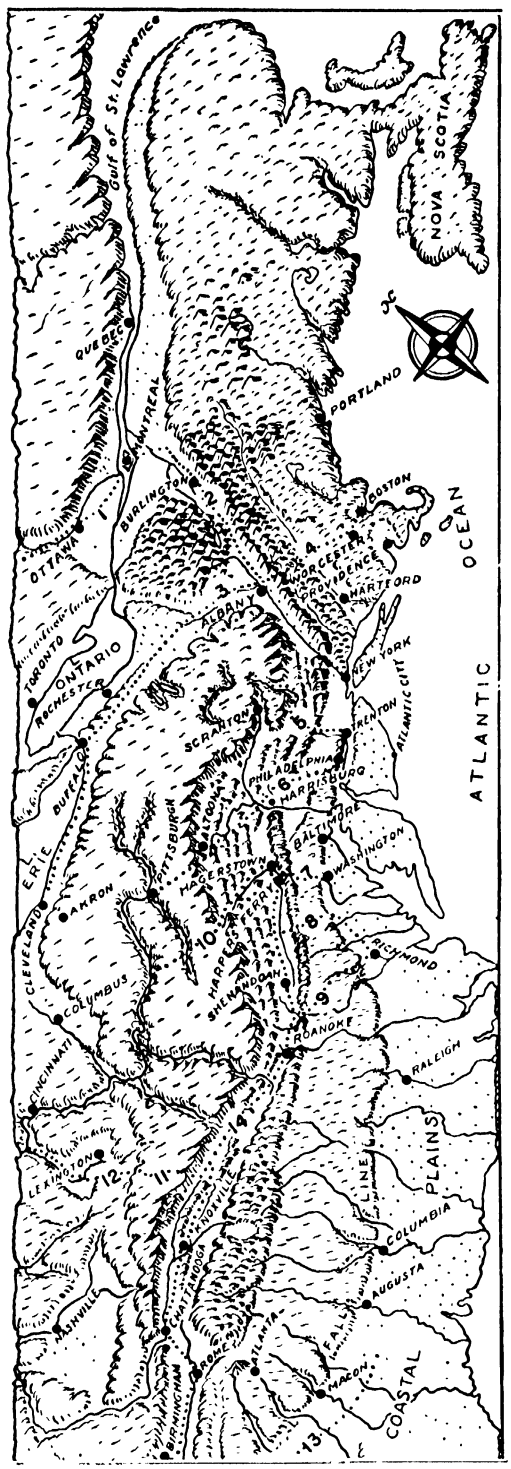


FIG. 17. THE APPALACHIAN HIGHLANDS AND GATEWAYS. (1) Route of the Voyageurs, (2) Champlain Route, (3) Mohawk Gap, (4) Mohawk Trail, (5) Delaware Gap, (6) Susquehanna Gap, (7) Potomac Gap, (8) Manassas Gap, (9) James Gap, (10) Cumberland Road, (11) Cumberland Gap, (12) Wilderness Road, (13) Coastal Plains Route, and (14) Great Valley Corridor.

The forests, the minerals and rocks, and the beauty of the southern Blue Ridge, *Great Smoky*, and *Unaka* mountains are valuable resources and should be made available to more and more people. Greedy or thoughtless exploiters have nearly denuded the region of its once marvelous forest of hardwoods with all the attendant damages that follow in the wake of such practices. The control of soil erosion, soil depletion, and rapid runoff should be given more attention.

Schools and colleges for higher education are numerous in the Appalachian Highlands. The University of Virginia at Charlottesville, established by Thomas Jefferson, was the first state university in the United States. Others include Cornell University in New York, the University of Pittsburgh in Pennsylvania, and the University of Tennessee at Knoxville. However, parts of the educational system in the South are being reconstructed, especially in the districts occupied by the poorer whites and by the Negroes. The homes and living conditions are being improved so that the people are now beginning to enjoy the more abundant life. Much work has been done to improve highway facilities and continued effort in this direction is desirable.

For purposes of this study it will be convenient to divide the Appalachian Highlands into three parts, each of which may be subdivided for more detailed study. The three divisions are (1) the *Blue Ridge* and the *Piedmont Upland* which have been eroded from ancient crystalline rocks, corresponding in age to that of the *Laurentian Upland;* (2) *Appalachian Plateaus*, and the *Appalachian Ridge and Valley Region* composed of sedimentary and metamorphosed sedimentary materials; and (3) the *New England-Acadian Upland*, which is a northeastward extension of the Blue Ridge and Piedmont Upland.

THE BLUE RIDGE AND THE PIEDMONT UPLAND

This section of the Appalachian Highlands with its southern extremity in Alabama touches all the seaboard states northward to the Hudson River. The mountainous portion, appearing as a large mass 150 miles wide in North Carolina, narrows northward to a single ridge, and in the vicinity of

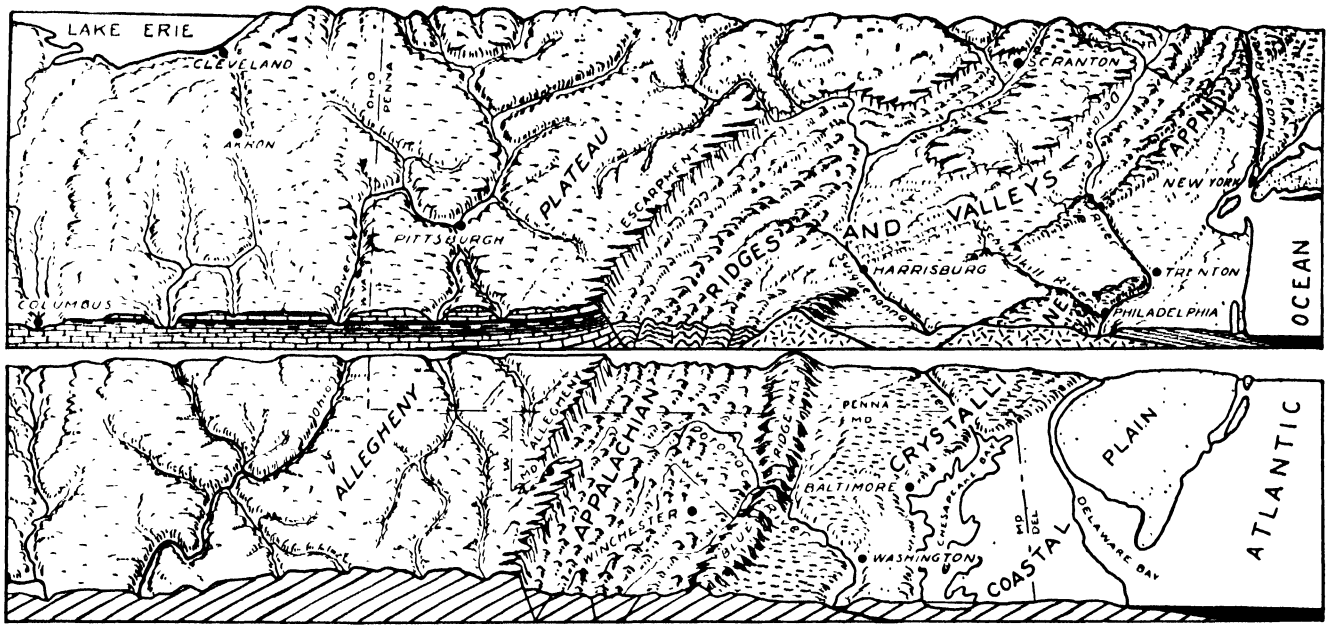


FIG. 18. SECTION ACROSS THE APPALACHIAN HIGHLANDS. The vertical section from the Atlantic Ocean to Columbus, Ohio, shows in a general way how surface features in the Appalachian Highlands are a response to the understructure of the area. It will be helpful to refer to this sketch in connection with associated textual material. The significance of igneous, sedimentary and metamorphic rocks are all evident in this sketch.

Harrisburg, Pa., disappears beneath marine sediments. Farther northward they reappear and extend to the Hudson River. These mountains are generally known as the Blue Ridge, but in the South where they are broadest certain portions are called the Great Smoky and the Unaka mountains.

The Piedmont Upland lying just east of the Blue Ridge is from 20 to 50 miles wide in New Jersey, gradually increasing to about 115 miles in Georgia and Alabama. The term "Piedmont" means at the foot of the mountains and is appropriately used because this upland lies at the eastern foot of the Blue Ridge.

Natural Features

When compared with the lofty mountains and plateaus in the western part of North America, the altitudes in the Blue Ridge and the Piedmont are very modest, indeed. The eastern edge of the Piedmont, although sinking to sea level at New York City, rises to 300 or 400 feet in the Carolinas; and at the western edge, where it comes in contact with the Blue Ridge, the altitudes range from 700 to 1200 feet. Along the Hudson River the Blue Ridge, locally known as the Hudson Highland, rises abruptly from the water's edge to 1500 feet, but southward it rises higher and higher, reaching 6711 feet in bold *Mt. Mitchell* in the Great Smoky Mountains in North Carolina.

The surface of the Piedmont, which varies from slightly dissected upland to rather bold and rugged relief, formerly had the appearance of a plain whose surface was quite uniform. When the land was elevated in comparatively recent geological times, the rejuvenated streams cut valleys that increase in depth from the Blue Ridge to the eastern margin. However, broad views over the area show an even sky line.

There are many rapids where the water in the streams of the Piedmont descends from the hard crystalline rocks of the eastern edge to the soft sedimentary rocks of the coastal plains. For this reason the boundary between the Piedmont and the Coastal Plains is called the "Fall Line." The falls in early days were barriers to transportation—hence the pioneers had to unload their cargoes at the falls when they went up or down stream. Villages were established at these breaks in transportation, some of which have grown into large industrial cities, thanks to the power developed at the

"Fall Line." The many cities thus located are known as the "Fall Line Cities."

The crystalline bedrock of the area is covered throughout by residual mantle, except for a small area in New York and northern New Jersey over which there is glacial drift. On the mountains the soil and soil materials are thin, but on the Piedmont they are 40 to 80 feet thick in many places. The alluvium in the valleys provides parent material for excellent agricultural soils.

The Blue Ridge and Piedmont Uplands have a humid climate—subtropical in the south and continental with long summers in the north. The annual rainfall varies from 35 to 60 inches or more, and is quite evenly distributed through the year (Fig. 8). At Washington the evenness (E) by months is 79 per cent.[1] More rain falls on the mountains than on the Piedmont, a condition which favors the development of hydroelectric power plants on the lower courses of the rivers.

Formerly the whole area was forest covered—black spruce, pines and broad-leaved deciduous hardwoods at the higher altitudes, and mixed forests such as beech, birch, maple, oak, chestnut, and yellow poplars on the lower slopes of the mountains and on the Piedmont. Most of the virgin timber has been cut from the Piedmont, but some areas support second-growth trees. However, many of the mountainous sections still retain their forest cover (Fig. 237).

Because of the heavy rainfall the mature soils are pedalferic—yellow and red on the Piedmont in the south and gray-brown on the mountains and in the north (Fig. 238).

Cultural Features

Early settlers east of the Blue Ridge established homes chiefly on the tidal estuaries of the eastward-flowing rivers. The Piedmont lands were not as rich nor as well located for water transportation as were the lands on the Coastal Plains. However, when the Coastal Plains became occupied almost wholly by large estates, the tenants and occupants of the remaining small farms began migrating westward and southward, many settling on the Piedmont, even in colonial days. The beginning of occupancy in the Piedmont inspired many nationalities in other regions to move in and thereby the area became a veritable mixing ground for Dutch, Germans, Scotch-Irish, French Huguenots, English, and others.

The Blue Ridge and the Piedmont have furnished the geographic setting for many stirring events of historic interest. Cornwallis, in his attempted march northward from Charleston, was defeated at King's Mountain by colonial troops under General Green. Sherman's march to the sea began at Atlanta on the Piedmont and the War between the States closed with the surrender of General Lee at Appomattox. The historic homes of George Washington at Mount Vernon and of Thomas Jefferson at Monticello near Charlottesville are in the Piedmont.

Until late in the eighteenth century the Blue Ridge served both as a barrier and as a protection to the English colonists. However, the water gaps of the Hudson, Delaware, Susquehanna, Potomac, and James rivers, and several other passes, were the sites for many historic episodes. Henry Hudson sailed through the Hudson Gateway; colonists poured through the wide Susquehanna gap to the interior; and in the Potomac gateway is Harper's Ferry, the site of the John Brown tragedy and the route of the projected Cumberland canal and road. It was through the wind gaps in the Blue Ridge that Confederate generals Jackson, Early, and Lee made their forays into the Great Valley. It was these mountains too that screened and concealed the activities of the Confederate army in the Shenandoah and Cumberland valleys just preceding the *Battle of Gettysburg*—the crucial struggle of the War between the States.

Agricultural activities on the Piedmont are varied and range from intensive, mixed farming and orcharding to the one-crop tobacco and cotton types of production.

In New Jersey, Pennsylvania, and Maryland mixed farming is prevalent, with emphasis upon dairy, truck, and corn. The soils are fertile and excellent markets are available for farm products. The more important centers for corn are in New Jersey and Pennsylvania, although it is grown throughout the Piedmont for local consumption.

In Virginia extending from the Rappahannock

[1] See Appendix D for a method of computation.

River southward to the James River is one of the famous apple sections. About 1885 the orchards were started in some of the small "cove" valleys in the eastern edge of the Blue Ridge. These succeeded so well that now large areas are producing apples near the western edge of the Piedmont. The main crops in the remainder of the rolling country are corn, hay, pasture, and some wheat.

Tobacco, the main crop south of the James River in Virginia and North Carolina, is grown as a one-crop type of agriculture, and here the farms are not ordinarily as well-kept as they are in the erately well-kept homes, together with the poorest of Negro huts and share croppers' cabins.

General or mixed farming is replacing the traditional one-crop agriculture in parts of the cotton belt. The inspiration for this reform is due in large measure to the devastating effects of the boll weevil which has become so common in the cotton districts of southeastern United States, and to education promoted by the agricultural extension service.

Not only is crop rotation an important factor in the control of the boll weevil but it is also one of

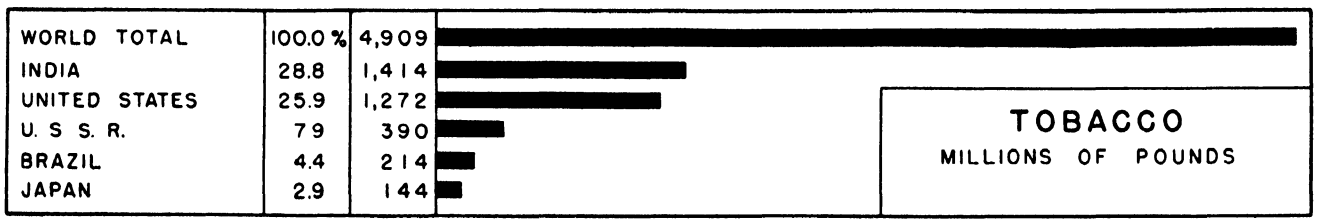


FIG. 19. WORLD'S TOBACCO PRODUCTION. This is an 8-year average just preceding World War II. (Data from *Foreign Commerce Yearbook*)

mixed-farming areas farther south. Tobacco is the principal cash crop, whereas corn and some vegetables, poultry, and swine are grown for subsistence purposes. Many of the large tobacco plantations recently have been reduced to smaller farm units (Fig. 19).[1]

In the southern part of the Piedmont, "King Cotton" rules the agricultural activities. Unwise use of the land has been in vogue for nearly three quarters of a century. During that time the large plantation system with its white managers and its Negro and poor white laborers received two setbacks—one by the War between the States and the other by the boll weevil. Many Negroes freed from slavery by emancipation continued to live in the same cabins and work for their original masters, but had to pay most of their share of the crop for the privilege of being free. Under these conditions they were expected to look out for themselves which some have not learned even yet.

The southern part of the Piedmont is occupied by an incongruous mixture of mansions and mod-

[1] Erickson, Franklin C., "The Tobacco Belt of North Carolina," *Economic Geography*, January, 1945, Vol. 21, pp. 50-61.

the best methods to increase farm income, to improve the soil, and, if intelligently followed, to prevent soil erosion (Fig. 20). That the coming of the boll weevil was a blessing in disguise is true inasmuch as diversified farming assures more security for this agricultural population.

The Piedmont probably always will be an agricultural region. It has no important earth products except some building stone. Modern methods of soil rejuvenation, soil erosion control, and improved methods of farming can do and are doing much to restore the losses caused by early exploitations and the haphazard methods of farming which have existed in parts of the region. Excellent examples of reclamation can be seen near Lancaster, Pa., where farmers of German origin have improved their holdings greatly by practicing some European methods. Their farms are equipped with modern buildings, machinery, and good animals, and at the same time a variety of crops are produced. The carefully tilled tobacco and general farming areas in Pennsylvania contrast sharply with the tobacco and cotton districts in southern Virginia and North Carolina. These areas illustrate what can be done by way of readjustments and how human

intelligence and diligence can build up what early exploiters had so recklessly despoiled.

In addition to agriculture, the easily accessible water power, the relative ease of bringing coal into the northern part of the area, the availability of much cheap labor, the abundance of cotton, tobacco, and other raw materials, the nearness to good markets, and an early start were factors that contributed to the establishment of important manufacturing and trade centers in many parts of the Piedmont, especially along the Fall Line. Machine shops, textile mills, the manufacture of gunpowder, dynamite, chemicals, and other high-grade merchandise characterize the manufactures in the northern industrial zone of the Piedmont but tobacco products, cotton, and textile goods hold sway in the south.

Only about 20 per cent of the Blue Ridge is utilized for agriculture, and the remainder is forested. Farming of a subsistence type prevails in the coves, valleys, and basins. Corn, beans, vegetables, some dairy products, poultry, and a few hogs are produced.

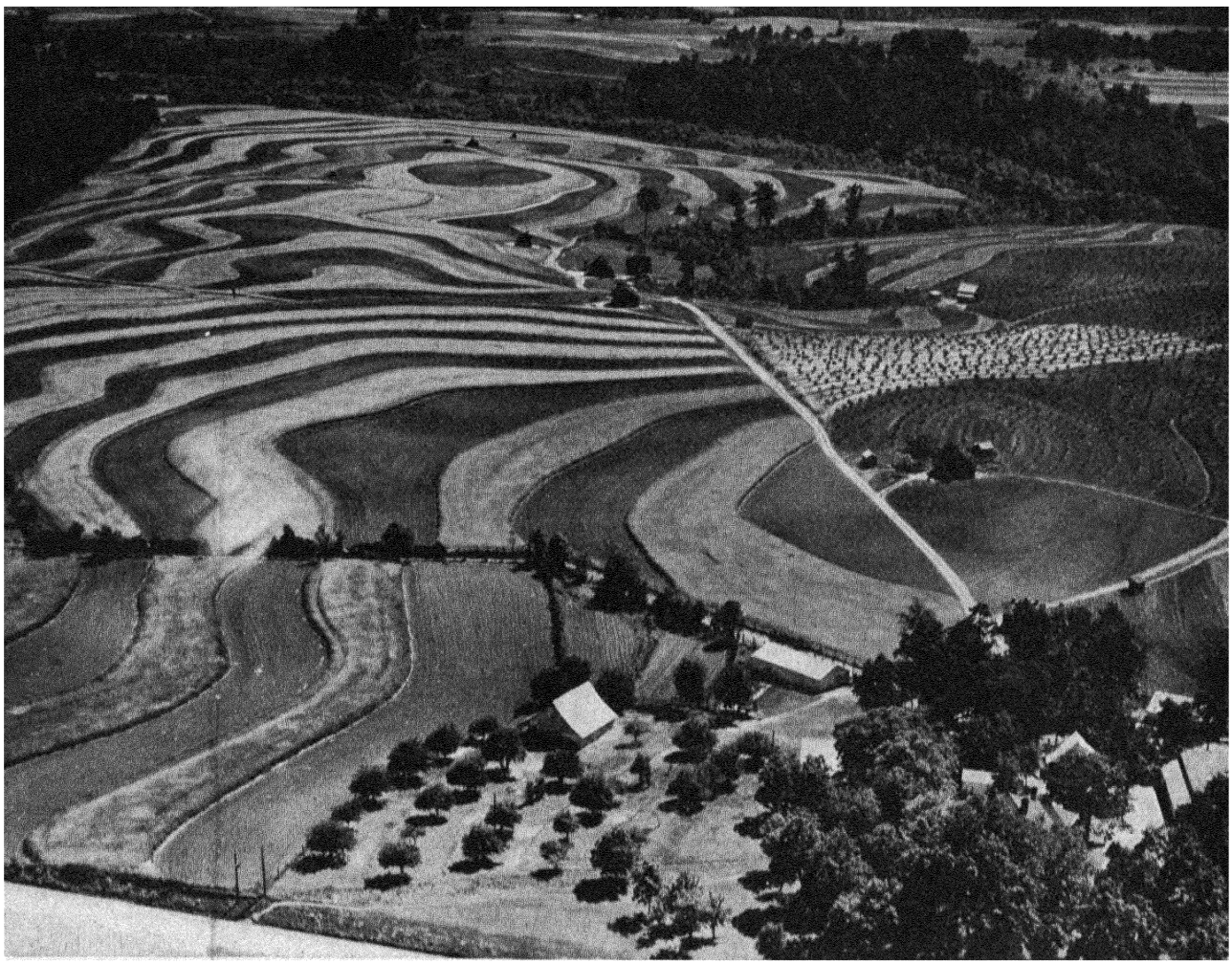


FIG. 20. STRIP-CROPPING COTTON AND SMALL GRAIN. This land is terraced, and each strip is one terrace-level wide. In recent years the Southland has progressed rapidly in farm management. Strip-farming and strip-cropping both are practiced extensively in semiarid regions to prevent wind erosion. (Courtesy U. S. Department of Agriculture)

Industry in the Blue Ridge country is not highly developed; only a small amount of manufacturing or processing of raw materials is done. Baskets, furniture, and homespun clothes are made for the tourist trade. Many articles used in the homes are

home-made. Building stones, soapstones, manganese, graphite, mica, and some gold are quarried or mined. North Carolina is noted for its beautiful granite.

The people of the Blue Ridge Region live mostly in small isolated settlements in valleys or basins.[1] Inasmuch as the groups are separated from each other, a clannishness has developed which too often has caused distrust, feuds, and internecine strife among the people. Life in general is characterized by simplicity of social affairs, education, religion, and politics. The houses as a rule are poorly constructed and inadequately equipped, and their occupants are often insufficiently clothed and fed. There are few Negroes in the Blue Ridge Mountains. The mountaineer must work hard for his living and is sometimes called "backward" because he does things in a more or less primitive fashion.

The construction of many new highways has not only supplied much work for the inhabitants but is making the mountains more accessible to tourists and is opening new avenues of livelihood in the form of tourist business. The establishment of two national parks, the *Great Smoky Mountain National Park* (643 square miles) and the *Shenandoah National Park* (282 square miles), the latter with its beautiful *Skyline Drive* of 100 miles along the crest of the Blue Ridge Mountains, is one of the outstanding developments that the federal government has contributed to this region in recent years. The Great Smoky Mountain National Park, located between Knoxville, Tenn., and Asheville, N. C., has fifteen or more peaks with altitudes of more than 6000 feet. Although these parks may not have the scenic grandeur of the western parks, nevertheless they are accessible and have an appeal to millions of people. The Appalachian clubs also have constructed many trails, hostels, hotels, camps, and good cabins for the enjoyment of visitors in many other parts of the mountains.

URBAN CENTERS. The cities of the Piedmont Upland and the Blue Ridge fall into three groups (Fig. 15):

1. The port and tidewater cities are *New York City* and its satellites such as *Jersey City, Passaic, Hoboken, Bayonne, Newark,* and *Paterson* in New Jersey; *Philadelphia* in Pennsylvania with its neighbors, *Camden,* and *Trenton* in New Jersey; *Wilmington* in Delaware; *Baltimore* in Maryland; and *Washington* in the District of Columbia.

2. The Fall Line cities include *Richmond,* Va.; *Raleigh,* N. C.; *Columbia,* S. C.; *Augusta, Macon,* and *Columbus,* Ga.; and *Montgomery,* Ala.

3. The largest city upon the Piedmont interior is *Atlanta,* Ga., in the South. Most of the other Piedmont cities, such as *Winston-Salem,* N. C., and *Lynchburg* and *Charlottesville,* Va., are smaller and serve mostly the needs of the local communities.

New York City, the metropolis of the Western Hemisphere and the leading gateway market of North America, is a gigantic product of an unusual combination of favorable factors, of which the distribution of transportation routes by water, land, and air is among the most important. One of the finest harbors in the world, scoured by tides and dredged by man, gives New York approximately 770 miles of water front. The East River and the North (Hudson) River are lined with miles of wharf space to which huge ocean liners, freight carriers, and tramp steamers bring their thousands of passengers and immense quantities of freight. In normal times, almost 10,000 foreign and coastwise vessels are accommodated by its hundreds of piers, some of which are 1000 or more feet long. The city is located at the seaward end of the Hudson-Mohawk highway to the interior of the continent (Fig. 21). It has excellent rail connections by many routes from New England, the South, and the West, and several large airports on Long Island provide facilities for hundreds of airplanes.

Of the five boroughs that make up New York City (Manhattan, Brooklyn, Queens, Richmond, and the Bronx), the most densely populated is Manhattan Island, purchased in 1626 by Peter Minuit from the Indians for $24 worth of trinkets. Because of the hard rocks underlying most of the city, it has been possible for the engineers in New York to construct skyscrapers ranging from 60 to

[1] Hitch, Margaret A., "Life in a Blue Ridge Hollow," *Human Geography Studies: The United States,* McKnight and McKnight, Bloomington, Ill., 1935, pp. 57-70. An intimate view of life in an isolated mountain community.

100 stories. Many buildings have three or four basement levels. Under the city is an intricate labyrinth of tunnels and conduits which carry electric power lines, telephone and telegraph cables, drinking water, sewage, passenger trains, subway trolleys, and vehicles. Thousands of people commute daily through these underground tubes and on the surface by street cars and trains. In addition tens of thousands of people travel over the bridges and ferries which connect New York with suburban areas and islands. The millions of people who either commute or live within the city require hundreds of thousands of tons of food and supplies which are brought in daily by trains, trucks, and boats.



FIG. 21. NEW YORK CITY. Looking north from the southern end of Manhattan Island. The Dutch founded New Amsterdam at the water's edge in 1626. One must marvel at the strength and stability of the underlying bedrock which supports such tremendous weights of skyscrapers with their teeming millions of people. (Courtesy Fairchild's Aerial Survey)

The New York metropolitan district includes about 2500 square miles lying in New York, New Jersey, and Connecticut. The city of New York has an area of 299 square miles. More than 350 self-governing municipalities lie within a radius of 40 miles from the New York City Hall. Among these are *Newark, Paterson, Elizabeth, Hoboken,* and *New Brunswick* in New Jersey; *Yonkers, Mount Vernon,* and *New Rochelle* in New York; and *Stamford* and *Norwalk* in Connecticut. The density of population per square mile in New York City is approximately 23,000 as compared with about 4300 per square mile in the metropolitan district. The large numbers of foreign-born people give rise to many problems concerned with living conditions and educational, recreational, and working facilities.

About 20 per cent of the tonnage of foreign trade of all the ports of the United States passes

through New York, and it is the greatest shipping and receiving port in the world (Fig. 22). Its position as the financial capital of North America is shown by the many large banks, trust companies, exchange and insurance headquarters, and other financial institutions located in Manhattan.

The manufactures of New York are characterized by those which require relatively small amounts of raw materials and much skilled labor. Its supremacy in the fabrication of men's and women's clothing and other high-grade manufactures is due in part to the large supply of foreign-born labor, the nearness to the coal and petroleum fields of Pennsylvania, and the ease of obtaining raw materials. About one half of the clothing made in the United States is manufactured in New York City. Moreover, it is one of the leading educational and theatrical cities of the world.

In 1609 Henry Hudson explored this area, and in 1614 the Dutch West India Company established a free trading post. The name, New Amsterdam, was adopted in 1640, but in 1664 the English captured the site, changed the name to New York, and as a peace offering gave Dutch Guiana (Surinam) to the Hollanders.

Newark, N. J., the state's largest commercial and industrial city and port, is located on an S-shaped curve of the *Passaic River* and faces Newark Bay at the mouth of the stream. The city may be reached by many railroads, trolley lines, highways, and steamships. Numerous trains daily carry thousands of commuters to and from New York City via the railway tunnels, and other thousands reach the Manhattan districts by the state highways and the Holland vehicular tunnel. The city has long been a leading manufacturing center, its varied products ranging from the making of lead pencils to the manufacture of locomotives.

Jersey City, N. J., on a peninsula between the *Hackensack River* and Newark Bay and just across the Hudson River from New York City, is connected with the great metropolis by vehicular and railway tunnels and numerous ferries. Jersey City, the eastern terminus for many railroads and highways from the West, is an entrepot for coal, iron, and agricultural products, sharing extensively in this business with New York City.

Paterson, N. J., formerly the "Silk City of the United States," is located on the Passaic River which winds through the city in a series of curves and has many rapids and falls, thus providing power for the numerous factories. Paterson, previous to the Global War, was the principal silk manufacturing center in the United States, the first mill having been established there in 1837. Many other industries associated with silk were established, such as dyeing, the manufacture of textile machinery, thread, and men's shirts. Today the silk industry has been replaced by other types of textile processing. The first locomotive was built in Paterson in 1837 and by 1870 engines were being shipped to all parts of the United States.

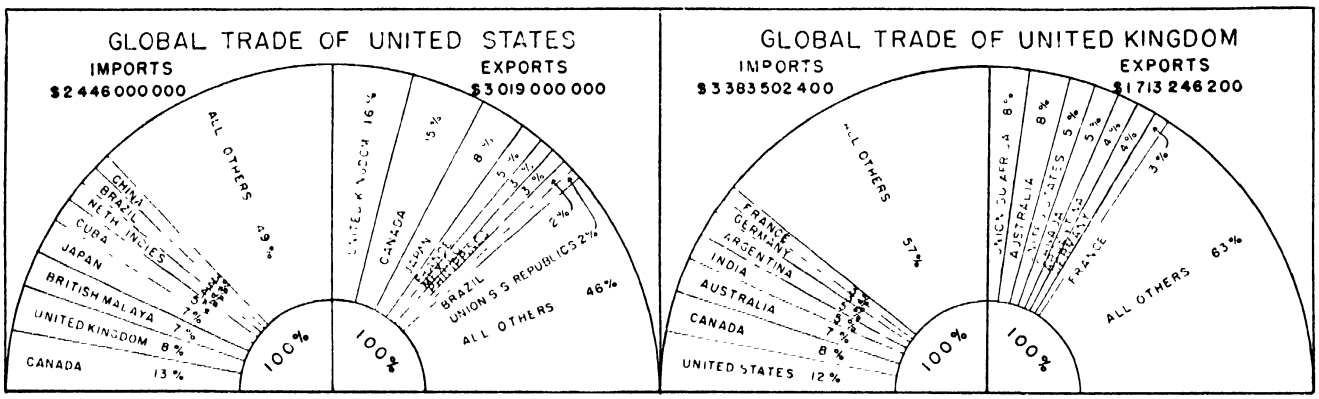


FIG. 22. GLOBAL TRADE OF THE UNITED STATES AND THE UNITED KINGDOM. The trade of the United States is widely dispersed over the globe, both imports and exports. No one country enjoys more than a small per cent of it. See Figs. 33 and 177 for commodities involved. (From *Foreign Commerce Yearbook*)

Mexico, and South America. It is claimed that the submarine was invented at Paterson, and today airplane motors, submarine cables, structural steel, and boilers are made in large quantities.

Philadelphia, the "City of Brotherly Love," is the oldest city in Pennsylvania and ranks third in size among the cities of the United States. It is situated on a peninsula between the *Schuylkill* and the *Delaware* rivers about 120 miles from the Atlantic Ocean. The city has one of the largest tidewater harbors in the world and its transatlantic and coastwise trade provides the principal outlet for the Pennsylvania coal fields. The city covers about 130 square miles and because of the abundance of room for expansion, the landscape of Philadelphia is not serrated by inordinately tall buildings.

The arrival and departure of 1000 trains per day testify to the importance of the city as a railway and shipping center. Nearness to coal and easy access to iron ore contribute to making Philadelphia a prominent manufacturing, steel-making, and ship-building center.

The site of Philadelphia was first occupied by Swedes in 1636, but not until 1681 was it permanently settled by a party of Quakers sponsored by William Penn. The First and Second Continental Congresses met in Philadelphia, the Declaration of Independence was ratified, signed, and adopted there in 1776, and the city was the capital of the United States from 1790 to 1800. At *Camden,* N. J., across the river from Philadelphia, are large shipbuilding yards, and *Trenton,* the capital of New Jersey, on the Fall Line of the Delaware River excels in the manufacture of pottery and chinaware.

Wilmington, Del., at the junction of three streams—the Delaware and Brandywine rivers and Christiana Creek—is on the Fall Line and is also at the head of tidewater. The site was first occupied by Swedes in 1638, but they were driven out early by the Dutch. During the Revolutionary War, the Battle of Brandywine was fought 8 miles away. The falls of the Brandywine made this an early flour milling center. At Wilmington the first steel steamship and the first steel sailing vessel were built. Here is the greatest explosive and chemical-manufacturing plant in the United States, the place where a large percentage of the explosive materials of the Allied Armies in both of the World Wars was made.

Baltimore, the largest city in Maryland and a port regularly visited by coastwise and transatlantic steamers, is located at the head of tidewater upon one of the deep-water estuaries of Chesapeake Bay. Its nearness to agricultural, coal, and mineral fields and its excellent anchorage and dockage facilities have made the city a center of immense import and export trade, as a rule ranking second or third in the United States in total tonnage. Next to New York, it is the largest grain market on the Atlantic Coast. Headquarters of the Baltimore and Ohio Railroad are here.

Hundreds of different articles are manufactured in Baltimore, the largest single product being men's clothing, and here is located one of the largest coffee-processing plants in the United States. Baltimore is famous throughout the nation for its fresh and canned oysters.[1]

The city was settled in 1730 and was named in honor of Cecilius Calvert, the second Lord Baltimore, who founded the colony of Maryland. Fast sailing vessels known as clipper ships were made in Baltimore in early days and today immense steel ships are constructed. The first steamer to cross the Atlantic sailed from Baltimore.

Washington, D. C., the capital of the United States and located at the head of navigation on the Potomac River, is without doubt the most beautiful large city in North America (Fig. 23). The first capital of the United States was New York but Philadelphia became the national capital within a year. After ten years Washington was made the governmental headquarters. Washington is unique among the large cities of the United States because the sole reason for its existence is political. It is also unique among cities of its size in having been carefully and intelligently planned before it was built. George Washington secured the services of Major L'Enfant, a French engineer, who made plans whereby the Capitol should occupy the center of the city, the streets should radiate from the

[1] Blood, Pearle, "Oystering in the Chesapeake," *Journal of Geography,* January, 1939, Vol. 38, pp. 9-18. A good description of a significant industry.

Capitol like spokes from the hub of a wheel, and other streets at right angles to each other should follow the cardinal directions. The design included numerous circles, squares, park spaces, and wide streets lined with beautiful trees. The plans indicated that the circles were to be used for fortifications if necessary in case of war. The architecture of the government buildings is better than

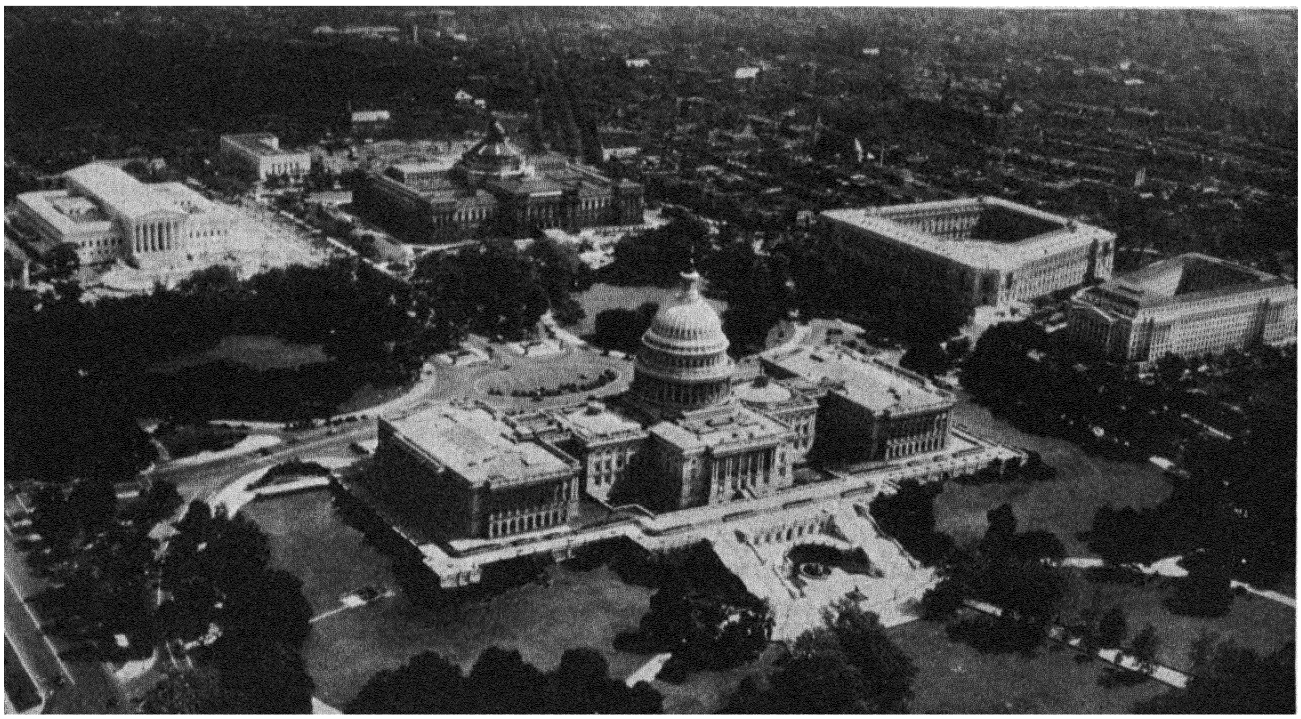


FIG. 23. WASHINGTON. Looking southeast with the capitol in the foreground and the Library of Congress just beyond. The beautiful building at the left is the home of the Supreme Court of the United States.

that of most public buildings in America, the Congressional Library and the New Supreme Court Building being considered among the finest in the world. Notable more recent structures include the Jefferson Memorial, the National Gallery of Art, the Commerce Building, and the Pentagon with a modern maze of highways and bridges leading to it.

Most of the people of Washington are employed as government workers or are engaged in supplying their needs. In addition to the many colleges and universities, the museums, art galleries, and libraries make Washington a cultural center, and thus the national capital has become a mecca for American tourists, travelers, educators, and politicians. During World War II, the city had many of the aspects of an international capital.

Richmond, Va., located at the Fall Line on the tidal estuary of the James River about 90 miles from the sea, like Rome is laid out on seven hills. It is in the center of a rich agricultural region at the edge of the tobacco belt, specializing in the making of cigars, cigarettes, and plug chewing tobacco. One of the largest plastic manufacturing plants was constructed near Richmond during World War II. Its good connections with coal fields, its nearness to the iron furnaces of the Great Valley, and its available water power have made possible locomotive works, wood-working industries, and cotton manufactures.

The territory surrounding Richmond is rich in historic significance, especially from the time of Captain John Smith to the War between the States. Patrick Henry's famous speech, the capital of the Confederacy, Libby Prison, and the homes of Robert E. Lee, Jefferson Davis, and Edgar Allen Poe are associated with Richmond.

Other important cities along the Fall Line

which are noted for their manufactures of tobacco and cotton products, and as agricultural receiving and distributing points are: *Lynchburg* on the James River and *Roanoke* on the Roanoke, both in Virginia; *Columbia,* S. C.; *Macon* and *Augusta,* Ga.; and *Montgomery,* Ala. The latter two are the largest and most important Fall Line cities in the southern part of the Piedmont and deserve special attention.

Augusta, Ga., located at the head of navigation on the Savannah River, is a pivotal point for highways, railways, and steamboats from Savannah. Locally it is known as the "Lowell of the South" because of its numerous cotton mills. Eli Whitney invented and operated the first cotton gin near Augusta, and it was here that the first steam-propelled boat was floated by James Longstreet in 1806, a year before Fulton's "Clermont" ascended the Hudson.

Montgomery, Ala., at the head of navigation on a big bend of the Alabama River just below its confluence with the Tallapoosa, was first occupied by white men in 1817 and called New Philadelphia. Montgomery, surrounded by a rich agricultural country, is a jobbing and commercial center for cotton, lumber, grain, fruits, truck products, and hogs, and it is also a gateway to adjacent ports on the Gulf of Mexico.

Atlanta, Ga., the largest city on the southern Piedmont, the capital of Georgia, and often designated as the "Gate City of the South," is on an upland or mesa not far from the Chattahoochee River. Stone Mountain, 15 miles away, is a monadnock [1] on the north face of which has been projected a massive Confederate memorial. About 290 miles to the southeast is *Savannah,* the principal Atlantic seaport south of Baltimore. Atlanta, at the crossing of eight railroads and also the center of a network of air mail service in all directions, is not only the commercial metropolis and transportation center for the southern Piedmont but also for the entire southeastern quarter of the United States.

The manufactures of Atlanta include cotton goods, cottonseed oil, furniture and other lumber products, fertilizer, and agricultural machinery. Hydroelectricity from near-by plants is the chief source of power used in the factories.

Atlanta's growth is associated closely with transportation. The site, chosen as the end of the railroad on the Piedmont, at first was called Terminus. In 1847 it was incorporated as Atlanta. In 1861 its strategic position as the depot for Confederate supplies made it a major objective by General Sherman in his famous march to the sea.

Asheville, N. C. ("Land of the Sky"), the largest city in the Blue Ridge country, is a beautiful resort town located in a basin in the highest part of the mountains. The Southern Railroad crosses the mountains at this point and near by is the delightful Great Smoky National Park.

West Point, N. Y., the site of the United States Military Academy, is the largest center of population in the northern section of the Blue Ridge.

THE REGION'S PROSPECTS. Since there are practically no mineral resources in the Piedmont, the region is likely to continue as a land of agriculture with manufacturing centered in the urban areas. This is an area in which people of the old aristocracy, with their traditions, have lived for many decades. Agriculture of the plantation one-crop type, especially cotton and tobacco, has prevailed since early settlement in the South. Much emphasis is being placed on better farming both by the federal government and by agricultural schools and colleges. Some of the problems which face the farmer are those of soil erosion, the maintenance of soil fertility, diversification of crops, introduction of better farming methods, the extension of fruit and nut-tree culture, and better marketing conditions. The abundance of available hydroelectric power, cheap labor supply, and mild, humid climate are favorable factors for increased textile manufacturing.

[1] An isolated residual mountain usually of old hard rock.

3

Appalachian Highlands (Continued)

APPALACHIAN PLATEAUS, AND THE APPALACHIAN RIDGES AND VALLEYS

QUITE IN CONTRAST to the crystalline substructure of the Blue Ridge and Piedmont Upland, the Appalachian Plateaus and the Appalachian Ridge and Valley Region are underlain by rocks of sedimentary origin—thick, generally strong, and massive under the plateaus, and folded and metamorphosed in the ridge and valley section. The folding took place in the weaker strata when they were compressed laterally between the thick sedimentaries on the west and the massive crystallines on the east (Fig. 18). It should be clear, therefore, that the numerous ridges and intervening valleys lie between the plateaus and the Blue Ridge. From the Hudson and Mohawk rivers at the northern end of this area to the southern extremity in Alabama is 1000 miles.

Natural Features

The eastern portion of the Ridge and Valley Region is dominated by valley features, and these valleys taken together are known as the *Great Valley*. In the north, the valley features are more conspicuous than the ridges. In the south, prominent ridges and narrow valleys dominate the west side and long, broad valleys occupy the east side. Within the Great Valley are numerous small valleys with local names, such as the *Walkill* in New Jersey, the *Lebanon* in Pennsylvania, the *Cumberland* in Maryland, the *Shenandoah* in Virginia, and the *Tennessee* and *Coosa* valleys in Tennessee, Alabama, and Georgia. Almost as prominent as the valleys are some of the ridges, among which are *Walden Ridge*, *Lookout Mountain*, *Big Stone Ridge*, *Kittatinny Mountains*, and *Missionary Ridge*. Altitudes within the Great Valley are not high, ranging from 500 to 2000 feet.

Some of the ridges of the region are nearly parallel, some zigzag, and others are almost isolated. Even though the topography is uneven, the tops of the ridges present a fairly even sky line. Across the ridges at nearly right angles, streams—through centuries of activity—have cut numerous gorges and openings known as water gaps and wind gaps. Through these breaches among the ridges the pioneers found their way westward into numerous rich valleys suited to agriculture and to buried stores of mineral products such as anthracite coal and slate in Pennsylvania, and marble in Tennessee. Today paved highways, railroads, and air routes follow the Great Valley and cross the region through numerous notches in the ridge section.

In the evolution of the area the softer limestones, shales, and marbles have disintegrated and decomposed more rapidly than the sandstones and other harder rocks, and consequently have become the fertile floors of numerous valleys. The ridges of hard rock generally extend from 25 to 50 miles or more, one ridge having been traced more than 300 miles. Not only were soft limestones on the surface worn down to form valleys but subsurface portions of these rock also were dissolved, forming great caverns, caves, and natural bridges. The towns of *Shenandoah* and *Luray* in Virginia are famous for the caverns bearing the same names. Located near by is one of nature's wonders, the *Natural Bridge* (Fig. 24).

The eastern edge of the Appalachian Plateaus is a well-defined escarpment dropping quite abruptly to the level of the Ridge and Valley Region (Fig. 18). This wall is and always has been a distinct bar-

rier to travel and transportation westward. So high is the escarpment and so incised is it by stream erosion, that it is called mountains in various places—Catskill Mountains in New York, Allegheny Mountains in Pennsylvania, and Cumberland Mountains in Kentucky and Tennessee. It should be remembered, however, that these so-called mountains are local names applied to the dissected eastern edge of the Appalachian Plateaus.

This plateau area consists of several sections—the *Catskill Plateau* which rises abruptly from the Mohawk and Hudson valleys, the *Pocono Plateau* in northeastern Pennsylvania, the *Allegheny Plateau* extending from western New York southward into Virginia and West Virginia, and the *Cumberland Plateau* farther south. To the west of the Cumberland Plateau is a lower section of the region which includes as special features the famous *Kentucky Blue Grass Region* and the *Nashville Basin*.

For the most part this plateau country has been intricately and deeply dissected by stream erosion, and consequently is quite rugged. However, the even sky line, as seen from an airplane or from the high interfluves (more or less level areas between streams), betrays the ancient flatness of the region. The central and southern parts of the plateaus have V-shaped valleys and narrow-crested ridges, and most of the streams drain westward into tributaries of the Mississippi River. An excellent waterway, the Ohio River, has been formed by the junction of the Allegheny and the Monongahela rivers at Pittsburgh. Some of the streams in the north such as the Susquehanna and Delaware drain over the rugged east edge of the plateau and, subsequently, into the Atlantic Ocean.

The bedrock of the plateau country consists mostly of sedimentaries lying in a generally horizontal position with some slight folding. The streams have carved deep valleys through the loose mantle and into the bedrock, thereby exposing thick seams of coal in numerous places. The first petroleum field in the United States was developed in the gentle folds of the bedrock of the Allegheny Plateau. Since the ground water is slightly acid, caverns and caves have been formed in many places by the dissolving of limestone bedrock. The most famous of these is the *Mammoth Cave* of Kentucky, a national monument, which attracts thousands of tourists annually.

The mantle material is of three major kinds. In the north, glacial drift covers southern New York and northern Pennsylvania. The glaciers not only left a thick mantle of rock debris but also gouged deeply into some of the valleys, leaving many depressions, some of which are now occupied by lakes. The well-known Finger Lakes and a number of water falls and gorges such as Seneca Falls and Watkins Glen in the northern part of the plateau in New York resulted from glaciation.

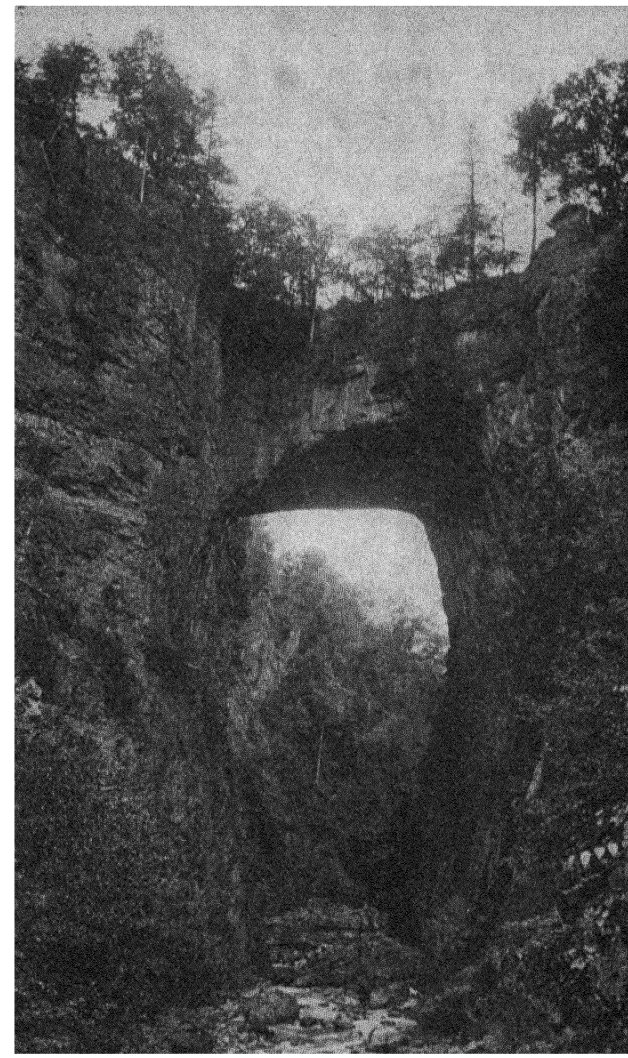


FIG. 24. NATURAL BRIDGE IN VIRGINIA. A natural feature remaining after water had dissolved most of the limestone from below. (Courtesy United States Geological Survey)

In the north the climate of the Appalachian Plateaus and Great Valley is continental humid with long summer. Albany, N. Y., at the foot of the Catskills, according to a 109-year record, receives a median annual rainfall of 37 inches, and Pittsburgh, Pa., on the Allegheny Plateau, 35 inches. The climate is subtropical humid in the south. Knoxville, Tenn., in the southern end of the Great Valley receives 47 inches, and Florence, Ala., on the plateau, 51 inches. At each of the above stations the rainfall is quite evenly distributed throughout the year—Albany, 78 per cent; Pittsburgh, 83 per cent; and Florence, 80 per cent. In the north on the plateau the growing season is less than 130 days in some places, but it increases to more than 200 days in Tennessee and Alabama.

The native forests in the north are mostly broad-leaved, deciduous, consisting of beech, birch, maple, hemlock, oak, and hickory. On the higher ridges and plateaus, areas of conifers are common. Much of the more rugged land is covered with virgin timber. In the south the oak-pine association is best developed (Fig. 237).

The mature soils are all pedalferic—mostly gray-brown in the central and northern portions, and red and yellow in the south (Fig. 238). In the Great Valley, soils vary much in texture, depending on the nature of the parent material—coarse, friable, and usually poor over sandstones; fine, fertile, and sticky over limestones and shales. In the middle and southern parts of the plateau area the soils are largely residual or alluvial in character. Some are very fertile and productive, such as those formed over the limestones in the Blue Grass Region and in the Nashville Basin, while others derived from sandstones are thin, sandy, and poor. The alluvial soils are usually rich but in some of the valleys they are subject to severe floods.

Cultural Features

The geographic significance of the Appalachian Ridges and Valleys, and the Appalachian Plateaus in the growth and economic development of our country is apparent to one who makes an appraisal of well-known episodes and events that are associated with the area. The Catskills, the northernmost section of the Appalachian Plateaus, was the rendezvous of Rip Van Winkle when he sought to escape some of the unpleasant realities of domestic life. Pittsburgh and vicinity on the Allegheny Plateau are associated with the struggle between the English and French colonists at Fort Duquesne, Great Meadows, Fort Necessity, and the disaster that overtook the Braddock expedition. The difficulty in collecting internal revenue in this region is associated with the so-called Whiskey Rebellion. The stirring times surrounding the settlement of Kentucky and Tennessee reflect the influence of geography on pioneer life on the plateaus. More recently the discovery of petroleum in the undulating rocks of western Pennsylvania in 1859 opened a new era in the development of the middle section of the Appalachian Plateaus.

Squire Boone and his family, from their home near Philadelphia, moved southward through the Great Valley in 1750 and settled in North Carolina. One of his sons, Daniel, hunted up and down the valley and eventually found his way through Cumberland Gap to the plateau beyond. During the War between the States, the Great Valley was very important as a source of agricultural products. Several critical battles were fought in the southern end of the Ridge and Valley Region, among them Chickamauga, Lookout Mountain, and Missionary Ridge. A memorable conflict between Federal and Confederate troops occurred at Winchester in the Shenandoah Valley, an event made famous by Sheridan's Ride. These are only a few of the stirring episodes with their geographic setting in the Great Valley roadway and on the Appalachian Plateaus.

The fertile soils of the Great Valley have produced abundant crops since historic times. In the north are excellent wheat, corn, and hay-producing areas, dairies, truck farms, and maple-sugar factories. Farther south the climate is sufficiently warm for the growing of cotton, corn, wheat, and subsistence crops. The ridges generally are forested or covered with orchards. In the central part of the Shenandoah Valley, apple growing has developed as a special crop. Here is located the famous Apple Pie Ridge which for a century and a half has been known for its apples. Orchards so nearly cover this ridge that one may travel many miles along its crest

and never be farther than a few hundred yards from one.[1]

Well-tilled fields, neat fences, painted houses and big barns, excellent pastures with sleek cattle and sheep, orchards, and well-kept highways indicate that the valleys are prosperous. On the ridges the homes and the fortune of the people are as a rule not as satisfactory as in the lowlands. The farms are often run-down, the smaller buildings are usually unpainted and practically all the cultural features of the landscape may have a neglected appearance.

The deposits of iron ore, coal, and limestone in the Lehigh and Schuylkill valley sections gave rise to early centers of iron and steel manufactures. At present, heavy iron and steel products such as locomotives and mining machinery are made at several places in the valley, notably at Harrisburg, Bethlehem, and Lebanon, Pa. Roanoke, Va., and Birmingham, Ala. The district around Birmingham is most favorably situated for the large iron-smelting and steel plants because the iron ores, coal, and limestone for flux are all in close proximity. In addition to the building stones already described, abundant quantities of clay and shale are used in the manufacture of brick, tile, and pottery. Good grade sandstones and limestones are also available for building purposes. The cement industry was fostered by the extensive limestone and shale beds, the nearby coal deposits in the Lehigh Valley in eastern Pennsylvania, and the adjacent large consuming centers.

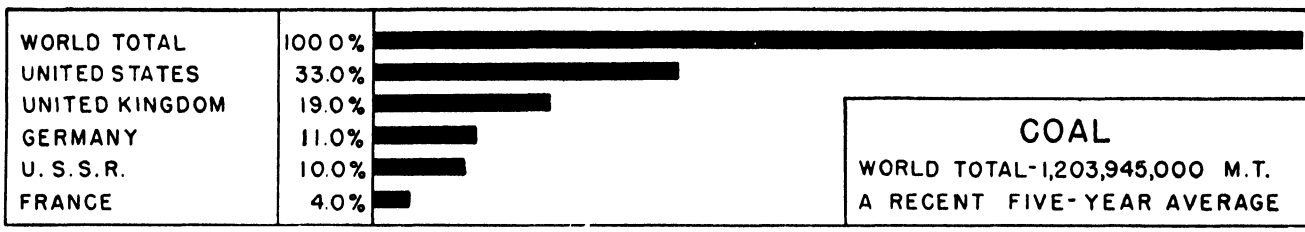


FIG. 25. WORLD COAL PRODUCTION. An 8-year average just preceding World War II. (Data from *Foreign Commerce Yearbook*)

The intense folding and the resulting changes in the rocks in the Ridge and Valley Region have been instrumental in making this region the leading mining and quarrying center in North America for anthracite coal and metamorphic building stones, such as marbles, slates, and quartzites. Because of nature's conversion of good bituminous coal into high-grade anthracite in northeastern Pennsylvania (Scranton and Wilkes-Barre), this district is outstanding in the mining of anthracite or hard coal, producing more than 95 per cent of the entire output of the United States (Fig. 25).

Tennessee and Georgia at Knoxville and Rome, respectively, yield high-grade marbles varying in color from white to maroon. Pennsylvania has one of the largest slate quarries in the world, yielding almost one half the output of the United States. Bauxite (aluminum ore) deposits are found on the southeast slope of Missionary Ridge near Chattanooga and were first worked in 1907.

The local forests early encouraged the lumber business, which has been developed into furniture manufacture, and into other industries using wood. Flour mills, creameries, and industries depending upon agricultural products abound, silk and other textile factories are numerous, and some industrial plants are engaged in the making of specialized articles such as shoes, billiard balls, knitted goods, confectionery, ice cream, and cigars.

A great social and economic experiment, undertaken by the federal government through the agency of the *Tennessee Valley Authority*, aims at a comprehensive development of the entire Tennessee River Basin. This gigantic undertaking begins in the vicinity of Knoxville and extends downstream. It covers more than 40,000 square miles in seven states. Three objectives for this proj-

[1] White, C. Langdon, "Shenandoah—'Daughter of the Stars,'" *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp. 40-56. An excellent description of the best-known segment of the Great Valley in both its historic and present-day aspects.

ect were proposed. First, it should reduce flood hazards during periods of high rainfall; second, it should permit the generation of hydroelectric power; and third, it should make possible the maintenance of a 9-foot channel for navigation between Knoxville and the Ohio River at Paducah, Ky. The effects of this project are far-reaching. It not only will make much electric power available for industry and home consumption and retard destruction by floods, but its benefits will extend far into the adjacent mountains and plateaus where the control of soil erosion must be encouraged. Moreover, farmers may benefit from rural electrification, and this type of enterprise, if successful, can be repeated in other sections of the country. Already there is considerable pressure for corresponding developments in the Missouri and Columbia river basins, and these are proposed as postwar projects.

The Appalachian Plateaus, due to the great variation in topography, the underlying materials, and the types of soil, foster a considerable diversity of human activity. The northern part was settled early by white men, whereas the southern portion was left unpenetrated until after the Revolutionary War.

The Allegheny Plateau in New York is famous for its excellent dairy farms which supply fresh milk and cream to people in New York City and other near-by urban centers. Cheese is a profitable product from surplus milk. Fruits, especially apples and grapes, are produced in great quantities in southern New York and northern Pennsylvania. The scenic Catskills offer excellent facilities for summer and winter recreation to people in the densely populated areas of New York, Pennsylvania, and New Jersey, and also furnish most of the domestic water supply for New York City.

In the central part of the plateau country many people engage in intensive agriculture such as truck farming and fruit raising near the larger cities, but in some of the rural districts many families can barely eke out a living by the more primitive types of farm practices. In the southern part of the plateau tobacco, cotton, corn, and small grains are produced on the better soils, especially in the Nashville Basin and in the Kentucky Blue Grass Region. On the uplands surrounding these two basins, where the soils are thin, corn is the leading crop, and one wonders how the farmers can obtain enough to make a living. The sale of home-manufactured furniture, baskets, rugs, and hand-woven textiles helps the farmers on these poorer lands to buy what they cannot produce at home.[1]

The Appalachian Plateaus support one of the greatest industrial bituminous coal fields in the world. It extends from northern Pennsylvania to Alabama, and produces most of the coal used in industry in eastern United States. Inasmuch as the coal lies in nearly horizontal beds, often quite close to the surface, mining is relatively cheap and easy. Pennsylvania, Kentucky, West Virginia, and Ohio are the leading producers of industrial coal.[2]

The second mineral resource is petroleum and associated natural gas. The first oil well in North America was drilled near Titusville, Pa., in 1859 by Colonel Drake. This was really the birth of the United States oil industry which has now reached such tremendous proportions and value. Natural gas is the chief source of lighting and heating in many towns in Pennsylvania and formerly was so inexpensive that it was just as cheap to burn the lights day and night as it was to extinguish and relight them daily. The natural gas and large supplies of sand have encouraged the manufacture of glass and glass products, Pennsylvania being the foremost state in glass manufacture.

During the early settlement of the Appalachian Plateaus the pioneers found deposits of iron ore. The coal, iron ore, and limestone in contiguous beds early led to the manufacture of iron and steel products in Pittsburgh. However, the iron and steel industry of the United States had its beginning in New England during colonial days. By the middle of the nineteenth century the industry was thriving at its best in the anthracite fields of the Ridge and Valley Region, but today the Pittsburgh-Youngstown district is the center of the most

[1] Davis, D. H., "A Study of the Succession of Human Activities in the Kentucky Mountains," *Human Geography Studies: The United States,* McKnight and McKnight, Bloomington, Ill., 1935, pp. 71-86.

[2] Murphy, Raymond E., "A Southern West Virginia Mining Community," *Economic Geography,* January, 1933, Vol. 9, pp. 51-59.

important steel-manufacturing area in the world. At present, the iron ore is brought from the Lake Superior mines through the Great Lakes to receiving ports along Lake Erie from whence much of it is transported to Pittsburgh by rail. The Pittsburgh-Youngstown district has the advantage of being near the eastern markets for steel goods, and in and near areas which have needed much railroad and agricultural equipment.

The Appalachian Plateaus are, on the whole, served by several good railroads and many highways, especially in the north. There are, however, many scattered areas which are accessible only by very poor roads or trails.

URBAN CENTERS. The fertile soils, the favorable climate, the rich mineral and stone deposits, and the importance of the Great Valley as a highway have promoted the rise of numerous agricultural and industrial enterprises. These in turn have contributed to the development of many medium-sized trade centers, only a few of which can be discussed here (Fig. 26).

Scranton and *Wilkes-Barre* in Pennsylvania are the two leading anthracite-producing cities in the United States. The former is 8 miles above the junction of the Susquehanna and Lackawanna rivers. It is the metropolis of the area which contains most of the anthracite deposits in the United States. Silk manufacturing, which ranks next to coal mining, has developed since 1900 and is an industry in which many miners' wives and daughters work. Recently many of these plants have been converted to the fabrication of rayon and nylon goods. Iron and steel goods, woolen and knit fabrics, and lace curtains are other manufactured products. Wilkes-Barre is 100 miles northwest of Philadelphia on the east bank of the Susquehanna River and, although smaller than Scranton, specializes in much the same kind of activities.

The capital of Pennsylvania, *Harrisburg*, is at the eastern edge of the Great Valley where the Susquehanna breaks through one of the most severely folded areas of the Ridge and Valley Region. Coal mined in the adjacent plateau and iron ore, formerly mined in the area but now brought from the Lake Superior district, have contributed to the establishment of iron and steel mills, blast furnaces, and machine shops. The place was first known as Harris' Ferry, but was changed to Harrisburg in 1785.

Knoxville, Tenn., in the Tennessee Valley between the Cumberland Plateau and the Great Smoky Mountains, is the trading, shipping, and manufacturing center for a large area. Quarrying, carving, and polishing marble constitute one of the most important industries. About thirty marble quarries are located in the vicinity. Among the

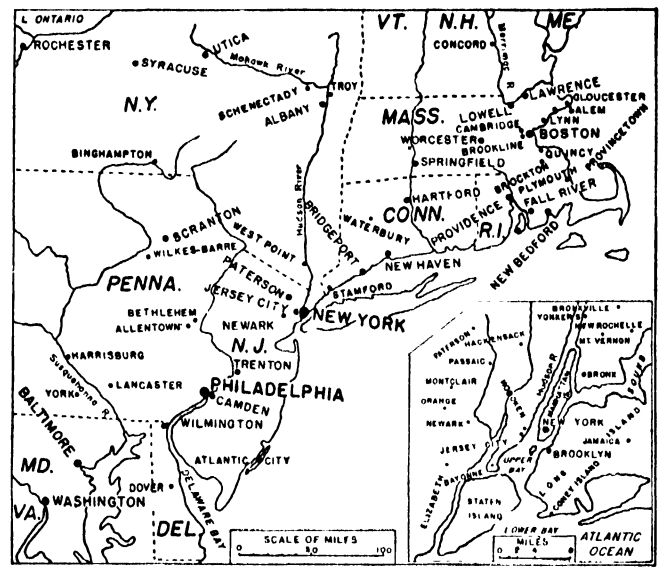


FIG. 26. CITIES OF NORTHEASTERN UNITED STATES Clusters of small satellite cities surround New York and Boston. (See inset.)

manufactured goods are woolen and cotton fabrics, flour, furniture, pottery, boilers, stoves, caskets, and zinc products.

Chattanooga, Tenn., is on the picturesque and famous Moccasin Bend, a sharp meander formed by the *Tennessee River* before it breaks through Walden Ridge. To the northwest is Signal Mountain, to the east Missionary Ridge beyond which is the historic battlefield of Chickamauga, and to the south rises Lookout Mountain which commands magnificent views in five states and on which was fought the famous "Battle above the Clouds." Chattanooga is a leading commercial, industrial, and distributing city.

Birmingham, the largest city in Alabama and one of the leading commercial cities in the South, is at the southern end of the Great Valley—a center

for converging lines of transportation. The large deposits of coking coal, iron ore, and limestone free Birmingham's iron and steel industry from dependence on other areas for raw materials. Through its excellent transportation system, the marketing of pig iron and iron products is easy and rapid. Because of the location of Birmingham in a good agricultural area, it is an important receiving and distributing center of farm products and machinery. The manufactures include about 2000 different commodities produced in some 700 mills. Among these are coal tar, gas, cast iron pipes, wire, nails, steel cars, and car wheels; machinery for use in cotton gins and mills, in sugar cane mills, and in coal mines; brick, cement, lumber, cottonseed oil, food products, cotton goods, chemicals, and explosives.

On the Appalachian Plateaus are many cities and towns; but because of limited space only five of them will be considered.

Pittsburgh, the "Smoky City," metropolis of the Appalachian Plateaus, and the second largest city in Pennsylvania, is situated where the *Monongahela* and the *Allegheny* rivers, flowing through deep valleys, unite to form the *Ohio River* (Fig. 27). Its location in the center of a network of railroads, its easy access by barges and by rail to the most productive coal fields in the United States, adjacent limestone deposits, and good transportation by rail and boat from the iron ore fields of Minnesota, have helped to make Pittsburgh the leading iron- and steel-manufacturing center in North America and also in the world. On this account it is known as the "Steel City." The petroleum and natural gas from the undulating folds of the underlying bedrocks have contributed much to



FIG. 27. PITTSBURGH. Note the numerous bridges over the Allegheny (left) and Monongahela (right) rivers. The city had its beginning on the point of land between the two bridges in the immediate foreground—at first Fort Duquesne and later Fort Pitt. The skyscraper in the far background is the University of Pittsburgh.

the manufacture of glass, pottery, electrical equipment, and numerous other articles.

George Washington, while exploring for the governor of Virginia in 1753, recommended the site for the erection of a fort. When the English returned to occupy the place, the French had already built Fort Duquesne but they were dislodged in 1758 and the place was renamed Fort Pitt.

Charleston and *Huntington*, W. Va., are smaller industrial and commercial cities which serve the people in the bituminous coal area.

On the Ohio River and near the famous Blue Grass country is *Louisville,* Ky., one of the gateways to the Southwest. It has become an important trade and manufacturing center in the South because of exceptional transportation facilities and the rich agricultural surroundings. Hydroelectric power for it, and other cities, is generated at the falls in the Ohio River. A canal and locks connect the upper and lower ends of the rapids, making river transportation possible at all times. Manufacturing in Louisville centers about tobacco, planing mill products, furniture, motor vehicle bodies, and meat packing. One of the great annual events is the running of the "Kentucky Derby."

Nashville, the capital of Tennessee, a leading transportation and manufacturing focus, is on the *Cumberland River* in the beautiful and fertile Nashville Basin (The Dimple of the Universe). It is a hardwood lumber center, ranks high in the production of cotton and burlap bags, and the processing of agricultural products, and specializes in the manufacture of steel barges.

Future of the Ridge and Valley Region and Appalachian Platfaus. The great diversity of topography, rock structure, soils, and natural resources in the Great Valley and Appalachian Plateaus has attracted a varied population. In the coal-mining and manufacturing centers are numbers of poverty-stricken people, many of foreign birth. Labor problems frequently become acute, two of the most distressing of which are the uneven distribution of work through the year for miners and mill hands and the low standards of housing.

Coal mining in the Appalachian Plateaus as in the Great Valley is a seasonal occupation and, consequently, the men are idle part of the year. Many foreign-born workers may find that the American ways of life do not conform to their preconceived notions. Such social and economic maladjustments often lead to strikes, damage to property and, perhaps, loss of human life. The conservation of coal, petroleum, and natural gas needs attention.

In the rural sections of the Great Valley live most of the successful farmers with excellently kept farms, while in the hilly sections are farmers who barely make a living and whose holdings are run-down and poorly maintained. Educational facilities as a rule vary according to the prosperity of the people. There are numerous institutions of higher learning in this area among which are Cornell University at Ithaca, N. Y., the University of Pittsburgh and Carnegie Institute of Technology at Pittsburgh, Penna., Vanderbilt University at Nashville, Tenn., and the University of Tennessee at Knoxville, Tenn.

Agriculture on some parts of the Plateaus is a problem because of remoteness from markets, soil erosion, soil depletion, and low prices. Since some areas are difficult to reach because of poor roads and lack of railroads, more attention should be given to the improvement of transportation.

There are considerable areas of good timber lands in the Appalachian Plateaus, although large tracts have been denuded of their forest cover. As a result, rapid run-off, soil erosion, and disastrous flooding of the Mississippi and Ohio valleys and many of their tributaries have taken a large toll of wealth, resources, and even lives. What efforts should be made to conserve and use them to better advantage?

4

Appalachian Highlands (Concluded)

NEW ENGLAND-ACADIAN UPLAND AND THE ADIRONDACK MOUNTAINS

THE NEW ENGLAND-ACADIAN UPland is a northern extension of four physiographic regions of North America. (1) On the west is a fertile agricultural and historic valley, the *Hudson-Champlain Lowland*, extending northward from the Great Valley. (2) Lying east of this lowland is the northeast extension of the Blue Ridge, represented by the *Berkshire Hills* and *Hoosac Mountains* in Massachusetts, the *Green Mountains* in Vermont, and the *White Mountains* in New Hampshire and still farther the famous *Mount Katahdin* area of Maine. (3) Eastward from the mountainous section is the northward extension of the Piedmont Upland, which makes up a large part of the eastern New England-Acadian area, and extends from Connecticut and Rhode Island far northward into Nova Scotia and New Brunswick. (4) A small portion of the Atlantic Coastal Plain in New England includes Cape Cod and the nearby islands of Martha's Vineyard and Nantucket.

Natural Features

A view from almost any hill on the uplands reveals a fairly even sky line, which is chiefly the result of ancient peneplanation.[1] Some of the isolated hills, called monadnocks, are remnants of the former highland. The valleys of the area have been carved into the ancient peneplain since it was elevated. Later these drainage systems were profoundly altered by glaciation. In many places dams were formed by glacial debris, blocking the valleys, thus making thousands of lakes. The glacial dams forced such rivers as the *Blackstone, Merrimac,* and *Penobscot* to make new courses around the obstructions. Waterfalls occurred in places where the streams encountered ledges of hard underlying rocks when they re-entered a pre-glacial valley. Both lakes and waterfalls have exerted marked influences on the economic life of the people. The lakes not only supply a storage of water for domestic purposes, fishing, and recreation, but also produce a constant stream flow, so essential to waterfalls that provide power for manufacturing industries.

After valleys were made in the old elevated peneplain, submergence of the coastline and later glaciation produced many coves and estuaries, and a deeply indented, irregular shoreline, resulting in a so-called ria coast—so well represented in Maine. In some places on the south coast of New England, where the shore is less rugged, there are a number of sandy beaches such as those of *Cape Cod, Newport, Nantucket,* and *Martha's Vineyard,* caused in part by outwash from ancient glaciers and in part by wave action.

Nearly all of the mountains in New England and New Brunswick are relatively low in altitude and as a rule are forested to the summits. The White Mountains of New Hampshire are highest with some peaks, especially in the *Presidential Range,* extending above the timberline. *Mt. Washington,* 6295 feet, is the highest peak. The Green Mountains of Vermont and the Berkshire Hills of Massachusetts are lower and are green with spruce and pine. Notches, cut through the mountain ridges by rivers, serve as gateways for roads and railroads.

[1] The process by which a large land mass is reduced to the lowest level possible by stream erosion.

The mountains of the region provide many beautiful sites for summer and winter resorts.

The bedrocks of the New England-Acadian Upland are complex, consisting largely of granitic and metamorphic materials. The Connecticut Valley was an inland sea during later geologic times. It was partly filled by sediment, eroded from the nearby uplands which later were consolidated into sedimentary rocks. The mantle is thin on the hills and slopes, whereas in the valleys it is frequently thick but composed of glacial debris full of coarse gravels and boulders. Alluvial deposits occur in the flood plains of the larger streams, especially the *Connecticut River.*

Nearly everywhere rock is available for building purposes. Even fences made of rock, locally called "stonewalls," are common. The granites, quarried in New England, especially in Vermont, Massachusetts, and New Hampshire, and the marble and slate of Vermont, because of their reputation for high quality and beauty, are shipped far and wide. Clays are used extensively in the manufacture of brick and tile, especially in the Connecticut Valley.

The New England-Acadian Upland has a continental humid climate with short mild summers (Fig. 236). The temperatures of summers and winters are not as extreme as they are farther inland in the same latitudes because of nearness to the ocean. The length of the growing season at Van Buren in northern Maine is 120 days, the average date of the last killing frost of spring is May 28 and the first killing frost of autumn on September 25. The winters are humid and longer, and the snows are deeper in the north and in the interior than in southern New England. At Van Buren, the average annual rainfall is 26.4 inches, quite evenly distributed through the year—August, with 4 inches, being the rainiest month, and February, with 2.3 inches, the driest.

At Boston and in other parts of southern New England, the average length of the growing season is 193 days, and the average annual rainfall is 43.5 inches with an evenness of 87 per cent. The average annual temperature is 50° F. at Boston. July, with an average of 72° F., is the warmest month, and January, with 28.2° F., the coldest. Winter temperatures decrease rapidly inland (Fig. 8).

Because of the position of the region in the path of a large proportion of the lows that cross the continent, the whole region is one of variable weather with frequent and rapid changes.

All of the New England-Acadian Upland Region formerly was forested with rich stands of spruce, white pine, and broad-leaved deciduous trees, but the original forest cover of much of the area has been removed and subsequent second-growth trees now furnish merchantable timber (Fig. 237). It



FIG. 28. HARDWOOD TREES ABOUT SIXTY YEARS OLD. Trees in Vermont do not grow as rapidly as they do in regions with less severe climate and with a longer growing season. (Courtesy U. S. Department of Agriculture)

must be remembered that owing to the limited growing season, trees do not reach maturity as rapidly here as they do in the subtropical humid climates (Fig. 28). Lumbering was formerly an important industry, and still is in portions of Maine. During colonial days and for several decades thereafter the New England forests furnished timber for a thriving ship-building industry along the coast from Connecticut to Maine and declined only when wooden vessels began to be replaced by steel ships.

The mature soils of the region are largely podzols and where used for farming require careful management and frequent lime amendments to maintain fertility (Fig. 238). On account of the ruggedness of much of the area and the unfavorable effects of glacial action, the soils except in the alluvial plains are generally either thin or boulder strewn.

Cultural Features

The varied imprints of man's occupancy of the New England-Acadian Region are remarkable in numerous aspects. Strong ties with European forebears are indicated by the names of the major political divisions—*New England, New Brunswick,* and *Nova Scotia* (New Scotland). Inhospitable natural conditions contributed much to the economic, historic, social, and literary features that characterize the activities of the people in the area. Some of these conditions were the forests, the falls in the rivers, the thin and rocky soils, the unfriendly Indians, and the severe winters.

When the English landed on the coast of New England early in the seventeenth century, Indians occupied the land and dispossessing them was not a pleasant experience. With that task completed, the sturdy pioneers from Europe and their descendants contributed immeasurably through the decades to our national heritage. From the historical standpoint such features as the settlement of Plymouth, the battles of Lexington, Concord, and Bunker Hill, the Boston Tea Party, the Abolitionists, and the threat of secession are a few samples. Here, education as a social policy received an initial impetus through the early founding of Harvard College at Cambridge, Mass., Yale at New Haven, Conn., and such colleges as Dartmouth, Bowdoin, and Williams. Literary genius reached fruition in the lives of men like Emerson, Bryant, Thoreau, Longfellow, Holmes, Whittier, and Lowell. Nova Scotia furnished part of the setting for Longfellow's *Evangeline.* Patriotism flamed through such individuals as Hancock, Webster, Garrison, and the Adamses. Economic progress was registered by the manufacturing industries that from early days thrived in the New England portion of the region.

The use that has been made of natural conditions in the New England-Acadian Region is a fascinating study. The genius of the people has accomplished much under the spur of some hard environmental circumstances.

Before the lands in the Ohio and Mississippi valleys were opened for settlement, agriculture was largely on a subsistence basis. Later, as manufacturing industries became more important, farmers were lured from the soil because they could make a better living by working in factories than by competing with the farmers in the fertile plains farther west. Today dairying thrives in some sections, especially in southern Vermont, Connecticut, and Massachusetts, because this is a good pasture and hay country and dairy products are in great demand in the many near-by cities. Some specialized crops have found a permanent place: tobacco in the Connecticut Valley, cranberries in the bogs of Cape Cod, apples in Massachusetts, and sweet corn and potatoes in Maine. Truck farming and poultry raising are profitable and stable industries near the urban centers.

Manufacturing first consisted of household industries and was expanded by harnessing the many small streams which provided an abundance of water power. As it waxed greater, however, water power had to be supplemented by the use of coal. Much of southern New England is a "hive" of industry, supporting a multitude of different manufacturing enterprises, some products of which are woolen and cotton textiles, leather goods, firearms, paper, and a host of things requiring much labor and small amounts of raw material. The textile industry gained favor because of New England's moist climate which kept the fibers from becoming dry and brittle. Even though humidifiers are now used to add moisture to the air of modern factories in drier climates, still the textile mills in New England can produce fabrics of extra quality because of the skilled operators that the region has been able to hold.[1]

The submergence of an ancient coastal plain gave the region a wide continental shelf over which fish abound in almost limitless numbers. The lack of good farming land, the presence of timber for shipbuilding, the many estuaries and coves to shelter ships from storms, the cool climate, and the abundance of fish in the sea early attracted large numbers of people into the fishing industry. Fishing today is one of the foremost occupations of the whole region; and Boston, Gloucester, Portland, St. John, and Halifax are important among

[1] Parker, Margaret Terrall, "Lowell: A Study of Industrial Development," The Macmillan Co., New York, 1940. A scientific study of the evolution of a large industrial community.

the cities in this industry. Cod, haddock, mackerel, lobsters, shrimps, scallops, and oysters constitute the chief harvest from the sea.[1]

The forest-clad hills, the fascinating scenery, the many lakes, and the wild game; the indented coastline of Maine and the beach coast of Cape Cod, Rhode Island, and Connecticut; and the places of historical and literary interest are permanent assets to New England, providing the foundations for an ever-increasing tourist business. On account of these features and the numerous resorts and recreational centers operated both in summer and winter the region is deservingly famous. About one-half billion dollars are spent annually in New England alone by the several millions of tourists and vacationers.

New England was among the first of the regions in the United States to develop the hostel movement similar to that which had been in vogue in Europe for several decades. Now, reasonably priced hostels are available to young and old in the Appalachian Highlands, especially in New England, and also in other mountain areas farther west in America.

This section of the United States and Canada has an abundance of good water for domestic use from the many springs, streams, and lakes. Reservoirs for large cities such as Boston are often located in valleys quite far from the city. Many of the farmers have piped running water to their farmsteads from springs or from streams in the mountains.

URBAN CENTERS IN NEW ENGLAND. The evolution and growth of urban centers in New England are different from any other region. In the first place the natural environmental features are unique; second, the cities and towns are older, most of them dating from the seventeenth or early eighteenth century; third, the cities and towns of the region were the first in the United States to develop specialized manufactures; fourth, the region for a half century or more has been primarily an industrial-commercial area, importing considerable foodstuffs; and last but not least, the cities of New England in their evolution have been forced constantly to modify their activities because of technological advances, changes in demands for their goods, and competition from other cities.[2]

Within the New England-Acadian Upland are 65 cities with populations of 25,000 or more. In this group are 28 cities each with 50,000 or more people, and 15 which have 100,000 or more. One great metropolitan district, Boston, has more than 2,000,000 people in an area of approximately 1000 square miles (Fig. 26).

To the traveler, two characteristic features usually mark the New England city or town: its historic connections, buildings, or schools; and its specialized industry or commerce. The following cities are given special consideration because they represent these features and characteristics. Ninety per cent of the population in Rhode Island and Massachusetts was urban in 1910, but in Vermont only 34 per cent was urban.

Boston ("The Hub"), the commercial and cultural metropolis of New England and capital of Massachusetts, is situated on Massachusetts Bay at the mouth of the Charles River. The city has one of the finest natural harbors along the Atlantic seaboard, but relatively it does not rank high in commerce as compared with some other ports of the United States because its hinterland is confined largely to New England, extending only to the mountain barrier, the Berkshires, in western Massachusetts. Boston itself is a "hive" of industry and surrounding it are three zones of specialized activities. The inner zone features the leather industry with its tanneries; the second zone is famous for leather footwear, especially at *Brockton*, *Haverhill*, and *Lynn;* and the third zone, specializing in the textile industries, extends from *Lowell* and *Lawrence* in the north to *Fall River*, *New Bedford*, and *Providence* in the south. About one half of the cotton manufactures of New England are produced in the Boston metropolitan and *Fall River-New Bedford* areas.

Boston, the leading wool and leather market in

[1] Ackerman, Edward A., "Depletion in New England Fisheries," *Economic Geography*, July, 1938, Vol. 14, pp. 233-238.

[2] Botts, Adelbert K., "Northbridge, Massachusetts. A Town That Moved Down Hill," *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp. 28-39. The sequent development of a small New England town.

the United States and preeminent as a fish mart, is important as a commercial port. Its manufactures, like its shipping and jobbing trade, are very diverse. The city is rich in historic interest; for it was here that the Battle of Bunker Hill was fought, and the Boston Massacre and Tea Party were held. Here also are some of the oldest churches, schools, and public buildings in America. Harvard College, founded in 1636, and the oldest in the United States, is located at *Cambridge,* a part of the Boston metropolitan area.

In addition to being a textile-manufacturing city, *Fall River,* at the mouth of the Taunton River, is also a port and railroad center. *New Bedford's* location on an inlet of Buzzard's Bay, was favorable in making it the center of the whaling industry in pioneer days. *Lawrence* and *Lowell,* on the Merrimac River, derive much water power from the river to drive the mills for the manufacture of woolen and worsted goods, chemicals, paper, and many other products.

Holyoke ("The Paper City") is in Massachusetts on a bend of the Connecticut River. Because water descends 57 feet as it winds through the city, the river has been harnessed by a great dam, which feeds power canals on three successive levels. The water, as it drops from one level to the next, develops power for a number of factories. The city is famous for high quality silks, satins, woolens, and worsteds, but it is best known for the great mills which make high-grade writing paper.

Worcester, in the interior of Massachusetts, was founded on the Blackstone River. Because water power was available for factories, Worcester has become noted for the manufacture of rugs, hardware, and machinery.

Springfield, Mass., is famous for its railroad activities, for the manufacture of hardware, and especially for Springfield rifles. For a long time most of the firearms in the United States were made in Connecticut and Massachusetts, the great centers being at Bridgeport, New Haven, Hartford, and Springfield.

Providence, R. I., the second largest city of New England, is situated at the head of navigation on Narragansett Bay. The site of the settlement was chosen in 1636 by the exiled Roger Williams, who later founded the city.

Hartford, Conn., is an important port of entry at the head of navigation on the Connecticut River, 50 miles from Long Island Sound and at the mouth of Park River, which flows through the city. Hartford was founded more than 300 years ago and has had a long, interesting history. It is noted as the home of a vast insurance empire. It manufactures many products such as firearms, machine guns, airplanes, telephone parts, typewriters, clocks, and organs. The city is also the center of the tobacco trade in Connecticut.

New Haven and *Bridgeport,* Conn., grew into great manufacturing centers because they were seaports first. New Haven is at the head of New Haven Harbor and on the New York, New Haven, and Hartford Railway. It is the seat of Yale University, one of the oldest in America. The city has numerous features of historic interest. Its industries are largely related to the metal trades—the better known being firearms, clocks, sporting goods, musical instruments, hardware, and wire products. Bridgeport, at the mouth of the Pequonnock River and on an inlet of Long Island Sound, has a harbor that is accessible to fairly large vessels. Daily steamboat connections are made with New York City.

Waterbury, Conn., an industrial center on the uplands of the western part of the state, is at the confluence of three small rivers. It has long been known as the "brass city" for it supplies a large proportion of the brass goods in the United States. It is also a famous clock- and watch-making center, where vast factories annually turn out hundreds of thousands of clocks and watches.

The three leading cities for quarrying and dressing rocks are *Quincy,* Mass., and *Rutland* and *Barre,* Vt. *Quincy,* about 10 miles south of Boston, is noted as the first place in the United States where stone quarrying was done. The granite is beautiful and of excellent quality. The shipbuilding industry is important also.

Rutland has long been famous for its high-grade marble which is produced on the flanks of the Green and the Taconic mountains. The beautiful location of the city near the Green Mountains and the many lakes within twenty miles have made it a summer resort and touring center.

In the Green Mountains is *Barre,* famous for high-grade granite which is shipped to all parts of the United States. On the east bank of Lake Champlain is *Burlington,* the largest city in Vermont. Its strategic location, with respect to Lake Champlain, the Green Mountains, and the Adirondacks, has made it a good commercial and industrial center as well as a famous resort and university city.

Portland, Me., a leading port of entry, is on Casco Bay where it has direct steamship connection with many of the coastal cities and with Canada. Portland is noted for its fisheries and associated industries, its canned goods, chemicals, and wood work.

SURVEYING THE FUTURE. As the people of the New England and associated Canadian areas look to the future, they are confronted by numerous perplexing situations. Some of these problems are inherent in the area itself, whereas others result from factors impinging from the outside. Much of the area does not produce enough food to satisfy the needs of the increasing population. There is not enough power developed in the streams of New England to supply the needs of all the factories. The region must seek coal and electrical power from other areas for additional energy. Most of the raw materials for manufacturing must be shipped in from outside. Some manufacturing interests of the New England section are migrating from the area now. Competition for markets is becoming keener. Nearly all the people of older lineage have been replaced by foreign immigrants, and no longer is New England the staid conservative community that it was a few decades ago. The situation is indeed challenging to the best minds among the people, but there seem to be several favorable factors.

It is not too much to expect that food from the outside can be imported into New England cheaply enough to keep the cost of living at a reasonable level. New power projects can be developed, and more fuel for power may be obtained from the Appalachian coal fields. More specialization in the manufacture of expensive non-bulky articles may help solve the problem of raw materials. Those manufacturing industries that are moving out may specialize in the making of articles that can be produced more cheaply near the source of raw materials but superior workmanship and the possession of many trained workmen should help New England to maintain its place in the world of competition. In addition to the possibilities mentioned, there are other advantages that may be featured. The fishing industry may be exploited more fully. Reforestation can do much for the future. But better still the forest-clad hills, the attractive lakes and streams, the alluring coastal features, and the rich background of historic, literary, and social interests can be capitalized upon in promoting the economic well-being of the people of the region, epecially by attracting students, vacationers, and travelers.

Adirondack Mountains

One of the most popular mountain resort and playground regions in eastern United States is in the Adirondack Mountains of northern New York. They form an island-like mass of more than 10,000 square miles, rising abruptly above the lowlands of the *St. Lawrence* on the north, *Lake Champlain* and its valley and the Hudson Lowland on the east, and the busy *Mohawk Valley* on the south. Although structurally the Adirondacks are a part of the Laurentian Upland, the area is discussed with New England because it is an integral part of the United States (Fig. 11).[1] The area is connected with the Laurentian Upland by the Thousand Islands in the St. Lawrence River (Fig. 29).

The climate of the Adirondacks is continental humid with short summers. An abundance of rain falls in summer and the temperatures are moderate. In winter the snows are heavy and the temperatures are low.

The area formerly was completely forested and now is covered largely with second-growth trees. Most of the merchantable timber has been cut. In the higher altitudes, where temperatures are lowest and rainfall is greatest, spruce is the dominant vegetation. On the lower slopes are pines and cedars and in the bordering valleys broad-leaved deciduous forests occur. Wild flowers are abundant and beautiful. The excellent vegetational cover,

[1] See short regional discussion on page 107.

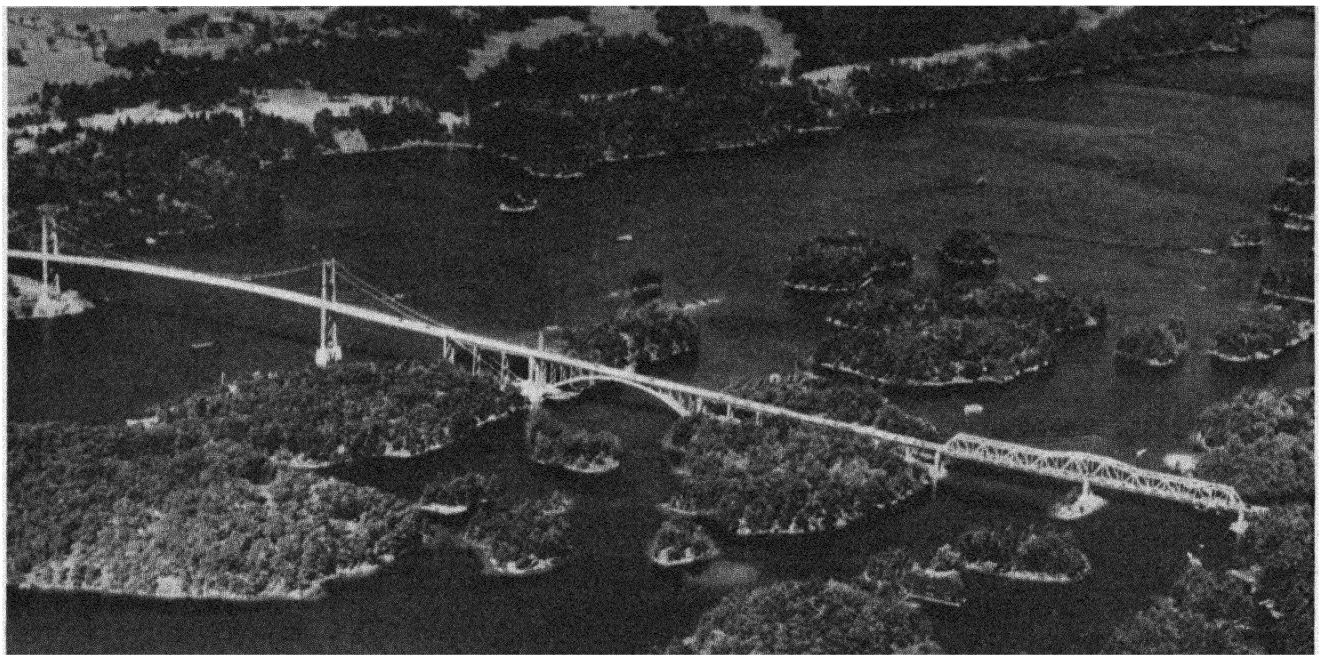


FIG. 29. "THOUSAND ISLANDS" INTERNATIONAL BRIDGE. This is the St. Lawrence River twenty miles from Lake Ontario, and the islands are remnants of the isthmus that once connected the Adirondacks with the Laurentian Upland. (Courtesy Canadian Government Motion Picture Bureau)

heavy rainfall, and relatively steep gradients of the streams make hydroelectric power possible at low costs for both homes and factories.

Even before white men came to the Adirondacks the Indians used Lake George as a major link in their water route between the Hudson River and Lake Champlain. The Iroquois, traveling back and forth in bark canoes in their warfare with the Algonquins to the north, appropriately called it *An-di-a-ta-roe-te,* "There Where the Water Is Shut In." Very little ground along the shores of this lake has not at some time been the site of a sanguinary conflict.

The combination of beautiful scenery, the numerous lakes both large and small, the cool summer climate and the cold winters with much snow, the nearness to large centers of population, and the excellent highways make this a prominent resort and playground area. Hunting, fishing, boating, hiking, swimming, and golfing are some of the summer sports. In late years winter sports such as skiing, skating, and tobogganing have developed. Special trains for skiing enthusiasts now take crowds of people from the near-by cities into the Adirondacks for week-end activities. Many resorts are available both in winter and summer for the tourist or week-end visitor. Accommodations are available to suit all pocketbooks. The Adirondacks are a mecca for musicians and artists, many of whom have summer homes in the region.

5

Interior Plains

THE INTERIOR PLAINS of North America, extending southward from the Arctic Coast to the Gulf Coastal Plain and eastward from the Rocky Mountains to the Appalachian Highlands and the Laurentian Peneplain, is indeed an immense area with diversified physical features and varied human interests. In latitude it reaches from the subtropical belt to the polar cap, more than 2500 miles. It extends from the deciduous hardwood forests of the East into the semiarid grasslands in the West. Several times all of the northern and eastern portions of the Interior Plains were covered by continental ice sheets which left a profound imprint on the natural landscape. The Canadian portion of the area and the Great Lakes section drain into the Arctic Ocean, Hudson Bay, and into the Atlantic Ocean by way of the *Mackenzie*, *Nelson*, and the *St. Lawrence* rivers. Most of the remainder is in the drainage basin of the Mississippi River and its tributaries. The Interior Lowland encompasses two large regions—the Glaciated Lowland and the Great Plains.

GLACIATED LOWLAND AND ASSOCIATED SUPERIOR UPLAND

The Glaciated Lowland has a slightly rolling topography with an abundance of glacial hills, moraines, lakes, swamps, and waterfalls. The advances of the ice front radiated from four centers, not once or twice, but several times. The *Labrador* center was in Labrador, the *Keewatin* just west of the Hudson Bay, the *Patrician* just south of the Hudson Bay, and the *Cordilleran* in the Cascade and Coast ranges and in the Rockies of western Canada. Each of the advances from these centers modified the topography profoundly, chiefly by moving loose materials from some places and depositing them unevenly in other localities. Many lakes were formed by dams of drift across streams and also by the gouging out of material, leaving depressions which were filled later with water. Some of the earlier advances of the ice sheet extended farther equatorward than the later ones, and, as a consequence, the exposed areas of earlier glaciation have been subjected to long periods of post-glacial erosion and stream development. For this reason, most of the glaciated portions of Indiana, Illinois, Iowa, and Nebraska have few or no lakes, whereas most of the more recently glaciated areas of Michigan, Wisconsin, and Minnesota are dotted with hundreds of lakes and swampy areas.

Natural Features

The Glaciated Lowland is an area of low relief, with some portions comparatively flat, and others moderately hilly. The gently rolling lands, as a rule, are those that have undergone the longer periods of post-glacial erosion. The flat portions usually are poorly drained.

Some of the lakes left by the uneven deposition of drift have been drained by post-glacial streams, whereas other former lakes such as *Lake Maumee*, *Lake Chicago*, and *Lake Agassiz*, caused by ice dams in pre-glacial river valleys, existed only during the period of retreating ice.[1] The melting of the ice sheet permitted the drainage of the old

[1] Goode, J. Paul, "School Atlas," Rand McNally and Co., Chicago, Ill., 1943, p. 47. Some excellent maps showing effect of continental glaciation on the Great Lakes, their margins, and their outlets.

lakes through pre-glacial channels. In many cases the beds of these ancient lakes are now rich, lacustrine plains producing bountiful crops of wheat, corn, hay, and other crops.

The Glaciated Lowland is underlain by sedimentary rocks—some lying horizontally, some dipping, and some undulating. This is accounted for by the fact that the whole region at one time was a sea floor and consequently received sediments of clay, sand, and gravel from adjacent highlands, and in addition immense layers of calcareous remains of sea life. The Great Lakes lie in the serrated northern margin of this area of sedimentary rocks.

In some places the folds of the sedimentary rocks contain large quantities of petroleum, notably in Illinois, Ohio, and Indiana. Coal is also abundant in several of the states, particularly Iowa, Illinois, Indiana, and Ohio. Building stones of high quality are quarried in all of the states, but the Bedford limestone of Indiana and the Berea sandstone of Ohio are among the best known. Clay for making bricks and pottery, and gravel and sand for road and building construction are abundant.

Since the Glaciated Lowland is an interior region in middle and high latitude, the climate is continental. The growing season varies from 187 days at Indianapolis, Ind. to 167 days at St. Paul, Minn., and continues to diminish northward. Ranges of temperature between summer and winter are large (Indianapolis, 48° F., and Winnipeg, 69° F.) as compared with that of continental margins in the same latitudes (Portland, Ore., 44° F., and New York City, 46° F.). In the vicinity of the Great Lakes neither summer nor winter extremes are as marked as in other parts of the region.

The continental humid climate with both the long and the short summer phases prevails in the southern part of the area, whereas most of the Canadian portion is in the continental subpolar (Fig. 236). The average annual rainfall and also rainfall dependability decrease westward (Indianapolis, 53.7 inches, and Omaha, 30.4 inches). The percentage of dependability at Omaha is 63 whereas at Chicago it is 77 (Fig. 8).[1]

The mantle rock in general is composed of weathered glacial drift, alluvium, and acolian deposits. There are also many areas of lacustrine soil which have resulted from the drainage of numerous lake beds. For the most part, however, glacial debris covers the region except in the driftless area. In some sections glacial till is capped by deposits of loess—a rich, soil-forming material of acolian origin. The variations in rainfall and temperature in the Glaciated Lowland are largely responsible for the four major types of mature soils. In the eastern part of the Dakotas and in a small portion of Manitoba black soils or chernozems prevail (Fig. 238). In the prairie soil region of Iowa, Nebraska, and Illinois, the rainfall is relatively heavy and the soil has lost most of its lime. Eastward and northward from the prairie soils, in Minnesota, Wisconsin, Ohio, and Indiana, the rainfall is still greater, making conditions favorable for gray-brown and podzol soils—areas formerly covered by forests. Grasses grew on the chernozem and the prairie soils before white man entered the region. The continued fertility of all the cultivatable soils except the chernozems depends upon the frequent application of lime.

The prairie landscape must have been an inspiring sight in summer to early travelers and explorers in this region. The black earth mold, the tall waving grasses, the rolling hills, and the broad expanses might well be taken as a forecast of the epic occupancy that was only a few years in the offing.

East and north of the prairies were the forested lands (Fig. 237). In Ohio and Indiana broad-leaved deciduous trees of oak, hickory, maple, walnut, and beech predominated; but in Michigan, Wisconsin, Minnesota, and Manitoba, the birch and conifers of white pine, hemlock, and spruce were a part of the original landscape. Most of these forests, both the evergreen and deciduous, have been removed, and much of the land is now producing crops of corn, wheat, barley, oats, and rye.

The owner of a farm in central Illinois or in Iowa is the possessor of a rich heritage. Many features of natural environment have contributed to the remarkable productivity of the land. In many places deep glacial till is overlain by a cover of fertile loess. The black prairie soils are in part the

[1] See Appendix D for method of computation.

result of age-long action of luxuriant native grasses. After a century of tillage the soil continues to produce bountiful crops of which corn is the most important (Fig. 30). It is the best feed for the fattening of hogs and cattle and it is no wonder, therefore, that the prairie of central United States is not only the domain of "King Corn" but also the abode of two of his animal vassals, the cow and the hog. These rich prairie lands, commonly known as the "Corn Belt," cover much of Indiana, about one half of Illinois, and extend westward to include nearly all of Iowa, northern Missouri, eastern Nebraska, northeastern Kansas, and part of southern Minnesota. Only a small part of the prairies west of the Missouri River was glaciated.

Cultural Features

The first white men to enter the Glaciated Lowland came as fur traders and missionaries by way of the Great Lakes and the St. Lawrence and Mississippi rivers. The most notable among these were Marquette, Joliet, La Salle, and Hennepin. Later the English entered through the corridors and gaps of the Appalachians. The most important route of the settlers was the Mohawk River gateway. Taking the lands away from the Indians was exciting and sanguinary.

The white men who early entered the Glaciated Lowland for the purpose of making homes came from lands east of the Appalachians. The area that they first saw was covered by dense growths of broad-leaved deciduous hardwoods. Little land for farming was available until trees had been removed. The forest was a formidable obstacle in a very real sense to the pioneers. Large stands of oak, elm, hickory, maple, and walnut were cut down, heaped in piles, and burned, for at that time farm land was needed badly and forest trees were a hindrance to the extension of crop land. This practice was not uncommon in Ohio as late as 1880. Now the forests are nearly all gone, but in their place are farms, cities, highways, and railways. What happened to the broad-leaved, deciduous hardwood lands of the region has been repeated in part in the northern white pine section, but the result is far different because in much of the latter area soils are poor and the chief evidences of human occupancy are wide expanses of waste cut-over and burned-over land.

White men settled on the prairies much more rapidly than they did in the forests. The pioneer with his steel plough easily could turn grasslands into farms. The occupancy of the prairies resembled a triumphal march, quite in contrast to the slow process of forest removal. The many trees

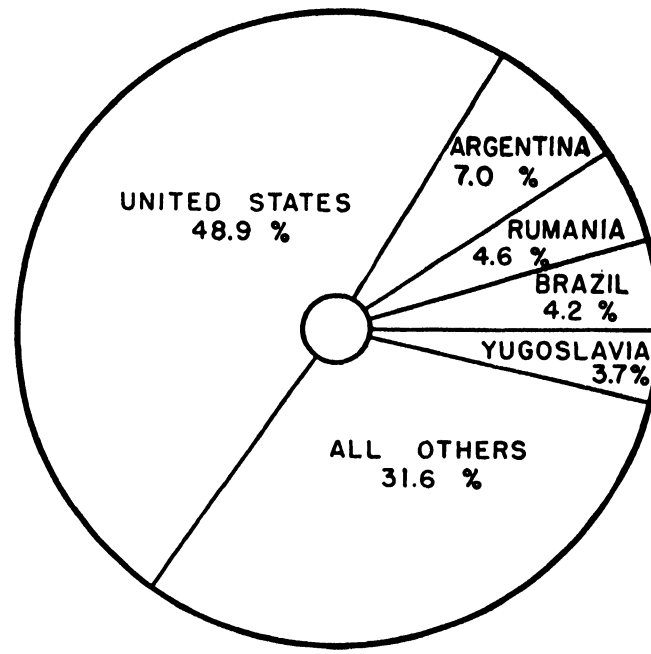


Fig. 30. World's Production of Corn. A 7 year average immediately preceding World War II. (From *Foreign Commerce Yearbook*)

which the pioneers planted on these grassy plains now greatly modify the appearance of the original landscape.

The first settlements were along the water courses because the rivers were the chief routes of travel and they often afforded most of the necessities of life—food, feed, water, and wood. When the railroad was in its infancy, the pioneers were at first greatly interested in canal building in order to connect the headwaters of the navigable streams. It was not difficult to construct canals in the region because of the low relief, the narrow, low divides, and the abundance of rainfall. Railway improvement, however, early stopped canal construction, although a number of such obsolete waterways still may be seen in Ohio and Indiana. Only one canal

is still important—the New York Barge Canal, which connects Buffalo and Albany.

The Glaciated Lowland is rich almost beyond belief. Soil, topography, and climate, blending in rare combination, make it the leading corn-growing region in the world, Iowa alone producing two thirds as much as all of Europe and usually 50 per cent more than Argentina. Illinois, Nebraska, Indiana, Ohio, and Missouri fall partly or wholly within the favored district. A more satisfying sight than a trip through the "Corn Belt" in late summer or autumn of a normal year would be difficult to imagine.[1] However, the southern part of the region does not possess all of the agricultural advantages. The leading spring wheat area of the continent is in the *Red River Valley*—the site of the former glacial Lake Agassiz—and flax also thrives in this section. Southern Wisconsin, Minnesota, Michigan, and Ontario are outstanding in dairy products, Wisconsin surpassing all other states in yields from its dairy farms.

The comparatively level or undulating topography in most of the region has made highway construction easy. The rectangular road pattern is the rule, the land usually being divided into square-mile units. The network of railways is intricate and all pervasive, involving so much capital outlay for rolling stock, roadbed, and upkeep that competition with the fleets of trucks and motor busses that skim over the newly constructed highways becomes more and more difficult. No other region has profited so much from the Great Lakes Waterway as has the Glaciated Lowland. Waterways and railways, as well as trunk-line highways, converge toward strategic centers, affording conditions favorable for the growth of some great cities—notably Chicago, Ill., Minneapolis, Minn., Indianapolis, Ind., Detroit, Mich., Buffalo, N. Y., Cleveland, Ohio, Columbus, Ohio, Omaha, Nebr., and many others.

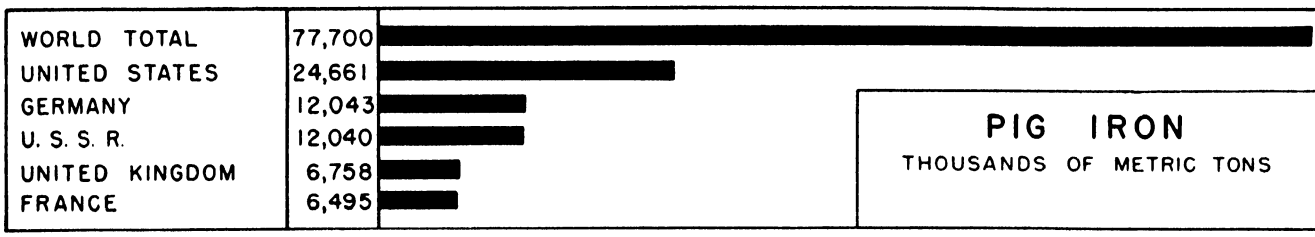


FIG. 31. WORLD'S PIG IRON PRODUCTION. A 7-year average prior to World War II. (From *Foreign Commerce Yearbook*)

RELATION TO THE SUPERIOR UPLAND. The advantageous location of the Glaciated Lowland between the Appalachian coal fields and the iron ores of the Superior Upland (see page 107 for a brief regional statement), the ease with which these basic materials may be brought together on the southern margin of the Great Lakes, and the markets for finished products in a rich agricultural hinterland have afforded favorable conditions for one of the great iron-manufacturing areas of the world (Fig. 31).

On the south shore of Lake Michigan, for example, coal meets iron ore at South Chicago and Gary, Ind., making this one of the leading iron- and steel-manufacturing centers of the country. Corresponding conditions prevail south of Lake Erie at Cleveland, Ohio, Ashtabula, Ohio, and Buffalo, N. Y. Among the many manufactures are farm machinery and appliances; automobiles and associated accessories; flour and cured meats; butter, cheese, and evaporated milk; clothing, furniture, and numerous other articles.

URBAN CENTERS. It seems incredible that, in a region such as the Glaciated Lowland, where agricultural pursuits are predominant, approximately 20,000,000 people live in cities of 50,000 or more (Fig. 32). Yet this does not account for additional millions who live in the thousands of small towns, villages, and hamlets. It must be kept in mind, however, that the existence of great cities and numerous urban centers is the consequence of a productive landscape. Millions of acres of grain fields;

[1] Rose, John K., "Delavan Prairie: An Illinois Corn Belt Community," *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp. 109-121.

enormous numbers of cattle, swine, and other domesticated animals; and the products of many mines and quarries are the factors which make urbanization possible. Cities are needed to collect, to process, and to refine the products of a region; and it is in the city that man erects his greatest cultural edifices for government, commerce, education, and the fine arts. Wise indeed were the pioneers in this region when they decreed that special provision be made for the support of public schools and higher education. Every state in the Glaciated Central Lowland has one or more tax-supported universities in addition to the numerous other institutions maintained by taxes. All these cultural enterprises, however, are linked to the land, whether it be the forest, the soil, or the mine.

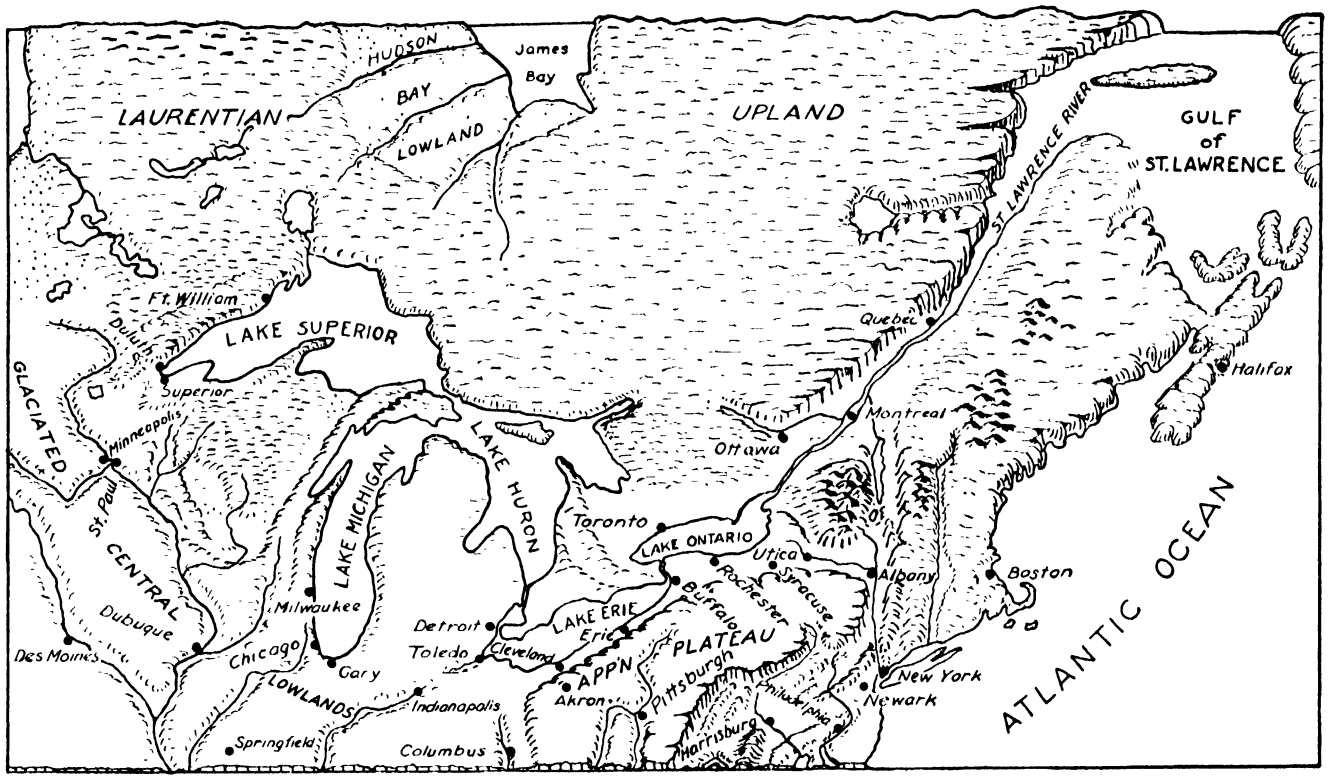


FIG. 32. TERRAIN AND CITIES IN THE VICINITY OF THE GREAT LAKES AND THE ST. LAWRENCE RIVER

In the Glaciated Lowland there are more than 50 cities, each of which has a population exceeding 50,000; and, of these, 25 have more than 100,000 each; four have more than 500,000 each; and two (Chicago and Detroit) have more than 1,000,000 each. Because of the plains topography with the associated ease of transportation, the cities have not developed in clusters nearly as much as they have in more rugged areas. Three types of sites in the area are apparent—namely, (1) lake sites, (2) river sites, and (3) railroad-highway network sites. Those belonging to the first group are largest and most numerous.

Chicago, Ill., the metropolis of the Interior Plains and second largest city in the United States, is located on the southwestern shore of Lake Michigan. The focusing of rail transportation at the southern extremity of Lake Michigan, together with the benefits of lake transportation and commerce, its location in the heart of one of the world's richest agricultural areas, and its nearness to power and mineral resources account for the phenomenal development of Chicago and its satellites into one of the world's largest and busiest trade and manufacturing centers.

Chicago's wholesale trade and bank resources run into billions of dollars annually. Among the more than 10,000 factories in the industrial zone,

meat packing is the greatest industry, and in the manufacturing of farm machinery Chicago has no peer. Immense quantities of railroad equipment and other steel products are made in the great iron and steel plants of South Chicago. Because Chicago has the largest railroad net in the world and has a wide trade territory, the manufacture of food products, furniture, paints and varnishes, and chemicals flourishes (Fig. 33). The universities, colleges, museums, theaters, public parks, and lake attractions combine to make Chicago one of the fine cultural and recreational centers of the Middlewest.

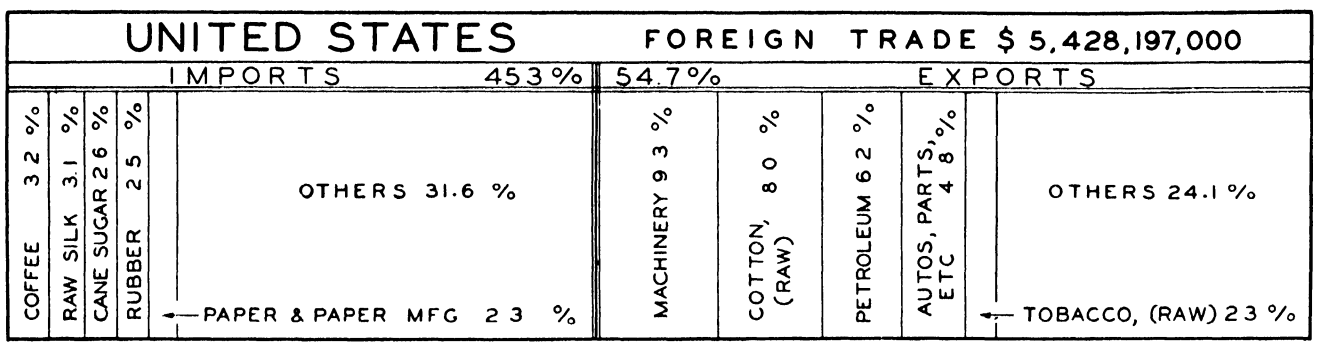


FIG. 33. FOREIGN TRADE OF THE UNITED STATES. A 13-year average just preceding World War II. (From *Statesman's Yearbook*)

Gary, Ind., at the southern end of Lake Michigan and a part of the Chicago metropolitan district, has become one of the rivals of Pittsburgh in the manufacture of iron and steel.

Milwaukee, on Lake Michigan at the mouth of the Milwaukee River, is the largest commercial and industrial center of Wisconsin. A fine harbor, a network of railroads to the interior, and extensive grain elevators link it with the great northwest grain region. The varied and extensive manufactures include flour, meats, leather goods, machinery, beer, and liquors.

Duluth, Minn., at the west end of Lake Superior, is the leading port for the shipment of iron ore over the Great Lakes from the Superior Upland to the steel-making cities south of the lakes.

On the south shore of Lake Erie are numerous cities which are, in part, the result of the rapid growth of the iron and steel industry associated with lake transport. Among these are *Toledo*, *Sandusky*, *Lorain*, Cleveland, *Ashtabula*, in Ohio, and *Erie*, Penna., and *Buffalo*, N. Y. *Cleveland*, the largest of this group, is located at the mouth of the Cuyahoga River, which forms a part of the city's harbor. A breakwater has been constructed to provide a larger outer harbor. Since Cleveland has such good facilities for bringing coal and iron ore together, and also good marketing advantages, it has become a great iron- and steel-manufacturing city. Some of the largest paint and varnish factories in the United States are in Cleveland.

Buffalo, second in size among the cities of New York, and located at the eastern end of Lake Erie and at the western entrance to the Mohawk Valley route, is the western terminus of the New York Barge Canal. It is the second largest flour-milling center in the United States and has long been a leading center in the processing of foodstuffs because of its advantageous location to eastern markets, to western sources of raw food materials, and to the enormous hydroelectric power at Niagara Falls.[1]

Toledo, on the Maumee River at the west end of Lake Erie and at a converging point for four coal-hauling railroads, is one of the chief coal-shipping ports on the Great Lakes.

Many of the prominent commercial and manufacturing cities in the Glaciated Lowland are located on rivers, either singly or as twin cities.

Detroit, the leading automobile center in the world, and the largest city in Michigan, is the oldest port on the Great Lakes. Its strategic location

[1] Kemp, Harold S., "Queen City of the Lakes," *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp. 1-18. A story of the location and growth of Buffalo.

on the Detroit River where coal, iron, and steel products can be brought together easily, its early start in automobile construction and associated industries, together with its rich hinterland have contributed to the city's phenomenal growth during the last two decades. Opposite Detroit is *Windsor,* the Canadian outlet for many of the industries in Detroit and the leading automobile center in the British Empire. Tunnels, ferries, and bridges across the Detroit River make possible short, direct, and rapid communication with Atlantic trade centers.

The famous Twin Cities, *Minneapolis,* and *St. Paul,* Minn., are near the St. Anthony Falls at the head of navigation on the Mississippi River. Minneapolis is a great grain-receiving city, and also the largest flour-milling center in the United States. St. Paul is outstanding as a meat-packing city. The opening of the Panama Canal robbed the "Twin Cities" of some of their transcontinental railway traffic and thus interfered with their growth and prosperity.

Omaha, Nebr., and *Council Bluffs,* Iowa, located opposite each other on the Missouri River, form one of the important urban districts and railway centers in the western part of the Glaciated Lowland. Omaha, the largest city of Nebraska and the principal distributing and industrial center of the state, is third among the meat-packing centers of the United States, has large grain elevators, and important food-processing plants. Council Bluffs is an important railroad and gateway center.

Two other twin cities, *Kansas City,* Mo., and *Kansas City,* Kans., located at the junction of the Missouri and Kansas (Kaw) rivers, serve the Great Plains as livestock and grain centers, having extensive stockyards and great meat-packing plants, grain elevators, flour mills, and creameries. Many railroads connect the cities with other parts of the West and with the Mississippi-Missouri water traffic. In pioneer days this was an outfitting point for travelers on the Santa Fe and Oregon Trails.

St. Louis, the leading commercial and manufacturing center and the largest city in Missouri, and its satellite, *East St. Louis,* in Illinois, are on the Mississippi River about 20 miles south of the mouth of the Missouri. St. Louis was founded as an outfitting center for fur traders and trappers and it still is important as a river town. One of the largest livestock markets in the United States, it is also the principal center in the United States for the manufacture of high-grade shoes and leather goods, and its other manufactures likewise are largely related to agriculture. East St. Louis has many meat-packing plants. Twenty-one railroads coming from all points of the compass converge at St. Louis.

Cincinnati, Ohio's second city in size and a leading commercial and manufacturing center, is on the Ohio River. Its pioneer importance as a river port, and its location at the southern terminus of an early canal, later attracted a number of railroads, which now serve the area. The chief manufactured products of the city today are tools, food and meat products, soaps, beverages, tobacco, paints, and varnishes.

The *Mohawk Gateway,* a corridor from the Glaciated Lowland to the eastern seaboard, is a valley feature between the rugged Adirondacks to the north and the Appalachian Plateaus to the south. In colonial times, the Indians came through this corridor with furs; later, the pioneers trekked westward through it to Ohio and Indiana; and today, it is not only the main gateway through the Appalachian Highlands, but it is also the site of several large commercial and industrial centers. From Albany westward to Buffalo is a series of thriving cities. Among these cities are *Schenectady,* noted for electrical goods; *Syracuse,* famous for its salt products and chemical manufactures; and *Rochester,* outstanding city for the manufacture of cameras, optical goods, surgical instruments, and clothing.

Distributed through the Glaciated Lowland are numerous cities which are dependent upon superior railroad and highway facilities, rather than upon lakes and rivers.

Indianapolis, the largest city and capital of Indiana, is well known for its manufacture of machinery and as the railway hub of the state. *Akron,* Ohio, is the rubber capital of the United States, while *Dayton* is famous for its airplanes and cash registers. *Columbus,* Ohio, *Springfield,* Ill., *Madison,* Wis., *Lansing,* Mich., and *Lincoln,* Nebr., are

all state capitals and in general owe their growth to the combined effects of government, agriculture, commerce, manufactures, and colleges and universities.

An Appraisal for Tomorrow. It is almost inevitable that the great exploiter, man, when he moves into a virgin area, will upset the equilibrium that has been attained among life forms. Excessive erosion and soil depletion have occurred and are still in progress in the areas formerly occupied by deciduous hardwood forests and tall grasses. This problem is acute in some of the more rolling sections of the Glaciated Lowland and is being attacked intelligently. The cut-over lands formerly occupied by white pine forests are a constant fire hazard in places and here reforestation is under way.

Along with the problem of the maintenance of soil fertility is the one of balanced crop production —a situation that can be solved only by much study of soil-conserving practices and by cooperation among those interested in the various crops and animals.

Transportation facilities and changes require perennial attention. Should a Great Lakes-St. Lawrence waterway to accommodate ocean-going vessels be constructed leading out to the ocean through Canada, or would it be better to enlarge the New York State Barge Canal? Should time, effort, and capital be expended on the promotion and improvement of river transportation, especially of the Mississippi system? In this connection should the government subsidize railroads so they can compete on more equitable terms with transportation by trucks and motor busses?

Recently there has been a gravitation of people to large manufacturing centers at the expense of the smaller cities. Is it desirable now, in an age of swift transportation, atomic bombs, and communication over ever-better highways and airways, to decentralize our large urban manufacturing centers? Continued improvement of manufacturing and agricultural machinery is enabling fewer and fewer men to do more and more work. What shall be done when technological advances threaten to create unemployment?

GREAT PLAINS

The western border of the Great Plains of North America touches the Rocky Mountains. From the mountains, they extend eastward from 400 to 500 miles but the eastern edge is not well defined. In a north-south direction the Great Plains reach from the Rio Grande to the low Arctic plains, a distance of about 3000 miles, covering in part ten states and portions of Saskatchewan, Alberta, and the District of Mackenzie in Canada—in all, more than three quarters of a million square miles.

Natural Features

From an altitude of less than 1000 feet on the east, the Great Plains rise to more than a mile at the foot of the Rockies. For this reason, the major streams are eastward flowing, and because of the seasonal variation in the supply of water, many of them are sometimes overloaded with sediment, and therefore flow through shallow valleys of coarse, sandy detritus. During the summer the *Pecos*, *Canadian*, *Arkansas*, and *Platte* rivers may dwindle to mere trickles, flowing over their sandy beds in braided channels, or perhaps becoming entirely dry. But even in this condition, water usually exists in large quantities a few inches under the surface, and the underflow is considerable.

Rising rather abruptly above the level of the Great Plains are several uplift features, conspicuous for their scenery or mineral deposits. Probably the most notable among these are the *Black Hills*, an eroded dome in which the topography is definitely mountainous, peaks of the granitic and schistose core rising to heights of several thousand feet (Figs. 34 and 35). Portions of the Black Hills are highly mineralized, especially with gold and silver. The *Austin Uplift* in Texas is also an eroded area with a granitic core providing building stone in considerable quantities, and some graphite on its flanks. Other mountains, outliers of the Rocky Mountains and partly buried under the Great Plains, are the *Bear Paw*, the *Little Rocky*, and the *Big Snowy* uplifts of Montana.

Among the erosional features in the western part of the Great Plains are many remnants of interfluvial areas, which stand out prominently as buttes, mesas, and escarpments. Among these may

be noted *Castle Rock Buttes* in South Dakota, *Chimney Rock, Scottsbluff Mountain,* and the *Pine Ridge Escarpment* in Nebraska, and the *Raton Mesas* and *Mesa de Mayo* in New Mexico and Colorado.

Other rather unusual erosional features of significance, to mention only a limited number, are the *Bad Lands* of South Dakota (Fig. 35), *Goshen*

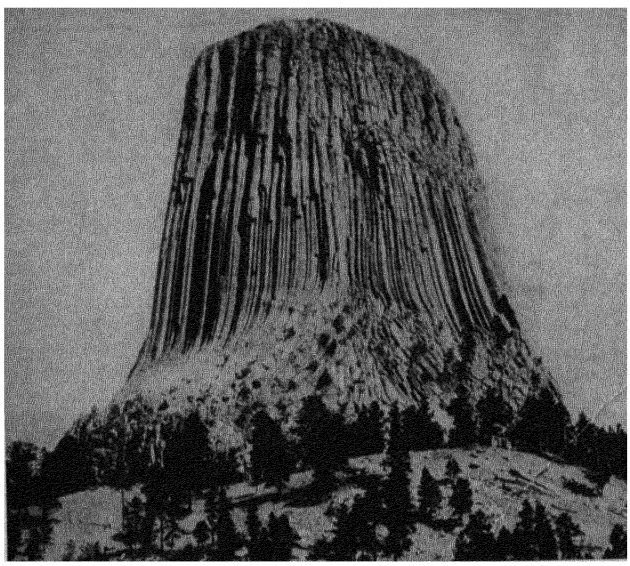


FIG. 34. DEVIL'S TOWER. This amazing feature northwest (see Fig. 35) of the Black Hills in Wyoming, is a remnant from ancient volcanic activity and differential erosion. (Courtesy U. S. Geological Survey)

Hole in western Nebraska and eastern Wyoming, and the *Sandhills* of Nebraska. One of the marvelous scenic features opened to the public in recent years is the *Carlsbad Caverns* in New Mexico. It is at the western edge of the Great Plains near *Roswell,* in the Pecos district of mesas, canyons, and escarpments.

The Great Plains are underlain almost everywhere by nearly horizontal beds of sedimentary rock which are upturned and leveled off on the flanks of the Rockies and of the Great Plains uplifts. Thus are created conditions favorable for flowing wells over much of the eastern portion of the Great Plains Region (Fig. 35). In some places the horizontal strata are covered by a thin veneer of mantle, whereas in other areas the mantle covering is hundreds of feet thick. Much of the soil of the western portion of the Great Plains is residual, having been weathered out of the loose, underlying bedrock. Farther eastward are considerable areas of windblown soil materials, especially the dunes of the sandhill areas and rich deposits of loess.

The mature soils are pedocalic, being a response to low rainfall conditons, and the short grass cover. With the exception of small areas of prairie soils in eastern Nebraska, Kansas, Oklahoma, and Texas, the chernozems, or black soils, prevail over the eastern portion of the Great Plains, but the chestnut soils are found in most of the region, especially in the western part (Fig. 238). In the alluvial plains of the river valleys, the sandhills, and on the steeper slopes a soil profile has not developed, inasmuch as the soils are youthful.

Most of the precipitation on the Great Plains is of cyclonic origin, and because of its position in relation to the Rocky Mountains it has a continental semiarid climate (Fig. 236). In the United States, the eastern margin of the region is near the 20-inch isohyet, and the amount of precipitation diminishes westward until it is scarcely more than 10 inches near the mountains (Fig. 8). The variability in precipitation is great in proportion to the total and, therefore, farming is a precarious business except where irrigation water is available. The average annual temperature at North Platte, Nebr., is 49° F.; July is the warmest month (74° F.), January, the coldest (23° F.), and the growing season is about 153 days. The average annual rainfall is 18.5 inches; June is the rainiest month (3.2 inches) and January, the driest (0.1 inches).

The natural vegetation consists chiefly of grasses —tall and medium grasses formerly occupying the more humid portion, and short grasses covering the semiarid western areas (Fig. 237). Much of the virgin grassland has been converted into farms, especially in the eastern part of the Great Plains, and in the western part where irrigation is possible.[1] In the more arid section, cultivation has proved to be extremely hazardous, because of the

[1] Gates, Donald S., "The Sod House," *Human Geography Studies: The United States,* McKnight and McKnight, Bloomington, Ill., 1935, pp. 209-215. A pioneer adjustment to grassland occupancy.

frequent shortage of rainfall at cyclic intervals resulting not only in low crop yields, but denudation of soil by wind and water erosion.

Cultural Features

Previous to the coming of white men, Indians occupied the Great Plains, making a living chiefly by simple agriculture, and by hunting the bison, cutting off the native Indian's supply of meat. Much of the bitter conflict between white men and the Indians of the Great Plains centered around the depletion of the native's food supply.[1] Of course, the great grasslands were soon occupied by the settlers' herds of cattle, sheep, and horses. The westward surge of migration rapidly carried men far beyond the line of successful farming pos-

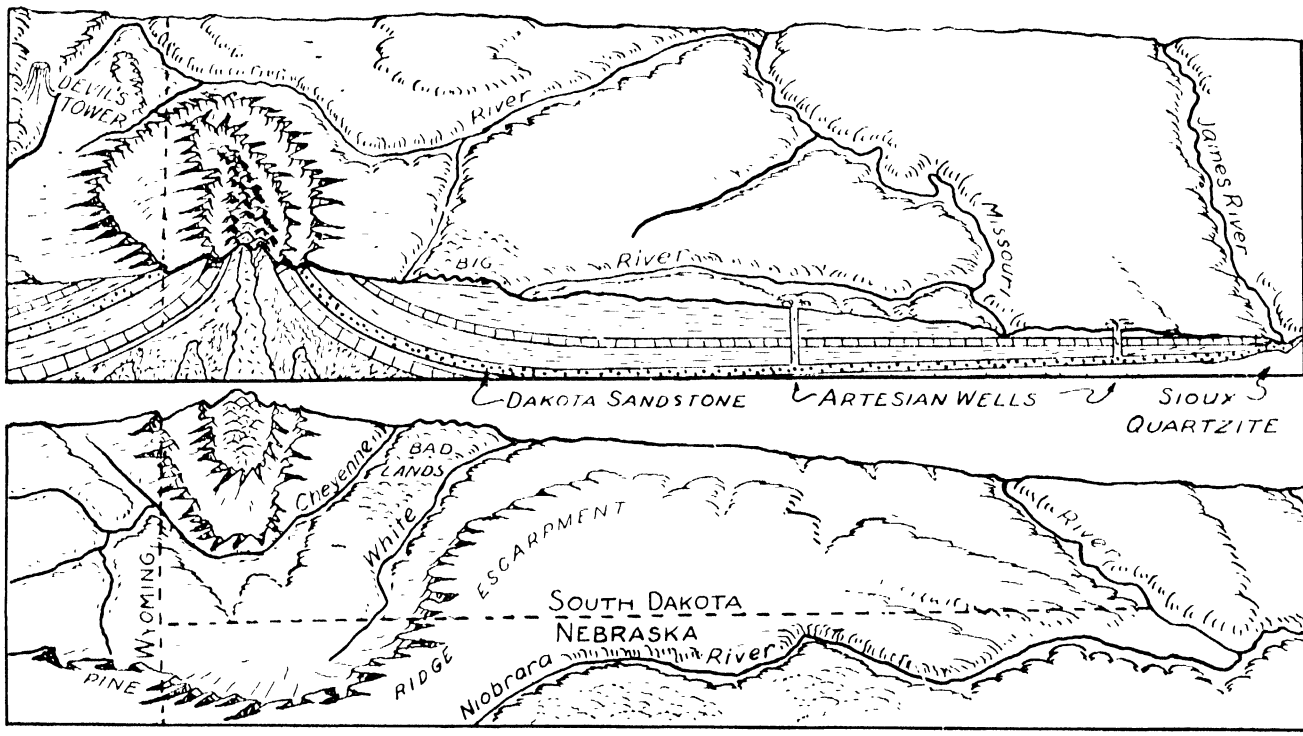


FIG. 35 STRUCTURE OF THE BLACK HILLS AND ADJACENT GREAT PLAINS. Note how water is trapped in the exposed Dakota Sandstone in the Black Hills, and how flowing (artesian) wells are made several hundred miles eastward.

immense herds of which roamed over most of the area. Early explorers and travelers in the region include Coronado (1541-1542), Mallet brothers (1739-1740), Lewis and Clark (1806), Astorians (1811-1812), Ashley (1824-1825), Frémont (1843-1844), and the Mormons (1845-1847). The settling of the Great Plains by white men during the latter part of the nineteenth century was a phenomenon replete with feverish activity and resplendent with brilliant adventure.

The semiarid character of the climate and the rich soil of the Great Plains made the region a natural grassland. During and after the period when railroads were constructed across the plains, the wild bisons were ruthlessly slaughtered, thus sibilities and into the semiarid area where cultivating the land under almost any condition except by irrigation is precarious. Deserted farmsteads in many places on the Great Plains testify to the woeful experience of agriculturalists who ventured into the semiarid area too far in their quest for better conditions under which to make a living. During boom times and humid cycles much of the grassland succumbed to the plow of land-hungry farmers and later had to lie idle, awaiting the time when native grasses might again occupy the soil.

[1] Neihardt, John G., "The Song of the Indian Wars," The Macmillan Co., New York, 1925. Epic poetry, descriptive of the struggle of the Great Plains Indians to hold on to the bison pastures.

Meanwhile, winds and droughts contributed to the rapid removal of some of the rich, virgin soil from the surface, and areas for hundreds of miles eastward experienced storms of dust that at times darkened the sky and were almost suffocating (Fig. 36).

In numerous places, however, where water for irrigation is available, notably along the Yellowstone, the Missouri, the Platte, the Arkansas, and the Pecos rivers, luxuriant crops are grown with gratifying regularity. Wheat, corn, sugar beets, potatoes, and alfalfa are the most profitable crops

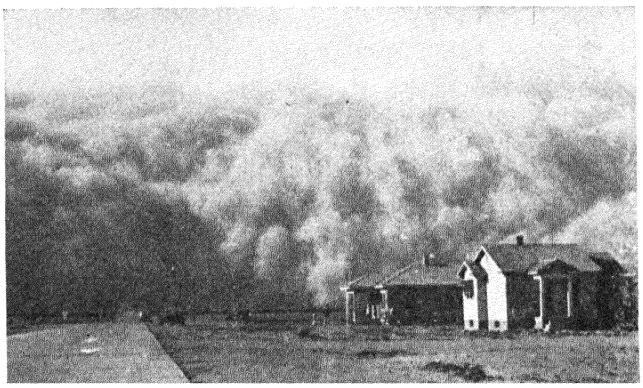


FIG. 36. DUST STORMS. During periods of prolonged drought in the semiarid section of the Great Plains suffocating storms of dust may sweep over the country. Poor tillage practices contribute also to the occurrence of these devastating storms. (Courtesy U. S. Department of Agriculture)

Alfalfa is especially valuable because of its use in the winter feeding of cattle and sheep, grown on the adjacent grazing lands. The valleys of the North Platte, South Platte, and Arkansas rivers produce a large proportion of the sugar beets processed in the United States. *Scottsbluff* and near-by towns in Nebraska and Wyoming; and *Greeley*, *Longmont*, *Fort Collins* and adjacent towns in Colorado are among the leading sugar-beet producing centers in the irrigated areas of the Great Plains.

The two major agricultural industries on the tablelands are grazing and the production of wheat (Fig. 37).[1] Much of the Great Plains must continue to be grazing land, and long-time planning should make sure that these semiarid acres are not thoughtlessly exploited again for the growing of grain crops.[2] People in areas where there is not enough rainfall on the average to grow a crop every year usually should attempt to conserve moisture by planting crops as drought-resistant as possible and by proper tillage methods (Fig. 38). Even

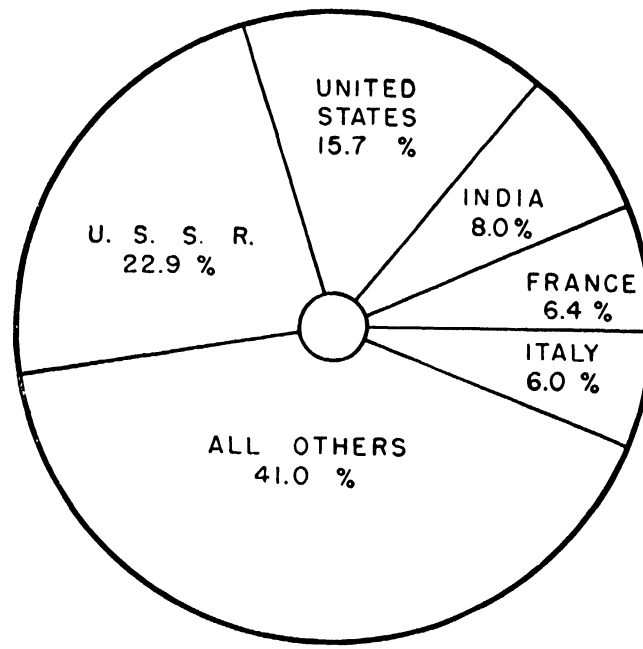


FIG. 37. WORLD'S PRODUCTION OF WHEAT. A 7-year average immediately prior to World War II. (From *Foreign Commerce Yearbook*)

with the best methods of cultivation, however, the stored moisture eventually may be depleted and wind erosion then is likely to do irreparable damage to the soil. The most satisfactory returns are from hay in the low flat lands, and from pasture, carefully adjusted to the carrying capacity of the soils, on the higher lands. Today one man with big farm machines can do as much work as several men could do a few decades ago. As a result the farm population is decreasing and the size of the farms is increasing.

The potential mineral resources of the Great Plains are immense. The reserves of lignite coal are

[1] Parkins, A. E., "The High Plains Region of Western Texas," *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp. 168-179. A detailed study of sequent utilization of the land on a semiarid plain.

[2] Anderson, Esther S., "The Potato Industry in Nebraska," *Economic Geography*, January, 1930, Vol. 6, pp. 37-53.

greater than the bituminous reserves of the Appalachian Highlands. Petroleum abounds in certain sections, especially in Oklahoma, Kansas, Texas, and Wyoming. The Mid-Continent oil province, the most important oil and natural gas-producing area in the world, lies mostly within this region. Numerous pipe lines carry the oil to many large refineries, both in the fields and to distant locations. Many of the larger cities of the Middlewest use natural gas for industrial and domestic purposes. In Kansas, Oklahoma, Texas, and New Mexico are huge quantities of gypsum compounds and salt.



FIG. 38. CONTOUR BASIN LISTING IN KANSAS. This practice holds the water until it has had time to soak into the soil, thus preventing erosion and the loss of precious water. (Courtesy U. S. Department of Agriculture)

The nature of the industries and the sparsity of population render manufacturing activities relatively unimportant. However, the manufacture of beet sugar, the refining of petroleum, the production of salt, and the packing and curing of meats are of considerable significance.[1]

The leading railways and airways cross the plains in an east-west direction, primarily because trade is carried on with people outside the area. Seven excellent United States highways also traverse the region from east to west. The Northern Pacific, Union Pacific, Burlington, Santa Fe, and Southern Pacific are the chief railways passing through the area in the United States. Now transcontinental airway routes across the Great Plains are becoming more and more important, and much attention is being given to the constructing of airports in the region.

URBAN CENTERS. Observers crossing the Great Plains are sure to note the sparseness of population and the long distances between urban centers. It is certain that they will be impressed also with the important role that soil plays in human occupancy for, on the Great Plains, production per man is high, and production per unit of land is small—a consequence of low rainfall, cheap land, and the use of machinery. Thus, with few exceptions, there is a dearth of mineral resources around which urban agglomerations might cluster and there are no large manufacturing industries which might sustain great metropolitan centers. Instead, numerous small towns and villages are widely scattered, but these are of great importance in the lives of millions of people. The pattern of settlement in the Great Plains has followed, almost meticulously, the principal railroads, which in turn, frequently followed natural features, such as the great, eastward-flowing streams (Fig. 39). A remarkable development on the Great Plains that is gaining in momentum is the construction of airports—numerous small towns now having ample landing facilities for the aircraft of farmers who live in more or less isolated areas.

The cities and towns of the great interior of the region are nearly all small, very few having as many as 25,000 people, but on the margin are such cities as *Minneapolis, Omaha, Kansas City,* and *Dallas.* These are the gathering metropolises associated with the plains, and they serve too as the major distributing centers. In these cities are the wheat markets, the grain exchanges, the flour mills, the meat-packing plants, the railroad termini, and the great wholesale houses from which goods are shipped into the towns and villages of the Great Plains. Thus, the large cities on the periphery are inseparably linked with the small towns of the interior. Among the cities of any considerable size in the region, only five are given special attention.

Denver, Colo., the "Mile High City" and the largest of several peripheral urban centers, is at the edge of the Great Plains where the South Platte River issues from the Front Range of the Rocky Mountains. The climate is favorable for health,

[1] Anderson, Esther S., "The Sugar Beet Industry of Nebraska," Bulletin 9, Conservation Department, University of Nebraska, Lincoln, Nebraska, April, 1937.

industry, and recreation. There is no Great Plains city of comparable size within 500 miles in any direction. Denver's trade territory embraces parts of ten states and a population of 6,000,000 people. Some of the leading industries are centered around meat packing, the manufacture of mining and sugar-mill machinery, and various types of luggage.

Fort Worth is famous for its hundreds of oil companies and corporations, and it is also a large market for grain, petroleum, and cotton from an extensive hinterland. Dallas, the largest city in the Cotton Belt, is a distributing center and a focal point for transportation. It manufactures oil-field equipment, farm machinery and many other products.

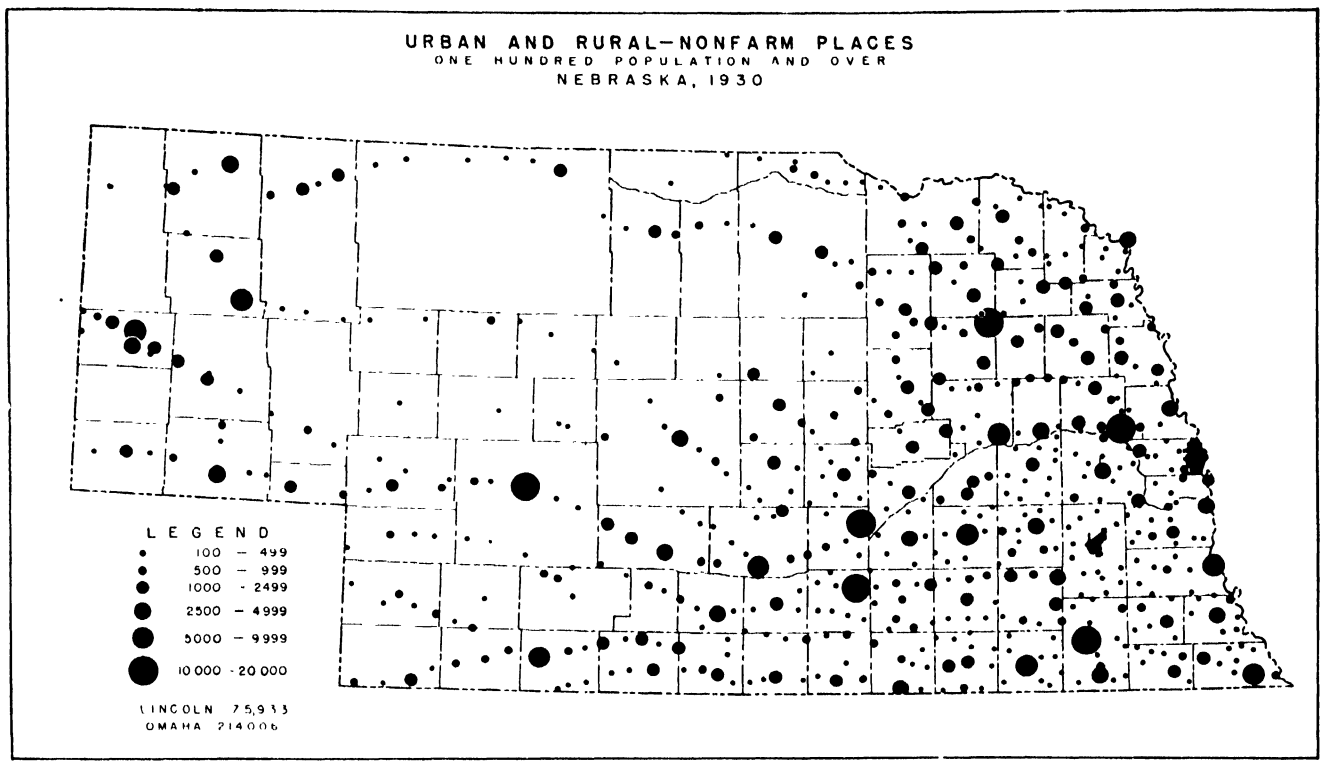


FIG. 39. DISTRIBUTION OF TOWNS ON THE GREAT PLAINS. Towns are usually along railroads, and many of the railroads follow valleys such as the Platte and Republican in Nebraska. (Courtesy Nebraska State Planning Board)

Because of its position on the main route into one of the best vacationlands of America, Denver has developed a lucrative tourist trade both in summer and winter.

Wichita, Kans., on the Arkansas River about 170 miles southwest of Kansas City, is near productive oil fields, but its principal importance lies in the part it plays as a livestock, grain, meat-packing, and flour-milling center. During World War II, it was one of the greatest centers in the United States for the fabricating of airplanes.

The heart of an oil empire is *Fort Worth,* Tex., about 250 miles northwest of Galveston. Several railroads serve this city and its near neighbor, *Dallas,* on the north margin of the Coastal Plain.

Oklahoma City, on the north fork of the Canadian River in the central part of the state, is the largest city and capital of Oklahoma. The site was chosen and opened for settlement in April, 1889, and within one day a tent city of 10,000 inhabitants had sprung up. Since that time the city has boomed under the stimulus of vast stretches of free land which have been converted by thousands of settlers into great ranches and farms. The discovery of oil brought more thousands of people into the city, starting a second building and expanding boom that is still in progress. Although at first it was an Indian trading post, it is now the chief political center of the state, and a jobbing center for the large agricultural and stock-raising hinterland.

Tulsa, the second largest city of Oklahoma, is one of the few cities of the Great Plains which owes its importance to the mineral, petroleum—the "black gold" of the prairies. The city is picturesquely situated at the meeting place of the old boundaries of the Creek, the Cherokee, and the Osage nations on the Arkansas River. At first, the city was only a small Indian trading post; but the oil boom, which began shortly after the turn of the twentieth century, was the beginning of modern Tulsa, a city of great oil corporations, fine buildings, and large refineries. All but one of the large companies operating in the Mid-Continent field have headquarters there, and the oil wells in this section produce hundreds of thousands of barrels of crude petroleum every day (Fig. 13).

On the western margin of the Great Plains, besides Denver, are several small cities. *Pueblo,* Colo., is the leading iron-manufacturing center west of Chicago. *Cheyenne* and *Casper,* Wyo., and *Billings* and *Great Falls,* Mont., are significant as marginal trade centers and as gateway cities to regions farther west. *Grand Island* and *North Platte,* Nebr., are significant trading centers in the Platte Valley and on the Union Pacific Railroad.

Because of the remoteness of the Great Plains and the Glaciated Lowlands from the east and west coasts, the good railroad and highway transportation facilities, and the large areas of comparatively level land, some of the largest munition plants and factories for war equipment were located in these regions during World War II.

Prospects Ahead. The critical difficulties of the people in the Great Plains are associated mostly with some phase of agriculture, and each problem involves a wide range of pertinent factors. Soil erosion is critical, and an intelligent attack on the problem should include evaluation of items such as rainfall, natural vegetation, soil management, flood control, soil depletion, shelter belt, and the economic possibilities involved.

The mechanization of farming operations has a train of perplexing conditions connected with it. Should the increased use of big machines be encouraged on the Great Plains? This situation becomes critical because mechanization invites overproduction of certain crops, and because it makes the practice of dry-farming methods profitable in semiarid regions, thus aggravating the wind-erosion menace.

Markets for the products of the Great Plains, after subsistence needs are taken care of, are usually at a great distance. Railway, highway, and airway communication and transportation in large areas of sparse population are, as a rule, expensive. Differential rates favoring the people of the Great Plains may be necessary. A number of possibilities in this direction need to be explored.

6

Southern Interior Highlands

THE SOUTHERN INTERIOR HIGHlands occupy an area about equal to that of Missouri, and about half the area is in that state. In general, these highlands extend northward from the Red River through eastern Oklahoma and western Arkansas to the Missouri River. In origin and structure this area may be thought of as a westward extension or outlier of the western part of the Appalachian Highlands, the connecting link between the two highlands being the Shawnee Hills in southern Illinois. The Ozark Plateau generally corresponds to the Cumberland Plateau, the Boston Mountains to the Allegheny Front, and the Arkansas Valley and the Ouachita Mountains to the Appalachian Ridge and Valley Region.

OZARK PLATEAU, OUACHITA MOUNTAINS, AND ASSOCIATED FEATURES

A description of the Southern Interior Highlands may well be undertaken by treating briefly its principal sections, namely, the *Ozark Plateau*, the *Boston Mountains*, the *Arkansas Valley*, and the *Ouachita Mountains*. To the west and associated with this region are the *Arbuckle* and the *Wichita* mountains. These sections will be described from north to south in the order named (Fig. 40).

Natural Features

The Ozark Plateau, occupying about 40,000 square miles and nearly square, consists in part of the *Springfield* and *Salem* platforms and extends from near the Missouri River southward to the Boston Mountains. These features were eroded out of sedimentary materials, and they dip westward from a core of crystalline rocks, known as the *St. François Mountains*. The eastern edges of the Salem and Springfield platforms face the central core of the crystallines, but on the west the layers of sedimentary rocks extend under the Great Plains. The surface of the area varies in topography from large, nearly level stretches, to rugged escarpments and valleys with deeply entrenched, meandering streams.

On the south the Ozark Plateau section ends abruptly at a north-facing escarpment—the northern slope of the so-called Boston Mountains. The south slope of these mountains follows the dip of the sedimentary rocks which disappear under the adjacent debris-filled Arkansas Valley. The picturesque Boston Mountains section is a rugged area with streams flowing in deep valleys on both the north and the south slopes.

The Arkansas Valley and the Ouachita Mountains in many ways correspond in structure to the Ridge and Valley Region in the Virginias—the Ouachitas corresponding to the ridge section, and the Arkansas Valley to the Shenandoah Valley. The intricate folds in the sedimentary rocks have been planed off so that parallel east-west valleys and ridges dominate the landscape.

West of the Ouachita Mountains are two small outliers in the Great Plains, known as the Arbuckle and the Wichita mountains. Structurally, these outliers are related more closely with the Southern Interior Highland than any other physiographic region and hence will be discussed here. The Arbuckle Mountains, with an area of about 2000 square miles, are the uplifted peneplain of an ancient highland. This upland is intricately folded and contains metamorphosed building stones, such as marble, some coal varying from bituminous to

semi-anthracite, and here and there igneous intrusions. Still farther west in southwestern Oklahoma are the Wichita Mountains, huge masses of crystalline rocks rising like an archipelago out of a great sea of sedimentaries. The Arbuckles and the Wichitas, although quite rugged, are not high, rising not more than 1000 to 1500 feet above the surrounding plains.

from the undulating folds of the sedimentary rocks on the margin of the Southern Interior Highlands, especially in Illinois, Kansas, Oklahoma, and Texas, that these areas now rank among the great producers in the world.

The long summer phase of the continental humid climate occurs in most of these highlands, only the southern margin extending into the subtropi-

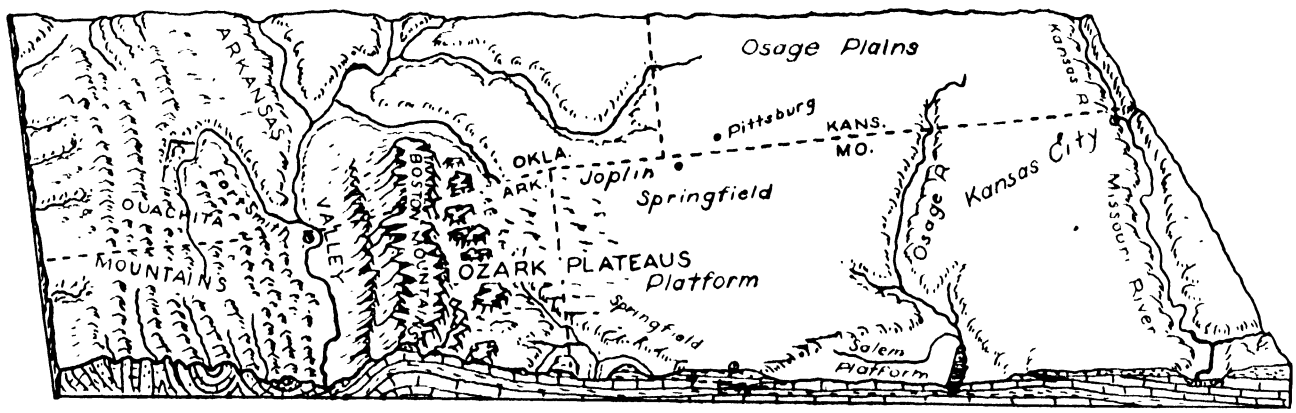


Fig. 40. A Sketch Across the Ozarks. The edge of the block helps one to understand how the topography has been influenced by subsurface structural conditions. You are looking west.

The Southern Interior Highlands are rich in minerals. In northeastern Oklahoma and southeastern Kansas an abundance of zinc ore is mined although not by the most economical methods. About two fifths of the lead in the United States is produced from the mines of the northeastern Ozarks (Fig. 41). Much of the coal that once covered the plateaus has been removed by erosion, but in the Ouachita Mountains the extensive folding

cal humid (Fig. 236). Temperatures, as a rule, are not severe in winter, but the high humidity at times makes summer weather oppressively warm.

The median annual rainfall at Springfield, Mo., during a 59-year record is 40.5 inches, which is quite typical of the region. Three fourths of the time, Springfield has received 37 inches or more, and one fourth of the time 47 inches or more. The rainiest month is June (5.0 inches) and the driest

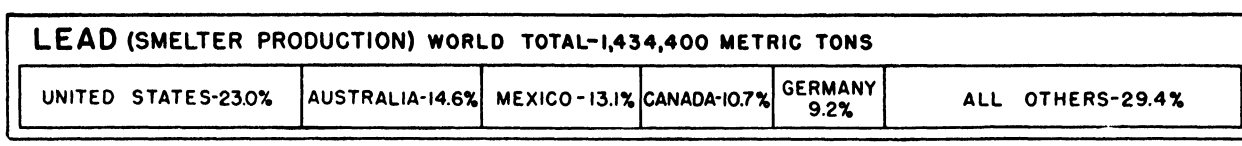


Fig. 41. World's Production of Lead. A 7-year average prior to World War II. (From *Foreign Commerce Yearbook*)

of the rocks has not only preserved some of the coal, but has metamorphosed much of it into high-grade semi-anthracite, most of which is used in the Middlewest for domestic purposes. Excellent granites and other rocks, used primarily in St. Louis, are obtained from the St. François Mountains.

Such immense quantities of petroleum are taken

is December (2.3 inches). Although the region receives most rain in spring and summer, autumn and winter are by no means dry.

Originally the southern and eastern portions of the region were forested, largely with broad-leaved deciduous species, such as oak, hickory, maple, basswood, and conifers mostly of yellow pine (Fig. 237). The central and western portions were pri-

marily grassland, trees doing well only along the streams.

The mature soils of the Southern Interior Highlands are chiefly pedalfers. The subtropical humid conditions of the Arkansas Valley and the Ouachita Mountains produce red and yellow soils, whereas in the Ozark section gray-brown soils predominate (Fig. 238). The rugged terrain over parts of the area is responsible for the youthful quality of the soil, especially on the steeper slopes and in the valleys.

Cultural Features

The first white people to enter the Ozark Plateau were French, who early in the eighteenth century moved into the area by way of the Great Lakes and the Mississippi River. This route eventually became an important highway for pioneers and for early transportation. The French were first interested in the area because of the deposits of lead and silver ore that were found on the margin of the St. François Mountains. They had high hopes that the region would be a source of great wealth to them such as Peru and Mexico were to the Spanish. Salt springs, as well as furs, were also enticing sources of wealth to the early French.

The immigration of Americans into the Ozark and Ouchita country began late in the eighteenth and early in the nineteenth centuries. The people came chiefly from Kentucky, Tennessee, and the Carolinas.[1] Among them were the renowned Daniel Boone and many other nomadic hunters. Somewhat later a considerable number of slave-owning settlers entered the region, thus stabilizing the population. The rocky and secluded fastnesses of the more hilly sections, during and after the War between the States, sheltered a number of guerrilla bands and likewise have been the rendezvous of many noted outlaws.

The general ruggedness of the region has made the construction of good roads expensive and difficult. For the same reason railroads were slow to enter and cross the Southern Interior Highlands.

The riches of the Ozark-Ouachita country are chiefly in the minerals, fruit, timber, and facilities for recreation. Much of the land has been nearly denuded of forests. The flood plains and flat interfluvial areas have been put under the plow, and soil deterioration has become alarming. At present, with government aid, roads are being built and the farmers are rejuvenating depleted soils.

In many sections, especially in the Arkansas Valley and Ouachita Mountains, fruits grow luxuriantly; consequently, this region has become known far and wide as the "Land of the Big Red Apple." Large quantities of strawberries, peaches, apricots, and other fruits are produced for near-by markets.[2]

So popular has the Ozark area become as a vacationland that tens of thousands of tourists find recreation here each year, many returning year after year to occupy summer homes. One of the most popular places is Hot Springs, Ark., where the thermal waters are reputed to have therapeutic value.

Urban Centers. This region has numerous small towns but few large ones. There is no city with as many as 100,000 people, but near the margins are a number of large cities, for example, St. Louis, Kansas City, Dallas, Tulsa, and Memphis.

Springfield, Mo., on the crest of the Springfield Platform, is one of the largest cities in the Southern Interior Highlands. Its surrounding area is rich in timber and zinc ore, and the city is a market for the products of the farms and orchards. Railway shops, flour and lumber mills, iron works, and wagon factories are among the leading industries.

Joplin, Mo., in the southwest corner of the state, is the center of the most productive zinc region in the United States. The coal mines and natural gas from near-by Kansas help to make this an outstanding zinc-smelting city (Fig. 42). The manufacture of paint and white lead are among the leading industries.

Little Rock (La Petite Roche), Ark., first established by the French as a trading post, has the foothills of the Ozarks on the west and the rich, alluvial, cotton-producing lands of the Coastal Plains on the east and south. In 1943, 97 per cent of the bauxite (aluminum ore) of the United States was mined in this vicinity. The coal of the Ouachitas,

[1] Lemons, Hoyt, "A Primitive Handicraft Industry in a Modern Setting," *Journal of Geography*, December, 1938, Vol. 37, pp. 358-364.

[2] Bratton, Sam T., "Land Utilization in the St. Francis Basin," *Economic Geography*, October, 1930, Vol. 6, pp. 374-388.

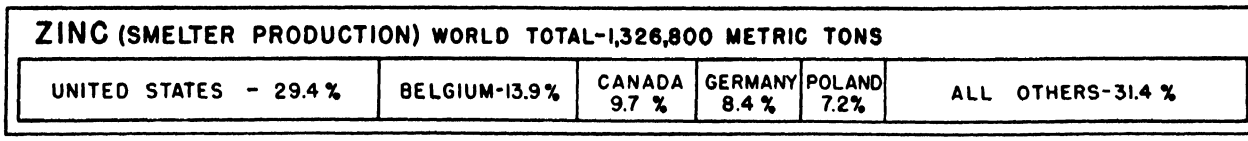


FIG. 42. WORLD'S ZINC PRODUCTION. This is a 7-year average preceding World War II. (From *Foreign Commerce Yearbook*)

the petroleum and natural gas of near-by Oklahoma, and the agricultural products near at hand, make Little Rock a significant industrial city.

Hot Springs, Ark., at the eastern edge of the Ouachita Mountains amid scenery of surpassing beauty, is chiefly a health and recreation center. The Hot Springs National Park is the only health resort owned and controlled by the United States Government. The many hotels and thermal baths testify to the belief of thousands that the hot, mineral waters have healing value. The first government hospital was erected there in 1884 and has now been replaced by one costing more than $1,500,000. Congress in 1932 created a national park surrounding the springs to prevent the exploitation of the hotels and springs for personal gain.

Fort Smith, Ark., on the north slope of the Ouachitas in the western part of the state, is at the junction of two streams, the Arkansas and the Poteau. Formerly a trading post on the eastern edge of the Indian Territory, it now is engaged in the manufacture of such wood products as staves, barrels, and furniture.

LOOKING TO THE FUTURE. The rainfall in the Southern Interior Highlands is high and the valleys in the sedimentary rocks are deep; conditions are thus favorable for the building of large dams and impounding great quantities of water for power. With such possibilities, the region is potentially a manufacturing area. Are other conditions favorable so that such activity can be successfully promoted?

The region is excellent for the growing of apples, peaches, grapes, and many other fruits, but distance to market and poor transportation facilities are serious handicaps. Is there anything that can be done to improve this situation?

The rugged lands, tree-covered slopes, clear-flowing streams, and hospitable people invite tourists and vacation seekers. What can be done to enhance these features and make them even more attractive and accessible?

During the last two decades many young men and women have been leaving the isolation of the Ozark-Ouachita country to seek more favorable opportunities in other parts of the United States. Can it be shown that favorable circumstances may be found in their home region and that greener pastures do not lie beyond?

7

The Rocky Mountains

THE ROCKY MOUNTAINS of North America rise abruptly west of the Great Plains and, viewed broadly, extend in a northwest-southeast direction from northern Alaska into Mexico. Throughout most of their length, the Rockies are far from the Pacific Ocean in the United States as many as 500 miles. From the Canadian border northward, the mountains are quite continuous, whereas, in the United States, they are broken by a number of low passes, the most important of which is *South Pass* in western Wyoming.

ROCKY MOUNTAIN SUB-SECTIONS AND THEIR CHARACTERISTICS

The Rocky Mountains of North America are composed of several sections, each of which is made up of a number of chains. In this discussion the sections will not be accorded independent treatment (Fig. 43). The *Southern Rockies* are mostly in Colorado and northern New Mexico, whereas the *Northern Rockies*, in the United States, covering a much larger territory, lie chiefly in Idaho and Montana. In their memorable exploring trip for President Jefferson, Lewis and Clark crossed the Northern Rockies. Between these two divisions of the Rockies is the *Wyoming Basin*, a high, comparatively level area serving as one of the chief routes through the mountain barrier. The Wyoming Basin and associated mountains, including the *Uinta, Wasatch, Wind River, Grand Teton* (Fig. 44), *Big Horn*, and *Absaroka* ranges, are sometimes called the *Central Rockies.* Under the horizontal sediments of the Wyoming Basin are buried mountain ranges, the highest peaks of which reach the surface or extend above the level of the surrounding country as isolated knobs or low peaks. North of the international boundary are the high *Canadian Rockies,* whereas south of the Rio Grande in Mexico is the *Eastern Sierra Madre* (Sierra Madre Oriental). A broken mountain and plateau area, transitional between the Southern Rockies and the Eastern Sierra Madre, is the *Trans-Pecos Highland*—a region of folded and block mountains, some partly buried beneath detrital sediments and similar in some respects to the Wyoming Basin.[1]

Natural Features

The Rockies are more than twice as high as the Appalachians, and are much more rugged. The highest peaks are in the Southern Rockies; they include the well-known *Long's Peak* (14,265 feet) and *Pike's Peak* (14,109 feet), both in Colorado. Either continental or local mountain glaciation covered practically all the region in the United States and Canada. The extensive glaciation in the Northern and Canadian Rockies carved deep valleys, formed lakes, cirques, and waterfalls, and at the same time chiseled serrated matterhorn peaks which rival those of the Alps. A large number of valley glaciers still exist in the Canadian, the Northern, and the Central Rockies, thus making these areas exceptionally scenic and well situated for playgrounds; indeed, they rival any other mountains in the world for grandeur, beauty, and opportunities for summer and winter sports. So outstanding are they in these respects that several

[1] For a detailed discussion see Nevin M. Fenneman, *Physiography of Western United States*, McGraw-Hill Book Company, Inc., New York, 1931.

areas have been set apart for playgrounds and wildlife preserves, notably, *Rocky Mountain National Park* in Colorado; *Yellowstone National Park* in Wyoming; *Glacier National Park; Waterton-Glacier International Peace Park* in northern Montana and southern Alberta; and *Banff* and *Jasper National Parks* in Canada.

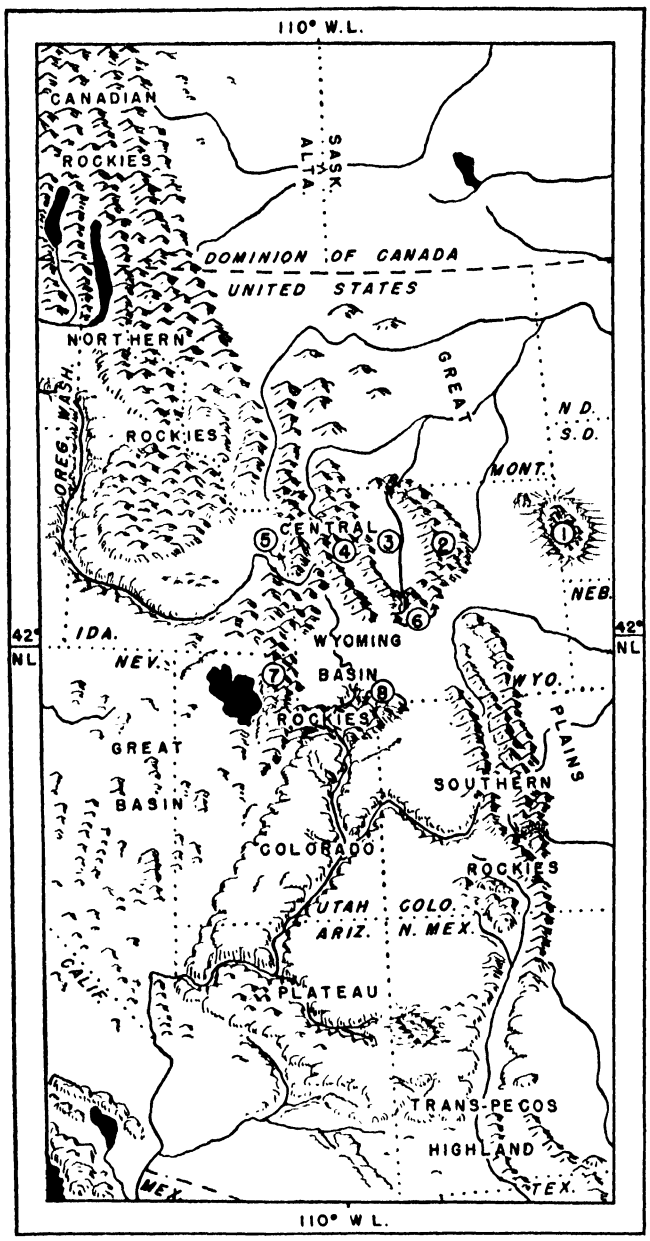


FIG. 43. ROCKY MOUNTAIN REGION OF THE UNITED STATES. Portions of the Great Plains lying to the east of the Rocky Mountains and of the Great Basin to the west are shown on this sketch. A more comprehensive treatment would include details concerning the several sections of the Rocky Mountain Region. The numbered features are as follows: (1) Black Hills, (2) Big Horn Mountains, (3) Big Horn Basin, (4) Absaroka Range, (5) Grand Teton Mountains, (6) Wind River Range, (7) Wasatch Mountains and (8) Uinta Mountains.

Many rivers, or some of their tributaries, have their headwaters in the Rocky Mountains. The chief of these are the *Colorado, Columbia,* and Yukon flowing to the Pacific, and the Missouri, Platte, Arkansas, *Red,* and *Rio Grande* draining into the Atlantic.

The Rocky Mountains have granite cores which are covered with tilted sedimentary rocks on their flanks. The Uinta and the Big Horn mountains still retain some of their rounded youthful appearance. In most places, however, the agencies of erosion have cut so deeply into the mountains that they have taken on rugged aspects, thereby exposing their igneous interior. Crustal disturbances on a large scale are in evidence in many places; for example, in Montana, the *Lewis Range* is an overthrust fold, having been pushed eastward over the plains, in places as far as 15 miles (Fig. 45). Crustal disturbances in the Rocky Mountains are always imminent. This is indicated by the recent earthquakes in Helena, Mont., and in the *Jackson Hole* district just east of the Grand Tetons.

The Rocky Mountains are famous for their valuable ores and minerals—silver and gold in Colorado, copper in Utah and Montana, gold in the Klondike, iron in Wyoming, and coal in northwestern Colorado and southern Wyoming.

The remoteness from populous areas precludes the possibility under present circumstances of utilizing the abundance of available water power and of extensively exploiting the coal and the less valuable minerals.

The great latitudinal extent and the differences in altitude give the Rocky Mountains a wide diversity of climate. The Eastern Sierra Madre range projects into the tropics whereas the Rockies in northern Alaska are north of the Arctic Circle. In some of the valleys in the United States, the growing season is long enough for the production of good crops of vegetables, fruit, grain, and hay, whereas in Canada, except in the southern part, the climate is too cold for crop growing. The mild summers in the Rockies make a favorable retreat from the high temperatures on the Great Plains, and conse-

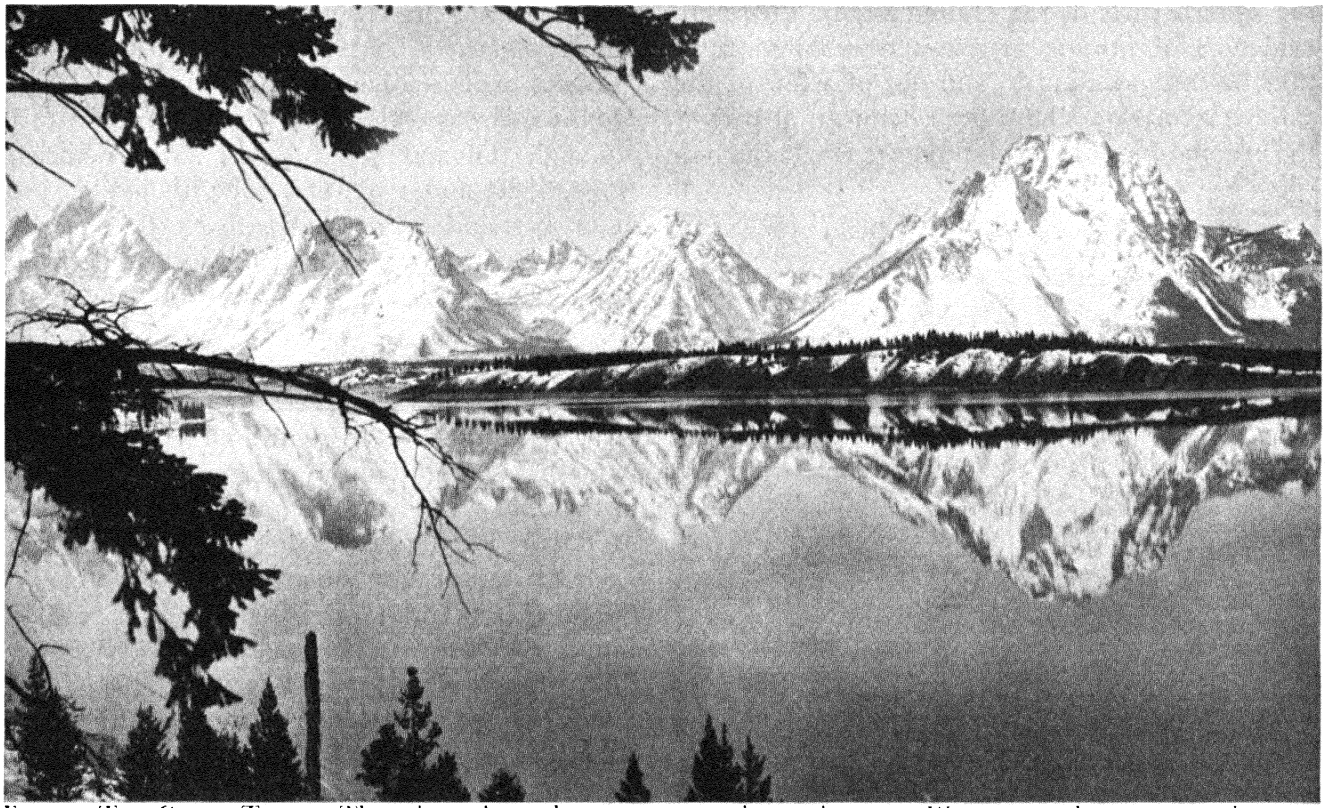


FIG. 44. THE GRAND TETONS. These ice-sculptured mountains are in northwestern Wyoming and are among the most picturesque in the world. (Courtesy U. S. Bureau of Reclamation)

quently many people from the plains have summer homes in the mountains of Colorado, Wyoming, and Montana.

The Rocky Mountains in the United States and Canada are in the westerly winds and, because of their height, even though far inland, receive considerable rainfall. At elevations above 9000 feet the annual precipitation is usually above 25 inches, and quite evenly distributed throughout the year.

On account of the dearth of level lands there is but little mature soil in the Rocky Mountains. However, in the valleys where not too stony, and where water for irrigation is available to supplement the rainfall, the youthful soils produce good crops.

The natural vegetation of the Rockies in the United States and Mexico consists chiefly of pine forests (Fig. 237). Covering the middle slopes are juniper in the south, lodgepole pine in Colorado, Wyoming, and southern Montana, and larch and white pine in northern Montana and southern Canada. On the upper slopes and below the timber line, firs and spruces predominate. However, nearly all of the mountain peaks extend above the timber line, beyond which are shrubs and grasses, that gradually grade into tundra vegetation of small plants, lichens, mosses, and algae. Farther northward even on the lower slopes the forests give way to treeless tundras. In some of the intermontane valleys and basins, such as the Wyoming and Bighorn basins, mesquite, short grasses, and sage brush are the prevailing types of vegetation.

The relative abundance of precipitation on the mountains and the prevention of rapid run-off by mountain vegetation are responsible, in large measure, for the steady supply of water for streams on the semiarid Great Plains where irrigation is practiced. Even so, numerous storage reservoirs have been constructed in and near the larger streams in order to conserve water for irrigation.

Cultural Features

The imprints of human occupancy in the Rocky Mountains are fewer and less conspicuous than in

the eastern parts of the United States. There are evidences of mining activities; roads and trails may be seen winding in and out of a few of the valleys; some slopes have been denuded of part of the original forest cover; but on the whole the natural landscape has been changed very little by human impact.[1]

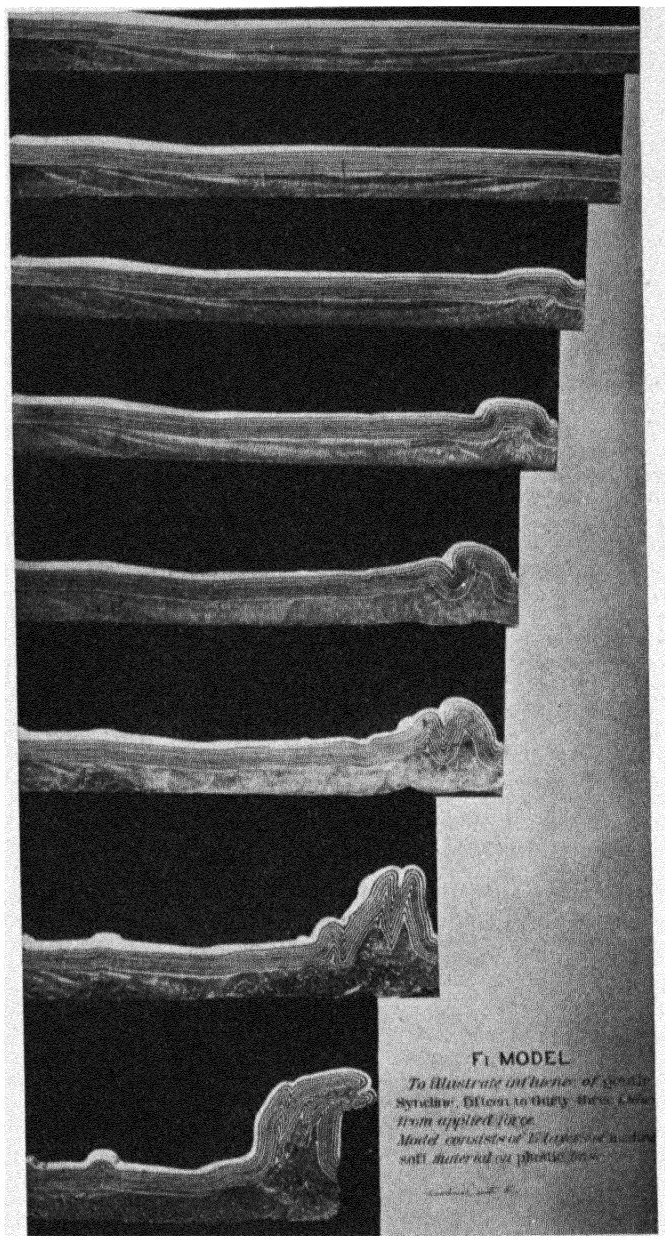


FIG. 45. HOW FOLDED MOUNTAINS ARE MADE. The upper section represents horizontal layers of marine-deposited sediments. The sections below show progressively how folding may culminate in over-thrust mountains, such as the Rocky Mountain range fronting the Great Plains in Montana. (See Fig. 43.) (Courtesy U. S. Geological Survey)

White explorers had not penetrated the Rocky Mountain area previous to the nineteenth century, although Thomas Jefferson on three occasions (1783, 1786, and 1792) had done his best to promote exploration into western North America. Soon after the purchase of the Louisiana Territory by President Jefferson, the Lewis and Clark Expedition (1803-1806) crossed the Rocky Mountains in what is now Montana. During the first three decades of the nineteenth century British fur traders ranged up and down the west slope of the Northern Rockies but did not occupy any portion of them. Not until the organization of the Rocky Mountain Fur Company in 1821 did white men from the east occupy the area. The adventures of the fur traders and trappers make exciting reading. Employees of this fur company under the leadership of Ashly, Bridger, and Smith in 1823 found *South Pass* (7489 feet), one of the lowest and easiest routes through the Rockies. South Pass in the western Wyoming Basin is about 20 miles wide, grass covered, comparatively free from deep snow in winter, and a real open route; whereas other routes, higher, colder, narrower, and forest covered, are formidable barriers. The fifth and sixth decades of the nineteenth century witnessed tens of thousands of emigrant wagons going over the *Oregon* and *Mormon* trails through South Pass. In 1849 alone it is estimated that from 8000 to 10,000 wagons went over this route through the Rockies. The building of the Union Pacific Railroad followed, being completed in 1869. Among the railroads utilizing other passes over the Rockies are (1) The Southern Pacific at El Paso (The Pass); (2) the Santa Fe near Santa Fe; (3) the Denver and Rio Grande by way of the Royal Gorge of the Arkansas River; (4) the Northern Pacific and (5) the Great Northern in western Montana; and (6) the Canadian Pacific and (7) the Canadian National in the vicinity of Banff and Jasper National Parks in the Canadian Rockies.

[1] Chapman, Wendell and Lucile, "Lords of the Rockies," *National Geographic Magazine*, July, 1939, Vol. 76, pp. 87-128.

Human interests in the Rocky Mountains now center chiefly around mining, lumbering, and recreation.[1] Most of the available placer gold has been recovered, but lode mining for gold and silver is growing in importance. Colorado today is the third state in production of gold, Utah second in yields of both silver and copper, and Montana third in copper yield.

and canyons, petrified forests, lava plateaus, and many forms of wild life are to be seen within an area of about 2500 square miles. Good highways enter the park on all sides, and railroads penetrate to the west and north entrances.[2]

Glacier National Park in Montana on the Canadian border differs from other Rocky Mountain areas in the United States in the grandeur of its



FIG. 46. SOME ALPINE PEAKS IN GLACIER PARK. In this area one may see what glacial-carving can do to over-thrust mountains. (See Fig. 45.) (Courtesy U. S. Geological Survey)

Although the Rockies are far removed from areas of dense population, recreation centers are easily accessible from the east, either by improved highways, by rail, or by air routes. The Rocky Mountain National Park in Colorado is remarkable for majestic mountains, lofty passes, and wild scenery. Many people have summer homes in this vicinity. Yellowstone National Park in Wyoming is unique in the great variety of natural features within a comparatively small area. Geysers, hot springs, high mountains, beautiful lakes, both placid and turbulent rivers, magnificent waterfalls

glacial-carved peaks, its many secluded lakes, its glistening glaciers shining from many valleys, and the overpowering intimacy that one feels for the region as he drives over the superb highway through the very heart of the area (Fig. 46). In British Columbia and Alberta, Glacier National Park is repeated with added emphasis on the alpine and tundra features in the Banff and Jasper National Parks. The peaks, lakes, and glaciers of Switzerland, although more accessible, do not surpass in beauty or in grandeur the Northern or the Canadian Rockies.

The latest resort features in the Rockies are the establishment of dude ranches, camps, and also

[1] Brown, Ralph H., "The Mountain Communities of the Boulder Region, Colorado," *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp. 192-208. A study of the variable factors involved in the mining of metallic ores in the Rockies.

[2] Vosburgh, Frederick G., "Fabulous Yellowstone," *National Geographic Magazine*, June, 1940, Vol. 77, pp. 769-794.

centers for winter sports, such as skiing and skating. *Sun Valley*, Idaho, has become both a great winter and summer resort. The abundance of clear, pure drinking water from springs and lakes and the cool streams abounding with trout, lure nature lovers and fishermen from all sections of the country.

Many areas in the Rockies are now under government control in order to save the forests from destructive exploitation and from fires, to protect the animal life against the over-zealous hunter, and to preserve the vegetation cover so that water will not run off so rapidly, thereby conserving life-giving water which is so necessary for irrigation on the plains.

URBAN CENTERS. In all of the Rocky Mountain Region there are but three cities with more than 25,000 people—namely, Butte, Mont., Albuquerque, N. Mex., and Colorado Springs,[1] Colo. The copper ore mined from the fissures of the granitic rocks in the vicinity of *Butte* for a long time has made this city the center of one of the greatest copper-mining districts in the world. *Colorado Springs* is in a mountain resort area which includes such features as *Pike's Peak*, the *Garden of the Gods*, and, not far away, the *Royal Gorge* of the Arkansas.

Several other cities in the Rocky Mountains proper have more than 10,000 people each. *Anaconda*, one of the great copper-smelting centers, and *Helena*, in Montana, are satellites of Butte in the copper-mining district. *Missoula*, also in Montana, is in the center of a rich irrigated area. *Boulder* and *Trinidad*, in Colorado, and each in the eastern foothills of the Rockies, are outfitting centers for mining interests in the adjacent mountains. In the vicinity of Boulder are many "ghost towns" and hundreds of deserted mine shafts, and it also is in an important irrigated area. There are numerous small towns and villages in the Rockies, some of which are well known because of special interests or activities. Some of these are *Leadville* and *Salida*, in Colorado, both depending on mining; *Laramie*, Wyo., and *Bozeman*, Mont., supported largely by grazing and irrigation; and *Dawson* in the Yukon territory near the great Klondike gold field.

In the transitional Trans-Pecos country is beautiful *Albuquerque*, the largest city in New Mexico, dependent largely on grazing, irrigation farming, and mining. *Santa Fe* and *Las Vegas* are tourist cities where Indian cultures and Indian ruins may be seen and studied, and they are centers also of special governmental activities.

THE FUTURE OF THE ROCKIES. The Rocky Mountains are rich in resources, minerals, lumber, water power, irrigation water, fertile valleys, recreation facilities, and scenery. Such variety and abundance of resources in densely populated areas of the world would furnish tens of millions of people with means for a bountiful life. Switzerland, one seventh as large as Colorado, supports four times as many people. The Rocky Mountain area, extending from Mexico to Alaska, is many times the area of Switzerland. Progressive increase in the utilization of each of these resources raises problems of absorbing interest. Climate, recreation, scenery, and tourists combine in their challenge to improve utilization. Better highways, making these features easily accessible, would bring many more people into the region in summer. The youth hostel movement, already started, could be extended. Fertile valleys and irrigation are inviting prospects for the farmer. Minerals, water power, and lumber certainly are present in a sufficient abundance to be worthy of much consideration. The frontier for constructive utilization of the Rocky Mountains is not closed, but in reality just well begun.

[1] The interests of this city are very definitely tied up with the mountains although it is on the Great Plains, a few miles from the Rockies.

8

The Intermontane Highlands

BETWEEN the Pacific Mountains and Lowlands on the west and the Rocky Mountains on the east is a series of plateaus, basins, and ranges known as the *Intermontane Highlands* which extends from the tropics to the polar cap. In the United States are the *Columbia Plateau,* the *Basin and Range Region* (Great Basin), and the *Colorado Plateau;* in Alaska and Canada is the *Yukon-Canadian Plateau;* and mostly south of the international boundary is the *Mexican Plateau.* The altitude in general ranges from 2000 to 8000 feet, and the climate varies from semiarid to arid. The temperature descends from the always-frost-free in Mexico to the never-frost-free in Alaska.

Some portions are underlain by horizontal, sedimentary rocks; some are covered by thick sheets of basaltic lava; and others are composed of tilted block mountains with deep, intervening valleys partly filled with unconsolidated detritus.

Several of the great rivers of the continent flow through the intermontane area, among which are the *Colorado,* the *Columbia,* and the *Yukon,* all of which empty into the Pacific Ocean. In the middle and lower latitudes human occupancy is dependent largely on grazing, dry-farming, or irrigation. Crops range from cotton, corn, and subtropical fruits in the south to apples and the hardy grains in middle and higher latitudes. The first white men to penetrate the intermontane area were Spanish, among them Cortez (1520) and Coronado (1540).

PLATEAUS, BASINS, AND RANGES OF THE UNITED STATES

The Intermontane Highlands in the United States reach from Canada to Mexico, and from the Rocky Mountains to the Sierra Nevada-Cascade ranges, a distance of 300 to 600 miles. For purposes of detailed study this immense area of more than a half million square miles should be divided into several regions, the most important of which are the Columbia Plateau (in the north), mostly in Idaho, Oregon, and Washington; the Colorado Plateau (in the south), which lies largely in Utah, Colorado, New Mexico, and Arizona; and the Basin and Range Region (Great Basin) which is chiefly in Nevada and Utah, but extends into southern California and Arizona where it merges into the Mexican Plateau. The following discussion will be integrated around these three regions.

Natural Features

The three regions differ markedly in structure, and these differences are reflected conspicuously in the corresponding surface features. The Columbia Plateau, one of the most extensive lava plateaus in the world (150,000 square miles), is comparatively level, but punctuated here and there by old granitic mountains rising above the engulfing lava rock. Just as remarkable are some of the canyons which have been cut thousands of feet deep through the lava cover and into the old landscape on the sedimentary and igneous rocks that antidated the lava flows (Fig. 47). The maximum thickness of basaltic lava is around 5000 feet, and it is estimated that 100,000 cubic miles of molten material were transferred from the earth's interior to the surface.

One of the most stupendous of the world's natural features is the *Grand Coulee* on the Columbia Plateau.[1] This is a fossil canyon of glacial origin,

[1] Barbour, G. B., "Harnessing the Columbia River," *Geographical Journal,* October, 1940, Vol. 96, pp. 233-242.

three times as deep and several times as wide as the gorge of the Niagara River, and within it is the dry "Fossil Falls," many times higher and wider than Niagara Falls. Today the Grand Coulee is the site of the largest power and irrigation project ever undertaken by the United States government (Fig. 48).

The Colorado Plateau is a composite of a large number of plateaus separated by steep escarpments and numerous deep canyons which have been carved into sedimentary rock. The most wonderful of the deep valleys is the *Grand Canyon* of the

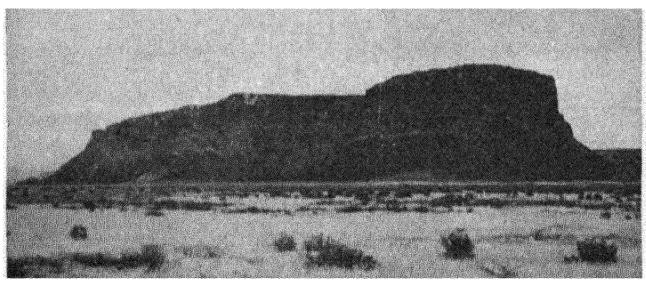


FIG. 47. STEAMBOAT ROCK. This butte was an island in the ancient river that excavated the Grand Coulee. The valley side is seen beyond the butte. The vegtation betrays the aridity of the area. (Courtesy U. S. Bureau of Reclamation)

Colorado River, an excavation a mile deep, twelve miles wide, and more than 100 miles long. The upper four fifths of the chasm (4000 feet), were carved through sedimentary rock, but the lower one fifth (1000 feet) was cut out of granite and metamorphic materials. Viewed from a distance the plateau appears nearly flat, but in order to travel across the area such grand features as *Bryce Canyon,* and *Mesa Verde,* and *Zion Canyon* must be crossed. The *Zuñi Mountains* on the plateau are eroded domes similar to the Black Hills, and *Mt. Taylor* is an eroded volcanic cone perched on a sheet of lava that was spread over the area (Fig. 49).

The Basin and Range area, as its name implies, is largely an area of interior drainage. During glacial times ancient *Lake Bonneville* (20,000 square miles) occupied part of the basin and drained over the northern edge into *Snake River. Great Salt Lake,* a remnant of the ancient lake, is only one tenth as large as the original one. One of the striking features of the basin region is the large number of north-south mountain ridges made by the fracturing of the earth's surface and the subsequent tilting of immense crustal blocks. The upturned edges of the tilted blocks form the mountain ridges, and the depressions between the ridges as a rule are deeply covered by unconsolidated sediments varying in thickness from a few feet to hundreds or even thousands of feet (Fig. 50). During the Lake Bonneville period many of the present ridges were

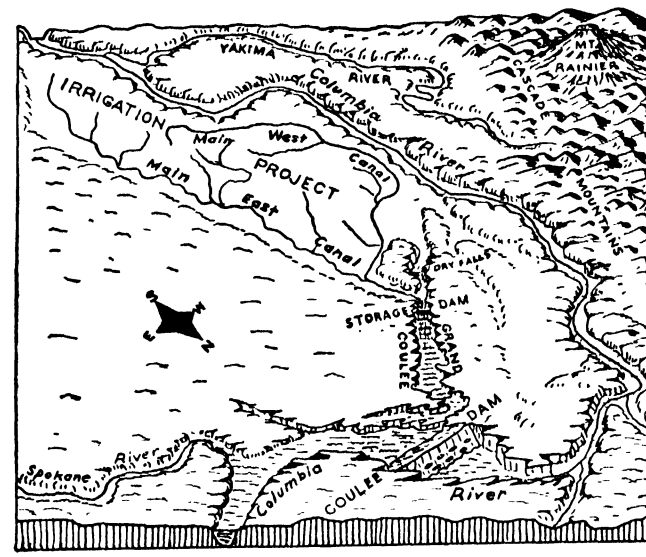


FIG. 48. THE GRAND COULEE PROJECT. Here the United States government is turning one of the grandest features of nature into a project to serve the needs of many thousands of people. The water above the large dam must be lifted 450 feet to the floor level of the fossil channel, the Grand Coulee. The grandeur of nature's sculpturing will be modified but little by this immense power and irrigation project.

islands, and the depth of the water was more than 1000 feet as is shown by the old shorelines and beaches high on the slopes of the *Wasatch Mountains.* The city of Provo is on one of these old lake levels, 625 feet above the present level of Great Salt Lake.[1] Three well known features in the southern part of the Basin and Range Region are *Death Valley,* and the *Mohave* and *Sonoran* deserts.

The Columbia and Colorado plateaus are practically destitute of commercially valuable earth products. Hopes for finding petroleum in the for-

[1] Borah, Leo A., "Utah, Carved by Wind and Water," *National Geographic Magazine,* May, 1936, Vol. 69, pages 577-623.

mer lie in drilling through the lava beds into old folded sedimentary rocks underneath. It is known that both coal and petroleum exist in the Colorado Plateau, but conditions have not arisen to make the exploiting of them profitable. For hundreds of years, however, the rock and clay have been used by the Indians of the Southwest in the construction of their adobe pueblos, their cliff dwellings, and in the making of pottery. The minerals of the Basin and Range area are plentiful and widespread. Rich



FIG. 49. THE SAN FRANCISCO MOUNTAINS. These are volcanic mountains perched on the Colorado Plateau, and are of such recent origin that some of them show but little evidence of erosional activity. (Courtesy U. S. Geological Survey)

beds of potash, soda, and borax in the playas of Death Valley are especially renowned. It is estimated that four million tons of salt are available in Great Salt Lake, and in southern California.

Gold and silver occur in paying quantities in some of the basin ranges. In 1859 the historic Virginia Lode, one of the richest deposits ever uncovered, was discovered near *Virginia City*, Nev. *Tonopah* and *Goldfield* in Nevada also are rich in gold and silver ores. Fluctuations in population in Nevada have been a response chiefly to the variable production of precious minerals. Great quantities of copper are now being produced in the *Bingham Canyon* district in Utah. However, southern Arizona, the leading copper-producing state of our country, is marginal between the Basin and Range Region and the Mexican Plateau. When copper is in demand, *Globe, Bisbee,* and *Douglas* in Arizona are thriving cities, but when demand slumps, these cities are depressed.

The dry climate of the Intermontane Highlands of the United States—continental in the north and central sections, and subtropical in the south—is due chiefly to its intermountain position, although in the south the subtropical belt of high pressure is a significant factor (Fig. 236). In the westerlies in Washington and northern Idaho the rainfall increases eastward from 8 inches near the Cascades to more than 20 inches adjacent to the Rockies. At Boise, the annual rainfall is 13.3 inches—July (0.2 inches) being the driest month, and January (1.9 inches) the rainiest (Fig. 8). Spokane has summers similar to those of the Adirondacks and winters much like those of Kansas City. Both aridity and temperature increase southward. At Imlay, Nev., the annual rainfall is less than 5 inches, and at Yuma in Arizona it is only 3.1 inches.

At altitudes above 6000 feet, rainfall increases; for example, at Flagstaff, Ariz. (6907 feet), the annual precipitation is 21.9 inches. Both altitude and latitude are controlling factors in the length of the growing season—Yuma (141 feet) having 357 days



FIG. 50. A BLOCK MOUNTAIN. This mountain in Nevada is nearly buried in lacustrine detritus that has been removed by wind and streams from the adjacent highlands. (Courtesy U. S. Geological Survey)

each year without frost, and Imlay (4029 feet), 500 miles farther poleward, having only 141 frost-free days.

The mature soils of the Intermontane Highlands in the United States are pedocalic, derived mostly from residual and aeolian parent materials on the uplands and from alluvium in the valleys (Fig. 238). In much of the Columbia Plateau the lavas have weathered to a considerable depth, making rich residual soils; in other places, a mantle of loess has been spread over the lavas; whereas in

still other areas the black lavas are scarcely weathered at all. In certain sections of the Columbia Plateau the lavas were scoured, denuded, and channeled by glacial outwash, making the well-known "scablands." In eastern Washington and northern Idaho are some chernozem and chestnut soils, but for the most part the soils of the region are weak—having but little humus, and are frequently impregnated with alkalies.

Sagebrush and short grasses dominate the less arid areas, bunch grasses growing in the more moist sections where chernozem soils have developed. Over much of the region from Canada to Mexico, desert conditions prevail. This is particularly true in the basins of Nevada, Utah, and California. On the lower mountains and on the Colorado Plateau much of the land is covered with poor grass and scrub trees (Fig. 237). Only above 7000 feet in the south do good forests of yellow pine occur. Much of the area is reserved as national forests and parks, but not all of the reserved lands are forest-covered.

Cultural Features

The first white men to enter the Intermontane region were the Spanish Conquistadors who came by way of the Colorado Plateau. Nearly one hundred years before the Pilgrims landed at Plymouth, Coronado (1540) was searching for the "Seven Cities of Cibola," the present home of the Zuñi Indians, expecting to find the much prized gold of which he had been told. The Spanish Padres of the Cross followed closely the swords of the Conquistadors into the home of the Indians of the Southwest. Nearly three hundred years later (1826), trappers invaded this territory and nearly a half century later still, Major Powell (1868) made his memorable boat trip down the Colorado River from Green River City, Wyo., to the Grand Wash at the lower end of the Grand Canyon.

Lewis and Clark, in their exploring expedition for President Jefferson, crossed and recrossed the middle portion of the Columbia Plateau in 1804-1806. The Astorian hunters and traders in 1811-1812 crossed the plateau by following the Snake River from the vicinity of its headwaters to the Columbia River and thence on to Astoria. The Oregon Trail, so intensively used in the fifth decade of the nineteenth century, followed closely the route of the Astorians along the Snake and Columbia rivers. The story of the development of the rich oases along the Snake and the Columbia rivers is a fascinating tale replete with many types of adventure, daring, and hardship.

Credit for opening the way across the Great Basin belongs to Jedediah Smith, an employee of the Rocky Mountain Fur Company. In 1826 Smith, with fifteen men, journeyed southwest from the Great Salt Lake to southern California, returning the next year through central California over the Sierra Nevada Range, by way of Carson Sink and the Humboldt River to the trappers' and traders' rendezvous on the shore of Great Salt Lake.[1] This route to the western coast over mountain barrier and desiccating deserts was by far more difficult than the river routes followed by Lewis and Clark two decades earlier.

In 1842 John C. Frémont with Kit Carson as guide set out to explore carefully the great interior area between the Wasatch and Sierra Nevadas. It was Frémont who definitely proved the basin character of this area and surveyed in considerable detail the route followed by the California Trail of the "Forty-niners" and later by the Union Pacific Railroad. It was Frémont's description of the Great Salt Lake vicinity that influenced Brigham Young to lead the Mormon group into the Great Salt Lake oasis. *Truckee Pass*, the lowest route over the central Sierra Nevadas, was described by Frémont. Within two decades after the discovery of South Pass in the Central Rockies by James Bridger, explorations in the Great Basin by Bonneville, Smith, Frémont, and many others were in progress.

Low rainfall in the Intermontane area limits agricultural activities to grazing and such farming practices as can be carried on by irrigation and dry-farming methods. Human occupancy and achievement in the northern part of the region center almost wholly around agriculture. The sheep industry developed on the semiarid lands of Oregon just east of the Cascades, and today Oregon and Idaho are among the first ten states in the growing of sheep.

[1] Neihardt, John G., "Song of Jed Smith," The Macmillan Co., New York, 1941. An epic poem, descriptive of the adventures and vicissitudes associated with finding routes across the Basin and Range Region.

The quest for new agricultural land enticed many people into growing wheat on a large scale on the semiarid lands of eastern Washington and Oregon, and northern Idaho. There is an ever-present danger, however, of depleting the soil of stored moisture and fertility by dry-farming methods, and as a consequence wheat production has been declining in recent years. The problem of conservation of soils and moisture under dry-farming methods has not yet been solved.

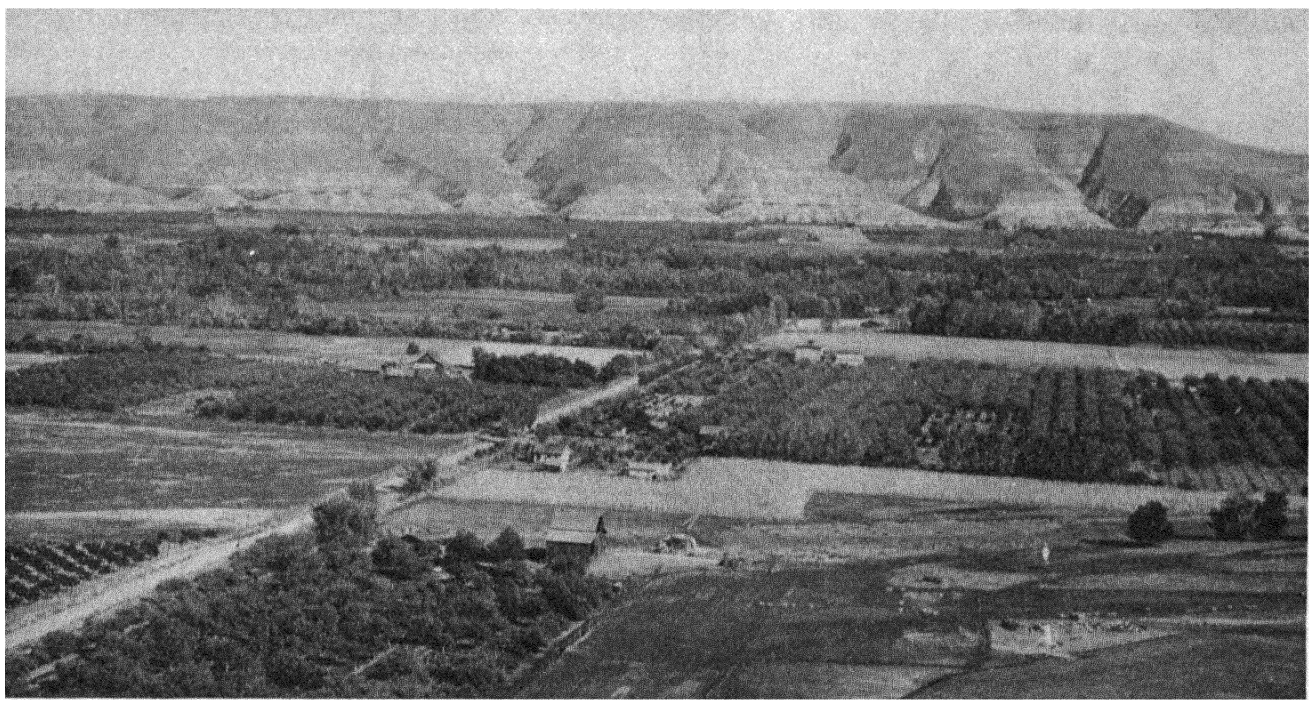


FIG. 51. RICH YAKIMA VALLEY. Thirty years ago this well-kept valley was as barren as the valley side beyond. Irrigation water comes from the Cascade Range. There is sufficient water for only a small portion of the arid land. (Courtesy U. S. Bureau of Reclamation)

Growing crops on some of the arid lands of the Columbia Plateau by means of irrigation is well established. Usually some phase of specialized farming succeeds best. In the *Yakima Valley* in Washington, for instance, is one of the great apple-growing areas in the United States (Fig. 51). The famous "Idaho baking potato" is especially important in the Snake River valley. The Minnedoka district along the Snake River in southern Idaho is a successful general-farming region. However, irrigation on a large scale has its handicaps, for there is always the tendency to develop more land than the water supply can accommodate. The whole process is expensive and is a continual drain on the gross income of the farmer. Such farming is hard work and, as a rule, the farms must be small. In most irrigated areas there is a tendency for the soil to become alkaline or to lose its favorable structure. Often, too, these areas are far from adequate markets and the cost of transportation, except for non-competitive products, may be burdensome. It is usually an inspiring sight to travel through a well-irrigated area at the height of the growing season or at harvest time.[1]

On the beaches, terraces, and alluvial fans of ancient Lake Bonneville, between Great Salt Lake and the Wasatch Mountains, is one of the truly great oases of the world. Several large cities are located here. Agricultural development depends entirely on irrigation with water brought by the streams on the western slopes of the Wasatch

[1] Baylor, J. Wright, "Climate and Man in the Columbia Plateau Area," *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp. 216-230. Here is an exposition of human adaptations to desert and semi-desert conditions.

Mountains. Sugar beets, vegetables, fruits, and potatoes are important, and alfalfa is the chief forage crop. The altitude makes the climate too cool for corn, but cattle and sheep thrive on the home-grown alfalfa and the by-product beet pulp.

On the west margin of the Great Basin, chiefly in Nevada, is another outstanding oasis (Truckee-Carson Project), the water for irrigation coming from the Sierra Nevadas. In addition to these two large oases there are many small irrigated districts, the size of the areas depending largely on the amount of available water.



FIG. 52. BOULDER DAM FROM AN AIRPLANE. The dam is 726 feet high and the lake (Lake Mead) is more than 100 miles long. The top of the dam is a highway over the Colorado River and is used by hundreds of vehicles daily. (Courtesy United Airlines)

The spread of human occupancy on the Colorado Plateau has been limited by several factors other than aridity. Among these are the large number of intricately distributed deep canyons, the isolation, and the difficulty of getting underground water for domestic purposes. The area is appropriately called a desert wonderland. The canyons, petrified forests, cliff dwellings, myriad erosional forms, and volcanic cones are some of the remarkable scenic features. Good highways now reach many of the more accessible features, and new highways and trails are under construction.

Agriculture on the Colorado Plateau is severely handicapped by adverse natural conditions. Water is not available for irrigation; the land under the present grass cover can gain no more in carrying capacity for pasturage, and dry farming is precarious in most any region.[1]

One of the world's greatest engineering feats was the construction of the *Boulder Dam* in the *Grand Canyon* of the Colorado River (Fig. 52). Here are impounded millions of cubic feet of water for the generation of electric current and the irrigation of large tracts of land far down the Colorado Valley. Los Angeles, 300 miles away, receives part of its water supply and hydroelectric power from this project. Lake Mead, back of the dam, is one of the largest artificial lakes in America and is becoming part of a prominent pleasure resort.

Nature has placed severe limits on the Intermontane Highlands of the United States as far as human use is concerned. The area is immense and distances are great. The dearth of attractive natural resources (lands, forests, grasses, and minerals) limits the need for transportation routes largely to those which cross the region in order to connect sections east of the area with those on the west. Consequently, railways and improved highways, as well as airways, traverse the region from east to west, but few such lines are needed from north to south. The facilities for transportation and communication now available are a great contrast to those of the Oregon, Mormon, and Santa Fe trails, and the Pony Express of pioneer days. Transcontinental traffic over the present routes is very great, and prospects are good for their increasing utility.

CITIES OF THE INTERMONTANE HIGHLANDS OF THE UNITED STATES. The welfare of the cities of the Intermontane Highlands revolves for the most part around irrigation, mining, and transportation interests. A number of these cities cluster about the Great Salt Lake oasis in the Basin and Range Region. This oasis is a monument to the energy of the Mormon people who, because of persecution in Illinois and other places farther east, sought a se-

[1] Hoover, J. W., "Southwestern Desert Vegetation, Its Adaptations and Utilization," *Journal of Geography*, April, 1935, Vol. 34, pp. 148-156.

cluded spot where they would not be molested in the practice of religious beliefs which they held to be fundamental. The frugality, industry, leadership, and devotion of these people to their peculiar institutions have been instrumental in their successful occupancy not only of the Salt Lake area but also of some of the other irrigable lands in the arid intermontane region, especially in the Snake River Valley.

Salt Lake City, the capital of Utah, on the *Jordan River* about 10 miles east of Great Salt Lake and on the west slope of the Wasatch Range, is not only a gateway city to the east by way of South Pass, but also the gateway westward to the Pacific Coast by way of the Humboldt River route and Truckee Pass. It was founded by the Mormons only two years preceding the California gold rush, and because it was on the California Trail, early became an outfitting and provisioning center for miners. Today it is the largest city between the Rocky Mountains and the Pacific Coast. The interests of the people center mainly around the agriculture of the vicinity and upon the manufacturing associated with earth materials and products of the farms. The alpine scenery and the streams of the Wasatch Mountains furnish the city with excellent recreational facilities and an abundant supply of wholesome water for domestic use.

Ogden, Utah, at the junction of the Ogden and Weber rivers, founded on a grassy semicircular delta of ancient Lake Bonneville, is 15 miles east of the Union Pacific bridge over Great Salt Lake. Just east of the city is the picturesque canyon of the Ogden River. *Provo*, Utah, on the Provo River three miles east of Utah Lake, is in a gardening and horticultural area. Near by are important mining and steel-manufacturing plants. There are numerous other small cities and villages in the Salt Lake oasis, each of which is closely related to the surrounding irrigated lands. *Bingham*, Utah, twenty-five miles southwest of Salt Lake City, with its great open-pit copper mines, is the leading copper-producing city in the state.

On the Truckee River, is *Reno*, Nev., a gateway city to the western coast by way of Truckee Pass over the Sierra Nevada Range. It profited early by being on the California Trail and benefits now from its location on a transcontinental railroad, the Union Pacific. Reno's proximity to such gold- and silver-mining areas as Virginia City, Tonopah, and Goldfield is also a distinct advantage. It is known best, however, as a place to gain release from marital obligations.

Las Vegas, Nev., in the southern part of the state within a short distance from Boulder Dam, is an important mining center and secures its water supply from artesian wells of which there are one hundred in the vicinity. One well alone has the capacity sufficient to supply a city of 25,000 people.

The Columbia River basin on the Columbia Plateau supports a number of cities most of which depend on irrigation and dry farming. *Spokane* (formerly Spokane Falls), Wash., on a river of the same name, is at the eastern edge of the Columbia Plateau and profits from its proximity to the Grand Coulee Dam and to the Rocky Mountains with both of which its activities are closely associated. Seventy-six lakes mostly of glacial origin lie within fifty miles of Spokane. Hydroelectric power from the falls in the Spokane River is abundant and cheap and has helped to make the city a significant manufacturing center, especially of flour. *Yakima*, Wash., on the Yakima River, is in an oasis created out of a sage brush country by the United States Reclamation Service, and is renowned for apples, pears, and some other fruits grown by irrigation. *Walla Walla*, the metropolis of southeastern Washington, is in the valley of the *Walla Walla River* whose headwaters are in the *Blue Mountains* about 20 miles southeast of the city.

On or near the Snake River in southern Idaho are a number of small cities. *Boise*, on the Boise River, depends on a territory which is irrigated from rain and snow water from the Rocky Mountains. The water is stored in two great reservoirs lying in a narrow valley east of the city. *Pocatello*, near a gateway through the northern rim of the Great Basin, and in a region threaded by a network of irrigation canals, boasts the largest railway shops between Omaha and the Pacific Coast. *Twin Falls*, at Shoshone (Snake) Falls, derives power from two magnificent cataracts in the Snake River. *Lewiston* is at the head of navigation on the Snake River. *Idaho Falls*, near the falls in a narrow canyon of a tributary of the Snake River, is renowned for its hundreds of tons of extracted honey and its

beet sugar manufacture. On the plateau in Oregon are three small cities, *Pendleton*, *Baker*, and *La Grande*, each with fewer than 10,000 people and each located on a small river, tributaries of the Snake or of the Columbia. Each of these cities depends on agricultural activities of the surrounding area, and, together with the Idaho cities previously mentioned, are on or near the site of the old Oregon Trail. In addition to the cities listed, there are dozens of villages and towns on the Columbia Plateau, nearly all of which are dependent on irrigation or dry-farming agriculture.

The cities of the Colorado Plateau are chiefly railway and mining towns with other mixed interests. *Grand Junction*, Colo., at the fork of the Grand and Gunnison rivers, 4583 feet above sea level, is in a rich irrigated area. This is one of the leading sugar-beet districts in western Colorado. A short distance east of the city is a large flat tableland (the Grand Mesa), and eleven miles west are the Red Monoliths of the Colorado National Forest. *Durango*, Colo., a coal, oil, metal, and timber center, has important iron smelters, a beet-sugar factory, and is the gateway to Mesa Verde National Park with its marvelous cliff dwellings. *Flagstaff*, Ariz., at the foot of the San Francisco Peaks, is the center of dry farming and irrigation agriculture, and of the cattle and sheep industries, and has many wonderful natural landscape features in the vicinity. Here is the Lowell Astronomical Observatory, as well as important lumber mills. Considerable quantities of coal and petroleum not yet commercially exploited underlie the near-by area. *Phoenix*, in the Salt River valley and the largest city in Arizona, is the capital of the state and significant as a distributing center in the Southwest. Phoenix and *Tucson* are health and winter resorts, but during the long, dry, hot summer both lose their travelers and tourist business. *Gallup*, N. Mex., a coal-mining city and chief trading point for the Zuñi Indians from the reservation forty miles south and for the Navajos from the north, is in the vicinity of one of the largest pueblos in the Southwest and is the site of one of the cities of Cibola sought by Coronado. It is not probable that the southern section of the highlands will experience soon the growth of any large cities.

Bisbee and *Douglas* in Arizona depend on copper for their prosperity. The main street of the former, a copper-mining town, follows the bottom of a deep canyon, and the residences spread out on adjacent slopes. The ore from the three great copper mines at Bisbee is shipped to the near-by town of Douglas for smelting. This vicinity is the leading area in the United States in the output of copper (Fig. 53).

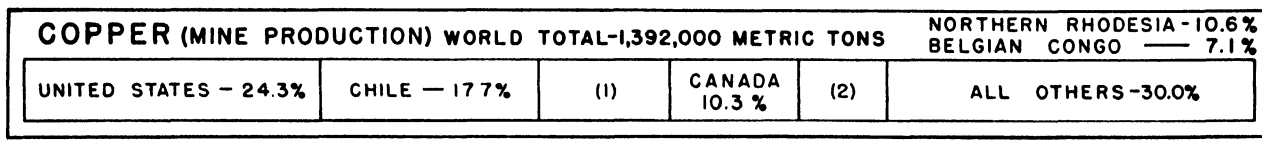


FIG. 53. WORLD'S COPPER PRODUCTION. A 7-year average immediately prior to World War II. (From *Foreign Commerce Yearbook*)

El Paso, Tex., once a trading-post on the old Santa Fe and Butterfield trails, is now the largest city between San Antonio, Tex., and Los Angeles, Calif. Today it is the principal distributing and manufacturing center for the Southwest and for much of northern Mexico. El Paso has achieved notoriety as a health resort of considerable significance because of its sunshine, dry air, and cool nights.

AN APPRAISAL FOR THE FUTURE. When civilized man enters a new region he is hardly ever satisfied with the natural environmental situation and therefore he proceeds at once to modify conditions to meet better his material needs. This is particularly true of a stingy region like the American Intermontane Highlands. In isolated areas far from markets, the problem of maintenance crops must always be considered. If certain surplus materials can be produced, the problem of balanced production always needs attention. There are immense areas in this region where topography and soil are suitable for irrigation, but water, in sufficient quantities, is not available. As previously stated, there is always the temptation of overestimating

the water supply either from streams or from wells. Because of alkali in the soils, and poor drainage, the production of salt-resistant plants is always a problem. The equitable distribution of irrigation water is a perennial difficulty. Not all states in this arid area have good irrigation laws.

In surveying the possibilities of any region there is a place both for the realist and the dreamer. The realist sees things as they actually are, the dreamer as they might be. The realist sees the Intermontane Highlands as a vast area of desert and semi-desert land. Rainfall is deficient for crops, rivers have much water but are usually in deep valleys with narrow flood plains, and markets for products are far away. The realist, if he lacks constructive imagination, is likely to pronounce the whole area a dismal prospect and continue to look for a more promising land. The constructive dreamer, however, has found how to utilize to advantage some of the possibilities that the realist refused to consider. But disturbing nature's equilibrium in any area usually is accompanied by a whole train of unforeseen conditions, and meeting these situations before or at the time they arise constitutes the critical problem of the people of the region. In the Columbia Plateau it has been found that dry-farming methods have nearly exhausted the soil of its stored moisture and food elements, destroyed soil structure by reducing the small humus supply, and as a result, wheat growing is becoming more and more precarious.

In irrigated areas the cost of production is usually close on the heels of gross income. How to reduce production costs and increase markets and selling prices are critical problems. The Grand Coulee irrigation and power project, on the Columbia River in northern Washington, is a social, economic, and engineering experiment on a scale that dwarfs all previous attempts. The problem of carrying the project through to completion and providing for continuing success through succeeding years is a magnificent challenge.

It must be recognized that whatever agricultural activity is promoted, be it grazing, dry farming, or irrigation, rainfall deficiency must always be taken into account. The old saying, "After man the desert," has been reversed in portions of this intermontane region, but after the "Great Exploiter" has gotten in his work, the old maxim may again be invoked.

As a wonderland, the southern part of this area can hardly be surpassed for variety, grandeur, and antiquity; and making it accessible to an increasingly mobile people calls for constructive insight. The exploiting of backward populations has always been a favorite activity of so-called civilized peoples. Perhaps white men should refrain from pressing too insistently on the stabilized cultures of the Indians of the Southwest, for creative enterprise often blossoms best among peoples not harried by outside interference. Finally, it must be remembered that in an area with so many sections isolated from each other, the population must remain scattered and the benefits of schools, churches, good roads, and other agencies of culture are certain to be denied to many people.

9

Pacific Mountains and Lowlands

THE PACIFIC MOUNTAINS AND LOWlands of North America extend northwestward from the Isthmus of Tehuantepec in Central America to and including the Aleutian Islands. This is more than 6000 miles or twice the distance from New York to San Francisco. The mountains are discontinuous and entirely unlike in structure in different sections; some are folded, some blocklike, and others volcanic. From Alaska to southern Mexico the mountains appear generally as two long series of parallel ranges, united near both ends and also at two intermediate points (Fig. 54).

The places of coalescence from north to south are (1) the *St. Elias Range* in southeastern Alaska (St. Elias Knot); (2) the *Klamath Mountains* on the Oregon-California boundary (the Klamath Knot); (3) the *San Gabriel Mountains* in southern California (San Gabriel Knot), and (4) the *Nevada de Colima* on the midwestern coast of Mexico (Colima Knot).

The mountains adjacent to the ocean are the Coast Ranges, which rise quite abruptly from the sea in the Peninsula of California and in the United States; but in British Columbia and southeastern Alaska, what was formerly the Coast Range has sunk partly into the ocean, leaving hundreds of islands.

The inner or landward series of ranges are known from north to south as (1) the *Coast Ranges* in Canada, which are in contrast to the previously mentioned old drowned coast range; (2) the *Cascade Range* in Oregon and Washington, and the *Sierra Nevadas* in California; and (3) the *Western Sierra Madre* (Sierra Madre Occidental) in Mexico.

Between the parallel ranges, and separated by the Klamath and San Gabriel knots, are three depressions, one wholly and two partly in the United States. These lowlands are from north to south (1) *Puget Sound Lowland*, including the *Willamette Valley*, lying between the Coast Ranges and the Cascades; (2) the *California Valley*, lying between the Coast Ranges and the Sierra Nevadas; and (3) the *Southern California Lowlands* (including the Gulf of California), lying between the Coast Ranges of the *Peninsula of California* and the Sierra Madre. The northward drowned section of the Puget Sound Lowland in British Columbia and Alaska is known as the *Inside Passage*, and lies between the coastal islands on the west and the Coast Ranges on the east.

PACIFIC MOUNTAINS OF THE UNITED STATES

The Pacific Mountains of North America extend both north and south far beyond the bounds of the United States. The Sierra Nevada-Cascade Mountains and the middle section of the Coast Ranges will be discussed here. Other parts of the Pacific Mountains will receive additional attention in connection with the study of Alaska, the Dominion of Canada, and Mexico.

Natural Features

Along the coast of the United States the Coast Ranges rise boldly from the sea with a number of drowned breaches, which are important for navigation. Three of these breaches are the *Golden Gate* (entrance to San Francisco Bay), the Columbia River (gateway from the ocean to the Puget Sound Lowland), and the *Strait of Juan de Fuca* (route from the sea to the Puget Sound). West of

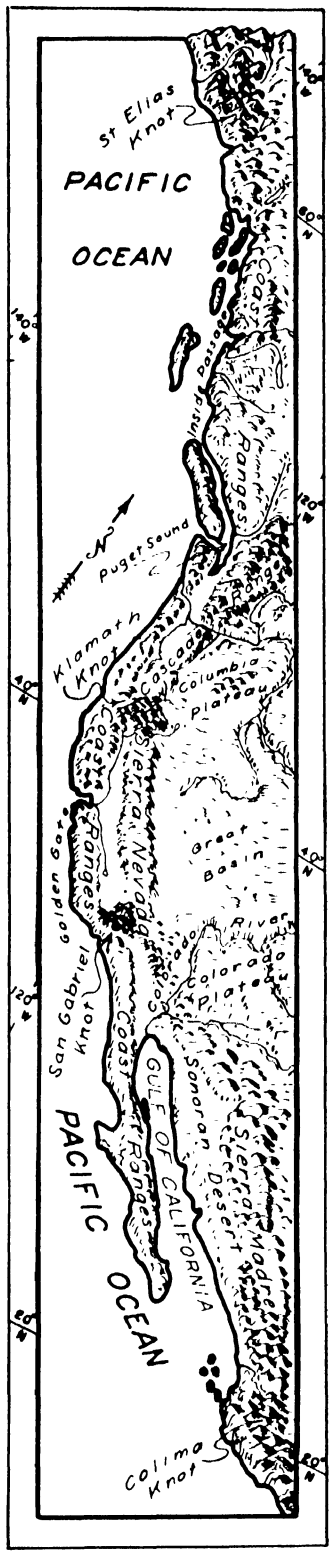


FIG. 54. PACIFIC MOUNTAINS, RANGES, AND VALLEYS. This sketch should be studied carefully in connection with the associated reading matter in the text.

the *Puget Sound* are the snow-capped *Olympic Mountains* which rise as high as 8000 feet above the sea. Rainfall exceeds 200 inches annually in the Olympics and, as a result, the forests are so dense that some parts of the mountains have not yet been completely explored.

The continental shelf on the Pacific Coast of North America is comparatively narrow and adjacent to deep ocean. Such conditions favor crustal disturbances. Faulting, folding, volcanic and earthquake activities, and vertical oscillations with associated peneplanation are characteristic of the western coast. Earthquakes assume serious proportions occasionally in California and southward. The most disastrous ones in recent years were those at San Francisco in 1906, and at Long Beach in 1935.

Bordering the large land depressions which lie east of the Coast Ranges are three north-south mountain ranges—namely, the Cascade, the Sierra Nevada, and the Western Sierra Madre, the last of which is in Mexico.

The Cascades in Washington and Oregon are mostly an elevated peneplain, deeply dissected by streams and surmounted by some marvelous snow-capped volcanic peaks among which are *Mt. Rainier* (14,408 feet) (Fig. 55), *Mt. Baker* (10,750 feet), *Mt. Adams* (12,307 feet), *Mt. Hood* (11,255 feet), and *Mt. Shasta* (14,161 feet), the last being in California. *Crater Lake* (6117 feet), hidden in the collapsed summit of an ancient volcanic peak, is in the Cascade Mountains (Fig. 56). A great river, the Columbia, flows from the intermontane area through the Cascades and Coast Ranges to the Pacific Ocean. At the southern extremity of the Cascades, the Klamath Mountains form a uniting link or knot between the Cascade and the Sierra Nevada ranges on the east and the Coast Ranges on the west. The Klamath Mountains also separate the Puget Sound Lowland from the California Valley.

The Sierra Nevada Range in eastern California is in reality a massive tilted block with its eastern faulted edge a relatively steep escarpment and its western slope long and gently inclined with the dip of the rock strata. This block has been deeply dissected by streams causing many peaks, of which

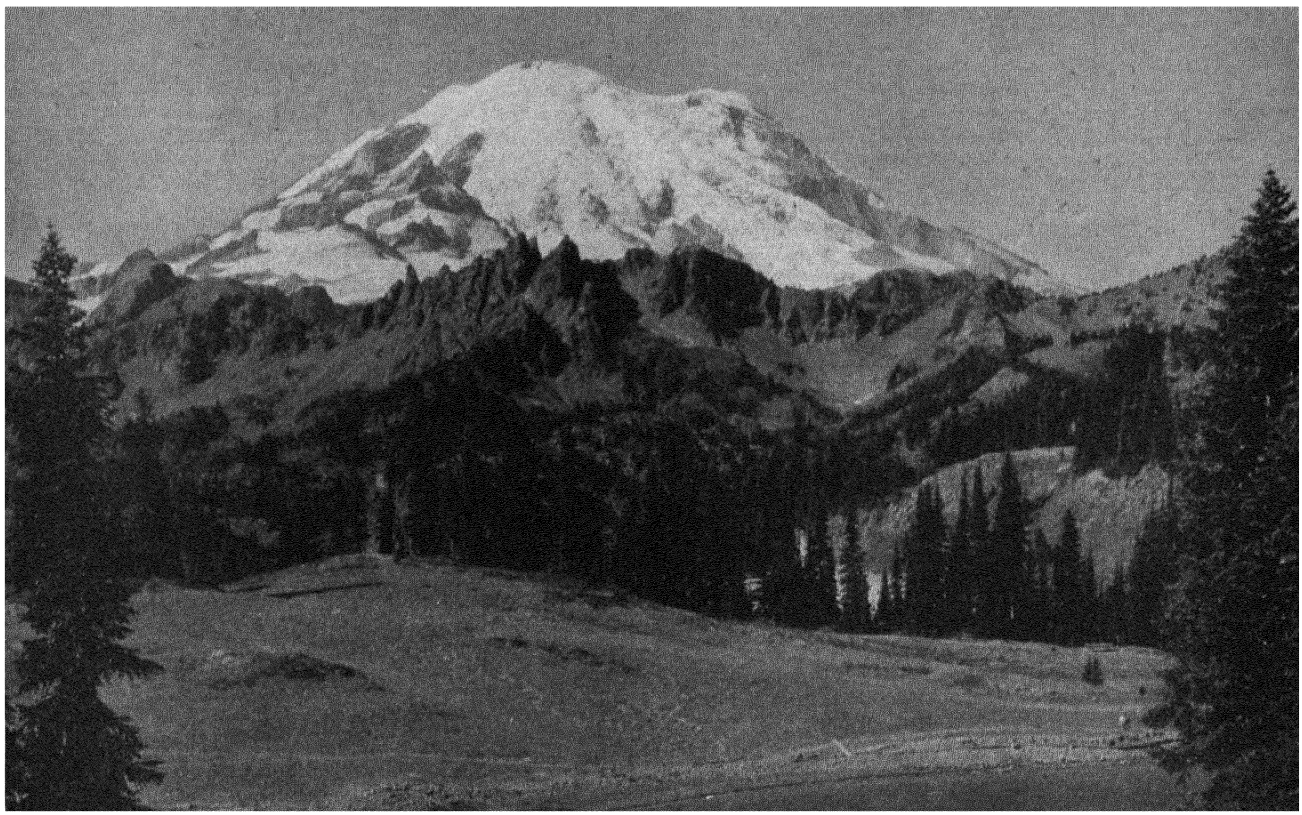


FIG. 55. MT. RAINIER. One of the giant volcanic cones that rises from the broken Cascade Range in Washington. Mt. Rainier is always snow-covered. (Courtesy U. S. Bureau of Reclamation)

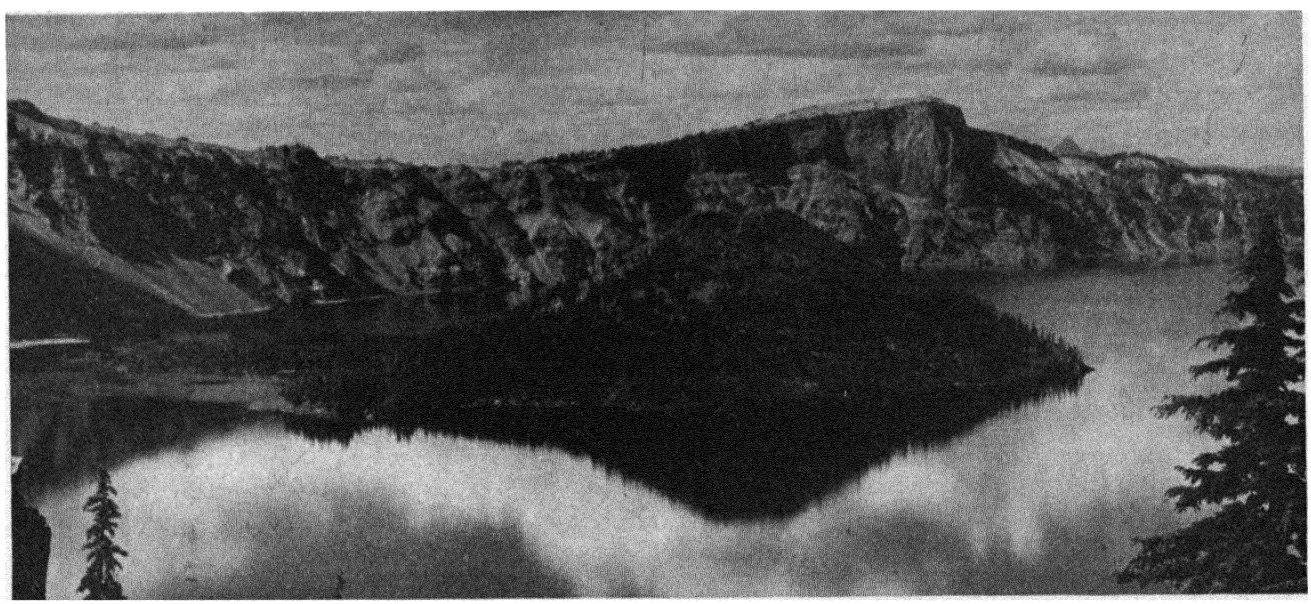


FIG. 56. CRATER LAKE. This lake is in the sunken crater of an ancient volcanic mountain. The water's edge is 1000 feet below the crest of the rim seen in the distance. Wizard Island in the lake is a volcanic cone rising 800 feet above the water level. (Courtesy United Airlines)

Mt. Whitney (14,501 feet) is the highest in the United States.

One of the natural wonders of the United States is *Yosemite Valley,* a deep narrow gorge cut into the western slope of the Sierra Nevadas by an ancient valley glacier (Fig. 57). Here a perpendicular wall of granite extends 4000 feet above the valley floor. Water falls from valleys 2000 to 3000 feet above the bottom of Yosemite Valley.[1] The Yosemite Valley of the Merced River is nearly duplicated by several others—namely, the valleys of the American, the Tuolumne, and the Kings rivers. In addition to these remarkable features in the Sierra Nevada are *Lassen Peak* (10,437 feet), the only active volcano in the United States, and the groves of giant sequoia trees (redwood), claimed to be the largest and oldest living trees in the world.

Where the ranges of the Sierra Nevadas, Great Basin, and Sierra Madre seem to coalesce, the mountains are nearly buried under the southern margin of the detritus-covered Mohave Desert. Here and there low isolated mountain remnants may be seen projecting above the debris. It is in this vicinity that the Colorado River finds its way to one of the depressions in the Pacific highlands—the Gulf of California.

The Pacific Mountains of the United States are mostly in the belt of westerly winds and therefore receive heavy precipitation on their western slopes. In winter excessive quantities of snow cover the crests of the Sierra Nevadas and Cascades, but the Coast Ranges, which are lower and next to the sea, do not get so much snowfall. The Sierras and the Coast Ranges in southern California have dry subtropical summers and humid winters.

In the Pacific Mountains are some of the world's finest forests—the giant sequoias in California and spruce and Douglas fir in Oregon and Washington (Fig. 237). Due to the heavy rainfall and high humidity in the north, there is an abundance of ferns, herbs, and considerable underbrush in the forests. Mosses and lichens are also plentiful, especially on the north side of trees and buildings. Greedy exploitation has despoiled large areas of their once magnificent trees, but government regulations are now protecting much of the remaining stands.

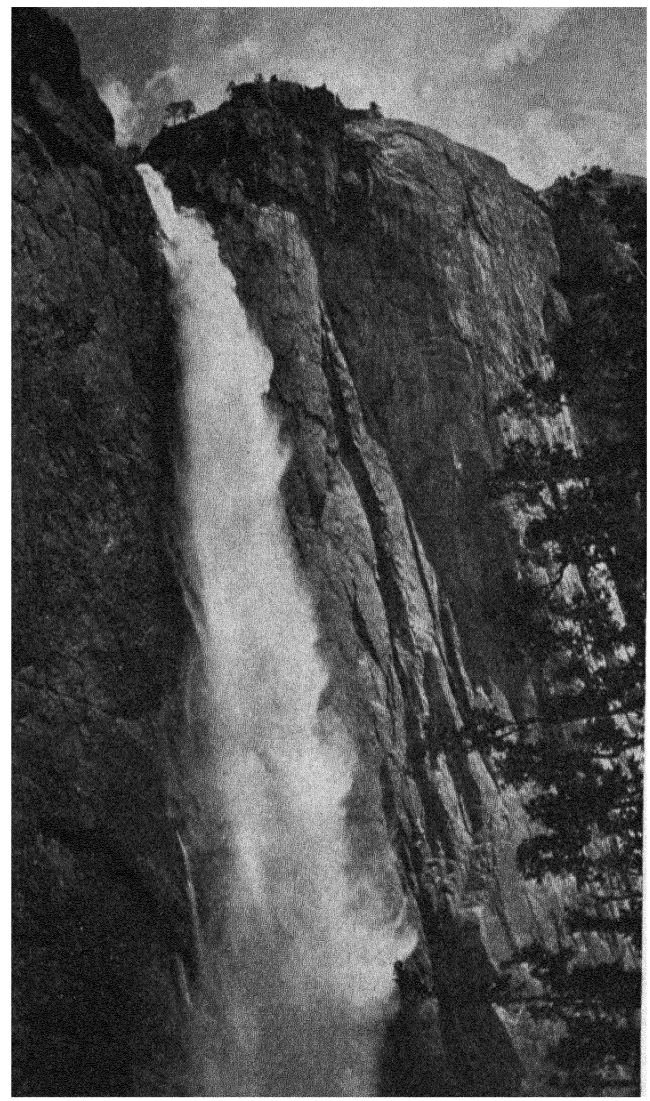


FIG. 57. YOSEMITE FALLS. The water is flowing out of a hanging valley, falling more than 2000 feet to the valley floor of Merced River. (Courtesy U. S. Geological Survey)

Cultural Features

By the beginning of the seventeenth century the Spanish had sailed along the west coast of North America as far as the Columbia River searching for a water route through the continent, but they did not follow the search assiduously; for they were fearful lest the discovery of such a passage

[1] Atwood, Jr., Wallace W., "Crater Lake and Yosemite Through the Ages," *National Geographic Magazine,* March, 1937, Vol. 71, pp. 327-342.

might help their enemies, the English, more than it would themselves. The English buccaneer, Drake, sailed along the coast in 1579, Bering navigated the south Alaskan waters between 1730 and 1740, and by 1813 the Russians, coming from the north, had fortified a trading post just a little north of San Francisco Bay. The occupancy of the coastal range region of western North America is filled with stirring adventure involving the rival claims of the Spanish, British, Russians, and Americans.

The Sierra Nevada and Cascade ranges are a formidable barrier betwen the western coast and the arid intermontane areas. Because the trend of pioneering in North America was westward, the routes through the barrier were discovered from the east, chiefly by trappers. Lewis and Clark passed through the Cascades by the Columbia River route in 1803. In 1826 Smith skirted the southern end of the Sierra Nevada by way of *Cajon Pass* to what is now Los Angeles. Joseph Walker crossed the Sierras in the vicinity of Yosemite Valley in 1833 and returned by way of *Walker Pass*. In 1841 the high *Sonora Pass* was crossed, and in 1844 the low *Truckee and Carson* passes were discovered. These various routes differ a great deal in height, steepness, and accessibility. Today several of them are the routes for railroads, the first of which was the Union Pacific through Truckee Pass. It was chiefly in the sands of the western foothill streams of the Sierra Nevada that the precious gold of the Forty-niners was found.

Little farming is done in the Pacific Mountains of the United States. Fruits are grown in some of the valleys in the Coastal Ranges of California, notably prune plums, apricots, peaches, grapes, and nuts, such as almonds and English walnuts. In the *Santa Clara Valley* south of San Francisco truck farming is important near large cities. This is also a most prominent fruit-drying district. Farther northward the rainfall is so heavy and the weather is so damp in the Coastal Ranges that the forests are almost impenetrable in places. In the coastal mountains of Oregon and Washington grazing and dairying are practiced to a considerable extent. The growing of small fruit such as berries is profitable, and because of a lack of sunshine, poultry has been replaced in some sections by the growing of rabbits.

Washington and British Columbia are now the leading lumbering centers in North America. Logs are brought by rail or truck to the water's edge where they are floated in streams or along shore to near-by sawmills.[1] Some of the smaller timber is sawed into pulp wood dimensions.

Small deposits of coal occur in the coastal ranges of Oregon and Washington, and petroleum is abundant in southern California. Some of the most intensively exploited oil structures in the United States are in this area, many wells having been drilled under the edge of the sea. Two of the most important petroleum-producing areas are in (1) the *Los Angeles Basin* and (2) the Bakersfield district in the *San Joaquin Valley*.

Railroads follow easy passes through the Cascades to Seattle, through the Columbia River gorge to Portland, through Truckee Pass to San Francisco, and through Cajon Pass and other passes to Los Angeles and San Diego. Following the same and other routes through these mountains in the United States are excellent paved highways. One of the most popular and scenic automobile highways of the West is the one following the coast from San Diego to Astoria at the mouth of the Columbia River. Among other modern developments of considerable significance are the scenic Columbia Highway, the Cascade Tunnel constructed by the Great Northern Railway through the Cascades, and the world-renowned 200-inch reflecting telescope on Mt. Polamar in southern California.

URBAN CENTERS. Cities of the Cascade Mountains and the Sierra Nevadas are small and, as a rule, on railways or highways that cross the barrier. In some instances these small centers of population have grown in response to the exploitation of forest or mineral resources.

The large cities of the Coastal Ranges, San Francisco and San Diego, will be discussed in connection with adjacent lowlands regions. Throughout the entire length of the Coastal Ranges there is only one other city with more than 25,000

[1] White, C. Langdon, and Renner, George T., "Geography: An Introduction to Human Ecology," D. Appleton-Century Company, New York, 1936, pp. 9-11. A résumé of the activities and interests associated with the forests in the Cascades.

people—*Santa Barbara*, Calif., a residential center located at the base of one of the Coastal Ranges. Other coastal cities in California are *Eureka, Santa Cruz,* and *Ventura. Astoria*, in Oregon, and *Aberdeen, Hoquiam,* and *Port Angeles* in Washington are fishing and lumbering centers. *Olympia* is the capital of Washington and *Bremerton* has a large navy shipbuilding yard.

LOOKING TO THE FUTURE. The problems of the Pacific Mountains are nearly all associated with the development of forest, mineral, and power resources, and the extension and development of recreational possibilities. The Cascades and the Coast Ranges in Washington and Oregon are especially rich in timber, and the chief problem is that of preventing ruthless exploitation. Better market facilities are also needed because the timber is quite far from points of consumption. Glacier-covered volcanic peaks, magnificent mountain gorges, and groves of stately sequoia trees encourage travelers and tourists. Improved access to these natural wonders needs attention.

Extending and improving trade with the Orient by way of the coastal cities is an ever-intriguing possibility. The climate of the whole coast is an asset that grows in favor as it becomes better known. With all these allurements confronting the people, together with the newness and freshness of the region, it seems that a rich development is inevitable and just in the offing.

PUGET SOUND LOWLAND

The Puget Sound Lowland, which includes the Willamette Valley, lies in a structural depression between the Cascade and Coast ranges, and extends southward from the Fraser River in British Columbia to the Klamath Mountains in southern Oregon.[1] The lowland is more than 400 miles long, about 50 miles wide in the north, and 40 miles in the south.

Natural Features

Most of this lowland is less than 600 feet above sea level and is comparatively flat, although there are some areas of hilly land due to glaciation or to stream incision. Many branches of the Sound extend into the adjacent highlands, making numerous "canals," coves, and harbors. Flowing into or across the depression are two large rivers, the *Fraser* (in Canada) and the Columbia, each with tidal estuaries that are navigable for long distances. Before subsidence the former probably flowed through the Strait of Juan de Fuca to the ocean. The Willamette is the chief confluent of the Columbia from the south, and the Cowlitz from the north. The Inside Passage is structurally a northward extension of the Puget Sound Lowland.

The valley floors of the Columbia, Willamette, and Cowlitz rivers are composed of deep beds of detritus brought down from the adjacent Coast and Cascade ranges. The northern portion of the area, extending to a few miles beyond the southern limits of Puget Sound, is covered with large quantities of glacial debris. There are also a number of basaltic hills of preglacial origin which are conspicuous because they rise several hundred feet above the level of the glacial outwash. The abundance of rainfall, and the near-by snow- and ice-capped mountains with numerous clear streams, supply the valley with an abundance of good water for both domestic and power purposes.

The Puget Sound Lowland has a marine climate with mild winters and summers, similar to that of the British Isles (Fig. 236). The average temperature for the warmest month (July) at Olympia is 63° F. and for the coldest month (January) 39° F. Thus, the seasonal range is only 24° F. The growing season is 192 days, the average date of the last killing frost of spring coming on April 23, and the first killing frost of autumn on November 2. The prevailing winds are from the south and southwest in winter which is the rainy season. The median annual rainfall is 54.0 inches, 43.6 or more inches falling three fourths of the time and 61.3 or more inches falling one fourth of the time. The rainiest month is December (9.39 inches), and the driest month is August (0.65 inches) (Fig. 8). Fogginess is characteristic of the weather in winter.

On account of the heavy rainfall and mild temperatures, the mature soils of the lowland are pedalferic. To insure continuous productivity, lime, phosphorus, nitrates, and potash must be added.

[1] A structural depression is a trough-like fold in the bedrock—a feature known in geology as a geosyncline.

The Willamette Valley formerly was a park grassland, excellent for pasture and easily converted to good farm land. North of the Columbia River most of the area was in forests, a large part of which has yielded to the ax of the lumberman (Fig. 237). Today much of this portion is brushland or poor second growth timber.

Cultural Features

The United States and Great Britain held rival claim to most of the Puget Sound Lowland until

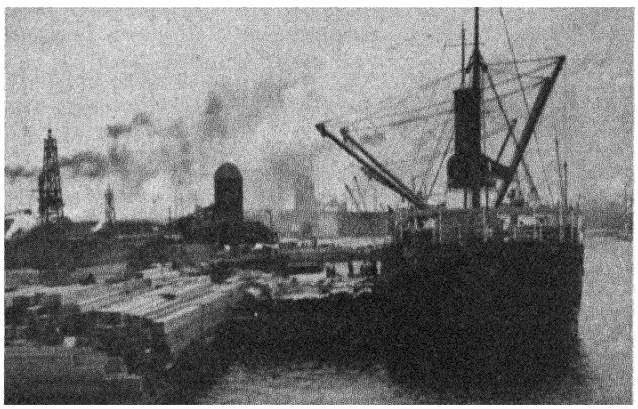


FIG. 58. LOADING LUMBER. Large quantities of lumber are shipped from the big lumber mills through Seattle's great fresh water port. (Courtesy Pan American Union)

1846 at which time the forty-ninth parallel was agreed upon as the boundary between the United States and Canada. This treaty left only a small portion of the region in Canada. In 1806 Lewis and Clark crossed and recrossed the region. Astoria was settled by American fur traders in 1811. Early in the fourth decade of the nineteenth century people from the East were pouring into the Puget Sound Lowland by way of the Oregon Trail—1000 in 1843 and 3000 in 1845. The Willamette Valley was the recipient of most of these pioneers. Later in the same decade and in the next decade the people of the region profited in a considerable measure from the gold rush to the western coast.

Early settlement in the Willamette Valley centered around agricultural activities. General farming today is the rule throughout the whole lowland. A great variety of crops and fruits and livestock are grown, but no great export staple is produced. Small fruits such as cherries, plums, loganberries, raspberries, and blackberries thrive well because of the cool, moist summer. On account of the great amount of labor involved in the north in clearing the land of stumps, vines, and shrubs the preparation of the land for farming is expensive. Intensive farming is the rule and includes such activities as dairying, the production of poultry and eggs, and the growing of berries and other small fruits. The associated industries of canning, drying, and preserving fruits and the manufacture of butter, cheese, and evaporated milk supply work for many people. The best coal deposits on the Pacific Coast are in the vicinity of Tacoma.

Lumber mills are numerous throughout the entire lowland, but especially in the Puget Sound section, the timber supply being received from the adjacent mountains (Fig. 58).[1] The manufactures from forest resources, however, are largely for local use. Domestic and foreign trade is extensive because of excellent harbors and relative nearness to Oriental countries and to Alaska.

URBAN CENTERS. The conditions of natural environment in the Puget Sound Lowland are similar to those of Northwest Europe. It is not surprising, therefore, to find that some cities of this area have experienced remarkable growth. As the region has been occupied by white men less than a century, it is not unreasonable to expect that the next hundred years may see just as phenomenal development as the past century has witnessed. Nearly all the large cities of Washington and Oregon are located in the Puget Sound-Willamette Lowland. The deeply indented shoreline provides excellent harbors for several seaports.

Seattle, Wash., beautifully situated on an excellent landlocked harbor between Puget Sound and *Lake Washington* and a little more than 100 miles from the ocean, is the western terminus of several transcontinental railroads. It is the principal trade and manufacturing center in the lowland, it has the shortest routes from the United States to Alaska and to the Orient, and has served long as an outfitting center for logging, lumbering, and mining. In 1916 a ship canal with appropriate locks was

[1] Merriam, Willis B., "Forest Situation in the Pacific Northwest," *Economic Geography,* January, 1938, Vol. 14, pp. 103-108.

constructed connecting fresh-water Lake Washington with the sea. The business district of Seattle is on the lower land near the water's edge but the residential section is built on higher land, giving a fine view of both the Cascades and the Sound. A considerable amount of the import and export trade of the Pacific Coast of the United States is transacted through the ports of Seattle and Tacoma.

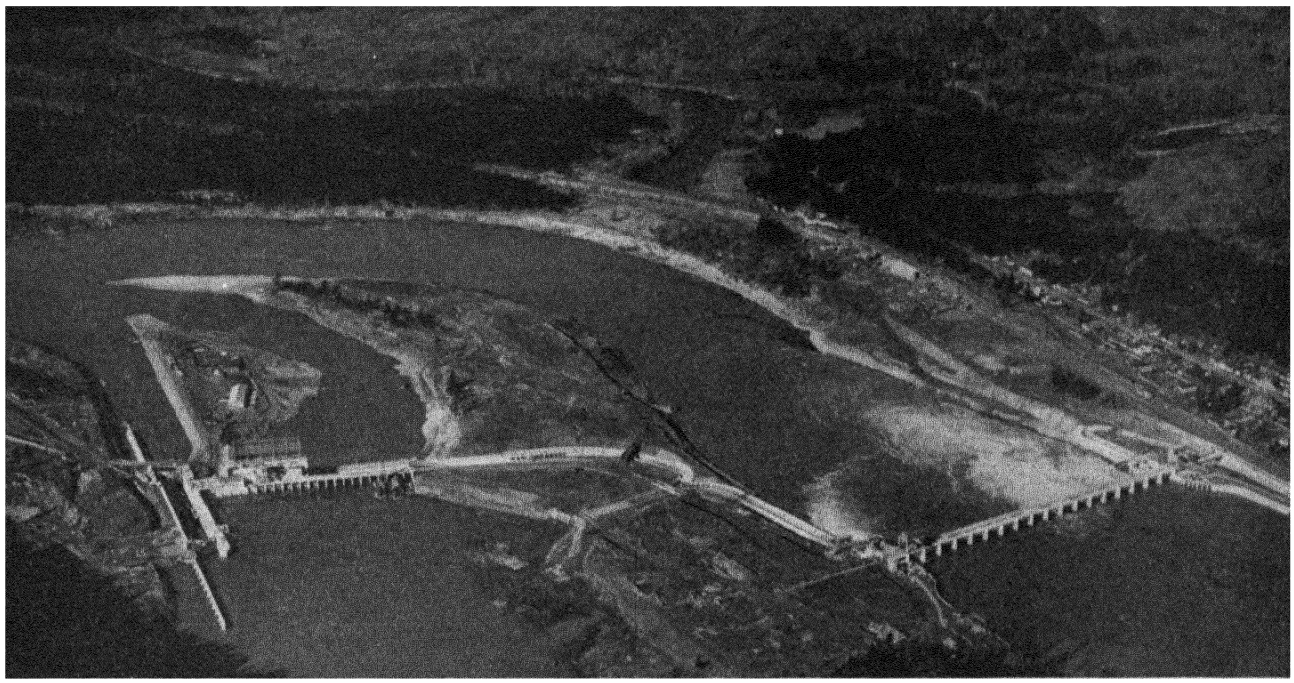


FIG. 59. BONNEVILLE POWER, NAVIGATION, AND IRRIGATION PROJECT. The dam is in the Columbia River gorge through the Cascade Mountains. This gorge is also one of the most important gateways through the Pacific Mountains. (Courtesy U. S. Army Air Corps)

Tacoma, Wash., near the head of navigation on Puget Sound in the rich Puyallup Valley and the western terminus of several railroads, had its beginning around a sawmill in 1868, and was named from the nearby Mt. Tacoma, the Indian name of Mt. Rainier. The Cascades are in view on the east and the Olympic Mountains may be seen westward across the Sound. The city is built on a series of terraces rising above the southern shores of Commencement Bay. Much of the development of Tacoma has hinged upon the rich forests of Douglas fir in the vicinity and the wheat region in the Columbia Plateau.

The most significant river port on the Pacific Coast is *Portland,* Ore., located on the Willamette River near its confluence with the Columbia, one hundred miles from the sea at the head of navigation for ocean-going vessels. The magnificent Columbia River gorge through the Cascades east of Portland gives access to the interior by train and highway, and now with the construction of the large ship locks at the *Bonneville Dam,* river steamer traffic is possible far inland. Plainly in view from "Portland Heights," in the western part of the city, are the Cascades surmounted by a number of snow-capped volcanic mountains among which are Hood, Adams, *St. Helens, Jefferson,* and Rainier peaks. Portland is a prominent lumber center, also a commercial and manufacturing city. Water supply for future hydroelectric development is abundant in the Columbia River, especially at Bonneville Dam (Fig. 59) and in the mountain streams.

Bellingham, Wash., the nearest American city to Alaska, has one of the finest landlocked harbors in the world and it is the center of great lumber and canning industries.

Eugene, Ore., at the head of navigation on the Willamette River, is in a rich agricultural valley. *Astoria,* Ore., at the mouth of the Columbia River, was founded as a fur-trading post in 1811. The lumbering and canning industries dominate the life of the people today.

Looking Ahead. The Puget Sound Lowland is high in potential possibilities to satisfy human needs and aspirations. In this respect, but on a smaller scale, it rivals western Europe. The climate is similar; the soils are just as good; and the timber, minerals, and potential power possibilities may be even greater. With an auspicious beginning and all these advantages, however, the tempo in recent years has been slowing up. This is due in part to the fact that the easily exploitable resources are rapidly diminishing, especially the timber, and much labor and expense are necessary in preparing cut-over land for the plow. If the area is to continue to prosper, it is probable that the industrial interests must center on agriculture of the small-farm variety. This type of farming is on the increase and is receiving the support of scientific planning for the future.

In view of the availability of much water power, the abundance of good water supplies, and the long distances to large industrial centers, the manufacture of certain types of goods should be profitable and therefore encouraged. The tourist business should be promoted because of the excellent scenery. The nearness of this region to Alaska and the Orient augurs well for the future in the interchange of commercial goods. The impact of World War II on the area, in the long run, probably will be beneficial, although some recession from peak activities is certain to occur.

THE CALIFORNIA VALLEY

The California Valley is a deep, sediment-filled trough between the Sierra Nevadas on the east and the Coast Ranges on the west, and extends from the Klamath Mountains to near the San Gabriel Knot. From north to south the valley is 400 miles long, and it averages about 50 miles in width. The valley has easy access to the Pacific Ocean through the Golden Gate and to the interior and eastern United States by way of several passes through the Sierra Nevadas.

Natural Features

The surface configuration of the California Valley is largely the result of the combined natural forces of climate, erosion, and sedimentation. Most of the area is a nearly flat alluvial plain. The detrital filling is more than 2000 feet deep, the materials having come largely from the western slopes of the Sierras. So great has been the load of sediments piled into the east side of the depression that both the *Sacramento* and *San Joaquin* rivers have been crowded far to the west side of the valley floor. This process of valley filling by the streams on the west slope of the Sierras has built numerous alluvial fans at the base of the mountains and these deposits now have coalesced into a nearly continuous alluvial piedmont running almost the full length of the valley. So arduously has Kings River worked at its task of filling the valley that drainage from the southern end of the area has been cut off from the sea, forming several shallow basins, of which *Tulare* and *Buena Vista* lakes are two of the more important. Most of the valley floor is less than 400 feet above sea level.

The bedrock under the California Valley is a complex down fold with an intricate series of fault lines and blocks, of which the immense Sierra Nevada block with its upturned eastern edge is the largest (Fig. 60). So slowly has the crustal action taken place that the area probably has never been below sea level, but has been filled with alluvial sediments as rapidly as depression has taken place. The evidences of this interpretation are in the deposits themselves which show no trace of marine fossils or of water sedimentation.

The alluvial deposits are progressively finer textured toward the middle of the valley, the coarser materials being deposited near the mountains where the velocity of descending streams is the greatest. The coarse deposits are rich in groundwater supplies which are used extensively for irrigation, as well as for domestic purposes.

Lying as it does on the equatorward margin of the westerly winds, the California Valley has rainy winters and dry summers—the so-called sub-tropical dry summer type (Fig. 236). At Fresno toward

the southern end of the valley the median annual rainfall is 8.8 inches, whereas at Sacramento toward the northern end it is 18.1 inches (Fig. 8). At the former station the average annual temperature is 63° F., the lowest monthly average being in January (46° F.) and the highest in July (82° F.). Irrigation is essential for the growth of crops, so the conversation of farmers in summer turns to water rights and irrigation rather than to prospects for rain. The relative humidity is low during both day and night in summer.

The soils vary much in texture, depending in considerable measure on the distance from the

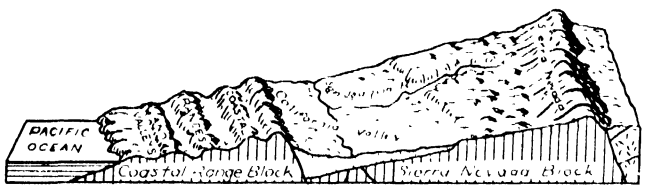


FIG. 60. A SURFICIAL AND VERTICAL SKETCH ACROSS CALIFORNIA. The relation of the California Valley to the Sierra Nevada Mountains and the Coast Ranges is suggested by this diagram.

mountains, the finer-textured soils occurring near the middle of the valley. Because of varying conditions under which the parent materials have been deposited, widely differing soils may occur within short distances. The mature soils, because of semiaridity, are mostly pedocalic, although much of the soil is of such recent deposit that it has not had time to develop a profile.

The valley is comparatively rich in groundwater resources, although depletion is easily possible with increased pump irrigation. There is little or no coal, but abundant power from adjacent mountain streams and from petroleum in the southern end of the valley is available. One of the most productive petroleum fields in the United States is near Bakersfield in the San Joaquin Valley where thousands of derricks dot the landscape. Formerly, immense quantities of gold were taken from stream beds, but the paying sands have now given up practically all of their precious metal.

The valley formerly was a natural grassland, the quality and quantity of grass varying with the amount of rainfall (Fig. 237). Only along the streams were forests found. Today much of the land is in cultivated crops, especially fruits, truck-garden produce, and nuts.

Cultural Features

The California Valley has been transformed in less than one hundred years from a natural grassland to a land of intensive agriculture. This remarkable change began with the influx of gold seekers just preceding the middle of the nineteenth century. In 1849 many thousands of people migrated to California expecting to get rich quick by digging gold out of the sands of the streams. A few were not disappointed, for it is said that one man and a mule made $3000 per month for several months. Ninety thousand people came in one year, but placer mining soon depleted the golden stream. Production in 1853 was $57,000,000 but by 1857 it had dropped to $19,000,000 when the placer gold was mostly gone.

When the gold supplies in the sands were exhausted, some, who could secure financial support, began lode mining in the solid rocks of the Sierras, but most of the gold seekers turned to agriculture. Stock raising and bonanza wheat farming followed, after which, as more immigrants poured in, the large ranches were subdivided and agricultural activity began to gain the appearance of the present irrigation and horticultural landscape. During the third quarter of the nineteenth century the region was largely self-sufficient.

For a time the petroleum output in the San Joaquin Valley exceeded in value the best years of the "Gold Rush" days. Tens of millions of barrels are produced annually. This is extremely important, especially in a region where coal is scarce. The recent high export of petroleum from California and also the sudden decline were directly related to Japan's misbehavior.

The citrus fruit crop ranks high in value. Raisin and tokay grapes are grown in remarkable abundance, the section through Stockton, Fresno, and Bakersfield producing a large part of the world's supply. Today excellent wines, rivaling in quality and taste the vintages of France and Italy, are being made in the California Valley. In the Santa Clara valley just south of San Francisco is one of the world's best known prune areas. Fruit drying as an open field industry is possible because of the

continuously dry days and nights in summer. Other forms of dried fruit are apricots, pears, peaches, and figs. Fruit canning, too, is pursued assiduously in Sacramento and San José.

North of Sacramento are the leading rice fields of the United States. Wheat formerly was the principal crop as it was grown on the bonanza farms, but wheat production has decreased, population has increased, and now wheat and wheat products

San Francisco, at the seaward entrance to the California Valley and formerly the metropolis of the western coast of the Americas, has now surrendered the latter distinction to Los Angeles. Located on a northward-extending peninsula between the ocean and San Francisco Bay, the city has a land-locked harbor that is large, deep, and safe, thus making it one of the great harbors and seaports of the world. Its trade extends along the

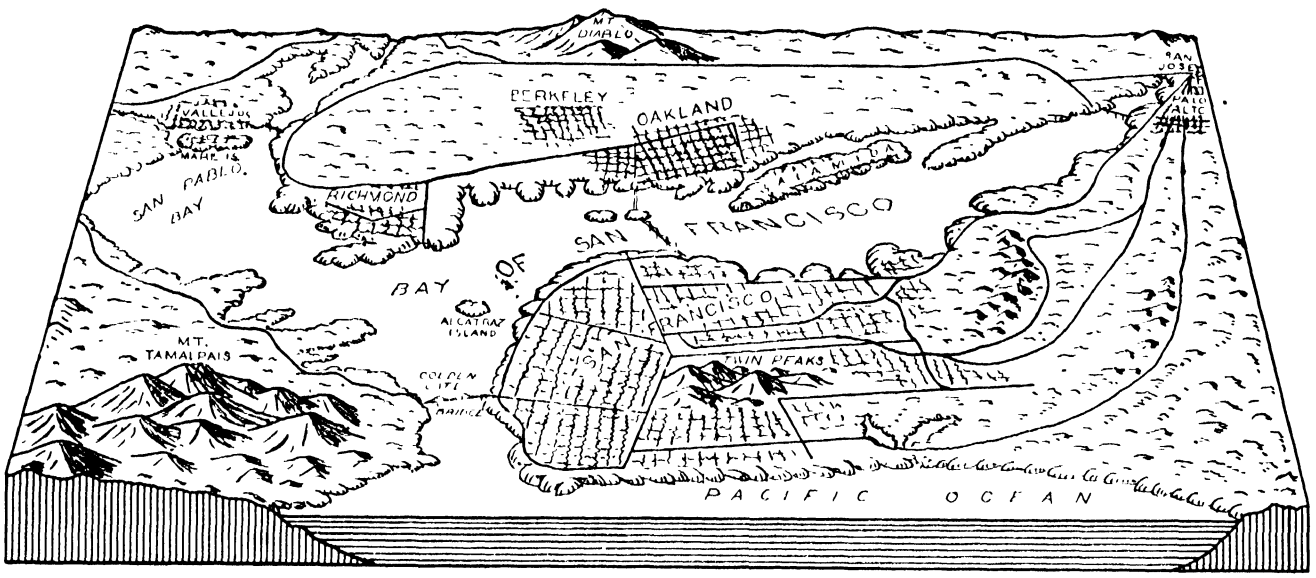


FIG. 61. SAN FRANCISCO AND ENVIRONS. The land-locked Bay of San Francisco is one of the finest harbors on the western coast of the Americas. Numerous satellite cities are in the vicinity.

are imported. Some of the finest vegetables in the eastern markets come from the deltas of the Sacramento and San Joaquin rivers, where the landscape is a mosaic of truck gardens. Poultry and egg production is one of the most important animal industries, especially near Petaluma. More and more Californians are becoming interdependent with people in other sections of America, shipping surpluses to the world outside in return for needed supplies.

URBAN CENTERS. Since San Francisco Bay is a natural gateway through the Coast Ranges connecting the California Valley and the Pacific Ocean, and inasmuch as it is the drowned mouth of the combined Sacramento and San Joaquin rivers, it seems natural that the bay region with its cities and activities should be discussed with the California Valley. The three most important cities in the bay region are San Francisco, Oakland, and Berkeley. Pacific Coast to Alaska and South America, and to the Orient and Australia. The Golden Gate was discovered and occupied by the Spanish in 1769 and after conflicts involving many nations it finally became a possession of the United States in 1848 (Treaty with Mexico), one year before the Gold Rush (Fig. 61). The construction of the Golden Gate Bridge and the San Francisco-Oakland Bridge has made San Francisco more accessible from all parts of North America by railroads and highways from the east, north, and south through the passes in the Sierra Nevadas. The city obtains its water supply from streams high in the Sierras. Both San Francisco and Oakland have many manufacturing industries such as automobile factories, shipbuilding plants, planing mills, canneries, flour mills, and creameries.

One of the amazing features of the climate of San Francisco is the delayed summer maximum

temperature, the warmest weather of the year coming 90 days after the summer solstice—that is, about the time of the autumnal equinox. This is due in large measure to the upwelling of cold water in the sea just off the coast. The delay of winter's coldest weather, however, is only about 20 days after the winter solstice. In the interior of the valley the lag of maxima and minima is near the normal—that is, from 20 to 30 days. When the valley is especially warm, strong cold winds blow in from the sea at San Francisco, making heavy wraps comfortable even in summer.

Across the bay from San Francisco is *Oakland* which enjoys a spacious harbor with 27 miles of water frontage. It also is the Pacific terminus of several railroads from eastern United States. It was incorporated as a city in 1852 during the great migration to the gold fields.

Berkeley, a part of Metropolitan Oakland, is primarily an educational and residential city. It shares in the commercial and residential activities which center around the specialized agriculture of the region and has about 150 factories along its water front.

The chief cities within the California Valley are trade and processing centers for fruits, vegetables, and petroleum.

Sacramento, the capital of California and largest city in the Sacramento Valley, was founded in 1839. The business center in the San Joaquin grape district is *Fresno. Stockton*, in the center of the great valley 50 miles east of Oakland, is at the head of tidewater on the San Joaquin River. The dredging of a deep water channel makes the port accessible to all but the largest of ocean-going vessels.

An Appraisal for the Future. It has been said that since California is so far from markets, an economy of self-sufficiency should be developed and maintained. This point of view is of doubtful validity for the California Valley, because all the specialized crops for which the region is so well adapted cannot be consumed at home. If such crops are to increase the wealth of the people, markets must be maintained and it may be that this can be done best by the purchase of manufactured goods from outside sources. This is a problem of considerable moment. Increased air freight will make possible the rapid delivery of perishable foods to distant markets. This suggests that more attention may well be given to the planning of additional airways and the construction of airports.

Additional land may be farmed when more water for irrigation is made available. In order to do this it is proposed to construct an immense irrigation canal along and paralleling the Sierra Nevada foothills, perhaps the full length of the valley.[1] Thus the water in the swamps in the middle of the valley would be conserved for crop growing. Would the utility of such a project justify the cost it would entail?

One of the great assets of the valley is its delightful winter climate. This has so attracted the people in the East and those of the interior of the continent that certain dangerous results have arisen. Recently hundreds of thousands of nomadic laborers have ranged up and down the western coast, seeking work chiefly at agricultural tasks. Since the heavy work is seasonal in nature, these nearly destitute people become a burden and a menace during the slack seasons of the year. Moreover, tens of thousands of people during World War II migrated to the West Coast to work in large defense plants. Many of these people will wish to remain in the West. What are their prospects for work and for homes?

SOUTHERN CALIFORNIA LOWLANDS AND ASSOCIATED FEATURES

The area included within this region extends from the San Gabriel Mountains (Knot) to *Cape Corrientes* on the west coast of Mexico. On the west of these lowlands are the Coast Ranges, including the ranges of the Peninsula of California, and on the east are the San Gabriel, *San Bernardino*, and *Chocolate* ranges in the United States, and the *Western Sierra Madre* in Mexico. Approximately one half of this depression is occupied by the Gulf of California. In California are the Los Angeles Lowland, *Perris Plain*, and the well-known *San Fernando, San Bernardino*, and *Imperial* valleys

[1] Meigs, 3rd, Peveril, "Water Planning in the Great Central Valley, California," *Geographical Review*, April, 1939, Vol. 29, pp. 252-273.

(Fig. 62). In Mexico between the Gulf of California and the Sierra Madre is the arid west-sloping *Sonoran Desert Plain,* extending southeastward a thousand miles from the international boundary. The present discussion is concerned only with that part of the region within the United States.



Fig. 62. Santa Ana Valley, California. The barren Santa Ana Mountains in the background bear mute evidence aridity. Pump irrigation is practiced to some extent in this area. (Courtesy U. S. Geological Survey)

Natural Features

In general, the region is composed of a number of tilted blocks, the eastern edges of which form mountains, with the areas between the blocks partly filled by sediments. The streams from the mountains as a rule are soon lost in the loose, thirsty deposits. Only during the rainy season do the streams continue on the surface to the sea. In summer the channels are dry except in places where bedrock comes to the surface. In such cases, the underflow may appear at the surface for a while, only to disappear again as soon as loose sediments are encountered. The value of ground water in much of this region can hardly be overestimated. Not only is it drawn upon for domestic supplies, but immense quantities are used for irrigation. This removal of ground water has become serious, the water table having been lowered in some places as much as 50 feet. Thus the great underground storage is becoming depleted and other sources of irrigation water must be found if some farm abandonment is to be avoided.

One of the features of this region is the Imperial Valley, a large dry basin that is in part below sea level. This basin was caused from deltaic deposits by the Colorado River, which, flowing into the east side of the Gulf of California, severed the north end of the depression from the rest of the Gulf. Desiccating aridity caused this isolated section to dry up, leaving part of the area which we now know

as Imperial Valley below sea level. During flood stages the Colorado River more than once has broken through protective dikes and inundated portions of the valley. At present the *Salton Sea*, whose bottom is 246 feet below sea level, occupies a part of this depression. In the Los Angeles Lowland is one of the most productive oil districts in proportion to its size in the world.

The region is in the subtropical dry summer climate, having mild, rainy winters and long, warm, dry summers (Fig. 236). The median annual rainfall at Los Angeles over a 58-year period is 14.4 inches, at San Diego 9.1 inches, and at Yuma in the Imperial Valley it is only 3.3 inches (Fig. 8).

Since the soils of the area are largely stream deposits, they vary much in texture, the coarsest materials having accumulated near the mountains. Owing to the low precipitation the mature soils are pedocalic.

Except on the higher mountain slopes and along the thalwegs [1] of streams the natural vegetation is desert to semidesert in character.

Cultural Features

Human occupancy in the Southern California Lowlands came as an adjustment to semiarid and arid conditions and has grown in intensity because of possibilities for irrigation (Fig. 63). Since white men first came into the area many factors have contributed to an accelerated development; among these were the railroads, the attractive winter climate, and the recent discovery of petroleum. The impress of early Spanish occupancy persists in the preserved historical monasteries, the Spanish architecture, and the many Spanish place names. The impetus for rapid development came with the tourist era, when people began to flock to this area to escape the rigorous winters of the central and eastern parts of the country. It was recognized that the climate was in reality the greatest resource of the region and promoters made haste to advertise this land of Alaskan summers and Egyptian winters —an allusion that is pertinent only in part. In 1876, about the time experimental horticulture began, the first car of oranges was shipped.

The rapid evolution in a half century of a little-used semidesert to one of the most progressive and dynamic regions, is a lasting marvel and probably has not been duplicated anywhere in history. Today wherever irrigation is available all kinds of vegetables thrive and orchards of oranges, olives, lemons, grapefruits, and figs, as well as many more common fruits and nuts, cover the landscape. Cities, towns, and villages are numerous. Improved highways thread the region in every direction.



FIG. 63. FARMING IN IMPERIAL VALLEY. Rubber boots and a spade are standard equipment for the irrigation farmer near Calexio, California. (Courtesy U. S. Bureau of Reclamation)

All-year truck farming satisfies local needs, but the production of crops for eastern markets follows a seasonal sequence which takes into account the growing season in both the East and the South. A steady flow of vegetables for large urban areas in the East is thus synchronized to include the interests of the farmers and truck growers in eastern, western, southern, and interior United States. One of the features of successful agriculture in southern California is cooperative marketing and crop control. Without cooperation, chaos would engulf the gardening and orcharding businesses.

Imperial Valley is becoming more and more important in the production of long-fiber cotton which is used in the manufacture of automobile

[1] The lowest line of a valley—usually moist from the underflow of ground water.

tires. This area is singularly free from cotton diseases and the boll weevil.

The variety of climates, scenery, and vegetation in southwestern United States has been a major factor in the evolution of the motion picture business in Hollywood, the leading place in the New World for this industry.

A part of the popularity of the region is indicated by the state reunions and picnics which are held annually. It is not unusual for thousands to assemble in the guise of loyalty to the state of their nativity and at the same time to laud and shout their allegiance to the state of their adoption.

URBAN CENTERS. *Los Angeles*, the one great city of the region, dominates the life and activities of southern California, and contains a large proportion of the people. The city is in the Los Angeles Basin between the San Gabriel Mountains and the ocean, a distance of about 25 miles. An Indian village on the site in 1769 was named by the Spanish "Our Lady Queen of the Angels." It became and remained a Mexican village until 1848, when it passed into the possession of the United States.

The domestic water supply of Los Angeles is brought by aqueduct 250 miles from the Sierra Nevadas. Local water for power and irrigation for the Los Angeles territory is inadequate; hence, a supplementary supply now comes from the storage at Boulder Dam in the Colorado River. For power purposes, the abundance of petroleum in the vicinity is a valuable asset. Three railroads cross the arid Southwest to meet at Los Angeles. The city is the center of southern California's highways. Los Angeles, with its harbor at San Pedro, ranks high in ocean tonnage. The leading export is petroleum, and the chief import, lumber. Six thousand industrial plants produce more than a half billion dollars' worth of goods annually.

The feature that captures the interest of most visitors is the agricultural industry, centering in the growing of citrus fruits and vegetables. Los Angeles County is the most intensively farmed area of its size in the United States.

San Diego, ten miles from the Mexican border and 130 miles southeast of Los Angeles, is on a narrow plain between the mountains and the ocean. This city is the Pacific terminus of several transcontinental highways and railroads, and it is the southern terminus of the Pacific Coast Highway. The largest naval base on the west coast of the United States is located here. San Diego has a large natural harbor and is the first port of call for vessels plying from the Panama Canal to the west coast of the United States. The fine Municipal airport accommodates both land and sea planes. Perhaps the most valuable resource is the healthful, equable climate, which is especially attractive to winter tourists and to fruit and truck growers.

Other cities of southern California, satellites of the metropolis of the West, are *Long Beach*, with its fine residences on San Pedro harbor; *Pasadena*, a residential city for many wealthy people; *Santa Monica*, one of a number of ocean resort towns; and several smaller cities lying within a 50-mile radius. Among these are *Glendale*, *Pomona*, *San Bernardino*, *Riverside*, *Santa Ana*, *Beverly Hills*, and *Hollywood*. The last two have been made famous by the moving picture industry. The climate and scenery were two natural assets for the early start of these industries in California.

THE REGION'S PROSPECTS. A region so intensively occupied as the southern California area is almost certain to face numerous critical situations. The latitude is such that destructive frosts sometimes descend on the citrus crops, causing immense damage. Frost-resistant varieties of plants and better frost protection are ever-present needs. An area that depends on irrigation is almost certain to develop projects beyond the capacity of the permanent water supply. This is happening in southern California, especially where pump irrigation is practiced. The quest for increasing water supplies is pursued zealously.[1] Destructive salt accumulations frequently occur in irrigated sections to harass the farmers, and the usefulness of the soil may thus be impaired. Soil management is a critical problem at all times.

A shortage of coal and of iron ore in the West curtails manufacturing and limits the capacity of the region to be self-sustaining. Of course, this might be a blessing in disguise, because goods must be bought if fruits and vegetables are to be sold.

[1] Raup, H. F., "Land Use and Water Supply Problems in Southern California: Market Gardens of the Palos Verdes Hills," *Geographical Review*, April, 1936, Vol. 26, pp. 264-269.

Because of the highly advertised advantages of California's climate, there is a continual influx of people from less temperate climates. This has resulted in the accretion of numerous people from all walks of life. Some of these are wealthy, and while seeking to regain their health have become promoters of speculative enterprises; some with superlative religious zeal have attempted to convert the multitudes to their special plan of salvation; others, taking advantage of the misfortunes of people of low estate, have become organizers of various types of welfare work; and not a few who just spend their time enjoying their infirmities.

10

Alaska

THE LATTER PART of the nineteenth century witnessed the rapid shrinking and final closing of our western frontier. However, Alaska, an area one fifth as large as the United States, is still open to the pioneer and the adventurer. It is not a poor area, either, for regions little if any better in Eurasia sustain many millions of people. It is true that the climate is rigorous, the crop season is short, and the homeland is far away, but these handicaps are no more discouraging to human effort, perhaps, than the low rainfall, drought, and isolation found in certain parts of the home country where perseverance has brought a considerable measure of success and well being.

Alaska extends through nearly 60° of longitude. The difference in time between Seattle and Boston is not as great as that between Attu and Ketchikan (Fig. 64). Point Barrow is in the same latitude as Hammerfest, Norway, and the Alaskan Panhandle is as far south as Denmark.

In the present air age, both in war and peace, Alaska holds a strategic position between the densely populated areas on opposite sides of the North Pole. Of the 40 cities in the world each with more than a million people, 25 are within 4500 miles of Fairbanks. Moreover, most of the North Atlantic and North Pacific oceans fall within this circle. From a corresponding latitude in Greenland not a single large city of Asia is within the 4500-mile radius. Alaska is truly a goodly heritage and deserves more than passing attention.

Natural Features

Alaska is composed of a large, rectangular main body, the *Aleutian Islands* and the *Alaska Peninsula*, and the *Panhandle*. The Panhandle section is nearest to the United States and is best known, although World War II has given thousands of Americans an intimate knowledge of the vast Alaskan interior and the stormy Aleutians.

Three large physiographic divisions of North America already described extend through Alaska. They are the Rocky Mountains, the Intermontane Highlands, and the Pacific Mountains and Lowlands (see pages 69, 75, and 84, respectively).

The Rocky Mountains in Alaska, known as the *Brooks Range*, are far north of the Arctic Circle, and extend east and west. They are 5000 to 6000 feet in altitude, and slope northward to the Arctic Coastal Plain. Little is known of these bleak mountains and plains.

Running through southern Alaska from east to west are the Pacific Mountains of North America, the most important of which is the *Alaska Range*. These mountains are remarkable for their great valley glaciers, their immense peaks, and their volcanic activity. Several mountains are more than 18,000 feet in altitude, *Mt. McKinley* (20,300 feet) being the highest on the continent (Fig. 65).

Between the Brooks Range in the north and the Alaska Range in the south is the *Yukon-Kuskokwim Basin*, a feature which is associated with the *Yukon-Canadian Plateau*. Flowing through this region is the *Yukon*, the second largest river in North America.[1] Even though its headwaters are within a few miles of the Pacific Ocean, it flows more than 2000 miles through the Yukon Territory (Canada) and Alaska before it reaches the

[1] Burg, Amos, "Today on 'The Yukon Trail of 1898,'" *National Geographic Magazine*, July, 1930, Vol. 58, pp. 85-126. Good description, excellent pictures.



FIG. 64. AIR-AGE MAP CENTERED ON FAIRBANKS, ALASKA. An all-land highway (except for Bering Strait) might be constructed from Buenos Aires to Rangoon, following close to the great circle. The American section is nearly completed. Note some of the large cities within the dotted circle, 4500 miles from Fairbanks.

Bering Sea. The main tributary of the Yukon is the Tanana. The Kuskokwim River flows into the Bering Sea south of the Yukon delta.

The Aleutian Islands and the Alaska Peninsula constitute an immense, curved festoon, reaching westward nearly 1000 miles from Alaska, almost to Kamchatka and the Kurile Islands. No wonder Japan started "island hopping" toward Alaska (Fig. 66)!

The climate of Alaska ranges from the mild equable marine to the severest continental (Fig. 236). At Sitka in the middle of the Panhandle, the

climate is relatively mild with an average annual temperature of 42.3° F., a seasonal range of 24.5° F., and a mean annual rainfall of 81.4 inches. At Fairbanks in the interior, the corresponding figures are 25.6° F., 66.0° F., and 11.7 inches (Fig. 8). Nevertheless, because of the almost continuous sunshine of midsummer, Fairbanks has more than 50 days each year with temperatures above 70° F. more than a billion dollars, and the mineral wealth accrued has been nearly as much. One of the exciting episodes of Alaskan history was the Gold Rush in 1898.

Agriculture cannot become a major industry in Alaska because of the rigorous climate in the middle and northern sections, and the dearth of level land in the south. *Matanuska Valley* at the



FIG. 65. MT. MCKINLEY. This peak in Alaska, the loftiest in North America, is always snowcapped. The glaciers in the foreground are boulder-covered and full of debris. (Courtesy U. S. Department of Interior)

This accounts for the agricultural possibilities in the middle Yukon and Tanana valleys.

Cultural Features

Russia was glad to sell Alaska to the United States in 1867 for twelve and one-half cents per acre. Four motives prompted this purchase: (1) the coast was rich in fish and furs; (2) Congress did not want England to get Alaska; (3) trade and friendship with China and Japan could be promoted; and (4) Russia was sympathetic toward the Union cause in our War between the States. However, in three quarters of a century of American ownership little has been done to promote settlement, but there has been much exploiting of the fish and mineral resources. During the years of ownership by the United States the fish harvest has amounted to

head of *Cook Inlet* is one of the most favorable areas for agriculture. This valley is protected from the cold northern blasts of winter by the high Alaska Range, and on the south are the mild westerly winds and the influence of the adjacent sea. In 1935 the United States Government induced 200 families in the drought-stricken Middlewest to try their fortunes as farmers in the Matanuska Valley.[1] Many of these families are still there (1946), although it is now known that markets are too far away, and that farming should be essentially of the subsistence type. If, eventually, the intercontinental land route from the United States to the Far East becomes important, the Matanuska

[1] Shearer, M. H., "The Matanuska Valley of Southern Alaska," *Journal of Geography*, May, 1936, Vol. 35, pp. 186-193.

farmers may look forward to better days. With the advent of freight planes, the farmers' produce then can be transported rapidly to distant markets.

It is not to be expected that transportation routes (highways, railroads, and waterways) would be developed rapidly in such a sparsely settled country. However, nearly 800 miles of railway have been constructed—112 miles from Skagway to *Whitehorse*, 197 miles up the Copper River Valley, and 467 miles from *Seward* to Fairbanks. The world's premier effort in road building was the construction of the *Alaskan-Canadian* (Alcan) *Highway* in 1942. This road was built by the United States War Department to carry supplies



FIG. 66. VILLAGE OF UNALASKA. On one of the Aleutian Islands 2500 miles northwest of the Hawaiians. The bleak character of the island chain is here in evidence. (Courtesy U. S. Coast and Geodetic Survey)

for the air route to and beyond Alaska. Fortunately, the route was not needed much for the purpose for which it was constructed. The termini of the Alcan Highway are Fairbanks in Alaska and Dawson Creek in British Columbia.

PEOPLE AND CITIES OF ALASKA. As far as population is concerned, Alaska is almost empty, having on an average of only one person per 10 square miles. Of the 72,500 people, 39,000 are white, and most of the remainder are Indians. One third of the Indians are Eskimos and Aleuts. Fewer than 500 are Orientals and Negroes. The towns are all small, only Juneau having more than 5000 people.

Anchorage is the gateway to the interior, having a railroad through Matanuska Valley to *Fairbanks* on the *Tanana River*. *Skagway* has facilities by the Yukon Railway through the *White Pass* to the headwaters of the Yukon River and to the *Klondike* gold fields (Fig. 67). *Juneau* is the capital of Alaska and has rich gold mines in the mountains back of the city. *Cordova*, *Ketchikan*, and *Wrangell* are fishing and lumbering centers.

THE FUTURE. For a long time to come the chief wealth of Alaska will be her resources of fish, fur,



FIG. 67. THE KLONDIKE NEWS. This was the first issue of the paper published at Dawson, April 1, 1898, and sold at five dollars per copy. George Carmack, the discoverer of the Klondike Field, is the man in the picture. (Courtesy Canadian Pacific Railways)

and metals. The exploitation of these resources will be continued. A more delightful cruise can hardly be imagined than a summer trip along the south Alaskan coast, especially if the return can be made through the interior by airway or highway. Perhaps it is not fantastic to envision the day when the Alcan Highway will be extended to Bering Strait, there connecting with trunk roads

or airways to various parts of Asia and Europe. It should be remembered, too, that the Inter-American and Alcan highways follow close to a great circle from Buenos Aires to Peiping and Singapore (Figs. 6 and 64).

In 1934 General Mitchell said, "Alaska is the most central place in the world of aircraft. In the future, I think whoever holds Alaska will hold the world. It is the most strategic place in the whole world." This certainly was no idle forecast, for precarious, indeed, was our hold on the Aleutian Islands and Alaska at the beginning of our war with Japan. He also contended that air power would be a determining factor in the next world war. How well everyone now knows the accuracy of General Mitchell's insight!

11

British and Danish North America

BRITISH NORTH AMERICA is a large area extending through nearly 90° of longitude, and hence, when it is 6:00 A.M. in Dawson on the Alaskan border, it is noon in St. Johns, Newfoundland. The distance from Vancouver to the Arctic Coast is farther than it is from New Orleans to Duluth. British North America is larger in area than the United States with all its outlying possessions. It is composed of two political subdivisions of the British Empire, namely—the *Dominion of Canada*, and *Newfoundland and Labrador*. The former is a self-governing commonwealth and the latter is a colony.

DOMINION OF CANADA

If Great Britain were superimposed upon central Canada in a corresponding latitude, it would extend half of the distance from Winnipeg to the Arctic Coast. On the other hand, the southernmost part of Canada at Windsor, just east of Detroit, lies in the same latitude as northern California.[1] All of the country at one time or another was covered by one or more continental ice sheets, which radiated from four centers—namely, the *Labrador* center in Labrador, the *Keewatin* center west of Hudson Bay, the *Patrician* center north of the Great Lakes, and the *Cordilleran* center in the western highlands. Nearly everywhere the surface features of Canada show the profound influence of glacial invasion. However, the most pronounced effects of ice invasion are glacial scouring rather than deposition.

[1] Wilson, J. A., "Canada from the Air," *National Geographic Magazine*, October, 1926, Vol 50, pp. 389-466. Gives a fine selection of pictures from all parts of the country.

Natural Features

Several physiographic divisions and regions of North America are included wholly or partly in Canada. The largest of these is the Laurentian Peneplain in the eastern part of the Dominion. In general, the divisions and regions of western Canada are northward extensions of regions introduced into the study of the United States—only one (Yukon-Canadian Plateaus) lying entirely north of the international boundary (see Fig. 10).

Laurentian Peneplain and Associated Features

The *Laurentian Peneplain and Associated Features*, the largest physiographic division of North America, lies in the northeast quarter of the continent and occupies approximately two thirds of the Dominion of Canada. The region may be divided into three sections—namely, the *Laurentian Upland*, the *Adirondack Mountains*, and the *Superior Upland*. The latter two are in the United States, and generally are considered as outliers of the Laurentian Upland. Associated with the Laurentian Peneplain are the *Hudson Bay* and the *St. Lawrence* lowlands.

The Laurentian Upland. The Laurentian Upland is sometimes designated as the *Archean* or *Canadian Shield*. According to geological evidences it has been subjected to uninterrupted erosion longer than any other area on the continent, and consequently, it may be considered the oldest portion of North America (Fig. 68). The area is nearly triangular in outline with Hudson Bay in the center. The boundary extends approximately from near the mouth of the Mackenzie River on the Arctic Coast southeastward along a line of lakes including Great Bear Lake, Great Slave Lake, Lake

Athabaska, Lake Winnipeg, Lake-of-the-Woods and thence into northern Minnesota, Wisconsin, and Michigan. The boundary then is prolonged eastward from the Georgian Bay to the St. Lawrence River in the vicinity of Quebec and thence northeastward to include the Labrador Peninsula and Newfoundland.

The bedrocks underlying the Laurentian Upland consist of old formations of igneous and metamorphic origin, and contain important ores of iron, nickel, cobalt, graphite, and copper, and the very useful mineral, asbestos. The Great Bear Lake district is one of two leading places in the world for the mining of radium-uranium ore, so necessary in the making of atomic bombs—the deadly weapon that successfully hurried the end of World War II. Large quantities of rock suitable for building purposes are available but in general they are too far from centers of population to be of much economic value.

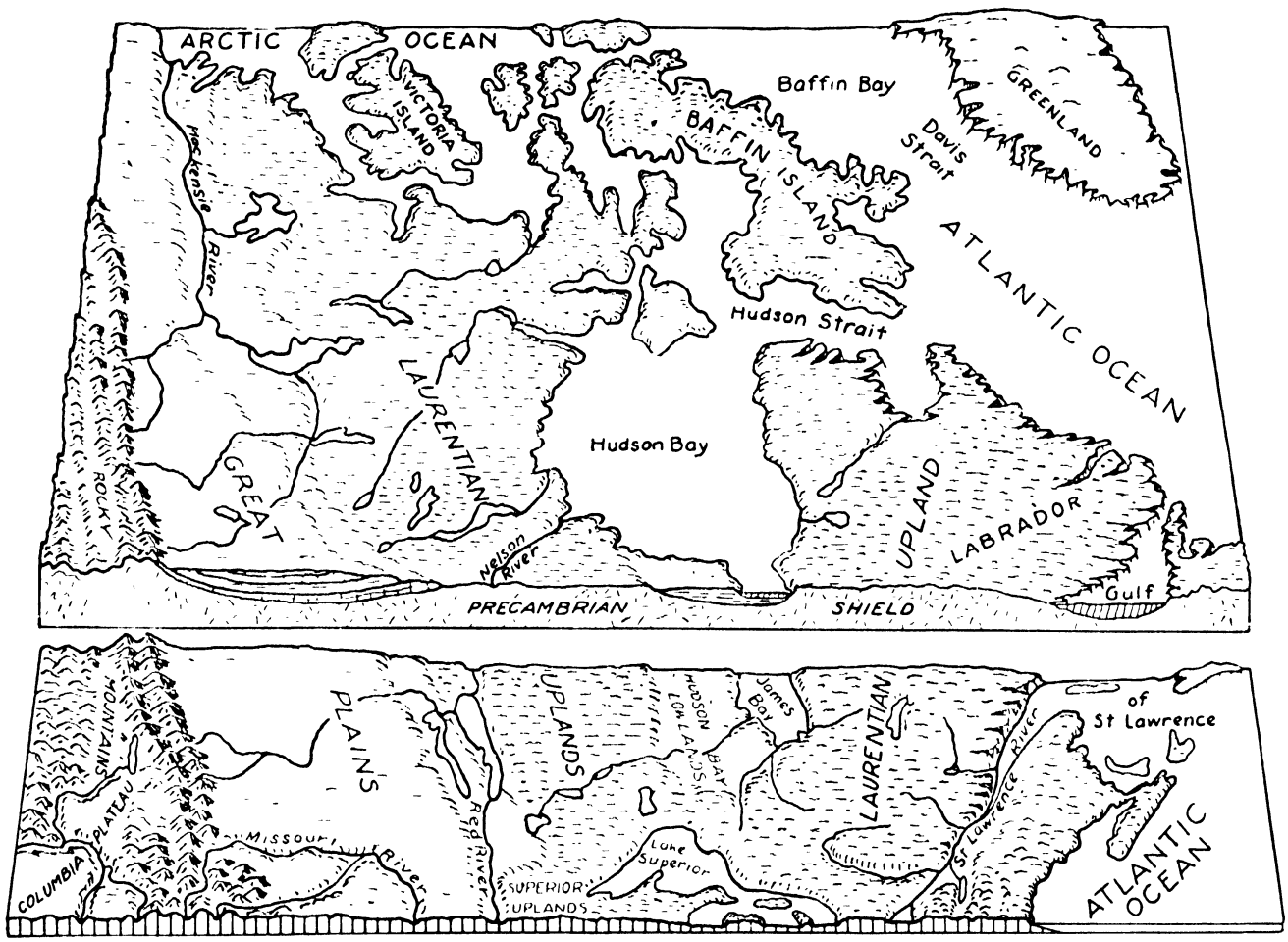


FIG. 68. DIAGRAMMATIC SKETCH OF THE LAURENTIAN UPLAND. The ancient rocks of the Precambrian Shield in this region are largely of igneous origin, having little or no sedimentary cover. See the vertical section across the middle of the drawing. Trace the margin of the region according to the textual description.

Numerous scratches (striae) on the exposed rocks indicate that the glacial ice moved from three main centers—the Labrador, Keewatin, and Patrician.

The Laurentian Upland is plateau-like with altitudes not often exceeding 2000 feet, most places being less than 1000 feet above sea level. The region has been eroded by many streams, most of which drain into the Hudson Bay. The southeastern edge rises abruptly from the St. Lawrence River where the escarpment is known as the *Laurentide Mountains* and from here the slope is toward the north.

Much of the glacial debris, carried far southward, was deposited in those parts of the United States now occupied by the famous "Corn Belt" of the central states and of boulder-strewn New England. In many places the glaciers gouged holes out of the softer rocks or obstructed drainage ways, leaving depressions which are now lakes and swamp lands. Water-tolerant trees, such as the tamarack and some forms of cedar, grow in the swamps. Muskegs are areas where rocky basins are partly filled with debris and covered with bushes and grasses. Some of the muskegs are filled with peat. Cranberry bogs occur in the southern part of Wisconsin and Minnesota. The period of post-glacial erosion has not been nearly as long in the Laurentian Upland as it has been in the Glaciated Lowland in the United States, and, consequently, drainage is very imperfect.

ADIRONDACK MOUNTAINS. The Adirondacks consist in part of numerous rounded mountains among which are many long narrow lakes. The eastern part is highest and most rugged, the altitudes ranging from about 2000 to 5000 feet. Most of the high peaks, of which *Mt. Marcy* (5344) is loftiest, are confined in an area comprising about 4 per cent of the whole region. Next to the Blue Ridge of North Carolina and the White Mountains of New Hampshire, these are the most imposing mountains in the eastern part of the continent.[1]

The Adirondacks are composed of igneous rocks in the center with metamorphosed sedimentaries on the flanks. Considerable faulting has taken place and this has given rise to numerous rift valleys containing beautiful lakes, among which are the well-known *Indian* and *Long* lakes. Stream courses frequently follow fault valleys, resulting in a trellised drainage pattern.

The entire region was glaciated and valleys were dammed by glacial debris, in many places causing lakes and waterfalls. There are approximately 2000 lakes and ponds in the Adirondacks, about half of which are in the mountainous section. Among the most famous are *Lake Placid, Saranac Lake*, and *Lake George*. The site of the pre-glacial divide between the Hudson and the Champlain valleys is in Lake George and is known as the "Narrows." Because of its beautiful setting Lake George is sometimes referred to as the "Queen of American Waters."

SUPERIOR UPLAND. Extending westward and southward from Lake Superior is the Superior Upland—a section of the Laurentian Upland lying in the United States.[2] It was severely trenched by lobes of the Keewatin and Patrician glaciers. In the depressions thus made and in others left by the uneven deposition of drift are numerous lakes. In the ancient rocks of this area are the richest beds of iron ore in the United States, supplying 75 per cent of all the iron ore smelted in the country. These ores lie so near the surface that they may be secured by stripping off a few feet of loose overburden and resorting to open pit methods of mining. Thus, the mines of the Superior Upland furnish the ore for one of the leading iron- and steel-manufacturing areas in the world—the region south of the Great Lakes.[3] The Superior Upland is also famous for its excellent copper ores which are mined in the upper peninsula of Michigan.

HUDSON BAY LOWLAND. The Hudson Bay Lowland, an area south of the Hudson Bay, is underlain by sedimentary rocks lying upon the old crystallines of the Laurentian Upland. This section is swampy and quite inaccessible, and inasmuch as the human activities of the few occupants are similar to those of adjacent areas, it does not merit extended treatment.

ST. LAWRENCE LOWLAND. The St. Lawrence Lowland lies between the New England-Acadian Upland and Adirondack regions on the south and the Laurentian Upland on the north. The underlying rocks were soft sandstones and shales which weathered more rapidly than the hard crystallines of the adjoining areas, thus forming the lowland. The valley, approximately seventy miles wide at Montreal, extends westward almost to Lake Ontario where the hard rocks of the famous *Thousand Islands* in the St. Lawrence River form a connecting

[1] Since the Adirondack Mountains are in the United States, the cultural and industrial features were discussed on pages 49 and 50, inclusive.

[2] Since the Superior Upland is in the United States brief statements about industrial relations and cities were made on pages 54 and 56.

[3] Primmer, George H., "Future of the Lake Superior Iron Ore Supply," *Economic Geography*, October, 1934, Vol. 10, pp. 395-401.

link between the Laurentian Upland and their Adirondack outlier (see pages 49-50). The lower St. Lawrence River is in reality a portion of the sea reaching far inland, and it was produced by the drowning of a part of the valley. Submergence was so great that the *Saguenay River*, a northern branch of the St. Lawrence, is 800 feet deep in some places, and the head of navigation at Montreal is about 1000 miles from the ocean.

Other Regions Extending into Canada. Several regions discussed in the study of the United States reach northward into Canada. One of these regions, the Glaciated Lowland, a part of which lies just north of Lake Erie and Lake Ontario, is the most densely populated section of the Dominion.

The Great Plains, the Rocky Mountains, the Intermontane Highlands and the Pacific Mountains project northward from the United States through Canada. The first-mentioned region reaches to the Arctic Ocean and the other three extend into Alaska (see pages 58, 69, 75, and 84). One region of the Intermontane Highlands (Yukon-Canadian Plateaus), which is entirely outside the United States, requires some attention here.

Yukon-Canadian Intermontane Plateaus. The Yukon-Canadian Intermontane Plateaus extend 2000 miles from the Okanagan Mountains in southern British Columbia northward and westward to the Bering Sea. They lie between the Rocky Mountains and the Brooks Range on the east and north, and the Coast Ranges on the west and south. In British Columbia the area is from 100 to 150 miles wide, but in western Alaska, it increases to a width of nearly 500 miles.

Complexity characterizes the structure of the underlying rocks of the Yukon-Canadian Plateaus and several forces have combined to produce the arrangement of the bedrock, the topographic features, and the materials of the landscape. In ancient geologic time when the mountains on either side of the region were uplifted, streams carried much detritus onto the intermontane area. Later this layer of sediment was attacked by streams, and volcanoes belched forth materials which were spread upon the plateau. Still later, mountain-building forces elevated the lands to their present heights, thus creating a new erosion cycle upon the former peneplain. More recently the Cordilleran ice sheet effected great changes in the landscape. Not only did it create many of the lakes, but it left thick morainic deposits on the plateau. Since the retreat of the glaciers, streams have cut deeply into the glacial drift and other morainic material, and many of the larger streams have incised their valleys through the drift into the bedrock. Thus the present landscape, a dissected plateau with ridges and valleys, is the result of millions of years of crustal movements and the work of ice and running water upon the earth's surface. The *Yukon*, the largest river of the plateau, has sources in northern British Columbia, from whence it flows westward by a devious course of about 2000 miles into the Bering Sea.

The principal bedrocks of the region are composed of faulted and folded crystallines, mostly schists and gneisses, but in a few places sedimentaries are found. The sedimentaries contain thick beds of lignite and bituminous coal, whereas anthracite exists in the folded sedimentaries. Alluvial gold has been secured in immense quantities from stream beds, and prospects for petroleum in some areas are encouraging.

Climates, Natural Vegetation, and Soils. Nearly all of Canada is in the higher middle latitudes and, therefore, is in the cyclonic and polar climates. East of the Rocky Mountains four types are represented. Along the southern border, Canada shares with the United States the continental humid, short summer climate and the continental semiarid. The continental subpolar covers the central part of the country from east to west, and the polar littoral rules the weather and climate of the far north (Fig. 236).

The length of the frost-free season except on the west coast varies from about 130 to 140 days in the southern part to periods of continuous frost hazard in the north. The summer temperatures in southern Ontario reach 85° F. to 90° F., whereas winter temperatures from 30° F. to 40° F. below zero are not uncommon. The precipitation in the southern part of the Dominion ranges from 40 to 50 inches in Ontario and New Brunswick, to 10 or 15 inches adjacent to the Rockies. Farther northward in the subpolar and polar climates, average temperatures,

as well as rainfall, are lower both in winter and summer (Fig. 7).

Crops can be grown successfully in southern Canada from the Atlantic to the Rockies because of the long summer days and the favorable summer temperatures which are sufficiently high for the production of some grain crops, fruits, and vegetables. In the polar littoral the accumulated heat from the long summer days is sufficient to produce enough grass and tundra vegetation to support many animals such as reindeer, muskoxen, and caribou.

The climate of the Canadian west coast is cyclonic marine—not unlike that of southern Norway. Both summers and winters are mild and the rainfall is abundant at all seasons. Prince Rupert is 500 miles northwest of Victoria, but the month-by-month differences in temperature are less than 5° F. However, rainfall increases rapidly with the increase in latitude, the amount at the former station being at least twice that at the latter.

Most of the Great Plains in Canada is a grassland, but east of the Great Plains in the southern part of the country the native vegetation consists principally of coniferous forests—pines, hemlocks, and spruces predominating with a few deciduous trees such as maples and birches interspersed (Fig. 237). The size of the trees decreases northward until only shrubs and small bushes will grow, and these finally give way to tundras, which include small grasses, hardy shrubs, mosses, lichens, and algae. On the British Columbian coast are magnificent forests of Douglas fir and spruce. These furnish the foundation for a lucrative lumbering industry.

The soils of southern Alberta and Saskatchewan are chernozems and chestnuts, but farther east podsols prevail (Fig. 238). All of the northern part of the country has tundra soils.

Cultural Features

Most of Canada is yet a new country. Small areas along the upper St. Lawrence and the lower Great Lakes have achieved a high measure of utility. Most of the country, however, consists of wide, open, uninhabited spaces, and for many decades has been a paradise for hunting, fishing, and trapping. In 1497 John Cabot first sighted the mainland of North America near Cape Breton and named it "Bacalaos," a Basque word meaning codfish. More than 100 years later, Samuel de Champlain founded Quebec which long remained a small, weak settlement and failed to produce a large treasure of precious metals or to become an outpost on the way to China, as had been expected. The colony survived, however, established friendly relations with the Indians, and served as a base for fur trade, for missionary enterprises, and for exploration. Champlain reached Lake Huron by ascending the Ottawa River, and Nicolet reached Lake Michigan in 1634 by the same route. Much of the Arctic border was explored by English navigators when searching for the Northwest Passage and thus the English claim to the subpolar regions of the continent was established. These lands remained unexploited by white men, however, until 1667 when Charles II granted a charter to the Hudson Bay Company under the sponsorship of Prince Rupert for the dual purpose of continuing the search for a Northwest Passage across America to the Pacific and to the Orient, and also for the development of trade, especially in furs and minerals. The subarctic location insured fine, thick fur pelts, but because of short summers the trading season was limited; hence, most of the trading posts were established at the mouths of the rivers which had harbor facilities.

Fishing and lumbering were early industries in eastern Canada, but not until recent decades have either gained much importance.

Land Utilization on the Laurentian Upland. Hundreds of thousands of square miles in the Laurentian Upland are still awaiting development; many sections have not even been explored nor settled; and trapping, hunting, fishing, and fur gathering are still the only attractions.

The fine forests of spruces, balsams, firs, and hemlocks, especially in the south, the advantage of many streams and lakes for floating logs and also the abundant water power, have been significant factors in the development of wood pulp and paper manufacture. The first wood pulp mill in Canada was erected about 1866, and in 1891 there were 24 such mills. Today the pulp and paper industries support about 100 mills and constitute the leading manufacturing activity in Canada (Fig. 69). About

four fifths of the wood pulp in Canada is produced in the provinces of Quebec and Ontario, chiefly in the Laurentian Upland. The United States uses nearly all of Canada's exports of wood pulp, inasmuch as the forest resources in the United States are badly depleted.

Farther poleward forests are less luxuriant, and here thrive large numbers of muskoxen, caribou,



FIG. 69. LUMBERING IN SOUTHEASTERN CANADA. A scene north of Ottawa. Trees grow slowly in this latitude and most of the timber is used for pulpwood. (Courtesy Canadian Government Motion Picture Bureau)

wolves, foxes, rabbits, and bears. Seals, polar bears, whales, and many kinds of fish live along the shores and in the adjacent seas. The harvest of fish, seal, and walrus is a much more dependable source for human necessities than is the supply of food and clothing materials from the land animals which live in herds and migrate from place to place. The Eskimos use seal skins for clothing, tents, buckets, and covers for the framework of their kayaks (Eskimo boats). The seal meat is food for both people and dogs, and the oil is used for fuel in lamps. Fishing is the leading industry along the coast of Labrador where the cold Labrador current is ideal for cod and mackerel. During recent decades hardy vegetables such as potatoes, radishes, cabbage, and lettuce have been introduced into Labrador and new steamship connections enable the people to send large quantities of fish and fish products to foreign markets.

Large deposits of nickel, cobalt, asbestos, and some gold and silver are mined in Canada near the Georgian Bay, Lake Huron, and Lake Superior. Sudbury is in the world's premier nickel district. Quebec asbestos, an important mineral used for heat insulation, is finding markets all over the world. Sixty to seventy-five per cent of the world's asbestos is mined near the town of *Thetford Mines* in the St. Lawrence Lowland, 50 miles south of Quebec. Cobalt, a metal needed as a hardening ingredient in steel manufactures, is abundant near *Cobalt*, Canada. Copper, lead, and zinc have also been discovered in the Cobalt region.

The southern portion of the Laurentian Upland has become an important recreation land. The thousands of lakes with their fresh, clear waters provide excellent facilities for boating and fishing; many beautiful, cool sites are available for summer camps and cabins; and innumerable wild animals lure the hunter. The deep snows of the long, cold winters increase the cost of living but at the same time offer fine opportunities for sports, especially skiing, skating, and tobogganing.

Agricultural activities in the Laurentian Upland are confined principally to the southern parts of Quebec and Ontario where the climate is warmer and the growing season is longer.



FIG. 70. IN THE ANNAPOLIS VALLEY IN NOVA SCOTIA. Life moves at a leisurely pace in this corner of the British Empire. Apples in large quantities and of the best quality are produced here. (Courtesy Canadian Pacific Photos)

LAND USE IN SOUTHEASTERN CANADA. *Maritime Canada* includes the lower St. Lawrence Valley and the northeastern part of the New England-Acadian Upland (see pages 44 and 45). Seventy-five to ninety per cent of this section is forested. The *Annapolis-Cornwallis Valley* in Nova Scotia is an outstanding orcharding area, especially for apples (Fig. 70).

Although hay and potatoes also are grown, apples are so important that only 30 per cent of the crop is consumed at home, most of the remainder being exported to the United Kingdom. The farmland of New Brunswick is devoted principally to field crops and dairying. *Prince Edward Island,* too, is predominantly agricultural.

The St. Lawrence Valley is one of the most productive agricultural areas in eastern Canada. On the fertile pedalferic soils are harvested good crops of grains, potatoes, root crops such as beets and

The St. Lawrence River is the eastern end of the world-famous *Great Lakes-St. Lawrence* Waterway. Plans are under way to make this highway deep enough for seaworthy vessels to move from the ocean into the Great Lakes. During the course of a year, even now, more than 2000 ocean-going steamships, aggregating more than 7,000,000 net tons, stop at Montreal, the largest city in the Dominion. The river is made navigable for lake-worthy boats upstream from Montreal by means of canals and locks around the many rapids, the well-known

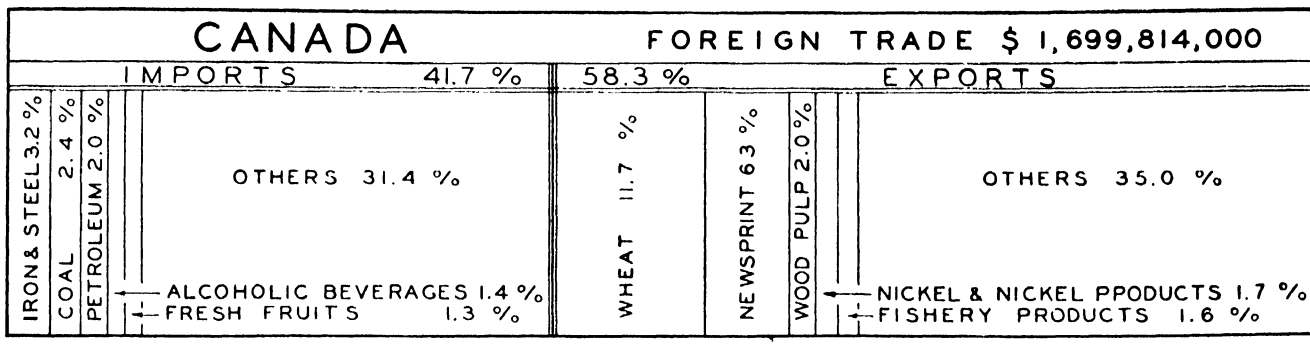


FIG. 71. CANADA'S FOREIGN TRADE. Compare the total with that of the United States. (See Figs. 7 and 33.) Note what the major items of import and export are. How do total imports and exports compare? A 7-year average just preceding World War II. (See also Fig. 72.) (Data from *Statesman's Yearbook*)

turnips, and some fruits, both for subsistence and commercial purposes; and dairy products, especially cheese and fresh milk, are marketed in Montreal, Quebec, New England, and New York.

The St. Lawrence Valley produces no coal, petroleum, nor natural gas, but the deficiency is counterbalanced in a large measure by an extraordinary abundance of available water power in the St. Lawrence River and in the swift streams that flow from the numerous lakes in the Laurentian Upland, the Adirondacks, and the New England-Acadian Region.[1] That the region plays a leading role in generating hydroelectricity is indicated by the fact that the Province of Quebec alone has nearly one half of the Canadian electric installations. The streams from the upland forests are used not only for floating logs to the mills but also in supplying power for operating pulp and paper mills.

[1] Whittaker, J. Russell, "The Great Lakes-St. Lawrence Lowland: Industrial Heart of Canada," *Journal of Geography*, December, 1934, Vol. 33, pp. 329-339.

Lachine Canal (8.74 miles) being one of the six within 100 miles of the Canadian metropolis. At present the Great Lakes inland waterway is the best in the world. It carries bulk materials such as iron ore, coal, wheat, limestone, and pulpwood. The seasonal load sometimes reaches 135,000,000 tons of cargo.

LAND USE IN CENTRAL AND WESTERN CANADA. The Interior Plains of Canada extend from the Laurentian Upland westward to the Rocky Mountains. The plains adjacent to the United States were originally a prairie with tall grasses in the east and short steppe grasses in the west, the change corresponding to the decrease in rainfall. Today this is a small-grain and cattle country with specialization on spring wheat, one of the leading exports of Canada (Fig. 71). North of the spring wheat area is the westward extension of the coniferous (taiga) forested section of eastern Canada. Scrub forest, Arctic grasslands, and tundras occur in succession northward to the Arctic Ocean.

The scenic attributes of Waterton-Glacier Inter-

national Peace Park in the United States extend far northward into the Canadian Rockies, and they are duplicated and accentuated in the *Banff* and *Jasper* National parks where the alpine and tundra features become more prominent. The peaks, lakes, and glaciers of Switzerland, although more accessible, do not surpass in beauty or in grandeur those of the Northern Rockies in the United States and of the Canadian Rockies.

The Intermontane Highland in southern Canada is much like the adjacent part of the Columbia Plateau. Such fruits as apples, plums, and cherries grow in abundance in the valleys, and even peaches and apricots are produced in considerable quantities. Garden crops and alfalfa thrive, but irrigation is essential to insure crops. In the higher altitudes grasses and summer pastures are utilized. Four hundred miles north of the international boundary in the Fraser Valley, oats, hay, and vegetables can be grown but the land is not farmed intensively. The intermontane plateaus contain fewer and fewer people farther poleward.

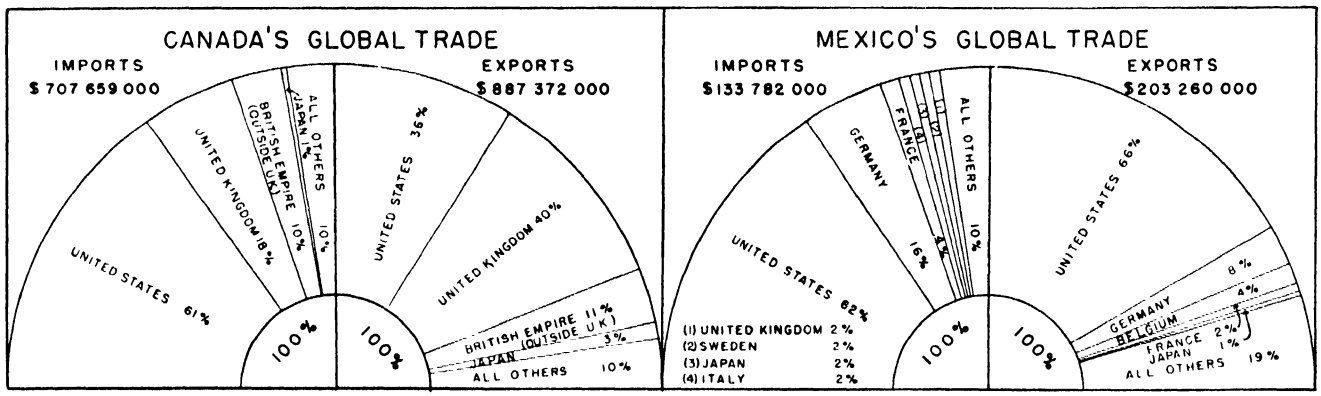


FIG. 72. GLOBAL TRADE OF CANADA AND MEXICO. The trade (both imports and exports) of both these countries is narrowly limited. See Fig. 71 for the major commodities in Canada's trade. (From *Foreign Commerce Yearbook*)

Transportation and Trade. Interior Canada has access to the western coast by three railroads across the western highlands—namely, the Canadian Pacific, the Canadian National (Grand Trunk Pacific), and the White Pass and Yukon Railway. These lines have their termini, respectively, at Vancouver and Prince Rupert in British Columbia, and at Skagway in Alaska. The great bends of the Fraser, Kootenay, Columbia, and other rivers in echelon arrangement are controlling features in the location of east-west routes across the Canadian Intermontane Plateau. The Yukon River is navigable to White Horse in the Yukon Territory, but is closed most of the year on account of ice. Highway construction in this region normally would be delayed for a long time because of remoteness, ruggedness, and unfavorable climate. However, the exigencies of the Global War hastened the construction of the Alaska-Canadian (Alcan) Highway from Dawson Creek on the Great Plains in British Columbia to Fairbanks in Alaska.[1] This route, if and when completed, promises much for travelers and tourists in the postwar era.

Canada is a new, thinly populated country, rich in many materials essential in a highly industrialized society. This condition is apparent when it is shown that the leading exports are grains, ores, woods, and their various processed forms; and the chief imports are iron and steel goods, machinery, sugar, textiles, coal, and petroleum products. The major portion of Canada's global trade is with the United States, the United Kingdom, and other members of the British Commonwealth of Nations (Fig. 72).

People and Cities of Canada. Nearly all the people of Canada live in the southern part east of the Rocky Mountains. It has only seven cities with more than 100,000 people, and only two with more than a half million—namely, Montreal and To-

[1] Raup, Hugh M., "Forests and Gardens Along the Alaskan Highway," *Geographical Review*, January, 1945, Vol. 35, pp. 22-48.



FIG. 73. SOME CITIES OF NORTH AMERICA. Nearly all the cities mentioned in the text are shown on the place maps. Study size of cities as shown by the key. Note the inset map of the Los Angeles area.

ronto. However, Canada supports hundreds of small towns and villages (Fig. 73).

Montreal, in the St. Lawrence Lowland and the largest city in Canada, is one of the world's great ports and the country's principal commercial gateway. It is connected by rail and water with a large and productive hinterland reaching back more than 1000 miles into the grain fields of Alberta. Its harbor is adequate, with excellent terminal facilities and modern export elevators which can store more than 16,000,000 bushels of grain. Here lake steamers meet seaworthy vessels because upstream from here canals and locks have to be constructed around the numerous rapids in the St. Lawrence River to accommodate even lakeworthy vessels. The ice and fogs of winter are the two greatest handicaps of this important commercial and manufacturing city. Headquarters of two transcontinental railroads are located at Montreal.

Quebec, located on a high, narrow promontory between the St. Lawrence and St. Charles rivers, is the metropolis of the Laurentian Upland. It was founded by Champlain in 1608 and named Quebec, an Indian word which means *narrow*. The river at Quebec is deep, and although Quebec is 300 miles from the Gulf of St. Lawrence, the city is easily accessible by large ocean-going vessels. Quebec, as well as Montreal, has become famous as a point of embarkation for tourist travel to Europe because of the quiet waters in the river as contrasted with the rough seas outside of the St. Lawrence estuary. *Cape Diamond*, a promontory between the St. Lawrence and St. Charles rivers, rises precipitously 333 feet from the water's edge (Fig. 74). This, the loftiest part of the city, is known as the Heights of Abraham. In September, 1759, General Wolfe, while floating down the St. Lawrence with his soldiers on the night preceding the Battle of Quebec, quoted Gray's *Elegy* to his men and commented that he would rather be the author of those lines than to take Quebec on the morrow. The following day his men scaled the Heights of Abraham and took Quebec but Wolfe lost his life in the struggle. Quebec was one of the places where the British Prime Minister, Winston Churchill, and the American Commander-in-Chief, Franklin D. Roosevelt, met to discuss Allied war and diplomatic strategy during World War II.

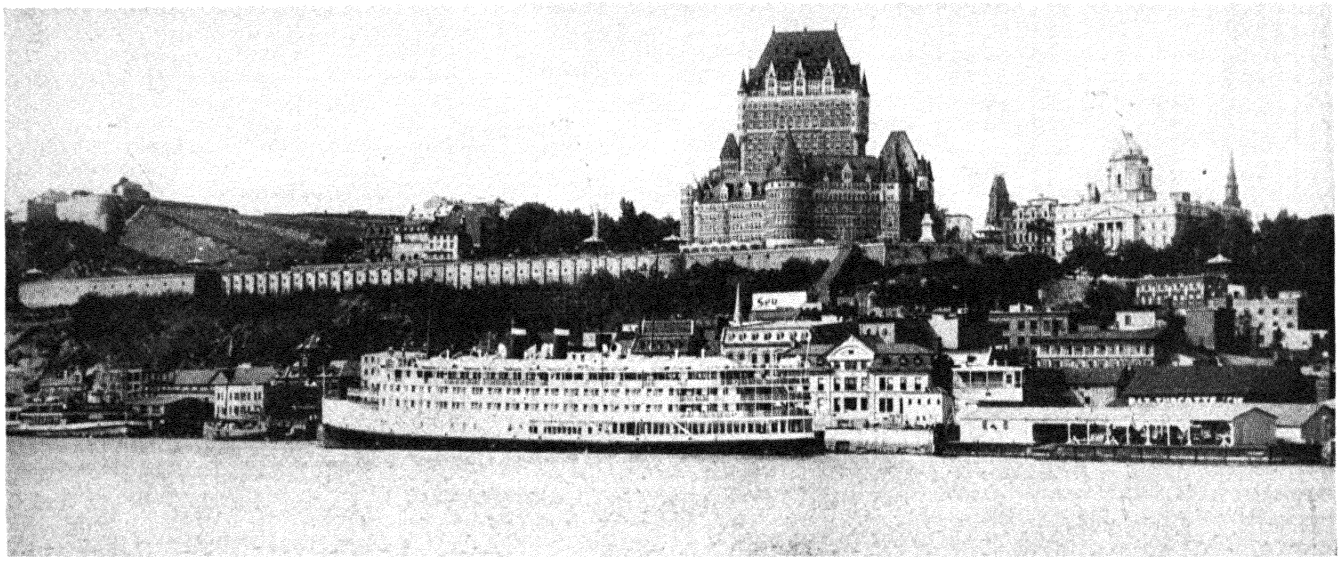


FIG. 74. THE CITY OF QUEBEC. The St. Lawrence here is navigable for large ocean-going vessels. Note the rugged shoreline—the southeastern margin of the Laurentian Upland.

For many years Quebec was the leading port of Canada, but now it is surpassed by Montreal because the latter city is nearer to the rapidly developing interior. Water power in abundance is available for Quebec's industries, which include the

manufacture of paper, machinery, cutlery, gunpowder, and musical instruments.

Ottawa, the capital of the Dominion of Canada, stretches three miles along the south bank of the Ottawa River, and is 100 miles west of Montreal on two transcontinental railroads. Champlain visited the site in 1613 and for two or three centuries the place has been and still is on the thoroughfare of the Canadian fur traders. The settlement began to grow in 1827 when it became the northern terminus of the Rideau Canal, at which time it was called Bytown. Because of its lumber trade, it grew in wealth and importance and was renamed Ottawa. It was selected as the capital in 1858 by Queen Victoria. Ottawa, sometimes designated as a "sawmill town," uses hydroelectric power to run its pulp mills, sawmills, and other manufacturing industries.

Toronto, the site of a seventeenth century Iroquois Indian village and the entrance to the land route from Lake Ontario to Lake Huron, has become the second city of the Dominion in size. Its key position on the north shore of one of the Great Lakes also has helped to make it an outstanding railway, commercial, manufacturing, and financial center.

Sudbury, a small town in southern Ontario and on the Canadian Pacific Railroad, is in the district which produces approximately 80 to 85 per cent of the world's supply of nickel, and more than one half of the country's copper.

Fort William and *Port Arthur*, on the north shore of Lake Superior, are the two chief shipping points for grains from the spring wheat area of Manitoba, Saskatchewan, and Alberta.

Winnipeg, the metropolis and railroad center of the spring wheat region of Canada, is situated near the confluence of the Assiniboine and Red rivers, and near the southern end of Lake Winnipeg. It has the largest stockyards in the Dominion and is the most important distributing and receiving center in central Canada.

Other outstanding railway and trade centers on the Great Plains of Canada are *Regina*, *Moosejaw*, *Sasketoon*, *Calgary*, and *Edmonton*.

Kamloops, on the Canadian Pacific Railway in British Columbia at the junction of the two branches of the Thompson River, is a supply and shipping center for a rich irrigated grazing and mining area. *Dawson*, 1500 miles from the sea on the Yukon River (a city with 20,000 inhabitants during the gold rush in 1898, but with a population of less than 1000 now), is the center of the renowned Klondike region. In early days the Klondike was reached over the Coast Range by way of Chilkoot Pass, but in 1898 the White Pass and Yukon Railway from Skagway were completed to White Horse at the head of navigation on the Yukon, 460 miles above Dawson.

Vancouver, at the northern end of Puget Sound Lowland, is near the mouth of the Fraser River on Burrard Inlet. This river provides the gateway through the Cascade Mountains by means of which grain from the Prairie Provinces of Canada reaches the Pacific port. The city, the western terminus of several railroads, is also the eastern terminus of more than thirty steamship lines which lead to the Orient, to Alaska, and to Europe by way of the Panama Canal. Vancouver, a creation of the Canadian Pacific Railway, was founded in a trackless forest in 1886. The vicinity is rich in iron ore, copper, coal, forests, and water power resources. As the chief outlet of Canada to the Pacific Ocean, the prosperous future of the city seems assured (Fig. 75).

A city which could be mistaken for a seaport in the British Isles, because of its climate and the customs of its people, is *Victoria*, on the southern end of Vancouver Island. It is here that East meets West. Equimault Harbor is sufficiently large to accommodate a whole squadron of vessels, although the protection of a breakwater is necessary.

The Canadian Outlook. The welfare of the people in the Canadian Maritime lands is closely associated with the more populous New England. The agricultural activities of the people north of the international boundary prosper more when their products are used freely by the New Englanders. This emphasizes the desirability of favorable trade relations between the American and Canadian sections of the region (Fig. 7). Tariffs and trade barriers in general react to the detriment of most of the people concerned.

The lack of transportation facilities is one of the major problems in the Laurentian Upland. However, a number of good highways and railroads

have been constructed within the last 20 years even though the swamplands, the lakes, and the woods are hindrances to highway construction. Many sections of the region are reached only by boats and trails. With the advent of the airplane some sections are now being entered which formerly were inaccessible, but the lack of landing fields is a major problem. The long, cold winters and the short summers are factors against which man has been unable to make satisfactory agricultural adjustments.

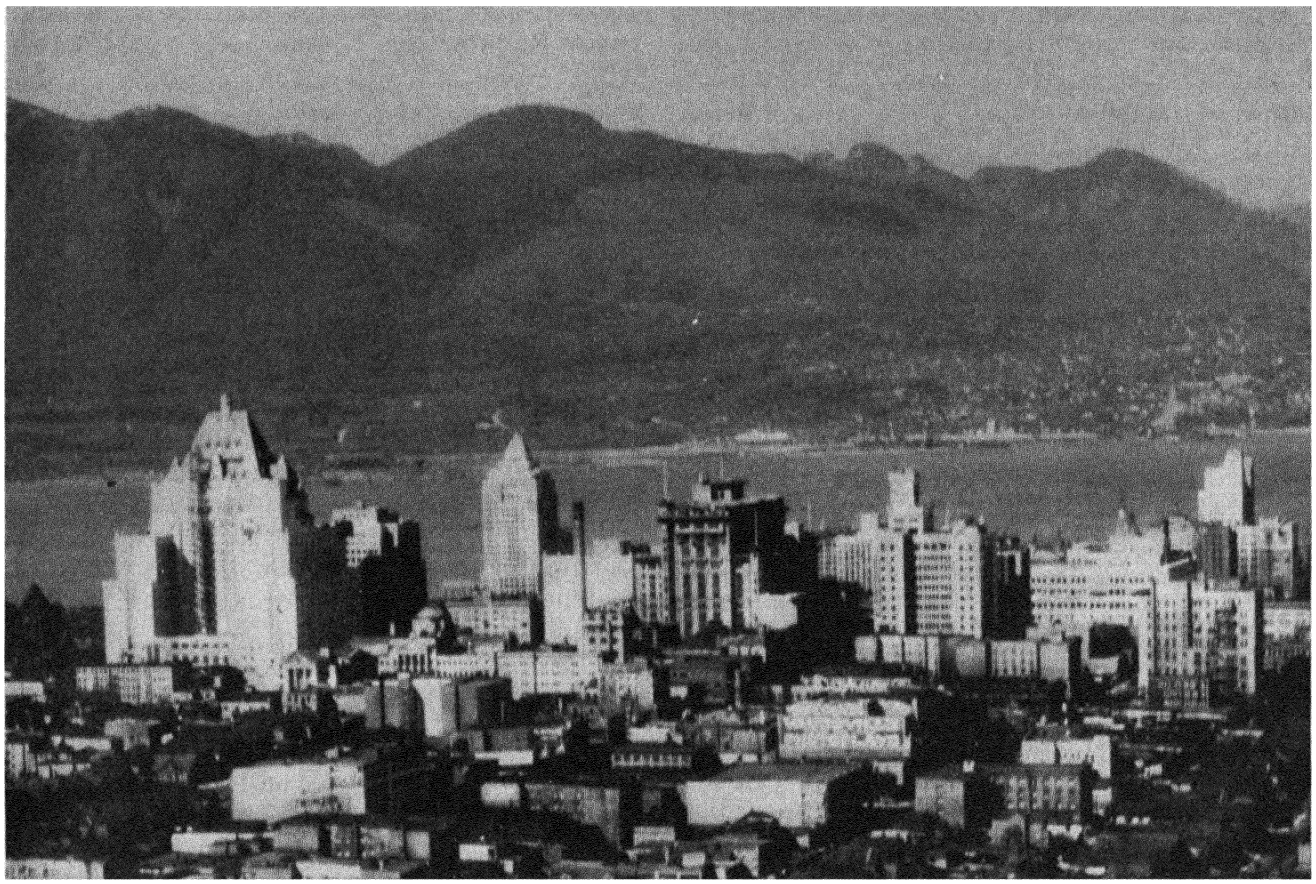


FIG. 75. VANCOUVER. At the southwest corner of Canada, this is the Dominion's leading Pacific port. A part of the city is on the mountain slopes in the distance. (Courtesy United Airlines)

In the Arctic Archipelago the muskox, which feeds on the Arctic flora, is a good beef animal and also produces an annual fleece of wool weighing from 10 to 15 pounds from which good cloth can be made. What can be done to encourage the domestication and further use of this animal? Perhaps muskox cheese might be profitably produced and a demand for reindeer and caribou meat might be developed, thereby making better use of large areas of the Arctic tundra pastures.

Agriculture suited to short growing seasons should be encouraged and increased. Experiments are being made and should be extended in many sections to see what crops can be grown profitably and successfully. The improvement of plants so they can thrive under rigorous climatic conditions is a primary need.

Since trees grow so slowly in the subpolar lands, efforts should be made to conserve the forests and to make better use of them. The thousands of lakes and waterfalls suggest hydroelectric power. What can be done to further the use of this abundant resource?

Mosquitoes and black flies are two of the worst hindrances to human activities, and these pests

must be controlled if man is to exploit successfully these northern lands. Perhaps the use of the new chemical DDT will help to solve this problem.

Other problems confronting the Canadian people include how much of the unused land may be made available and usable to thousands of people who are without homes; how the mineral resources may be conserved and exploited for the benefit of all the people; and how streams and lakes teeming with fish may be used to better advantage.

Transportation and crop diversification are two problems that are receiving much attention in the Great Plains of Canada. The Yukon-Canadian Intermontane section of Canada is a vast region with resources of minerals, forests, agricultural land, water power, and magnificent natural beauty. In many respects it offers large possibilities for future development. When the pressure of population increases in the more densely populated portions of the world, this region will offer homes for many people. At the present stage of land use the terrain is too rugged for extensive highway and railway construction, but, when the demand becomes sufficient, transportation facilities will be developed.

Life in the Far West centers about resources of forests, minerals, and fish. The conservation of these sources of natural wealth and the promotion of shipping and coastal travel are interests that today are receiving considerable attention.

NEWFOUNDLAND AND LABRADOR

Newfoundland, discovered for the British by an Italian (John Cabot) in 1497, is the oldest English colony. The country held dominion status for a while, but, owing to decreasing and fluctuating markets and to financial difficulties, it became necessary in 1935 for the country to return to colonial standing.

Newfoundland is nearly as large as Pennsylvania, but has only 3 per cent as many people. It should be remembered that most of the Labrador peninsula is in the Province of Quebec, and that the colonial section (Labrador), associated with Newfoundland, embraces only the east coastal lands of the peninsula—an area equal to that of Nevada.

Practically all of Newfoundland was glaciated, and a study of the terrain at once betrays this fact. Smoothly rounded, rocky hills; numerous lakes and swamps; and a deeply indented fiord coastline establish beyond doubt the profound activity of the Newfoundland glacier.

Unfortunately, the rugged topography, the thin, acid soils, and the short growing season all are hostile to agricultural activity. The average temperature for the warmest month at St. Johns (July) is below 60° F., and the rainfall ranges from 3.2 inches in May (lowest) to 6.3 inches in January (highest), with an annual total of 56.5 inches (Fig. 8).

Although the land is inhospitable, the sea is rich almost beyond belief. Conditions favorable for the congregating of large numbers and varieties of fish are unsurpassed. The broad continental shelf (Newfoundland Banks); the warm, food-laden waters of the Gulf Stream; the cool Labrador Current; the numerous, sheltered fiords and coves; and an insatiable market have all contributed to the fishing industry of Newfoundland and Labrador.[1] It must not be assumed, however, because fish are plentiful that life is easy. Commercial fishing in the Newfoundland Banks is hazardous work; markets are far away and competition at times is disheartening; and not enough vegetables, fruits, cereals, and animal products can be produced for local use. This condition has led to a search for other types of human activity in which a part of the population may engage. Although much of Newfoundland is forested, the trees are not large and, of course, grow very slowly. However, the forests and the water power have led to a prosperous pulp and paper industry. In Newfoundland it is forbidden by law to export unprocessed pulpwood, for it is essential that the increasing population have employment. Large reserves of iron ore are known to exist in the country, but fuel for smelting is far away. Profitable exploitation of the ores, therefore, awaits the dwindling of reserves in areas of limited supplies.

The leading imports of the colony are flour, clothing, and coal. Fish, fish products, paper, and ores are the chief exports. More than 80 per cent

[1] Adams, John Q., "Settlements of the Northeastern Canadian Arctic," *Geographical Review*, January, 1941, Vol. 31, pp. 112-126.

of the foreign trade is transacted with Canada, the United Kingdom, and the United States.

PEOPLE AND CITIES. Nearly all the people of Newfoundland and Labrador live along the coast, and transportation and communication for the most part adhere to the shoreline. One railroad crosses the island from St. Johns to the west coast touching the north shore on the way, but Labrador is without railroads.

The cities and towns are all small, only one (St. Johns) having more than 25,000 people. All the others are under 10,000. *St. Johns,* the largest city and capital of the crown colony, is almost as old as St. Augustine, Fla. It has a deep, protected harbor, which was used extensively by fishermen, even before the place was permanently settled in 1580. The city grew rapidly during World War II, because it is the last stop in North America for airplanes on their flight to Europe. St. Johns is the eastern terminus of the trans-insular railway, and nearly all foreign trade passes through its port.

LOOKING TO THE FUTURE. It is only 10 hours (2000 miles) by airplane from the Botwood airbase on the north shore of Newfoundland to Foynes on the west coast of Ireland. In this air age Newfoundland's half-way position between Chicago and Ireland has become significant. However, this is one of the very few favorable features in Newfoundland's situation. A dearth of natural land resources, harsh climate, remoteness of markets, and overpopulation combine to portray a gloomy outlook. It seems now that the colony will remain a liability to the mother country for an indefinite period.

DANISH NORTH AMERICA

Greenland

Greenland, the largest island in the world, is about one-fourth the size of the United States, but supports only 6000 people, all of whom live along the southern coast.

Because of the high latitude and high altitude of most of the island, it is so cold that it is completely covered with a vast sheet of ice and snow except along the margin. Crags (nunataks) of solid rock extend through this ice cap in a few widely scattered places. Neither plants nor animals can live in most of Greenland and mining is practically impossible because any minerals that might exist are buried so deeply by the snow and ice that they cannot be reached (Figs. 236 and 237).

The Greenland glacier is similar to the continental ice sheet, which formerly covered much of northern North America and Europe. Icebergs, which are fragments of the great glacier, float southward hundreds of miles from the margin of the island and make transatlantic shipping and travel hazardous, especially in the spring and early summer.

The people who live along the shore garner a precarious living by fishing and the growing of such quick maturing crops as broccoli, spinach, rhubarb, carrots, turnips, and other garden truck.[1] Most of the inhabitants are Eskimos or descendants of early Scandinavian occupants. In 986 A.D. twenty-four ships left Iceland to colonize Greenland. Other settlers followed and there were soon about 200 farms on the Greenland coast. Active trade between Greenland, Iceland, and Norway followed for several centuries. Later, however, interest in Greenland declined because of economic and social disturbances in Europe and in 1410 the last ship sailed for the continent. In 1721 the island was rediscovered by the Danes, to whom it now belongs. The explorer, Donald B. MacMillan, reported finding seams of coal twenty-five feet thick in Ellesmere Land within 9° latitude of the North Pole. The largest cryolite (an aluminum mineral) mine in the world is at Ivigtat on the west Greenland coast. More than a million dollars' worth of the ore was imported by the United States in 1940.

Inasmuch as Greenland has a very inhospitable climate, it is not to be expected that it will ever support a dense population. The hardships associated with such an environment can be endured only by sturdy people who are able to adjust their ways of life to adverse natural conditions. During World War II, the United States undertook to protect Greenland, in return for which Denmark ceded rights to construct air bases and certain essential naval facilities.

[1] Bartlett, Robert A., "Greenland from 1898 to Now," *National Geographic Magazine,* July, 1940, Vol. 78, pp. 111-140.

12

Spanish North America

SPANISH NORTH AMERICA is a triangular area, composed of ten republics, aggregating more than one million square miles (see page 14). The vertex of the triangle in northwestern Mexico is 3000 miles from both San Domingo and Panama, and the latter two countries, the other vertices, are 1000 miles apart. The smallest of the countries (Haiti) is the size of Vermont, and the largest (Mexico) is five times as large as California. In all this vast area Spanish is the spoken and official language. In addition to the ten independent republics (Mexico, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Cuba, Haiti, and San Domingo), there are several small areas belonging to the United States and European countries (Puerto Rico, Virgin Islands, Canal Zone, British Honduras, Jamaica, Barbados, etc.). An understanding of the activities and interests of the peoples of Spanish North America requires some knowledge of the main physical features.

PHYSICAL FEATURES

Land Forms

Several physiographic sections of the United States extend southward into Mexico. In eastern Mexico is the Gulf Coastal Plain (see page 17). The Eastern Sierra Madre is in line with the Rocky Mountains in the United States, although it is not considered part of the Rocky Mountain system (see pages 69 and 70). The mountains of the Peninsula of California are a southward prolongation of the Coast Ranges, and the Western Sierra Madre corresponds in position to the Sierra Nevada and Cascade ranges in the United States (see page 85). The Colorado Delta, Gulf of California, and Sonoran Desert constitute a southward extension of the Southern California Lowlands (see page 69).

In addition to the regions mentioned, three other physiographic regions in Spanish North America need special consideration—namely, the *Mexican Plateau,* the *Central American Highlands,* and the *West Indian Archipelago.*

MEXICAN PLATEAU. The *Mexican Plateau*, extending southeast more than 1000 miles from the middle New Mexico-Arizona boundary to the *Sierra del Sur* south of Mexico City, and lying between the Eastern and the Western Sierra Madre, contains an area about equal to that of Texas and Oklahoma. The plateau is mostly an area of low relief, rimmed by mountains on the east, west, and south, and connected with the Colorado Plateau of the United States on the north. Portions of the interior of the area are ribbed with "irregularly disposed and disconnected mountain ranges, buttes, and isolated ridges which are separated by broad valleys and plains." Many of the basin depressions are the beds of ancient lakes not unlike the fossil lake beds in the Great Basin. The altitude gradually increases from about 4000 feet at the international boundary to 8000 feet in the vicinity of Mexico City. The region, for the most part, resembles a vast plain, the monotony of which is relieved by mountain ridges, mesa edges, and numerous canyons. Southward the features of the plain diminish and mountain ridges become more prominent.

The bedrock is composed chiefly of sedimentary beds of sandstone and limestone which here and there are folded or fractured and tilted. These con-

ditions, together with the arid to semiarid climate, are favorable for the development of mesas and buttes. In the west are some large, flat-topped basaltic areas, whereas volcanic intrusions accentuate the landscape in the east. Basins of interior drainage occur in many places, whereas in other sections streams break through the mountains, especially where rainfall is more plentiful. Many streams cease flowing during the dry season.

much faulting, folding, and displacement of bedrock have occurred.

The *Lowland of Tehuantepec* in southeastern Mexico, extending from the Gulf of Mexico to the Pacific Ocean, and including the isthmus of the same name, is generally accepted as the northern boundary of the Central American Highlands. Extending in a southeasterly direction from this lowland, the highland region, consisting of a series

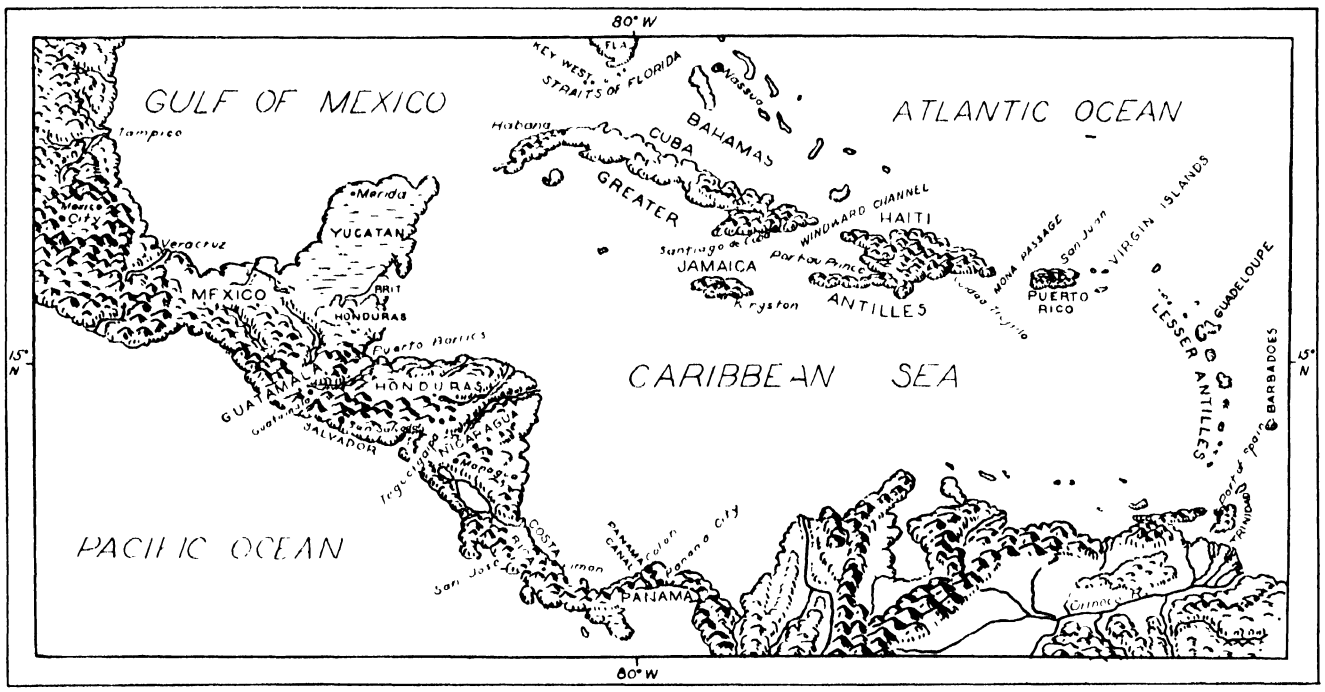


FIG. 76. CENTRAL AMERICA AND THE WEST INDIES. The mountainous surface of the area is suggested by this sketch.

CENTRAL AMERICAN HIGHLANDS. Central America forms a land bridge between two continents. This connecting link between North America and South America together with the West Indies nearly encircles the Caribbean Sea (Fig. 76). Volcanic and earthquake activities associated with lines of weakness in the bedrock characterize the region along the Pacific margin from the Gulf of Tehuantepec nearly to the Isthmus of Panama (Fig. 77). These were important factors in the choice of the Panama rather than the Nicaragua site for the great interoceanic waterway, the Panama Canal. Much of Central America and the West Indies is underlain by sedimentary bedrock of recent origin. Throughout the Caribbean lands of twisted, serrated ranges and valleys, bends its way through seven republics and one crown colony into South America, disappearing on the Pacific coast of Colombia. Narrow coastal plains border the ranges on both the east and the west flanks from the southern boundary of Panama to the region of volcanic peaks in the north, a distance of 1700 miles or more.

Altitudes within the region vary from 500 to more than 10,000 feet. In general, the ranges and flat-topped massifs average about 5000 feet in altitude, whereas a considerable portion of the area is between 1000 and 2000 feet. A number of interrange valleys, some structural and some stream-made, lie at altitudes of approximately 500 feet. In

the highland valleys within the region are numerous lakes.

Throughout the length of the area are transverse depressions formed by streams, which provide natural gateways across the region from the Pacific Ocean to the Caribbean Sea and the Gulf of Mexico. Four passes deserve special mention: (1) The low divide across the *Isthmus of Tehuantepec* which is crossed by a railroad; (2) the gateway from the *Gulf of Honduras* to Guatemala and on to San José on the Pacific Coast, also followed by a railroad; (3) *Lake Nicaragua*, which nearly touches the west coast and drains to the Caribbean Sea by the *San Juan River*, thus affording a natural water route to the interior that some day may be extended into another interoceanic canal; and (4) the *Panama Canal* across the Isthmus in a northwest-southeast direction, combining natural lowlands and *Gatun Lake* to create the canal site.

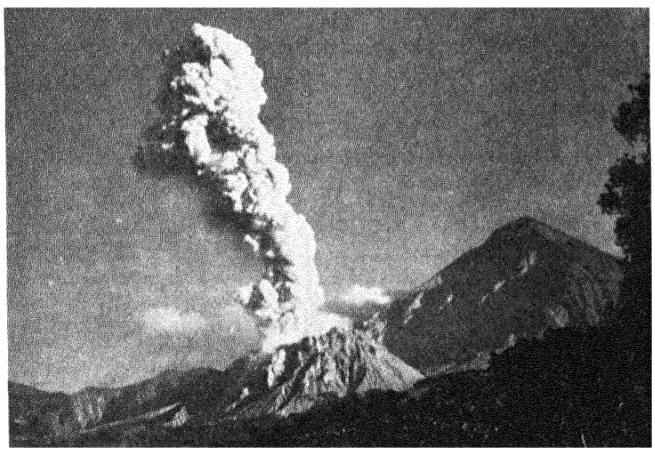


FIG. 77. SANTA MARIA VOLCANO. This volcanic cone in Guatemala is typical of dozens that may be seen in Central America from the new Inter-American Highway. (Courtesy Pan American Union)

The Central American ranges consist mostly of old crystalline rocks with volcanic intrusions here and there; but in some portions lava has covered considerable areas, creating excellent parent material for the development of soils.

WEST INDIAN ARCHIPELAGO. The West Indian Islands, although differing from each other in structure and land forms, nevertheless possess an insular coherence which gives them regional unity. The islands naturally fall into three groups—namely, (1) the *Bahamas*, (2) the *Greater Antilles*, and (3) the *Lesser Antilles*. The three chains converge in the vicinity of Puerto Rico. It is almost as far from the west end of Cuba or of the Bahamas to the farthest extremity of the Lesser Antilles near the Gulf of Venezuela as it is from New York to San Francisco. The islands extend from the 10th to the 27th parallel, a latitudinal distance of nearly 1200 miles—that is, about as far as from New Orleans to Duluth. The Bahama chain reaches from Hispaniola to within 100 miles of the east coast of Florida; and the Lesser Antilles swing in a great arc from Puerto Rico to the Venezuelan Coast. The total land area of the archipelago (100,000 square miles) is about 4000 square miles less than that of Oregon. However, the West Indies contain 11,500,000 people as contrasted with about 1,000,000 in Oregon.

Numerous gateways lead from the Atlantic Ocean to the "American Mediterranean," the name sometimes applied to the combined Gulf and Caribbean waters. Among the many routes through the West Indian Region, three deserve special mention—namely, (1) the *Straits of Florida*, between Florida and Cuba; (2) *Windward Channel* between Cuba and Hispaniola (Haiti); and (3) *Mona Passage* between Hispaniola and Puerto Rico. Each of the three is vitally related to the protection of the great interoceanic gateway, the Panama Canal.

The Bahamas are low coral islands rising above a submarine platform which gradually becomes more deeply submerged southward, and these islands are bordered on all sides by deep sea.

The four Greater Antilles (Cuba, Hispaniola, Puerto Rico, and Jamaica) are mountainous, rising from very deep seas (20,000 feet just south of Cuba) to the highest point in Hispaniola (more than 10,000 feet). Considerable lowland exists in central and western Cuba. Jamaica is on the submarine ridge between Honduras and Hispaniola.

The Lesser Antilles are all small islands, consisting generally of high volcanic peaks or of limestone plateaus, the former occurring in the west and the latter in the eastern chain which includes

the islands of *Guadalupe, Martinique,* and *Barbados.*

Climate, Natural Vegetation, and Soils

Nearly all of Spanish North America has tropical climates, ranging from the always-rainy to the always-dry (Fig. 236). Associated with these varieties of climates are the corresponding phases of natural vegetation and soils.

Mexico has a tropical dry climate on the west coast north of the 20th parallel. The arid phase

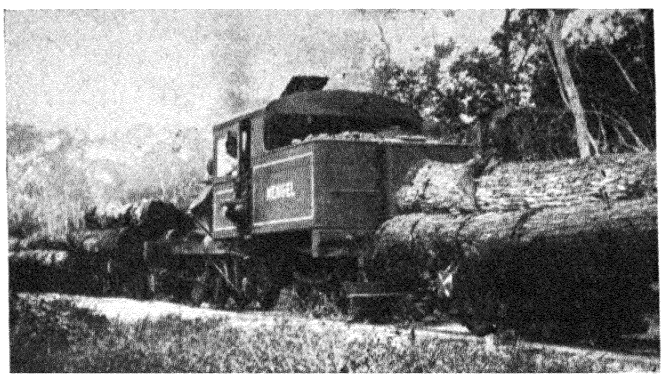


FIG. 78. HAULING MAHOGANY LOGS. Central America is rich in tropical woods such as these in Honduras. (Courtesy Pan American Union)

prevails in northern Mexico, where the annual rainfall usually is below 5 inches. At Mazatlan, Mexico, on the Tropic of Cancer, the average annual rainfall is about 25 inches, most of which falls in summer. On the Mexican Plateau in the same latitude as the Peninsula of California, occur the high altitude phases of the tropical and subtropical dry climates. Most of the rainfall comes in summer, chiefly during July and August. The subtropical high-pressure belt, the high altitude, and the mountain rim surrounding the plateau are chiefly responsible for the low rainfall. At Chihuahua (4890 feet), near the international boundary in the latitude of New Orleans, the average annual rainfall is 24.2 inches, about 19 inches of it falling in July, August, and September. Mexico City (7464 feet), 20° North latitude, receives 23.1 inches, of which about 16 inches fall in June, July, August, and September (Fig. 8). However, these two cities are not representative of the region as a whole because large areas receive only 10 to 15 inches of precipitation and in low latitudes, this amount of rainfall usually means deserts. On account of the high altitude, not much of the plateau is entirely frost-free, not even Mexico City. Winters on the plateau are mild and the summers hot.

The mature soils of the plateau in the higher altitudes near Mexico City belong to the prairie type, whereas in the more arid north, chestnut and gray soils prevail (Fig. 238). The texture of the soils as a rule is sufficiently fine to retain water and produce good crops under irrigation and proper crop management. Most of the Mexican Plateau supports a thorny scrub or scrub woodland vegetation. Savannas or tropical prairies prevail in the south at the higher altitudes (Fig. 235). Some areas, especially in the north, support only a desert vegetation.

The Central American Highlands are in the equatorial belt of low pressure in the summer and during the remainder of the year lie in the northeast trades and consequently have tropical rainy eastern coasts and slopes (Fig. 8). The interior of the region, the inter-range valleys, and the western slopes of the mountains belong chiefly to the tropical wet and dry type—that is, they are dry during the trade wind regime, and receive rainfall when the equatorial low pressure belt migrates northward in June, July, and August. The north central portion, just south of Mexico City, has a tropical semiarid climate (highland phase), with dry winters and some rain in summers (Fig. 236). The location of the Central American region under a tropical sun and the nearness of all portions to large bodies of water combine to give the area an all-year growing season. Four types of natural vegetation cover the Central American Highlands: (1) the tropical rain forests occurring on the eastern coastal plains and slopes (Fig. 78); (2) a strip of savanna grassland with clumps of trees extending through the central portion of the highlands; (3) a semiarid area on the northern tip of the Peninsula of Yucatan, supporting only scrub woodland and short bunch grass; (4) the coastal plain of southern Mexico bordering the Gulf, which is a prairie and steppe region; and (5) the Pacific Coast, which is on the leeward slope most of the year, supporting chiefly savannas and scrub forests (Fig. 237). Generally, where soils are mature, the lateritic, and the red and yellow soils

predominate. There are, however, considerable areas of alluvial material in which a profile has not developed. Young lava soils exist in many portions of the Central American Highlands.

The climates of the West Indian Archipelago are tropical (Fig. 236). Uniform temperatures of approximately 70° F. prevail throughout the islands with the highland areas averaging a few degrees lower. Since the region lies within the northeast trades at all seasons, the north and east coasts are quite rainy and the south and west slopes are arid to semiarid (Fig. 8). Many of the islands receive more than 80 inches of rainfall on their windward slopes. The West Indies are directly in the path of the tropical hurricanes which usually occur in the autumn. These destructive storms as a rule swing in from the east and southeast with great gusto, often taking many lives and destroying much property. Throughout most of the insular chain tropical rain forests predominate on the windward slopes of the larger islands, but on leeward slopes and in lowland areas savannas prevail. The mature soils are lateritic, and the chief parent materials are residual or volcanic on the slopes and alluvial along the coasts and in the valleys. A high degree of fertility in most places is characteristic of the soils in the West Indies.

COUNTRIES OF SPANISH NORTH AMERICA

Seven of the countries of Spanish North America are on the continent, and three are insular. The ten countries, altogether, have an area about one third that of the United States. Would it not be better for them to unite into one large country rather than to maintain the several small, impotent, mutually suspicious groups? In fact, five of the present-day Central American countries (Guatemala, Honduras, El Salvador, Nicaragua, and Costa Rica) were organized into the United Provinces of Central America in 1823, but after a stormy sixteen years they dissolved the union and each declared its independence. No doubt there are numerous factors that help to account for what happened, but two or three seem especially pertinent. First, it should be recognized that a large percentage of the people are primitive Indian stock and that they have intermixed with the volatile, aristocratic Spanish. The population, in general, is composed of a considerable number of Indians, a few Spanish, and a large number of the hybrid mestizos. Second, it is well to remember that Spanish North America is mostly a rugged land, composed of many comparatively small, isolated areas—valleys, plains, plateaus, and islands, similar in some respects to the Balkan area in Europe. Third, there are not enough people to occupy the open spaces among the well-settled areas, which further contributes to isolation. The diversity of activities and interest in this part of America is not the only disturbing factor—the primitive, fitful, and violent characteristics of the people are shown by the internal disturbances that occur so often. Hardly a year passes without its share of small uprisings or revolutions. However, the cooperative spirit is gaining ascendency in Central America and better days may be anticipated for the countries south of the Rio Grande.

Mexico

No other region in North America offers more thrilling and exciting tales of high adventure than does Mexico. In the southern part of the Mexican Plateau, the doughty conquistadors of Spain encountered the ancient Aztecs living in a splendor which, when described to Europeans, was unbelievable. Here Cortez and a handful of men with horses, guns, and armor vanquished an empire that had required many decades to build. In this region, hemmed in by majestic mountains on all sides, an important agricultural state had been built before Columbus set sail.[1] They had few domesticated animals, but entirely through human energy large areas of irrigated land produced abundantly. It required but a few years, however, for the Spanish conquerors to take possession of the lands, to enslave the population, to build estates with thousands of peons, and to open mines which sent the galleons home to Spain loaded with silver, gold, and other minerals.

In the first quarter of the nineteenth century Mexico gained independence from Spain after a bloody insurrection, and since that time, political

[1] Stirling, Matthew W., "Expedition Unearths Buried Masterpieces of Carved Jade," *National Geographic Magazine*, September, 1941, Vol. 80, pp. 277-327.

upheaval has been the rule. In the latter part of the same century, Napoleon III attempted to build an empire here but was unsuccessful. The twentieth century has witnessed a rapid development of the mineral wealth of lead, silver, and copper, and more significantly, petroleum, the magic liquid mineral so vital today.

The aridity of much of Mexico precludes the possibility of intensive use of the land for agriculture. Much of the area is too dry for farming ex-

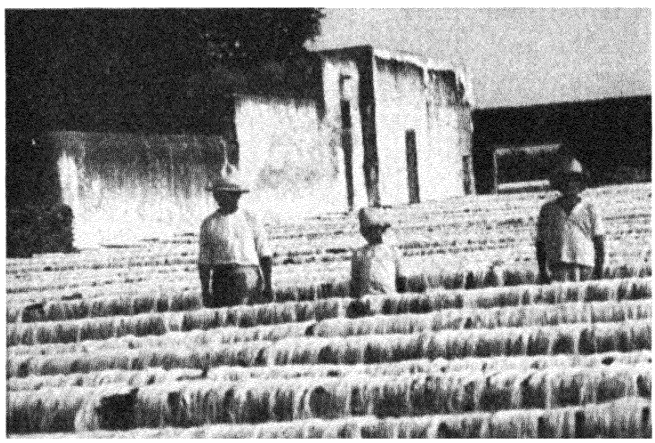


FIG. 79. SISAL HARVEST IN CENTRAL AMERICA. On the Coastal Plain only sixteen degrees from the equator. (Courtesy Pan American Airways)

cept in restricted areas where irrigation is possible. On these lands cotton is grown, but only as a cash crop and very little for domestic use. If pumping of ground water were resorted to, more land could be irrigated.[1] In the eastern part of the plateau near Saltillo, considerable areas of wheat are grown by dry-farming methods.

Large sections are fit only for grazing, and support great herds of cattle, sheep, and goats. Corn and beans are grown chiefly as subsistence crops. *Tortillas* (corn cakes), onions, and fried beans constitute the main articles of diet for the peons. *Pulque,* a popular alcoholic beverage, is made from a species of the century plant.

The Mexican Plateau is rich in minerals. Arizona, the leading copper-mining state of our country, is partly in this region. Rich silver, gold, copper, and zinc mines were being worked in the Mexican Plateau when Plymouth, New York City, and Philadelphia were young. The minerals are secured chiefly from the old mountains that are nearly buried in volcanic or in lake deposits. The plateau is still rich in minerals and awaits only more capital and modern methods for the rejuvenation of the mining industry.

In the Sonoran Desert, west of the Western Sierra Madre and around the Gulf of California, a little cotton, wheat, and subsistence crops of corn and beans are grown, but only by irrigation. Although conditions improve farther south because of more rainfall, there are still immense areas of unused land.

Along the Gulf Coast and in Yucatan are the best agricultural lands in Mexico. The soils are rich, the rainfall plentiful and quite evenly distributed through the year, and much of the land is level to rolling. Corn is the chief crop in the north, but southward from Vera Cruz rice, sugar cane, tobacco, and bananas become increasingly important.[2] Cabinet woods from the forests are receiving considerable attention (Fig. 78). In Yucatan two crops have attained special significance—chicle and henequen. The former is the chief ingredient of chewing gum, and the latter is used in the United States in the manufacture of cheap cordage, especially binding twine for grains.[3] Mexico has a near monopoly on henequen fiber (Fig. 79).

Mexico has nearly 16,000 miles of railroads, the plateau sections being served best, although one line follows close to the west coast from the United States to Mexico City and thence to the southern boundary of the country. Highway improvement is receiving considerable attention. Notable in particular is the Inter-American Highway southward from Laredo, Tex., now completed to Oaxica, south of Mexico City. The country has nearly 10,000 miles of all-weather roads.

[1] Platt, Robert S., "Magdalena Alipac: A Pueblo in the Central Plateau," *Latin America—Countrysides and United Regions,* McGraw-Hill Book Company, New York, 1942, pp. 30-51.

[2] Lemert, Ben F., and Lemert, Rose V., "Mexico: Rural Life in the Northeastern Coastal Plain," *Journal of Geography,* November, 1935, Vol. 34, pp. 318-334.

[3] White, C. Langdon, and Foscus, Edwin J., "Henequen: The Green Gold of Yucatan," *Journal of Geography,* April, 1939, Vol. 38, pp. 151-155.

Mexico's foreign trade is relatively low—only about $12 per capita. The leading exports are metals (silver, gold, lead, zinc, and copper), petroleum, henequen, and chicle; and the imports include automobiles, trucks, machinery, textiles, radios, and newsprint. Mexico's global trade in 1939 was chiefly with the United States, Belgium, France, and Germany (Fig. 72).

Cities of Mexico. The Mexican Plateau contains only two cities with more than 100,000 people. *Mexico City,* at the southern margin of the plateau, 7415 feet above sea level, is on a small elevation on the northwest part of a large lacustrine plain in what is known as the valley of Mexico. The city, three miles from the west shore of brackish *Lake Texcoco,* is hemmed in by mountains on all sides. Mexico City is the leading industrial, commercial, and educational center in Mexico. Plainly visible in the distance are several snow-capped volcanic peaks, among which are *Popocatepetl* and *Ixtaccihuatl,* southeast of the city. *Aguascalientes,* meaning hot springs, is an important manufacturing and trading center. *Chihuahua,* in a beautiful valley, is hemmed in on three sides by the Western Sierra Madre. *San Luis Potosi,* at the head of the Rio Verde valley, has a cool climate and is an important trade and manufacturing center.

Mazatlan, on a small peninsula jutting into the Gulf of California, is a city of some importance on the Mexican west coast. The Southern Pacific Railway of Mexico runs along the arid coast from the United States to Mazatlan and on to Mexico City.

Tampico and *Vera Cruz,* on the east coast of Mexico, are seaports—the former, the principal oil receiving and exporting city in Mexico. Pipe lines extending to Tampico can transport 1,200,000 barrels daily. Tampico's manufactured products include boats, oil-well equipment, clothing, and fruit preserves. Vera Cruz, formerly known as the "City of the Dead" because of widespread epidemics, is located on the *Bay of Campeche* about 200 miles east of Mexico City. The city has excellent steamship service with foreign countries and four railroads connect it with the interior. Considerable quantities of ore, chicle, dyewoods, and hides are exported.

Looking to the Future. Several problems loom large on the Mexican horizon: (1) how to exploit the mineral resources of the country so that more people may share in the profits; (2) how to organize ownership and direction of the agricultural land so that economic security may be enjoyed by more of the population; (3) how more of Mexico's tens of millions of virgin acres can be brought under cultivation by use of improved methods of farming; (4) how shifts in area of corn production and increased attention to livestock can help the Mexican people; (5) how the inertia of traditional methods of work and ways of life may be overcome so that accelerated progress may be anticipated; and (6) how methods of transportation both by land and air may be improved.

Central American Countries

A rich lore of exciting enterprise is associated with the exploration and settlement of Central America. Here Balboa first sighted the Pacific Ocean; here the doughty pirate, Sir Henry Morgan, plied his infamous business; here others, including Columbus, Ponce de Leon, Cortez, Pizarro—to mention but a few of the outstanding figures—found their ways along the coast in small sailing vessels seeking gold, the "fountain of youth," or any other marvels or treasures which the new world might yield; and all this happened even before the coast of the United States was settled.

During the early part of the nineteenth century, the colonies of Central America broke away from decadent Spain and established republics. Ill-advised and often bloody insurrections in nearly all of the countries thus formed have been common for the past 100 years. At the turn of the century, Spanish political power in the New World came to an end and since then the activities of the Central American countries have been guided largely through cooperation with and some coercion by the United States. For a number of years the diplomacy of some of the Central American countries has been subject to supervision by the United States and at times the customs unions have been taken over by the northern neighbor in order to adjust certain financial difficulties.

Three racial elements, the Spanish, the Indian,

and the Negro, have combined to produce the dominant strains of people. When the Spanish came, the Indians were occupying the region. Later Negroes were imported from the West Indies and Africa to work on the estates. There are six independent countries in Central America, each of which deserves a brief discussion.[1]

GUATEMALA. Guatemala is more truly an Indian country than any other nation in Central America, more than 50 per cent of its people being pure Indian stock. There is still plenty of room for

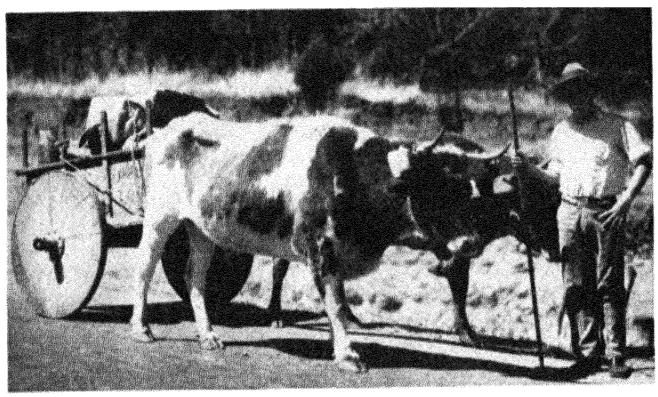


FIG. 80. OXCART TRANSPORTATION. Much of the transportation in Central America is just as primitive as this scene in Guatemala. (Courtesy Pan American Airways)

pioneering in Guatemala, since a large part of the country is yet free land (Fig. 80). Commercial crops are grown on only 40 per cent of all the land under cultivation, whereas the remainder is devoted to the production of subsistence crops such as corn, wheat, rice, and potatoes; and to the rearing of domesticated animals, among which are cattle, hogs, goats, and chickens. On some of the low coastal lands are large banana plantations, especially in the valley of the Motagua River back of Puerto Barrios and on the west slope south of the capital. Of all the cultivated areas, however, only 5 per cent produce bananas. In the middle altitudes are the highly prized coffee lands—20 per cent of the cultivated sections of the country producing this crop. On the highlands wheat and potatoes are grown (Fig. 81).

During World War II, the banana industry suffered two severe jolts. First, there was a shortage of shipping facilities, and second, copper sulphate was not available to control the banana blight. However, many of the plantation laborers were given work on the Pan-American Highway.[2]

Guatemala, stretching from the Atlantic Ocean to the Pacific, is mostly a rugged country, not quite as large as Arkansas, but with nearly twice as many people. The lowlands are very warm and for this reason most of the people live in the higher altitudes. Bananas, coffee, and chicle are the chief products entering into foreign trade, most of which has been with the United States, Germany, and the United Kingdom (Fig. 82).

Guatemala, capital of the country, is the largest and most important city in Central America. Lying at an altitude of nearly 5000 feet and surrounded, except for one side, by deep gullies, the city is laid out in gridiron fashion, the typical pattern of Hispanic-American cities. Nearly all the commerce and trade of the country heads in the capital. Guatemala has rail connections with *Puerto Barrios*, an important banana port on the Caribbean coast.

HONDURAS. Although Honduras is nearly as large as Guatemala it has only one third as many people. The chief centers of population are in the highlands in the southwest, the east and north being lower, thinly populated, and far from the centers of governmental control. The percentage of Indians has always been very low (less than 3 per cent now), but there is a considerable number of Negroes on the north coast, imported to work on the banana plantations. These Negroes were in dire straits when World War II and the banana blight nearly wiped out the banana industry. Many, therefore, were repatriated.

As in Guatemala, a large percentage of the cultivated land is devoted to subsistence crops, but bananas, coffee, and coconuts are grown for trade, the first accounting for more than two thirds of the exports. Honduras has 800 miles of railroads, and 600 miles of motor roads, both serving for the most part the banana plantations. In normal times

[1] Platt, Robert S., "Central American Traverse," *Latin America*, McGraw-Hill Book Company, New York, 1942, pp. 80-89.

[2] Atwood, Wallace W., "Highways and Byways of Guatemala," *Journal of Geography*, October, 1933, Vol. 32, pp. 265-278.

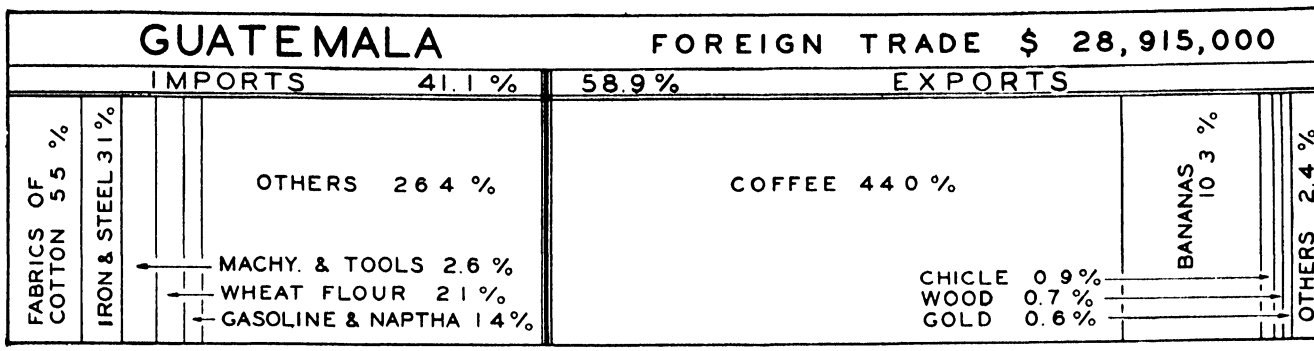


FIG. 81. GUATEMALA'S FOREIGN TRADE. An 8-year average just prior to World War II. (See also Fig. 82.) (From *Statesman's Yearbook*)

the global trade of the country is mostly with the United States, Germany, and Japan (Fig. 83).

Tegucigalpa, a highland city of nearly 60,000 inhabitants, has a beautiful valley setting and a delightful climate, but it has no railroad. Several small cities on the northern coast serve principally the banana industry. The cities in the highland and on the leeward slope, other than the capital, are all small.

EL SALVADOR. Quite in contrast to the other countries of Central America, nearly all the people of El Salvador live in a unit area. This, together with the occasional encroachments of their near neighbors, has kept the national spirit of the people running high. Not only is El Salvador the smallest country on the American continents, but it is one of the most densely populated, and has about 80 per cent of its area under cultivation. The one commercial crop of importance is coffee, although corn as a subsistence crop occupies a much larger acreage. There are a number of large coffee estates in El Salvador, but the country's real achievement lies in the fact that most of the holdings are comparatively small, averaging only about 20 acres per coffee orchard. It is evident, therefore, that the wealth of the country is more widely distributed than it is where the productive enterprises are centered on large plantations, and the capital furnished by a few people, or perhaps by foreign investors.

Grains, textiles, and machinery are the chief imports; coffee constitutes about 90 per cent of the exports. El Salvador's best customers are the United States, Germany, the United Kingdom, France, and Norway.

San Salvador, located thirty miles inland from the Pacific in a picturesque valley, is the capital of El Salvador. It has railroad connections with the chief cities of the home country, with Guatemala, and with the Pacific and the Caribbean coasts.

NICARAGUA. Nicaragua, the largest of the Central American countries, is about the size of Geor-

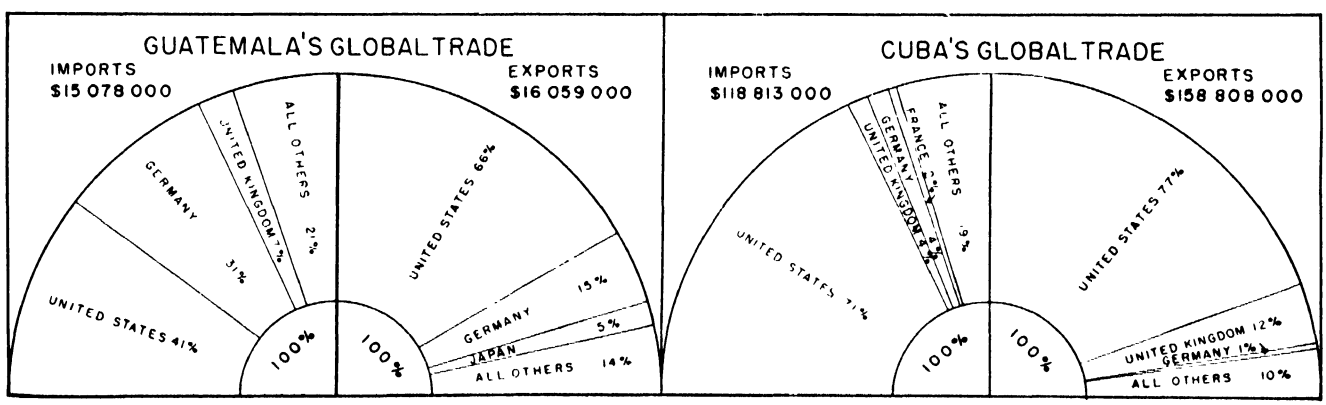


FIG. 82. GLOBAL TRADE OF GUATEMALA AND CUBA. These two countries do not enjoy broad trade intercourse. Figs. 81, 85, and 86 furnish good clues to the reasons why. (From *Foreign Commerce Yearbook*)

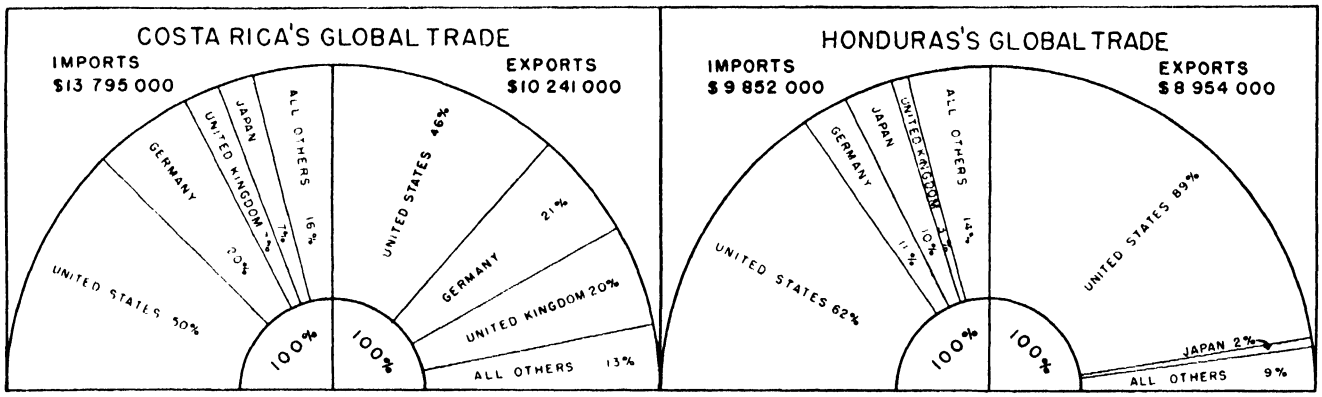


FIG. 83. GLOBAL TRADE OF HONDURAS AND COSTA RICA. The trade of these two countries is dominated by United States, United Kingdom, and Germany. Bananas and coffee are the chief exports. (From *Foreign Commerce Yearbook*)

gia, but it has only one third as many people. Although the country does a little manufacturing, it has an unusually large urban population for a Central American country—perhaps as much as 25 per cent. Nicaragua is a country of social and economic turbulence, and this may account, at least in part, for the hazards of rural life.

Northern Nicaragua is mountainous and is covered largely by coniferous forest. The windward slope of the mountains gradually becomes a stream-incised hill country that slopes to the eastern coastal plain, an area covered by tropical rain forests. The mountains, hilly country, and eastern plains are thinly populated.

The really significant section of the country is the *Nicaragua Lowland* which is a long, narrow, structural depression, running across Central America. Within the lowland are two large lakes, *Nicaragua* and *Managua*. The Nicaragua Lowland, together with its two lakes and *San Juan River*, afford a possible site for an interoceanic canal that might rival the Panama Canal.

Most of the people of Nicaragua live west of the two lakes, centering about the two rival cities of *Leon* and *Granada*. So bitter was the hostility between these two agglomerations that a third city, Managua, had to be chosen for the capital.

The forests of Nicaragua are rich in tropical woods that for the most part await intelligent development. The commercial and subsistence crops of the country and the foreign trade follow the general pattern of the Central American countries already discussed (Fig. 7).

The Nicaraguan section of the Pan-American Highway is nearly completed. There is now a good highway connecting the east and west coasts. The only railway (Government-owned) is near the west coast. *Managua*, the capital on the shore of Lake Managua, is the only city with more than 100,000 people, although there are numerous small cities and towns in the northern part of the Nicaragua Lowland. These cities have access to world trade through their Pacific port of *Corinto*. *Bluefields* is the banana port on the east coast.

COSTA RICA ("Rich Coast"). Costa Rica, a little country only half as large as Mississippi, has a rugged, mountainous backbone that fairly bristles with volcanoes. In the center of the country is a high structural basin (3000 to 4000 feet in altitude), lying between the main mountain ridge and four large coalescing volcanoes located 20 miles to the northeast. This basin is the cultural, economic, and political heartland of Costa Rica. The mild climate, the ample rainfall, and the rich, volcanic soils are excellent for the growing of coffee—an industry initiated into Central America more than 100 years ago by the Costa Ricans. This plateau coffee country is a land of small farmers, cooperating in a democratic enterprise that sets a pattern not surpassed in all America. The less densely populated Pacific slope lands are utilized extensively in the livestock industry, looking chiefly to the highland coffee country for markets. The wet, eastern coastal lands are utilized to some extent in the growing of bananas on large plantations by the use of Negro laborers from Jamaica.

At present, Costa Rica is experimenting in the growing of rubber trees and abacá (Manila hemp).

The upland basin is connected by rail with *Puntarenas* on the Pacific Coast and with *Limon* on the Caribbean Sea. Three fourths of the people of the country live on the central plateau, and 90 per cent of these are unmixed whites. On the west slope more than half of the people are mestizos, and on the east coast they are mostly Negroes. Coffee constitutes almost half of the exports of Costa Rica, and bananas and cacao rank second and third, respectively. The United States, United Kingdom, and Germany have been the country's best customers (Fig. 83).

San José on the plateau is the capital with a population of about 75,000. All other towns are small (less than 10,000).

PANAMA. The Spanish spent more than 20 years exploring in and about the Caribbean Sea before Balboa, as good luck would have it, climbed to the continental divide and peered into the great western sea—the first white man to see the eastern shore of the Pacific Ocean. No wonder explorers, navigators, and statesmen dreamed of a water route through this barrier for 400 years before the dream became a reality on August 3, 1914, when the first ship passed through the Panama Canal.

Panama, a little country half as big as Missouri, is nearly 500 miles long, and throughout most of its length about 50 miles wide. The country in general is S-shaped, and extends in an east-west direction. It is ribbed throughout its entire length with disconnected mountain ridges, geologically quite unstable.

The country, formerly a neglected appendage of Colombia, achieved independence in 1904. From the beginning the fortunes of Panama have been intimately associated with the construction and operation of the Panama Canal which is owned and controlled by the United States. One fourth of the people live in the two cities, *Panama* and *Colon,* at the west and east ends of the canal, respectively. The world-wide interest in the canal, therefore, gives these two nuclei of population a cosmopolitan air.

Few people live on the Caribbean or windward slope of the country, but there are several areas of concentration on the Pacific slope where corn, coconuts, and sugar cane are grown, and where grazing receives considerable attention.[1] Banana plantations worked by imported Negroes are important on the Caribbean coast. The United States is the chief market for the fruit.

Panama is severed by the Panama Canal, and the strip of land (20 miles wide) bordering the waterway belongs to the United States. In general, highways are few and poor, although the Pan-

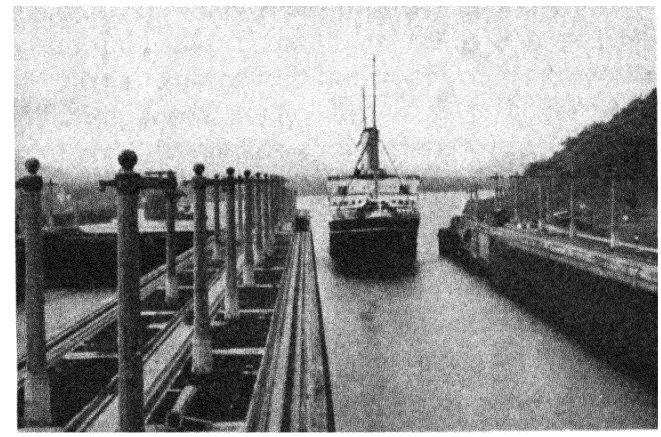


FIG. 84. MIRAFLORES LOCKS. One of several locks that is used in raising ocean-going vessels from sea level to Gatun Lake. This is a part of Panama Canal, one of the great inter-ocean gateways. (Courtesy Canadian Pacific Railways)

American Highway, if and when completed, should give the country a new birth.

It is appropriate that something be said here about one of the world's greatest artificial waterways. The world famous Panama Canal is a theater of trade and commerce all through the year—vessels from all parts of the world shuttling through its locks. The west coast of South America has connections with Europe and the east coast of North America by this route; coastwise trade between the east and west coasts of North America is conducted through the Panama Canal; and several great steamship lines of Europe connect with the Far East and the South Sea Islands by way of this interoceanic gateway (Fig. 84).

The people of Panama outside the three or four largest cities are chiefly mestizo, only a small group

[1] Marden, Luis, "Panama, Bridge of the World," *National Geographic Magazine*, November, 1941, Vol. 80, pp. 591-630. A panorama of pictures of the Canal and vicinity.

of the land-owner class being of pure or nearly pure Spanish ancestry. *Panama*, the capital of Panama, is the Pacific terminus of the Panama Canal. The site, a rocky peninsula jutting into the bay, was chosen by the Spaniards in 1519; they fortified the city and built many beautiful buildings and churches. The city was destroyed in 1671 by the buccaneer, Sir Henry Morgan, and, when rebuilt, the site was moved 5 miles west. Situated on one of the world's finest interoceanic gateways, Panama has communication with the whole world through its port of *Balboa*, the American administrative center for the operation of the Panama Canal.

Colon, a busy tourist center about 50 miles northwest of Panama, is in the Canal Zone near the Atlantic terminus of the Panama Canal. Its streets are lined with shops owned by peoples of many lands. Sanitary measures have brought disease under control so that Colon is now one of the cleanest and healthiest tropical cities in the world. Not only is it connected by water with Panama, but also by rail.

THE CENTRAL AMERICAN OUTLOOK. For centuries the development of the natural resources of Central America has depended upon imported capital and initiative. This reliance upon the outside for leadership is one of the principal problems of the people. An improved educational program would contribute much to instilling people with a pride in their natural heritage and a spirit of cooperation and responsibility.

Great strides have been made in the improvement of health and sanitation, but these problems are far from solved. Malaria is the chief health hazard, and until this menace is brought under control, health standards will be low.

Efficient production of more of the tropical products of the region would raise the standards of living for many of the people. Nearness to the northern markets opens vistas of achievement which the people of Central America might well take into account when planning for the future. This region has numerous scenic features which, if more accessible, would attract many tourists, but the promotion of such enterprises awaits the construction and improvement of roads, airports, and tourist accommodations.[1] One of the perils that continually besets the western coast is the frequent destructive earthquakes. What do we know about earthquakes in relation to building construction that might mitigate the terror and destruction accompanying these crustal disturbances?

West Indian Countries and Dependencies

Since their discovery in 1492 by Columbus, the West Indies have been the pawns of the great powers of the world. For 400 years white men have dominated the islands, colonizing, governing, and controlling trade. To be sure, the islands have not always been under the control of one nation. Spain ruled the region for nearly 150 years after its discovery, but the rising commercial and sea strength of the young, vigorous nations of France, England, and the Netherlands proved to be too much. Gradually the power and glory of the Spanish Empire vanished before the continued onslaughts of the privateers of the French, Dutch, and English, until by 1700 the Spanish monopoly of the West Indies was practically destroyed. Each of the newcomers established colonies.

Finally in 1898, the last vestige of Spanish control in the New World was broken by the United States when, after the Spanish-American War, Spain granted independence to Cuba and ceded Puerto Rico to the United States. Since the purchase of the Virgin Islands in 1917 by the United States from Denmark, the pattern of control of the West Indies has not changed. The four commercial powers—the United States, the Netherlands, France and England—control the colonies of the West Indies (Fig. 5). There are, however, three independent countries—namely, Cuba, the Dominican Republic, and Haiti. Several times in the past 30 years the United States has intervened in the political activities in the islands in an attempt to establish order and to maintain stable governments in the three republics. Today the destinies of the people of the independent coun-

[1] James, Edward W., "The Inter-American Highway," *Journal of Geography*, May, 1945, Vol. 44, pp. 182-192.

tries of the West Indies are almost irrevocably linked with the United States.

THE BAHAMA ISLANDS AND BERMUDA. The Bahama Islands and Bermuda are crown colonies of England. Of the three hundred or more small islands only twenty are inhabited. One third of the total population of nearly 60,000 lives on New Providence Island. *Nassau,* the only large city in the islands (about 20,000 people) is a center for tourists, winter resorts, and the small commerce of the islands. The exports of the Bahamas are sponges and sisal (henequen fiber), but subsistence crops of corn, vegetables, sugar cane, and fruits are grown in sufficient quantities to satisfy local demands.

Bermuda also is a center for smart resorts. This portion of the West Indies has become a popular midwinter rendezvous for those in the United States who can afford yachts and cruises. The devotees of angling find the waters around Bermuda and the Bahamas teeming with large fish such as shark, swordfish, and barracuda. Water for drinking purposes is secured mostly from rain water stored in cisterns. Bermuda retains its quaint uniqueness and only recently have motor vehicles been permitted on the islands.

THE GREATER ANTILLES. The Greater Antilles, consisting mainly of four large islands, are by far the most important part of the West Indies. The republic of Haiti and the Dominican Republic occupy Hispaniola; Jamaica is a colony of England; Puerto Rico is a dependency of the United States; and Cuba, the largest island of the West Indies, is a republic (Fig. 85).

Throughout the entire Greater Antilles a range of mountains extends east-west, at times lofty and jagged, at others subdued, as in Cuba, to a mere line of hills. These mountains have a tremendous effect on the rainfall of the islands because they lie across the track of the northeast trade winds. For this reason the north and east coasts and slopes are wet and the south and west slopes and coasts are dry.

Although the area of Cuba is only a little more than 44,000 square miles, it has more than 4,000,000 inhabitants. It lies about 200 miles directly south of Florida. The topography of Cuba, about 60 per cent of which is flat to rolling, is much less rugged than that of the other islands of the Greater Antilles. The most uneven portions are in the southeast, where altitudes in the *Sierra Maestra Range* exceed 7500 feet. In the central and western parts are smaller areas of less rugged relief than that in the east. As far as topography is concerned, modern farm machinery can be used on practically all of the plains area and on about 50 per cent of the more rugged lands.

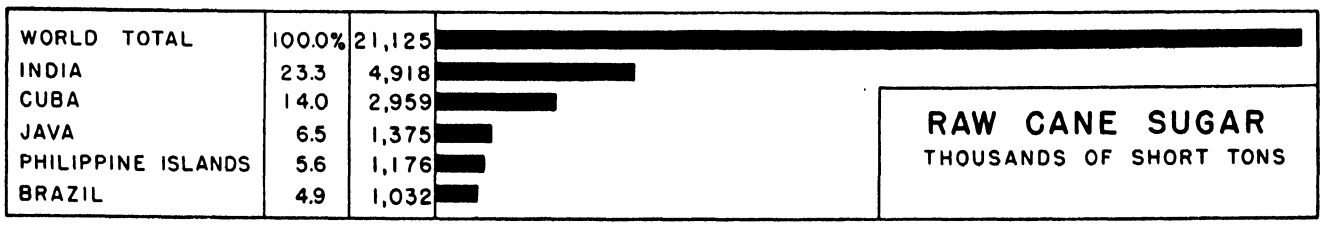


FIG. 85. WORLD'S CANE SUGAR PRODUCTION. A 5-year average including 1938. (From *Foreign Commerce Yearbook*)

The topography in *Jamaica, Hispaniola,* and *Puerto Rico* is much more rugged than in Cuba and the plains areas are much more limited. In the Dominican Republic is a central rough upland, the *Cibao Mountains,* in which altitudes exceed 10,000 feet, but the eastern part is mostly a plains area. The southern part of Puerto Rico is an upland, whereas the western and northern sections contain some lowlands.

For more than 300 years tropical estate agriculture has been practiced in the Greater Antilles. During the Spanish regime, slaves were imported from Africa to Cuba, Jamaica, and Puerto Rico; under the direction of the white overseers, they produced abundant crops of sugar cane. In the early famous three-cornered trade between Africa, New England, and the West Indies—trade which

dealt in slaves, molasses, and rum—the merchants of New England furnished the ships, Africa the slaves, and the West Indies the sugar cane molasses and rum.

Today the principal agricultural product in these large islands continues to be sugar. Cuba ranks second in the world as a producer of cane sugar, being outranked only by British India. Raw sugar and other derivatives of sugar account for most of the exports of the region.[1]

Another important export of the Greater Antilles is coffee, the Republic of Haiti being the leading exporter. However, each of the other islands produces some coffee, that of Jamaica having exceptionally high quality.

Tobacco is grown in considerable quantities throughout the islands. Cuba has developed a fine leaf tobacco which is used especially for cigar wrappers. Havana cigars are well known for their fine flavor, and find a ready market in the United States and Europe. Millions of pounds of leaf tobacco as well as cigars are exported annually from Cuba (Fig. 82).

Other commercial products are cacao, bananas, citrus fruits, henequen, and tropical woods, such as mahogany, cedar, gumwood, and dyewoods. Coconuts and coconut by-products are exported from Jamaica and Puerto Rico.

Throughout the islands tropical subsistence crops of corn, yams, cassava, rice, beans, and other vegetables and fruits are raised by the natives.

[1] Platt, Robert S., "Mariel, A Sugar District in Cuba," *Latin America*, McGraw-Hill Book Company, New York, 1942, pp. 124-135. A detailed description of a sugar plantation.

Manufacturing industries are, for the most part, associated with agricultural raw materials, such as sugar, cacao, and tobacco. Rum and granulated sugar are produced from sugar cane molasses, and the cacao bean yields chocolate, cocoa, and cocoa butter. Cigars (usually hand made) and cigarettes are manufactured in almost every city of the islands.

Transportation and Urban Centers. Most of the trade and commerce of the West Indies is associated with a few large coastal cities. Railroads are limited to one or two main lines through each of the large islands. Spurs from the main lines connect the estates with the coastal cities. Cuba has the best network of railroads, while Hispaniola has only an antiquated transportation system to serve the people. The railroads of Jamaica run through the interior, but those of Puerto Rico are near the coast and parallel to it. On each island one or two large cities dominate the culture, trade, and government.

Habana, capital and commercial metropolis of Cuba, lies on the northern coast of the island a little over a hundred miles south of Key West, Fla. The harbor is one of the finest in the entire Caribbean region, and to it come ships from every port of the world. Not only does the city have steamship connections but also airplane service with the United States, South America, and Central America. Habana is the principal exporting center for sugar and other tropical Cuban products (Fig. 86).

During the colonial period Habana was the object of attacks by French, English, and Dutch privateers. As one approaches the city he sees the

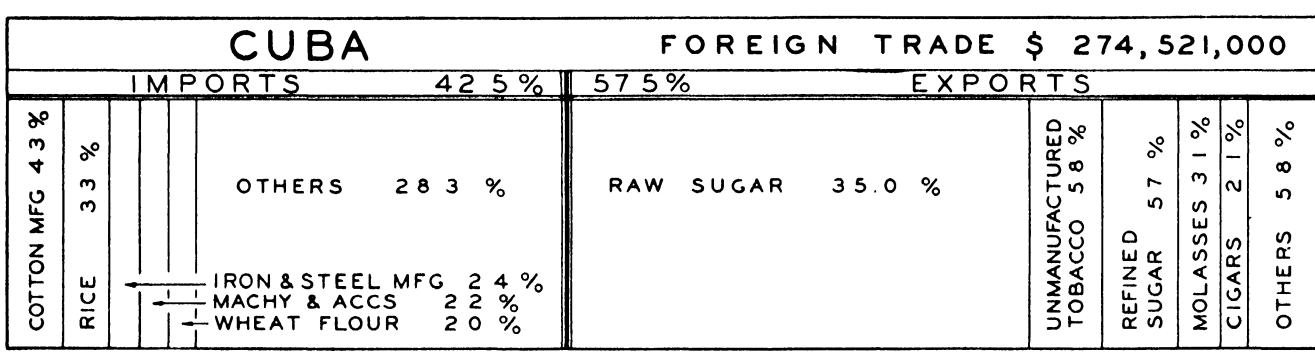


FIG. 86. CUBA'S FOREIGN TRADE. A 10-year average just prior to World War II. (See also Fig. 82.) (From *Statesman's Yearbook*)

ancient defenses of Morro Castle and the Punta, ghost features of three centuries ago, but which have little value for protection today.

Modern schools, universities, libraries, and churches combined with political headquarters, banking, and business have made the city the cultural and economic center of the West Indies. Thousands of tourists are attracted to Habana every year, and it has become a winter resort of the first order for people from Europe, the United States, and other countries.

Santiago de Cuba, second city of Cuba, is situated on a magnificent landlocked bay about 6 miles inland. The prosperity of the city depends upon the manganese, iron, and copper mines near by, and the rich agricultural hinterland which produces tobacco, coffee, cacao, sugar, and tropical woods.

The capital and chief port of Jamaica is *Kingston,* located on a landlocked bay on the southern side of the island.

Port-au-Prince, on the eastern coast of Haiti, is the capital and chief trade center of Haiti. The principal exports are coffee, cacao, tropical fruits, and timber.

Ciudad Trujillo (Santo Domingo), on the south coast of the island, is the capital and chief city of the Dominican Republic. A fine agricultural hinterland, producing cacao, sugar cane, and coffee, accounts for the growth of the city. It was visited by a devastating earthquake in August, 1946.

The capital of Puerto Rico, *San Juan,* is one of the most important commercial ports of the West Indies. The site, an island near the north coast of Puerto Rico, is connected to the mainland by a bridge. The harbor, one of the best and most commodious in the West Indies, is protected by an almost landlocked bay with a narrow entrance from the Atlantic. More than 200 vessels per year enter and clear the port of San Juan.

THE LESSER ANTILLES. The Lesser Antilles, which include the Leeward Islands and the Windward Islands, lie in the form of an arc from Puerto Rico to the Isle of Trinidad near the mouth of the Orinoco. Four countries—Britain, France, Holland, and the United States—have colonies in this portion of the West Indies. Many of the islands are of volcanic origin, while others, including Barbados and Trinidad, are of coral and sedimentary origin. These islands are in the northeast trade winds during most of the year, and at this time the windward slopes of the more rugged islands receive much rainfall, whereas the leeward slopes are dry. However, the northward migration of the equatorial calms brings considerable rain to all areas—to the low-lying, sedimentary islands as well as to the ones of greater relief.



FIG. 87. GOING TO MARKET. A scene in St Thomas, one of the Virgin Islands. The boxes formerly contained cans of kerosene. (Courtesy U. S. Department of Interior)

The principal crop of the Lesser Antilles is sugar cane. After the cane is processed into raw sugar, rum, and molasses by antiquated machinery, the products are shipped as a rule to the country which controls the island.

At present the islands of *Granada, St. Lucia,* and *Tobago* do not specialize in sugar production, but emphasize the growing of cacao. *Curaçao* and *Aruba,* which make use of Venezuelan oil, have some of the largest oil refineries in the world. The Virgin Islands, owned by the United States, help to guard important gateways leading from the Atlantic Ocean to the Caribbean Sea and the Panama Canal (Fig. 76). One of the best-known exports of St. Thomas Island is bay rum, assigned primarily to the United States (Fig. 87).

Trinidad is the most valuable island of the Lesser Antilles from a commercial point of view. The island, with highlands in the north and lowlands in the south, produces cacao, coconuts, and

sugar cane. Tropical timbers and petroleum are important resources which are worked commercially. Trinidad has one of the world's largest natural deposits of asphalt and exports about 10 million barrels annually.

Nearly one sixth of the population of Trinidad lives in *Port of Spain,* the principal city and capital. The city, which is situated on the western coast of the island, has railroad connections with the pitch lakes in the interior.

THE OUTLOOK FOR THE WEST INDIES. The West Indies were colonies for more than four centuries and now only two of the islands (Cuba and Hispaniola) are independent, and the three countries (Cuba, Haiti, and San Domingo) included are virtual protectorates of the United States. Thousands of agricultural workers are without land and depend upon great estates for their existence. Backwardness as well as disease and poor health prevail among the common people nearly everywhere.

If means could be found to bring about or create the following conditions, the insular region should be a finer place in which to live: (1) stable governments, (2) increased educational advantages, (3) improved methods of farming, (4) a fuller advantage of location on the route to the Panama Canal, (5) diversification of farming—that is, less dependence upon the great commercial crops, (6) increased tourist trade, (7) improved inland transportation facilities, (8) the fostering of a new spirit of cooperation and responsibility among all the people, and (9) population control.

Part Two

SOUTH AMERICA

Introduction

NORTH AMERICA is often spoken of as the melting pot of the nationalities and cultures of northern Europe. At the same time the influence of Spanish culture usually is associated with the development of South America. It should be remembered, however, that the imprint of European culture on South America is not purely Iberian. The civilization of Spain and Portugal today, as well as when Columbus sailed from Palos in 1492, is a curious compound of Mediterranean origin, including not only elements of the ancient Iberian culture of which Strabo wrote at the beginning of the Christian Era, but also of Roman, Greek and Phoenician as well as Christian, Jew and Moslem. It should not seem strange, therefore, that the impact of the Spanish and Portuguese way of life should have a profound influence on the primitive Indian cultures of South America. Above all, one should not forget that the Spanish and Portuguese people have always been amazingly energetic. To be sure, their energy has not been directed in channels corresponding to that of Europeans in most of North America, but perhaps the imprint of their occupance is even more apparent. The comparatively simple Indian cultures of South America and the diversity of natural features offered the Spanish and Portuguese an excellent opportunity for the spread of their influence. Evidence of the success of their adventures may be seen on every hand as the study of the regions and countries of South America progresses. An overview of some of the remarkable physical features of the continent are essential to an understanding of the life and achievements of the people.

The vertical rays of the sun swing rhythmically back and forth across the northern three fourths of South America (Fig. 88). Eastward through this area and close to the equator rolls the mighty Amazon, pouring such a flood into the Atlantic Ocean that the ocean water is fresh and turbid as far as 100 miles from the shore.



FIG. 88. THE PAN AMERICAN UNION. An organization dedicated to cooperation among the twenty-one American Republics, has its headquarters in this beautiful structure in the heart of our capital city, Washington, D. C. The Board of Directors of the Union are the Secretary of State of the United States and the consular representative from each of the other American republics. (Courtesy Pan American Union)

Draining a hot, tropical rain forest which includes an area about one half the size of the United States, the Amazon discharges more water into the ocean than any other river in the world. It is one of the greatest natural features of South America.[1] The flat, humid lowlands along the *Amazon River* are in sharp contrast to the mag-

[1] Bowman, Isaiah, "Amazonia: Land of Great Forests and Rivers," *South America*, Rand McNally and Co., Chicago, 1915, pp. 237-245. The Amazon Basin has changed but little since the eminent geographer wrote this description

nificent Andes Mountains which ascend precipitously on the west. Less than 200 miles from the hot, vine-tangled forests of the Amazon Lowland in Ecuador are the glistening, ice-capped peaks of *Chimborazo* (20,702 feet) and *Cotopaxi* (19,347 feet), rising nearly 4 miles above sea level in the Andean Highlands (Fig. 89).

Although the Andes are not structurally connected with the mountains of North America, they are in line with the almost continuous mountain highland which stretches from Cape Horn through the Americas and Eurasia to the Strait of Gibraltar. The unbroken character of the Andes throughout their extent of nearly 5000 miles makes them a formidable barrier. Not only are they a barrier to the east-west movement of man and other life forms but they also effectively bar the rainfall from the leeward slopes of the mountains in the belts of the trade winds and the prevailing westerlies. For this reason the west slopes of the mountains are arid in the trade wind area, whereas in the belt of westerly winds the east slopes are dry (Fig. 90).

DIVISIONS AND REGIONS

South America and North America possess a number of striking resemblances, especially with reference to topography and structure. The major land features of each continent extend in a north-south direction. Among the large physical features which are comparable in the two continents are: (1) a comparatively young and very rugged highland area on the west; (2) a great north-south interior lowland plain underlain with marine sediments; and (3) two old fairly rugged highlands in the east separated in each case by a large river.[1]

[1] Jones, Clarence F., "Major Physiographic Regions," *South America,* Henry Holt and Company, New York, 1930, pp. 14-29.



FIG. 89. COTOPAXI. This mighty snowcapped volcanic peak is in Ecuador and is only a few miles from the equator. The valley in the foreground is nearly 10,000 feet in altitude. (Courtesy Pan American Airways)

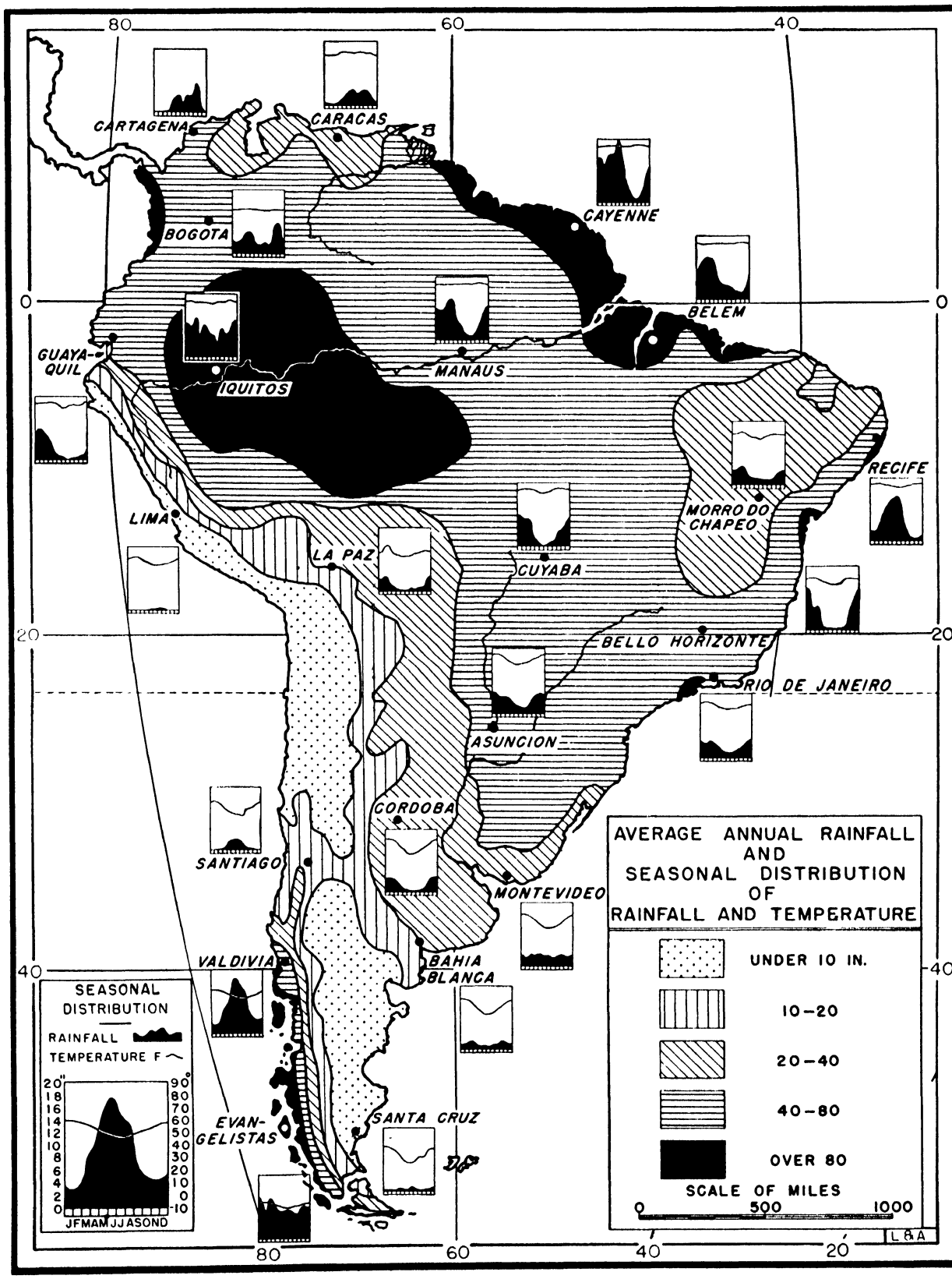


FIG. 90. MEAN ANNUAL RAINFALL OF SOUTH AMERICA AND MONTHLY DISTRIBUTION OF TEMPERATURE AND RAINFALL. The graph of Valdivia has been enlarged for your convenience in the interpretation of the graphs of other stations.

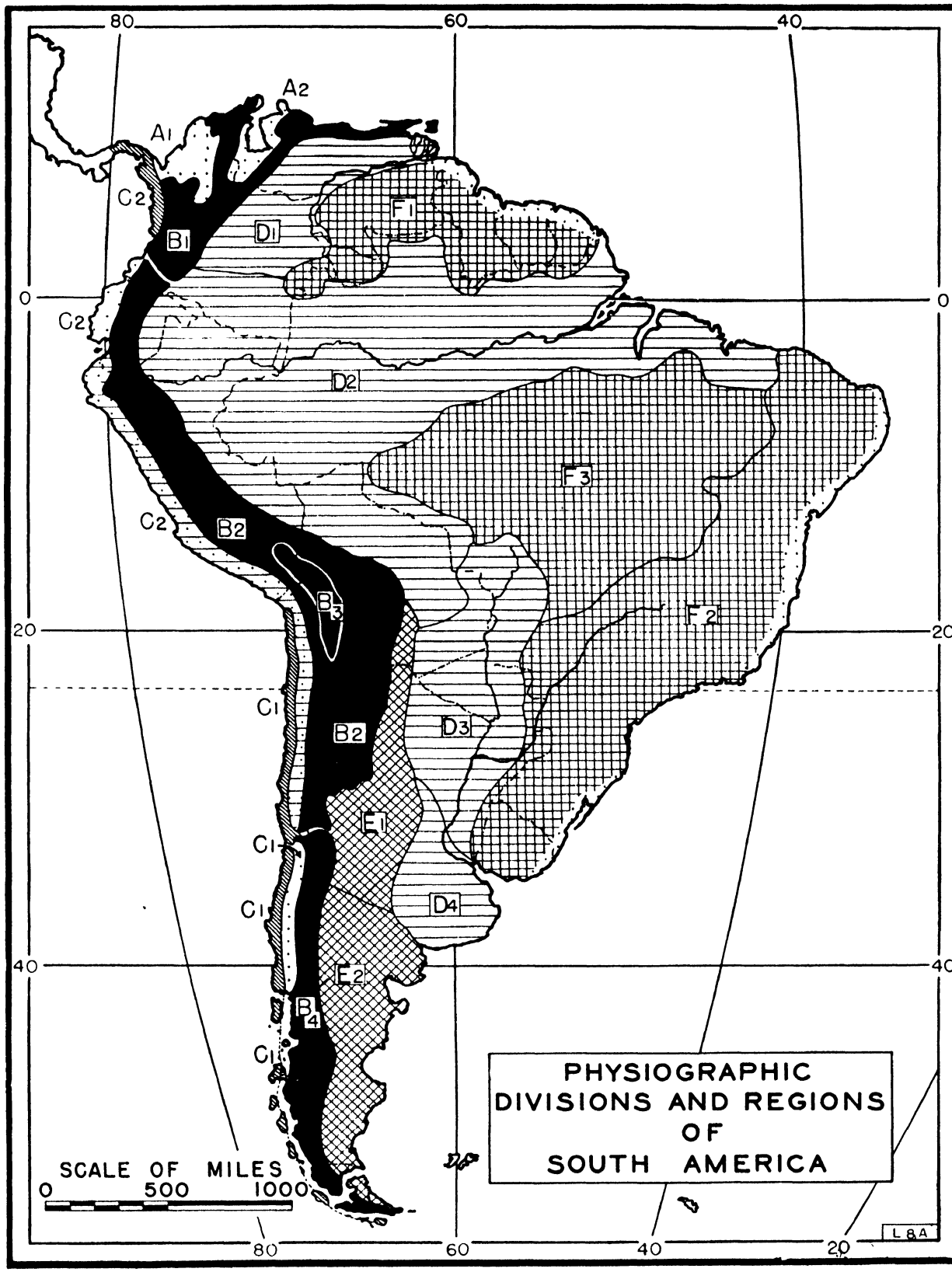


FIG. 91. PHYSIOGRAPHIC DIVISIONS AND REGIONS OF SOUTH AMERICA. Names of divisions and regions are shown on the opposite page.

In South America the three major surface features are the *Andean Highlands and Associated Features,* the *Interior Lowlands and Associated Uplands,* and the *Eastern Highlands and Associated Plains* (Fig. 91).[1]

I. ANDEAN HIGHLANDS AND ASSOCIATED FEATURES.
- A. Caribbean Lowlands.
  1. Magdalena Plain
  2. Maracaibo Basin
- B. Andes Mountains
  1. Northern Andes.
  2. Central Andes
  3. Bolivian (Andes) Plateau
  4. Southern Andes
- C. Pacific Slope Lands
  1. Chilean Trough and Coastal Ranges
  2. Coastal Piedmont, Plains, and Ranges

II. INTERIOR LOWLANDS AND ASSOCIATED UPLANDS
- D. Interior Plains
  1. Orinoco Plain
  2. Amazon Basin
  3. Parana-Paraguay Plains
  4. Pampas
- E. Argentinian Uplands
  1. Interior Basins and Ranges
  2. Patagonian Tableland

III. EASTERN HIGHLANDS AND ASSOCIATED PLAINS
- F. Eastern Highlands and Coastal Features
  1. Guiana Highlands and Coastal Plain
  2. East Brazilian Highlands and Coastal Plain
  3. Interior Brazilian Plateaus

[1] Smith, Guy-Harold, "Physiographic Diagram of South America," The Geographical Press, Columbia University, New York, 1935.

13

Andean Highlands and Associated Features

FOR UNBROKEN CONTINUITY the Andes surpass all other mountains in the world (Fig. 92). They are rivaled in height only by the lofty peaks of the Himalayas. Lying close to the western margin of the continent, they slope almost precipitously to the Pacific Ocean, and likewise, on the east, to the Interior Lowlands. They are a potent influence in the distribution of rainfall over much of the continent and in the consequent human responses that naturally ensue. The high valleys of the middle and northern Andes have temperate climates although located under the tropical sun. From the slopes of the Andes come much of the rich soil materials that are being spread on the adjacent lowlands and also much of the water used to irrigate otherwise dry lands on the leeward flanks of the mountains.

The Andean Highlands run at right angles to the direction of the earth's rotation. For this reason they lie athwart the path of both the trade winds and the westerlies. The result is that the mountain ranges astride the equator from the Caribbean Sea as far south as Guayaquil have about equal amounts of moisture on the east and west slopes. From Ecuador as far south as 30° south latitude the east slopes are rainy and the west slopes are dry; and farther south for an interval of 10° both sides of the mountains are equally dry. In the middle and higher latitudes (still farther south) the reverse is true; that is, the east slopes are dry and the Pacific slopes are rainy (Fig. 90). Furthermore, in the vicinity of the equator the snow line is at an altitude of about 15,000 feet, whereas in *Tierra del Fuego* the snow line descends to less than 2500 feet altitude.

Since this great mountain barrier extends through 65° of latitude and its altitudes vary from near sea level to 20,000 feet or more, temperatures range from very warm to very cold, and rainfall varies from the always rainy to the always dry. As a consequence, vegetation representative of practically all parts of the world occurs in these mighty mountains. Tundras, evergreen and deciduous forests, and other middle latitude plants extend throughout the length of the Andes—at high altitudes near the equator, but at lower and lower altitudes poleward. Tropical vegetation occurs on the lower slopes near the equator, but disappears at latitudes of 25° to 30° south. Semiarid and desert vegetations are found on the leeward coasts and slopes.

It is convenient for purposes of study to separate the Andean Highlands and Associated Features into three divisions—namely, the *Caribbean Lowlands*, the *Andes Mountains*, and the *Pacific Slope Lands*.

CARIBBEAN LOWLANDS

On the southern border of the Caribbean Sea in South America are two lowland areas separated and partly enclosed by three of the north-projecting prongs of the Andes Mountains. The *Magdalena Plain*, construed to include all the lowlands from the middle prong to the *Gulf of Darien*, was made from immense quantities of alluvial detritus carried from the adjacent highlands. The other lowland—the *Maracaibo Basin*—is a structural depression nearly surrounded by mountains and occupied in part by the shallow, brackish *Lake Maracaibo*. Although the two plains regions are separated by a high chain of the Andes, both face the

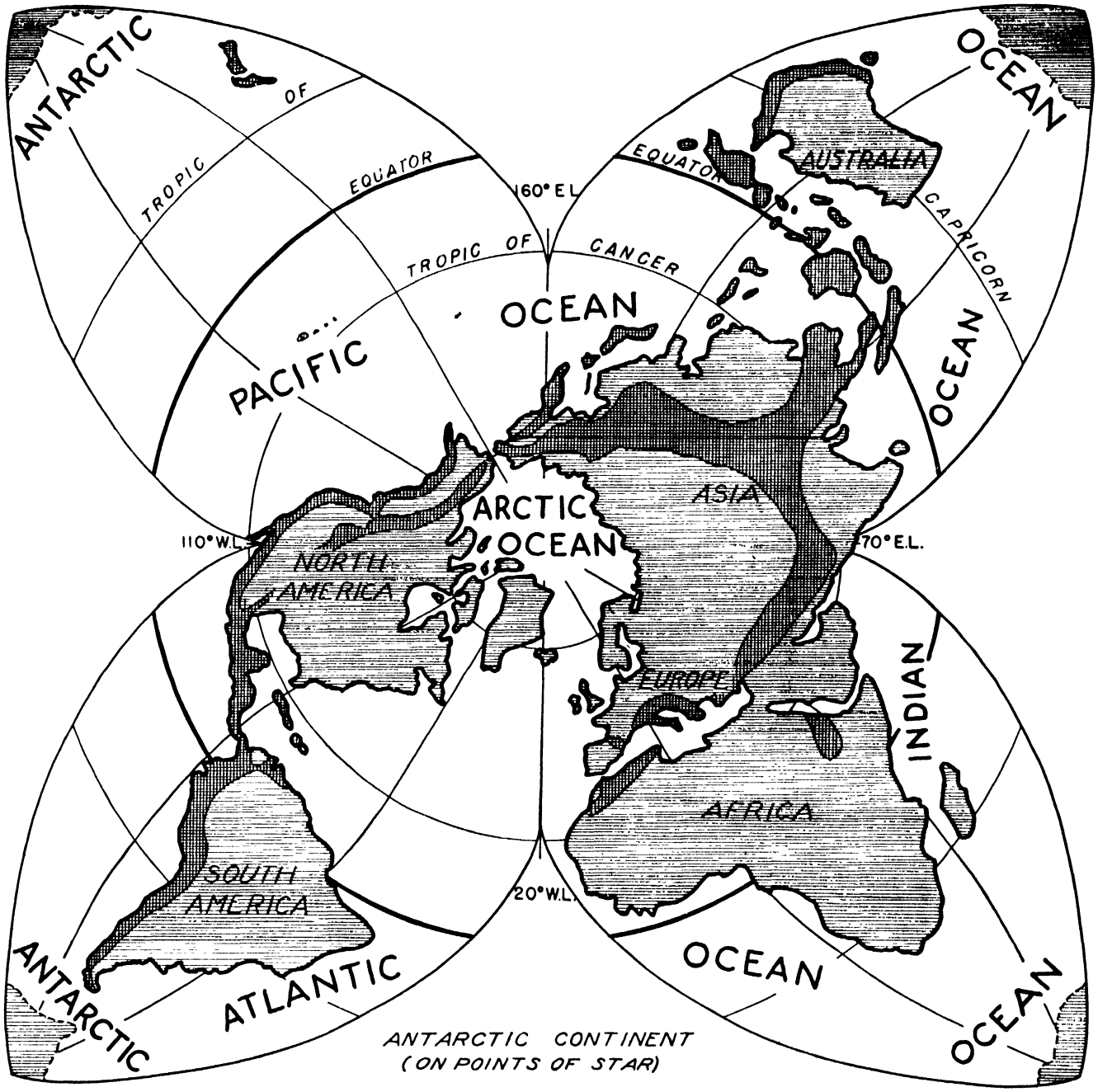


FIG. 92. STELLAR POLAR MAP. Note the continuity of the great mountain systems of South America, North America, and Eurasia, and likewise the great lowlands as described in the textual reading matter.

sea and together constitute the Caribbean Lowlands (Fig. 93).

MAGDALENA PLAIN. The great delta and alluvial area between the central and the western prongs of the Northern Andes Mountains is the Magdalena Plain, drained by the *Magdalena River*. From the Caribbean coast the plain extends southward about 200 miles, and its width is a little more than half as great. The chief tributary of the Magdalena is the *Cauca River* which flows into the main stream from the west.

The area is made up of low, flat lands formed by accumulated detritus carried into the sea from the adjacent mountains by the Magdalena River and

its tributaries. The value of the detrital material for human use depends chiefly upon texture, fertility, and drainage.

The coastal lands as a rule are low and marshy, rising gradually southward toward the mountains. The two rivers flow slowly over the plain in winding channels. In their lower courses these streams

rock is covered by a mantle composed largely of deltaic and alluvial debris carried in by rivers from the surrounding mountains. For this reason the soils grade from coarse sands to fine clays.

The rock structure is such that great quantities of petroleum have accumulated in this basin, so that the region has world-wide renown for its rich-

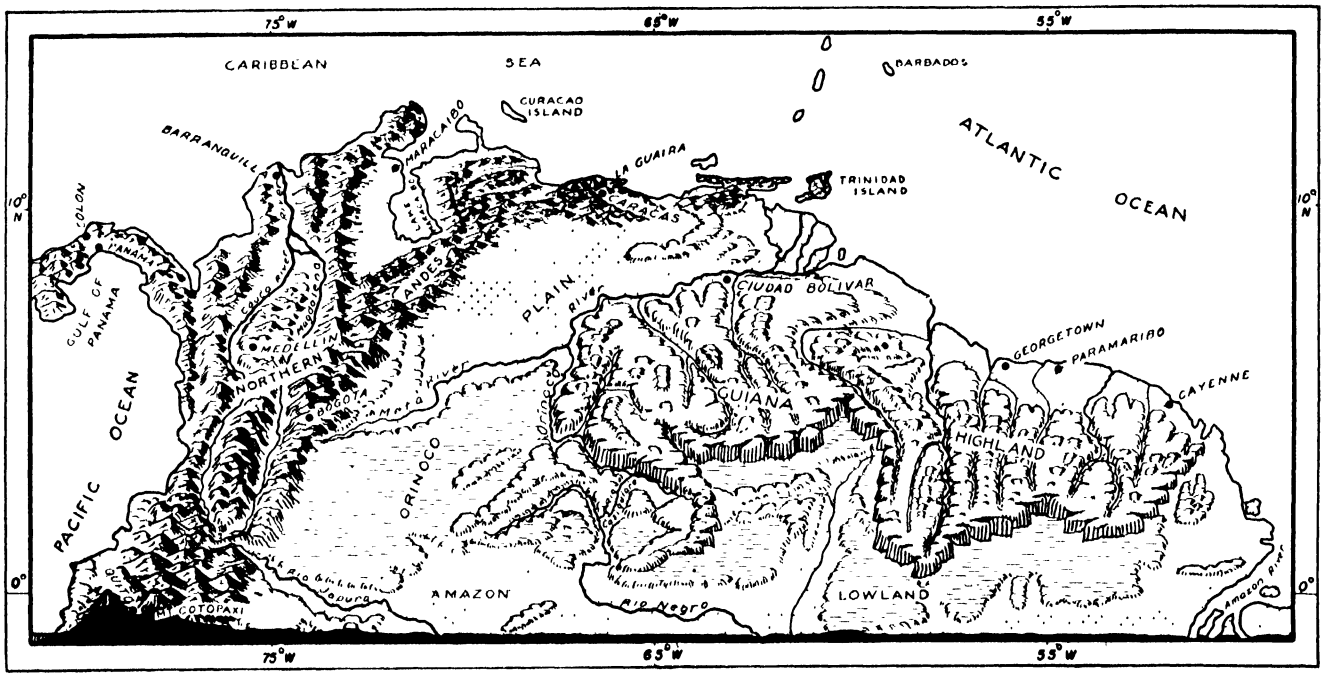


Fig. 93. Northern South America. The scenic effect should help to visualize the larger features of this section of the continent.

are navigable although obstructed here and there by sand bars.

In a distance of 300 miles up the Magdalena Valley the river sends off numerous lateral channels which envelop many long, narrow islands before they reunite with the main stream. These islands, as a rule, are low and marshy. In addition there are many swamps and lagoons usually near the valley sides. The Magdalena River is a broad, tranquil, enchanting sheet of water for about 200 miles before entering the Caribbean.

Maracaibo Basin. Extending southward from Lake Maracaibo for 100 miles between the central and eastern prongs of the Northern Andes is a flat plain crossed by meandering streams. During the rainy season much of the area near the streams and lake is flooded. The undulating sedimentary bed-

ness in "black gold." Even the rock structures under Lake Maracaibo abound in oil, and produce as abundantly as do the surrounding lowlands. A developed petroleum field in a lake bed is truly an unusual sight.

ANDES MOUNTAINS

Throughout most of their length the Andes Mountains are composed of two or more nearly parallel ranges. In two places, however, these ranges converge into well-defined knots. The northern point of coalescence is in the *Pasto Knot* (13,990 feet) in southern Colombia, just north of the equator and the other is at *Mt. Aconcagua* (22,835 feet) or the *Aconcagua Knot* in western Argentina. These places of coalescence together with a large inter-

montane area serve to divide the highlands into four regions—namely, (1) the *Northern Andes*, (2) the *Central Andes*, (3) the *Bolivian Plateau*, and (4) the *Southern Andes* (Fig. 91).

NORTHERN ANDES. The chief ranges of the Northern Andes are known as the *Eastern* (Oriental), *Central*, and *Western* (Occidental) cordillera. The Eastern and Central ranges nearly surrounding Lake Maracaibo continue northward to the sea, the former then extending eastward nearly a thousand miles, sinking into the ocean near the mouth of the Orinoco River (Fig. 93). The Western range disappears beneath the Magdalena Plain. Between the ranges are several important depressions among which are the Magdalena and Cauca valleys and the Maracaibo Basin. About one half of the Northern Andes are in Colombia and one half in Venezuela.

The altitudes of the Western range reach 8000 to 9000 feet; and those of the Central and Eastern ranges are as high as 10,000 feet. Some volcanic peaks extend to 18,000 feet in altitude, and a number of plateaus and valleys lie from 6000 to 8000 feet above sea level.

The Magdalena and Cauca rivers have their sources near the Pasto Knot at an altitude of about 13,000 feet. Each flows northward rapidly and impetuously from 40 to 50 miles through a succession of cascades and rapids, descending more than 6000 feet in this short distance. The *Catatumbo River* flows from the southwest into Lake Maracaibo.

The bedrock of the region is mainly igneous. The soils on the slopes are principally residual, and those in the valleys are deep, rich, and of alluvial origin.

CENTRAL ANDES. The Central Andes, paralleling the bends in the west coast of South America, extend southward from the Pasto Knot to the Aconcagua Knot, a distance about equal to that from New York to San Francisco. Just north of *Lake Titicaca* the Andes bifurcate, forming two distinct ranges between which lies the Bolivian Plateau. The ranges become adjacent again south of *Lake Poopo* and the salt flats of the plateau; then continuing southward, the Eastern ranges sink into the high plains of northern Argentina and the Western ones converge at the famous Mt. Aconcagua. The Central Andes, including the Bolivian Plateau, comprise an area of nearly 655,000 square miles.

The Central Andes have the most complex structure and relief of the regions of the great western cordillera. Nearly everywhere the ranges and many of the intermontane valleys rise to altitudes of 10,000 feet or more. Here and there are peaks whose crests frequently are hidden in the clouds. Mt. Aconcagua (22,835 feet), *Mt. Huascaran* (22,050 feet), Mt. Cotopaxi (19,347 feet), Mt. Chimborazo (20,702 feet), and many others project skyward more than 19,000 feet. Most of the passes from east to west over this great highland mass lie at altitudes of 12,000 feet or more. Snow and ice-capped ranges furnish water for streams both on the east and the west slopes. The sources of the short streams of the west coast, as well as the headwaters of the most important streams of interior South America—the *Parana* and the Amazon—are located in this series of great ranges. Careful study of a map of the piedmonts and alluvial fans shows the importance of this mountain system in the lives of the people dwelling in some of the west coast countries (Fig. 91).

The bedrock of the Central Andes consists principally of folded and faulted sedimentary and igneous rocks. Volcanic materials being present in numerous areas, the soil materials have originated from both igneous and sedimentary rocks. Some fertile alluvial soils occur along almost every stream, but the soils on the slopes and on the plateaus are usually quite coarse, sandy, and less productive than they are in the valleys.

BOLIVIAN PLATEAU. One of the chief features associated with the Central Andes is the *Bolivian Plateau*, which is enclosed by bifurcating prongs—the *Western Cordillera* and the *Cordillera Real*. Extending from 14° south of the equator to 23° south latitude, the plateau occupies an area equal to that of the State of Georgia in the United States, or nearly 60,000 square miles. This intermontane area has two large lakes, Lake Titicaca and Lake Poopo. In Peru, the plateau is called the *Altiplano*, and in Bolivia, the *Puna*. The region is nearly 500 miles long and varies from 50 to 150 miles in width.

The Bolivian Plateau, 11,000 to 13,000 feet in altitude with imposing mountain ranges on both the east and west, is principally an area of interior

drainage. Lake Titicaca, with an area a little larger than Great Salt Lake, Utah, and lying at an altitude of 12,507 feet above sea level, is the largest fresh-water lake in the world at such an altitude, and also the highest to have steamboat service. Although the plateau is an area of interior drainage, Lake Titicaca is a fresh-water lake because it overflows southward through the *Desaguadero River* ("The Outlet") into Lake Poopo (12,120 feet), which in turn drains onto the salt flats farther south. The whole plateau is surrounded by great peaks and volcanic cones, some of the more prominent of which are *Llullaillaco* (22,015 feet), *Misti* (19,167 feet), *Sajama* (21,391 feet), *Illimani* (21,184 feet), and *Illampu* (21,278 feet). All of the passes into the plateau are at altitudes of 14,000 or more feet.

The bedrock on the plateau is mostly of sedimentary and volcanic origin. There are ridges of sandstone scattered throughout the region. Soil-making materials are mostly residual on the slopes, transported on the plateaus, and alluvial in the river valleys. Alluvial fans and piedmonts as a rule lie on the plateau near the mountains.

Southern Andes. The Southern Andes extend from Mt. Aconcagua in a single, continuous chain until they disappear beneath the sea at *Cape Horn*. The crest of the chain forms a natural international boundary between Chile and Argentina. The Southern Andes contain a variety in topography. Even though they are a more continuous range than the Central and Northern Andes, they also contain many volcanic peaks and structural basins. Southward, beginning at *Uspallata Pass* (12,464 feet) near Mt. Aconcagua, the mountains begin to decrease in altitude. The lofty peaks like those of the Central Andes are missing, the highest of the range being less than 12,000 feet. *Mount Sarmiento* (7200 feet) in Tierra del Fuego is the highest peak in the extreme south. This southern extension of the Andes has acquired wild and beautiful scenery due to the hundreds of alpine glaciers. Many crags, peaks, lakes, and cirques rival those of Switzerland and the Canadian Rockies. Numerous fiords compare favorably with those in Norway and British Columbia. The Southern Andes are an impressive barrier with two major passes—Uspallata Pass and the *Strait of Magellan*,

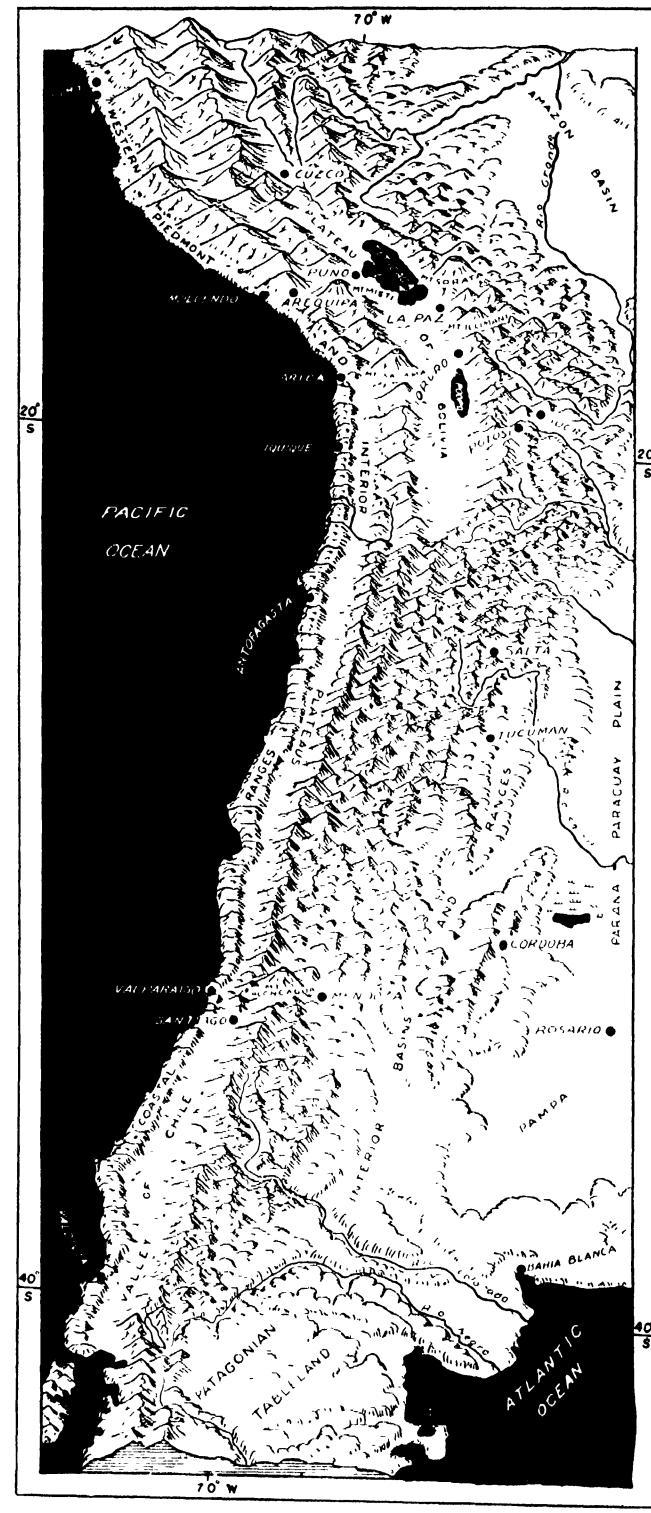


Fig. 94. West Coast of South America. Note how the Andes rise precipitously from the sea along much of this coast.

a water breach in the far south. In the northern sections only the highest portions are covered with perpetual snow, but the snow line descends practically to sea level as it approaches the Strait of Magellan.

The structure consists of complex, folded, sedimentary and igneous rocks with volcanic intrusions. The volcanic peaks of the Southern Andes are less numerous, however, than in the Central Andes. On the arid east side of the mountains immense deposits of talus have accumulated because disintegration and weathering take place faster than the streams can carry the debris away. Mature soils are pedalferic on the western slope and pedocalic on the eastern slope. Glacial till, abundant all through this region, is the parent material for much of the soil.

PACIFIC SLOPE LANDS

On the western margin of South America the physiographic features bear a marked resemblance to the corresponding features of the west coast of North America. Not only is this true relative to the nature of the features, but also with reference to their analogous locations both in sequence and in latitude. For example, the sunken coastal ranges along the coast of British Columbia may be compared with the sunken coastal ranges of southern Chile. The Valley of Chile is open at its poleward extremity which is true also of the Puget Sound Trough. However, the topography, soils, climate, and agricultural development of the Valley of Chile are similar to the California Valley (Fig. 91).

A similar comparison might be made with regard to the climate of the coasts of the two continents. There is a poleward gradation of climatic types from tropical rainy through tropical dry, subtropical dry summer, and marine in both continents (Fig. 236). Differences in latitude and high mountain ranges close to the sea have marked influence on climatic conditions of both continental coasts. South America, however, has an equatorial zone which gives it climatic conditions that are not duplicated in North America.

Almost any type of plant life from tropical rain forest to desert vegetation and tundra may be seen from Panama to the Strait of Magellan. As the climatic, biotic, and physical features are diversified from north to south, so too are human activities. On this coast are found some of the great cities of South America, as well as vast stretches of desert where scarcely any life may be seen. Here is one of the world's intriguing environmental complexes; some parts of the region enjoy world-wide renown, whereas others have never been visited by white man.

For purposes of this discussion it will suffice to divide the Pacific Slope Lands of South America



FIG. 95. STRAIT OF MAGELLAN. Sarmiento Mountain is on the large island of Tierra del Fuego. Huge glaciers flow down some of the valleys tributary to the strait. (Courtesy Pan American Union)

into two rather broad regions—namely, the *Chilean Trough and Coastal Ranges,* and the *Coastal Piedmont, Plains, and Ranges.* For a more comprehensive study these regions would be subdivided.

CHILEAN TROUGH AND COASTAL RANGES. Between the Andes and the Coastal Ranges poleward from 18° south latitude is a north-south trough (Fig. 95). In the south the trough is buried in the sea between the Andes and the numerous coastal islands—the crests of the nearly drowned Coastal Ranges. In the middle of the country the trough is known as the *Valley of Chile,* and in the north a portion of the plateau-like section is known as the *Atacama Desert.*

In the north near the Tropic of Capricorn the Coastal Ranges are comparatively high and continuous, attaining altitudes of 3500 to 7500 feet. In the middle section they become lower, and in the south the numerous valleys which formerly existed have been entirely drowned, serving now as passageways among the many islands.

In the Valley of Chile the unconsolidated sediments from the Andes and the Coastal Ranges,

made up largely of the coalescence of many alluvial fans, together with some spurs from the mountains and numerous residual hills, give the valley an undulating appearance. In this respect it is similar to the Valley of California. The two regions are similar also in seismic unstability, as is proved by the fact that earthquakes have taken heavy toll of life and property in this, the most populous area along the western coast of the continent. Near the southern end of the valley are a number of glacial-made depressions in which are nestled some beautiful lakes. The glacial sculpturing together with the volcanic features in the south give to this portion of the valley scenery that is unsurpassed.[1] The streams as a rule flow from east to west because the valley floor slopes gently toward the Coastal Ranges.

The portion of the Chilean Trough extending northward from the Aconcagua Knot is a plateau from 3000 to 6000 feet in altitude and is nearly enclosed by mountains—the Andes on the east and the Coastal Ranges on the west. The streams that flow down the west slope of the Andes disappear beneath the loose detrital materials which they have brought from the mountains.

Coastal Piedmont, Plains, and Ranges. In a more detailed study of South America considerable emphasis would be given to different sections of this area which extends from 18° south latitude to 9° north, a distance of nearly 2000 miles. The majestic Andes border the region on the east and the western edge is washed by the Pacific Ocean (Figs. 93 and 94).

The Peruvian portion of the area is a westward-sloping piedmont, formed from the detritus brought down from the Andes by outflowing streams. Alluvial fans and mountain spurs break the monotony by contributing a rolling topography. In the piedmont are a long series of fertile oases which cling to the alluvial fans and their margins, being supplied with irrigation water from the mountain streams.

[1] Schoewe, Walter H., "Glaciers and Glaciation of South America," *Journal of Geography*, October, 1915, Vol. 15, pp. 49-54.

The plains section of the region extends 500 miles northward from the *Gulf of Guayaquil*. In Colombia the plains are narrow but in Ecuador they attain as much as 140 miles in width. Nearly all of the coastal region is below 500 feet in altitude, and slopes gently from the mountains to the sea. North of Guayaquil, however, there is a low plateau of folded and metamorphosed rocks which in no place exceeds 3000 feet in altitude. Just south of the equator some spurs of the Andes reach out and connect with this plateau. A prominent feature of the plains region is the *Guayas River* which flows from north to south between the plateau and the Andes and empties into the Gulf of Guayaquil. Its valley is broad, swampy, and filled with alluvium and debris from the mountains.

The mountain ranges of western Colombia reach from Buenaventura northward nearly to the southern border of Panama, a distance of 250 miles. Structurally the region is not a part of South America, but a continuation of the mountain ranges in Central America, and this is one of the reasons for giving such a small area an independent discussion. It is separated from the Cordillera Occidental by a depression in which are the *San Juan* and *Atrato* rivers flowing in opposite directions. The range is about 100 miles wide in the northern part and its southern terminus is about 4° north latitude.[2] The region is a single range of north-south mountains between the Pacific Coast and the San Juan and Atrato river valleys, and in general averages about 6000 feet in altitude. In some places the mountains slope gradually to the sea, leaving a narrow coastal plain or piedmont, but in other sections they rise precipitously from the ocean. Little exploratory work has been done in this Coastal Range area. The bedrock, for the most part, is sedimentary with granitic intrusions. The valleys of the San Juan and Atrato rivers are partially filled by volcanic outflows near the headwaters and by sediment farther downstream.

[2] Murphy, Robert Cushman, "The Littoral of Pacific Columbia and Ecuador," *Geographical Review*, January, 1939, Vol. 29, pp. 1-33.

14

Andean Highlands and Associated Features (Concluded)

COUNTRIES ASSOCIATED WITH THE ANDEAN HIGHLANDS

FIVE COUNTRIES in South America are dominated largely by the Andean Highlands. These are *Colombia, Ecuador, Peru, Bolivia,* and *Chile.* All but the last of these extend far into the Interior Plains (see page 166) but, because of the generally unfavorable tropical climate, the eastern lowland areas do not play a large part in the national affairs of these countries. In the highlands of the four tropical countries are the most favorable areas for human occupancy, although the Pacific and Caribbean coastal lands are rather intensively used in many places, and in these lowlands, too, are some of the important cities.

COLOMBIA

Colombia in the northwest is the only South American country that borders two oceans. The Caribbean Sea, a part of the Atlantic Ocean, is on the north and the Pacific borders on the west. The southern portion of the country is crossed by the equator and the northern part extends to 12° north latitude. Colombia is nearly three times as large as Montana and has about fifteen times as many people. In configuration, the country is nearly square, and more than half of it lies in the plains of the Amazon and the Orinoco east of the Andes. However, only a small percentage of the population lives in this lowland section.

Natural Features

Of the six or seven regions included partly or wholly within Colombia, the two containing most people are the Magdalena Plain and the Northern Andes (see pages 143, 144, 148, 166, and 167). The portion in the Orinoco Plain and Amazon Basin are today relatively unimportant.

The Magdalena River is the great artery for transportation in Colombia. It is confined between the high Central and Eastern prongs of the Northern Andes in the upper two thirds of its course, but in its lower course it winds over the flat, monotonous Magdalena Plain.

The climate of Colombia is tropical with a low temperature range (1.6° F. at Bogota). The west coast and most of the Amazon Basin section are rainy and quite generally covered with tropical forests. The Magdalena Plain has a long rainy season in the south but it is dry in the north (Fig. 236). At Cartagena on the Caribbean Coast the average annual rainfall is 36 inches, nearly all of which falls from May to November. Bogota at an altitude of 8730 feet has an annual rainfall of 63 inches, coming in four seasons—two rainy and two less rainy (Fig. 90). The dependability based on a 37-year record is 83 per cent.

The natural vegetation at the lower altitudes varies from the humid tropical forest on the western coast and in the Amazon Basin to the savannas of the Orinoco and Magdalena plains, and semi-desert steppes at the extreme north (Fig. 237). More than 100 species of palms and 300 grasses are included in the Colombian flora. At the higher

altitudes the tropical vegetation merges into temperate types and finally to highland heath on the cold damp paramos.

Cultural Features

Within 50 years after the discovery of America by Christopher Columbus, Spanish explorers had

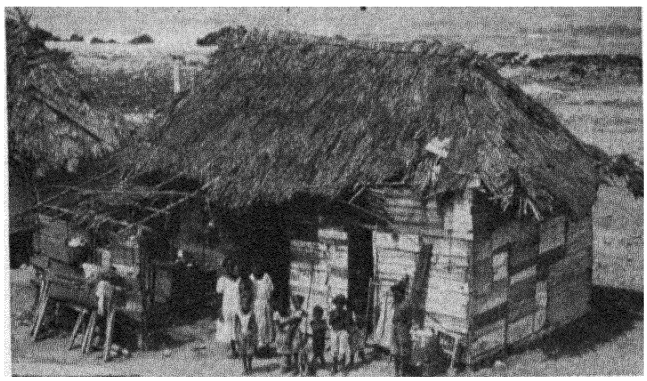


FIG. 96. A NATIVE'S HUT ON THE CARIBBEAN COAST. Near Cartagena. Perhaps the roof will be repaired when the rainy season comes. Pigs at the water's edge, a dog, two cats, two women, and eight children represent the live elements in the picture. (Courtesy Canadian Pacific Railways)

penetrated deep into the Magdalena Plain and the Northern Andes. During the same decades that Coronado, De Soto, and Cortez were searching for wealth in southern North America, Quesada, Pizarro, and Ruiz were exploring and conquering the Magdalena Plain and the Northern and Central Andes for Spain. Not all of the early explorers entered this part of the country by way of the Magdalena Valley but the importance of the route dates back to this historic period. Today the Magdalena route is even more strategic because it opens directly toward the United States by way of the Caribbean Sea and the Gulf of Mexico.

In 1770 the population of Colombia was less than 1,000,000—in 1875, 3,000,000—now it is more than 9,000,000. The early growth was caused mainly by interest in minerals, particularly gold. During the last quarter of the nineteenth century, the development of coffee lands was responsible for the importation of capital from foreign countries and accounted for much of the improvement in transportation and prosperity at that time.

Productive occupancy of the Magdalena Plain is narrowly limited. Cattle grown for meat, for draft purposes, and for dairy products graze on the savannas. In the moist lowlands sugar cane and cotton are produced, but most domesticated plants—as for example, corn, cassava, beans, plantain, bananas, and coconuts; and animals—such as chickens and pigs—are grown not for market but only for subsistence purposes (Fig. 96). Petroleum is the leading earth product of the Magdalena Plain, the exploitation of which is extensive and rapidly increasing. The potential resources in petroleum in this part of Colombia are very great and will probably furnish the basis for the next improvement in this region (Fig. 97).

In the Pacific coastal section, except for urban centers, little progress has been made in the past 200 years. Organized agriculture is practically nonexistent. The population is sparse and widely scattered. The Indians seek the highlands, and many Negroes live in the lowland. Each secures his living from forests, streams, and small patches of corn and vegetables, which are raised for home use only. The natives gather tagua nuts, wild rubber, chicle, balata, and toquilla fiber from the rainy forests,

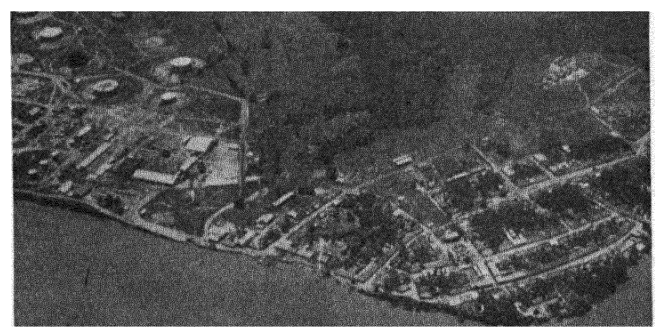


FIG. 97. BARRANCA BERMEJA. An oil town on the east bank of the Magdalena about three hundred miles from the sea. The street pattern, the compact residential structures, and the improved roadway bespeak the importation of foreign ideas and capital. (Courtesy Pan American Union)

besides working in the mines. The plantain, a tropical perennial resembling the banana, is the chief food of the native, taking the place the potato does in the white man's diet. Two precious minerals, platinum and gold, are found in the Pacific coastal area. Colombia is second in the world in

platinum production, a large part of which comes from the Pacific coastal region (Fig. 98). Most of the minerals are secured from the alluvial deposits in the Atrato Valley and along the Pacific margin. However, great difficulties must be overcome in mining because continual rain, enervating heat, and disease-ridden swamps must be combated; and only the Negro can withstand these conditions for any considerable time. Facilities for transportation and communication are primitive and inadequate.

Crop production in the Northern Andes assumes a zonal distribution, depending on topographic and climatic factors. On the lower slopes of the mountains cacao, sugar cane, and bananas thrive. Coffee grows well at elevations of 2500 to 7000 feet and is an excellent crop for this remote region because coffee is a nonperishable product and also has a high value in proportion to weight and bulk. Fortunately, the world market for the mild-quality coffee grown in the Northern Andes is not affected by the high production of coffee in Brazil.[1] Cereals such as corn, wheat, and barley thrive at successively higher altitudes. Cattle are grown for meat, dairy products, and draft purposes. Among the earth products, gold, secured largely by the placer process, is important. Increased significance awaits the development of lode mining through the greater use of water power. Coal and iron ore are mined for local use, but capital and skilled labor are needed for extended development. Emeralds are mined in the Eastern range but the industry is controlled by a state monopoly.

Since 1900 the foreign trade of Colombia has increased twelvefold. More than one half of it is with the United States, although the United Kingdom, Germany, and Canada come in for a considerable percentage. Much of this trade is due to exports of coffee and bananas. However, transportation facilities within the country are inadequate and poor. Railroads on the Magdalena Plain are short and mostly near the coast. Transportation up the valley is almost wholly by way of rivers, which, during the dry season, are shallow and obstructed by sand bars. Two railroads are projected, one to be built on the west side of the plain and the other on the east side. Several short railway lines have been constructed around falls and rapids in the Magdalena. Air transportation and commerce are developing at an accelerated rate and promise much for the years ahead.[2]

Transportation and communication by motor roads are being expanded. The completion of the *Simon Bolivar Highway* from Caracas to Guayaquil by the way of Bogota will open a new era in transport and travel in northern South America.



FIG. 98. ISTMINA ON THE UPPER COURSE OF THE SAN JUAN RIVER IN COLOMBIA. This is the site of important gold and platinum mines not far from the tropical rainy west coast. (Courtesy Pan American Union)

CITIES OF COLOMBIA. The larger cities of Colombia, as might be expected, are in the highlands and in general are closely related to water transportation.

Bogota, the capital of Colombia, is nearly twice as large as Omaha, Nebr. It is on a treeless plateau 8600 feet above sea level and is nearly surrounded by majestic mountains (Fig. 99). It is one of the most beautiful cities of South America and is a center of art, culture, and education. However, it is not favorably located for industrial or commercial activity because of its high altitude and its poor access to the sea. It is reached chiefly by combination rail-water routes up the Magdalena Valley. On the other hand, air service now is making the city more accessible. Although Bogota is near the equator, it is a delightful city in which to live because

[1] Pruitt, Fredonia M., "The Coffee Industry of Colombia," *Journal of Geography,* February, 1936, Vol. 35, pp. 68-72.

[2] James, Preston E., "Transportation Problems of Colombia," *Journal of Geography,* December, 1923, Vol. 22, pp. 346-354.



FIG. 99. SOME CITIES OF SOUTH AMERICA. Cities mentioned in the text are shown on this map.

the climate is always mild due mostly to the high altitude.

Medellin, in the middle Cauca Valley, is outstanding in manufacturing enterprises and in the intelligence of its people. A railroad now under construction will connect the Pacific Coast with Bogota by way of Medellin.

Barranquilla, just above the delta of the Magdalena, is the lower terminus of navigation on the Magdalena River. Between the city and the sea, the sand bars and shifting channels make the stream shallow and treacherous. The river is navigable 900 miles above the city. Barranquilla is connected with its seaport, *Puerto Colombia,* on the Caribbean coast, by a railway 18 miles long. Oftentimes when the waters of the Magdalena are too shallow for navigation, tens of thousands of tons of merchandise for trans-shipment to the interior accumulate at Barranquilla.

Cartagena, founded in 1533, was formerly the seaport of Barranquilla and was reached by a canal, but now canal traffic has been supplanted by a railroad to Puerto Colombia. Cartagena is an important petroleum pipe-line terminus.

Buenaventura is the only urban center on the Pacific Coast that deserves mention. It is situated on a small island at the head of a broad bay projecting inland from the *Bay of Choco,* and is the first port of call for several steamship lines plying southward from the Panama Canal. The most important Colombian port on the Pacific, it exports gold, platinum, tagua nuts, chicle, rubber, and palm fiber. Buenaventura is the port for *Cali* and *Popayan,* two inland commercial centers in the fertile Cauca Valley. Ninety per cent of the population of Buenaventura are Negroes, but the business men and traders generally are German, Syrian, or Italian.

Looking to the Future. The Northern Andes in Colombia are rich in possibilities. Minerals are abundant. The climate, except at high altitudes, is varied but always mild and many kinds of crops can be grown. These highlands have the greatest density of population in the northern part of the continent. More roads should be built, crops and animals need to be improved, and markets must be found. As time goes on this area will attract more and more travelers and tourists, especially since it is so near the great interoceanic gateway, the Panama Canal.

The Pacific coastal lands in Colombia always have been backward, even after the interior and the Caribbean region began to develop. The incessant warmth, the high humidity and continual rains prevent white men from living here permanently. However, there are many fertile valleys which would be productive under proper management. Improved transportation would doubtless bring new efficiency to the region and offer added possibilities for the development of such tropical crops as cacao, rubber, bananas, and spices, but this probably would require a kind of initiative and leadership which Colombia does not possess at this time.

ECUADOR

Ecuador is in the form of a wedge projecting between its neighbors, Colombia and Peru, and for the most part this relationship has not always been pleasant. Much of the boundary is controversial—so much so in fact that it cannot be said for certainty whether this small country will be twice as large next year or only half as large. However, the century-old dispute with Peru has recently been settled, it is hoped permanently. A good estimate today makes Ecuador about twice as large as New Mexico. It includes the 13 islands of the Galapagos on the equator about 600 miles west.

Natural Features

Ecuador is often called the land of volcanoes. The lofty Chimborazo rises more than 20,000 feet above the sea. The temperature changes in traveling from Guayaquil to the top of this giant volcano with its ice-capped summit and eternal fires smouldering in its bosom would correspond to those one would experience in traveling from the equator to the North Pole.

Ecuador is almost wholly within three physiographic regions—namely, the Central Andes, the Amazon Basin, and the Plains of the Pacific Slope (see pages 145, 148, and 167). The Amazon Basin has a tropical rainy climate and is covered by tropical rain forests. The climate of the Pacific Plains section, where one fourth of the people live, ranges from the tropical with moderate rainfall in the

north to the tropical desert in the south (Figs. 90 and 236). The north coast of the Gulf of Guayaquil receives nearly 40 inches of rainfall per year, but the south coast gets less than 10 inches. The natural vegetation of the Pacific slope varies from savannas with acacia trees and palms in the more humid section to the characteristic cactus thornbush and nearly grassless desert areas in the south (Fig. 237).

Two great parallel chains of mountains cross Ecuador from north to south. Between them is a high alpine trough divided into several basins by east-west ridges. The northern basins are fertile and well watered, the middle ones are fertile but have less rainfall, and the south ones are dry and not prosperous.[1]

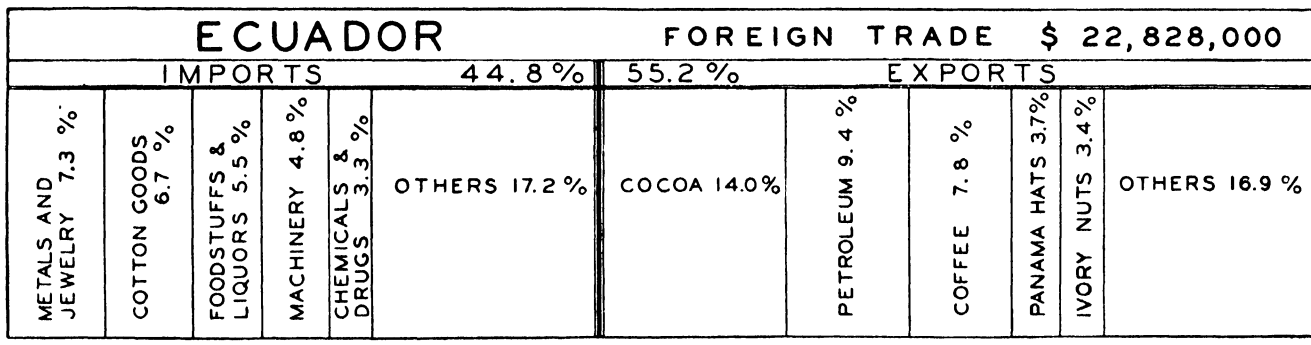


FIG. 100. ECUADOR'S FOREIGN TRADE. A 10-year average prior to World War II. (*From Statesman's Yearbook*)

Cultural Features

Ecuador contributed but little to colonial exploitation as compared with Colombia and Peru. Made up to a considerable extent of disputed territory between its two more powerful neighbors, the country has had a hectic career. When it gained independence in 1830 its name was chosen as a compromise between two rival parties in the new state. It was one of the last countries in South America to drive out Spanish control. The constitution of the country has been rewritten at least a dozen times, and usually changes in the administration of governmental affairs have been through revolution, often involving bloodshed.

Today a small aristocracy of white people own nearly all the productive land. The plantation system of agriculture prevails. This led to overspecialization in cacao-production on the Pacific lowlands. The near ruin of the cacao industry was caused by a parasite—the witchbroom disease—but cacao still remains a leading export, although coffee now is a close rival.[2] Exports continue to exceed imports. The United States is one of Ecuador's best markets, but before World War II, Germany was a worthy competitor (Fig. 100). Other cultivated crops that receive much attention are sugar cane, cotton, rice, tobacco, corn, and potatoes. The chief pastoral industry is the raising of cattle. From the forests are gathered kapok, tagua nuts, and rubber. Petroleum on the Santa Elena Peninsula is the only mineral of importance being exploited today.

As in all South American countries, transportation facilities in Ecuador are inadequate. About 200 miles of navigation is possible on the rivers of the Pacific Plains. There are nine railway lines with about 760 miles of roadbed, 287 of which run from Guayaquil to Quito.

CITIES OF ECUADOR. Most of the good towns of Ecuador are in the high Andean basins. The ones on the plains contain fewer than 10,000 people each, except the chief seaport, Guayaquil.

Guayaquil, located at the northern extremity of the Gulf of Guayaquil, is built on the delta plain of the Guayas River. During the rainy season much of the surrounding lowland is turned into extensive marshes. It is the largest urban center in Ecuador and is the center of culture and commerce for the entire country. The Guayas River

[1] Platt, Robert S., "A High Farm in the Central Plateau, Ecuador," *Latin America*, McGraw-Hill Book Company, New York, 1942, pp. 256-259.

[2] Foster, Alice, "The Guayaquil Lowland," *Journal of Geography*, September, 1938, Vol. 37, pp. 213-226.

is navigable for approximately 40 miles by small steamers, but natives in canoes and small boats utilize the river for at least 200 miles. Guayaquil is connected by rail with Quito, which is located in a high valley in the Central Andes. There is a succession of small urban centers along the Quito-Guayaquil railway. Transportation facilities are poor in the plains region, and there are few motor roads, but most of the cities are connected at least by pack train.

Quito, the capital and a significant trade center of Ecuador, is situated in a high fertile basin near the equator and is surrounded by the grandest assemblage of snow-clad volcanic peaks in the world. No less than eight may be seen at the same time. Although the city itself is 10,000 feet above sea level, many white-capped cones tower from 5000 to 10,000 feet higher. Among these is Cotopaxi, the highest active volcano in the world.

A Look Ahead. Lack of stability in government is one of Ecuador's critical problems. This is to a considerable extent a class difficulty. Landed aristocracy, plantation agriculture, ecclesiastical differences, peon labor all contribute to unrest and revolution. The decline of the cacao industry created a great deal of difficulty, for Ecuador at one time controlled the world market. Plant disease and the increased production in competing countries have broken this monopoly. Although Ecuador has much mineral wealth, the mineralized areas are unfavorably located for utilization. One of the immediate needs is better transportation facilities both on the Pacific lowlands and in the highland basins.

PERU

All of Peru is nearer the equator than is Puerto Rico or Mexico City. Its area of 483,133 square miles contains 7,000,000 people of whom 50 per cent are pure Indians, 10 per cent whites, 35 per cent mestizos, and the remainder Negroes and Orientals. The official language is that of the whites —that is, Spanish—but most of the Indians speak various dialects of their own language.

Natural Features

Peru encompasses parts of three physiographic regions, namely, the Central Andes, the Coastal Piedmont, and the Amazon Basin (see pages 145, 148, and 167). In central Peru the Andes are composed of three large mountain chains (Cordillera Blanca, Central, and Oriental, respectively, from west to east) with spacious intervening valleys (Fig. 94).

The climate of the Central Andean highland in Peru, like that of the highlands of Colombia, has a vertical zonation depending on altitude. At any given altitude, temperatures have but little variation. At altitudes ranging up to 4000 or 5000 feet, temperatures are always warm. Above 5000 feet subtropical to temperate and alpine climates prevail. Because Peru is mostly in trade-wind latitudes, the east side of the highland is the windward and hence the rainy slope. The west is the leeward slope, very dry, and consequently crops can be grown only by irrigation. Poleward from 20° south latitude the eastern slope becomes continually drier. The zonal distribution of vegetation in Peru is similar to that in the Northern Andes.

Among the wild animals of this region are the vicuña and guanaco, timid and fleet-footed, which live in the loftiest mountain valleys in the warmer season and descend to lower pastures when the weather becomes cooler.

The Central Andes is one of the world's richest mineralized regions. Gold and silver are found in stream gravels throughout the entire length of the area, but generally not in paying quantities. Copper, widely distributed in Chile, Bolivia, and Peru, especially in the Cerro de Pasco region, forms the basis for the largest mining industry in the Central Andes.

Because the Western Piedmont in Peru is on the leeward slope of the Andes and on the leeward side of the continent in the trade winds, a tropical arid climate prevails (Fig. 90). Floods sometimes occur when the mountain streams are swollen by heavy rainfall on the desert slopes of the Andes.[1] Most of the region is nearly destitute of natural vegetation except for the series of oases created by the score or more of rivers descending from the Andes to the Piedmont. Since new mantle materials are being added to the Piedmont almost con-

[1] Whitbeck, R. H., "The Coast Waters and the Coast Lands of Peru," *Journal of Geography,* February, 1926, Vol. 25, pp. 41-52.

tinually, most of the soils are immature. Where conditions have been favorable for the development of a profile, the soils are pedocals.

Cultural Features

The record of Peru during historic time has been one of turmoil and revolution. During colonial days Peru was the predominant colony in South America and even rivaled Brazil during the sixteenth and seventeenth centuries.

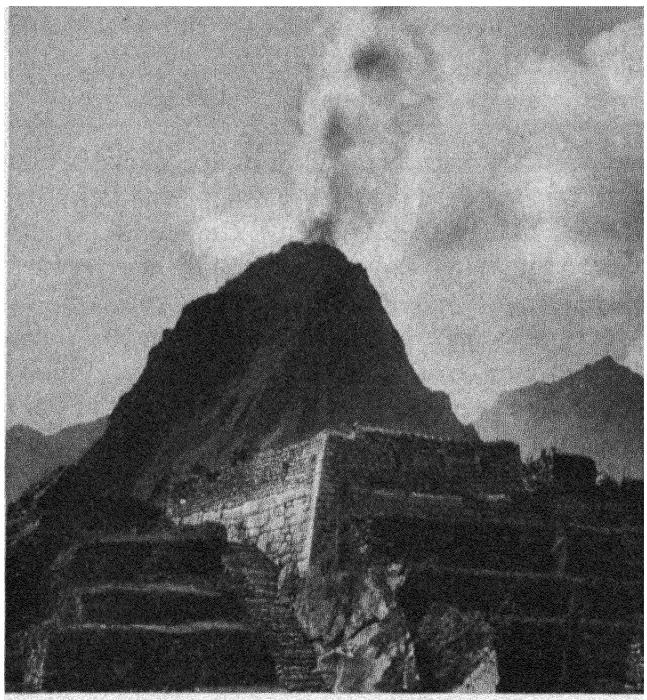


FIG. 101. MACHU PICCHU. Ruins of an ancient Inca capital. On a narrow, dizzy precipitous ridge, 2000 feet above the water's edge in the grand canyon of the Urubamba River, an Andean tributary of the Amazon. The ruins exhibit 200 edifices, built of white granite—palaces, temples, shrines, baths, fountains and numerous stairways. (Courtesy Pan American Union)

The great Inca Empire that ruled the Central Andes in pre-Columbian days extended from what is now northern Ecuador to central Chile, a distance of about 3000 miles. It seems strange that a Spanish army of 400 men should be able to conquer 15,000,000 Incas and destroy their Empire in less than a decade. No doubt Spanish guns were as decisive in conquering the Incas as was the atomic bomb in defeating the Japanese in World War II. The social order in the Inca civilization was dominated completely by the government and the people were regimented in their activities to the smallest detail. The old and infirm found security, and poverty was unknown. Hills were terraced and irrigated, the land was fertilized with nitrates and guano, and home industries were carried on diligently. Highways, buildings, and monuments were of high order, but nowhere did the Incas attempt to penetrate the lowlands (Fig. 101).[1]

Peru achieved independence from Spain in 1824 and her days of statehood have been stormy and characterized by many revolutions. Rivalry with her neighbor, Chile, over the guano and nitrate deposits finally resulted disastrously to Peru in the War of the Pacific (1879-1884). Only recently has the aggravating boundary dispute finally been amicably settled.[2]

Grazing is the principal activity in the high mountain valleys. Wherever irrigation or rainfall permits, wheat, corn, potatoes, and barley are grown in small patches for subsistence (Fig. 102). The crops are worked by hand, machinery being impractical and too expensive.

The llama, the most useful animal, is a docile beast of burden, requiring little attention as to feed and water. It furnishes wool, meat, fat, bone, and, in addition, fuel from dried manure. The llama is to the people of the Andes what the camel is to the hot desert dwellers of Asia and Africa (Fig. 103).

The agriculture on the Piedmont is limited to the irrigated valleys. Here great estates produce commercial crops of cotton and sugar cane. Numerous crops, such as corn, wheat, barley, rice, alfalfa, fruits, and vegetables, are produced for local consumption. Cattle are grown chiefly for meat, draft, and dairy purposes. Swine and goats are raised nearly everywhere because the former feed largely on waste materials on the farms and the latter on the vegetation of submarginal lands.

One of the greatest handicaps of the Central Andes in Peru and the domain of the Amazon Basin in eastern Peru is inaccessibility. Railroads

[1] Means, Philip A., "The Incas: Empire Builders of the Andes," *National Geographic Magazine,* February, 1938, Vol. 73, pp. 225-264.

[2] James, Preston E., "The Geographic Setting of the Tacna-Arica Dispute," *Journal of Geography,* December, 1922, pp. 339-348.

have been extended into the leading copper-mining areas, but transportation in general is dependent upon pack animals, such as the mule or the llama, and in many places the only means of sending goods across the mountains is by human carriers. The result has been little transmountain interchange of goods, the trade on each side of the Andes tending to move toward the ocean it faces. Recently, however, the completion of a 500-mile trans-Andine highway from Lima to the headwaters of the Amazon may mark a new era for Peruvian transportation.[1] Today it takes only five days (two by motor bus and three by steamboat) to travel from Lima to Iquitos—formerly a hazardous 30-day trip. This road is a branch of the famous *Pan-American Highway*.

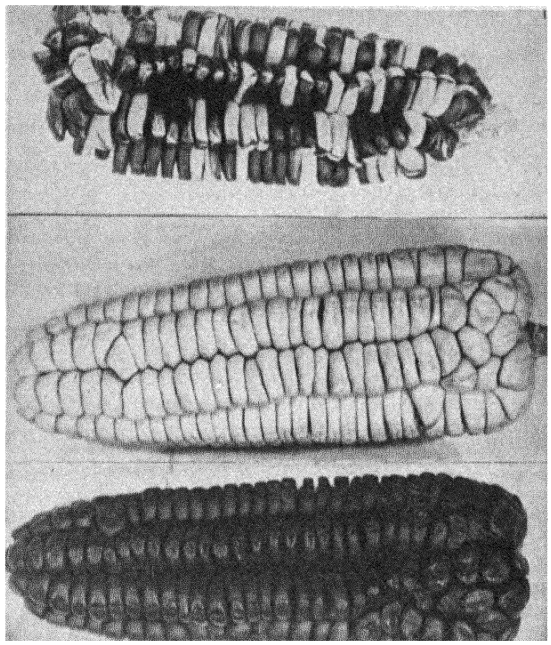


FIG. 102. EARS OF CUZCO CORN. Corn is a native of the Americas, and it is known that the Incas depended for their food supply chiefly on the type of corn shown in this picture. (Courtesy Pan American Union)

Peru's global trade extends to both Europe and Asia, but more than half of it normally is carried on with the United States, Germany, and the United Kingdom (Fig. 104). The excess of exports over imports continues to pile up large trade balances in foreign markets.

CITIES OF PERU. There are numerous small towns on both the Piedmont and the highland. The two leading cities are on the Piedmont and are closely associated—the largest being the capital and the other its seaport. *Lima,* the capital of Peru, 8 miles inland from its port Callao, was founded by the conquistador Pizarro about 400 years ago. The extreme aridity of the surrounding area makes crop-growing dependent entirely on irrigation, the water supply coming from the Andes Mountains. The most available construction material is clay, hence mud-brick structures are numerous. Lima is not only the political but also the commercial and cultural capital of Peru. The University of San Marcos was founded in 1551, nearly 100 years before the establishment of Harvard. *Callao,* the most important seaport in Peru, on the middle Peruvian coast, is on a spur of land projecting into the Pacific Ocean. Its poor harbor is partially protected by San Lorenzo Island, a half mile from the mainland.

Iquitos, Peru, is situated at an altitude of 400 feet on a low wooded bank of the upper Amazon River (Rio Marañon), 2300 miles from the Atlantic Ocean. The city has regular service by river steamboats with the ports on the Atlantic. The population has multiplied many times in the past several decades. One can readily see, then, that some particular resource must have attracted the trade and people who came to Iquitos. This product was rub-



FIG. 103. A CARAVAN OF LLAMAS CROSSING A STREAM IN PERU. These animals are loaded with vanadium ore which is being transported from the mine to the Cerro de Pasco Railway. (Courtesy Pan American Union)

[1] Schley, Major General Julian L., "Ocean-to-Amazon Highway," *Journal of Geography,* May, 1944, Vol. 43, pp. 161-167.

crystalline bedrock, capped here and there by volcanic materials.

EAST BRAZILIAN HIGHLANDS AND COASTAL PLAIN. The Eastern Brazilian Highlands parallel the coast from the eastern extremity of the continent to the estuary of the Rio de la Plata, a distance of about 2500 miles, and extend from 3° south latitude to 35° south. On the interior margins are the Interior Brazilian Plateaus and the Parana-Paraguay Plains. The region varies in width from 300 to 600 miles. These ancient highlands are probably of the same age as the Laurentian Upland of North America.

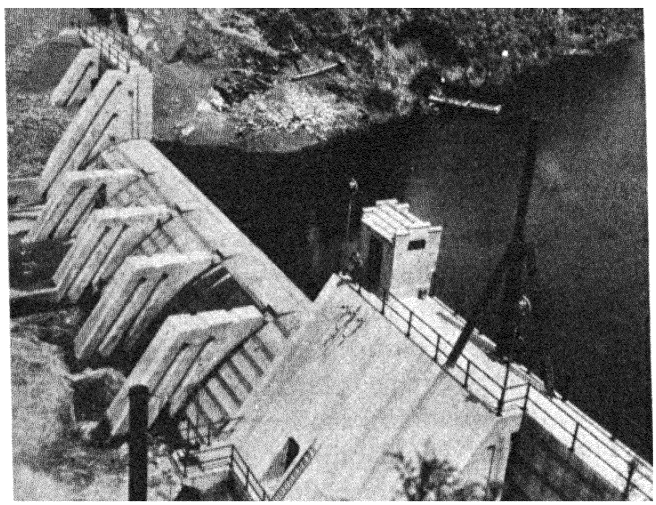


FIG. 120. HYDRO-ELECTRIC DEVELOPMENT IN THE RIO SÃO JOAO. This is near the coast 200 miles southwest of Santos. The seaward margin of the plateau abounds in potential hydropower sites. (Courtesy Pan American Union)

Bordering the seaward margin of the East Brazilian Highlands is a narrow coastal plain which varies in width from zero to 100 miles. Most of the coastal plain on its landward margin is bounded by a steep rugged escarpment ranging in elevation from a few hundred to a thousand or more feet. In a few places, as at Rio de Janeiro, the plain disappears and the escarpment rises from the sea.

Back of the coastal plain are the metamorphic and crystalline Brazilian old lands exposed throughout the entire length of the region except for a few places where they dip under the eastern margin of the Parana Plateau as in southern Brazil. As a rule the old massif is rugged, having been incised deeply by many streams (Fig. 120).

The *Parana Plateau* along the upper course of the Parana River is an area covered in part by lavas into which some of the tributaries of the Parana have carved deep gorges, and with which are associated some magnificent waterfalls. The falls of the Iguassu River are among the greatest in the world (Fig. 121).

The *São Francisco Valley* is a part of the East Brazilian Highlands in which a river has stripped much of the younger sedimentary materials from the old land and exposed the crystalline rocks, such as granites, gneisses, and schists. Among the earth materials are several minerals of commercial importance—namely, diamonds, and ores of gold, manganese, copper, and iron. Coal is mined in commercial quantities on the coastal plain from São Paulo south to the Uruguay border.

Three large rivers drain the East Brazilian Highlands—the *Uruguay*, the *Alto Parana*, and the *São Francisco*, the last of which flows northeastward paralleling the coast for nearly 1000 miles before it cuts across the escarpment into the Atlantic. Altitudes rise above 4000 feet in a few places only and in most places are approximately 2000 feet.

INTERIOR BRAZILIAN PLATEAUS. The Interior Plateaus of Brazil extend in an east-west direction from the great westward bend of the Madeira River to the northward bend of the São Francisco, a distance of more than 1500 miles. The north-south extent is about 1000 miles and the total area is equal to nearly one third of the United States. The region, occupying almost the entire central part of Brazil, has never been throughly explored, and is one of the sparsely populated sections of South America.

Most of the region is below 2000 feet in altitude, although there are some areas that range to nearly 5000 feet. This corresponds closely to the altitude of the Great Plains of the United States. In most places the southern margin is the divide between the southward-flowing and northward-flowing streams, hence the region is almost wholly within the Amazon drainage system. The large rivers that flow northward over the area parallel each other to a considerable degree. For this reason most of the interstream portions consists of long, north-

south, flat-topped ridges. One such interfluve, the *Bananal Island*, 200 miles long, is especially unique in that it was formed by the division and reunion of the *Rio Araguaya* northeast of the Plateau of Mato Grosso.

For ages streams have been cutting into the Interior Brazilian Plateaus removing much of the sedimentary overlayer of rock and exposing the old crystalline and metamorphic basement com-



FIG. 121. IGUASSU FALLS ON A TRIBUTARY OF THE PARANA. In Brazil 500 miles southwest of São Paulo. Here a series of 20 or more magnificent cataracts descend in scintillating spray into the deep gorge at the base of the falls. (Courtesy Pan American Airways)

plex, especially in the southeast *Goyaz Plateau* section. In the interior is located the famous *Mato Grosso Plateau* (meaning great woodland), an ancient massif that has been dissected by streams whose headwaters are in the area. The Mato Grosso still retains much of its sedimentary bedrock covering.

COUNTRIES DOMINATED BY THE EASTERN HIGHLANDS

Brazil, the largest country of South America, *Uruguay*, the smallest one, and *The Guianas*, three small dependencies are associated with the Eastern Highlands.

BRAZIL

The United States of Brazil is a republic of twenty federated states, a federal district, and one territory. It is larger than the United States and has about 30 per cent as many people, most of whom live adjacent to the southeast coast.[1] In both east-west and north-south directions Brazil's extent is equal to the distance from Boston, Mass., to Los Angeles, Calif. Its position astride the equator insures a tropical climate for all but a small area in the extreme south. Even so, much of the southern part is high enough to have a climate that is not too warm. The extreme southern panhandle section of the country is subtropical humid.

Natural Features

By far the largest part of Brazil is in three physiographic regions—the East Brazilian Highlands, the Interior Brazilian Plateaus, and the Amazon Basin (see page 167). However, in the far north the country extends into the Guiana Highlands, and in the west into the Parana-Paraguay Plains (see page 167). The topographic and structural features of these regions have been discussed, but the climate, natural vegetation, and soils of the country need special consideration.

It should be recognized first of all that the climates of Brazil are dominated almost entirely by the equatorial belt of low pressure and the trade winds. Any departure from the normal pattern of climatic arrangement is controlled mostly by the areal distribution of land forms and differences in altitude. Most of the Amazon Basin has a tropical rainy climate with rain forest vegetation and lateritic soils (Figs. 236, 237, and 238). The chief exception to this condition is found south of the Guiana Highlands during the southern summer. The average annual temperature at Manaus is 79° F., and the difference between the warmest month (November) and the coolest (March) is only 4° F. (Fig. 90). The average annual rainfall is 84 inches—April being the rainiest month (13 inches) and September the driest (1.5 inches). The escarpment facing the ocean in southeastern Brazil is constantly in the trade winds, which accounts for the fact that much of this coastal strip has a tropical rainy climate.

The highland section of Brazil almost coincides with its area of tropical wet and dry climate,

[1] Gauld, Charles A., "Brazil Takes a Census," *Journal of Geography*, April, 1941, Vol. 40, pp. 138-144.

the rainy season occurring when the equatorial rain belt has moved southward. The rainfall at Morro do Chapeo (altitude 3600 feet) in the great bend of the São Francisco River is 34 inches, distributed throughout the year in about the same proportions as at Manaus. The rainfall becomes somewhat less farther inland, and for this reason the transition in natural vegetation is from scrub forests in the east to savannas in the west. Soils in the highland of Brazil are mostly of the red and yellow type. It should be noted here that, although the southeastern part of the country is well within the tropics, the climate is not excessively warm because much of it is from 2000 to 5000 feet in altitude.

Cultural Features

A basic factor in the early settlement of eastern South America was the fact that this was the part of the continent closest to Europe. Sailing for hundreds of miles along the southeast Brazilian coast early in the sixteenth century must have been a thrilling adventure to Portuguese, Spanish, and English navigators. This was the only part of the new world which the Portuguese successfully colonized. During the sixteenth and seventeenth centuries the Portuguese explorers established trading centers along this coast, and trade with the mother country was so flourishing and the colony was so valuable that the King of Portugal fled to Brazil when Portugal was invaded by Napoleon's armies in 1807. Here an empire was established with Rio de Janeiro as the capital. When the Napoleonic Wars were over the King returned to Portugal, but he left his son as regent of Brazil. The son, coerced by the merchants and traders of Brazil, piloted the country to independence in September, 1822.

Developments came rapidly in southeast Brazil after independence, and, although war and revolution were waged most of the time, the country was able to establish trade with the world powers after the Portuguese monopoly was broken. Although Brazil nominally has a representative form of government, dictators have ruled the country most of the time since the latter part of the nineteenth century.

EASTERN AND SOUTHERN BRAZIL. The areas of most intensive cultivation in Brazil are the coffee lands on the highland back of São Paulo and Rio de Janeiro (Fig. 122). In four states of this section there are nearly 2,000,000,000 coffee trees. Several physical factors combine to make this the largest coffee-growing area in the world. Among these are the rolling topography suitable for water and air drainage, deep friable soil which is fertile and high in iron and potash content, and the dry, warm



FIG. 122. RAILROAD FROM SANTOS TO SÃO PAULO. Difficulties attend the climb of 2500 feet in a distance of only 25 miles up the incised margin of the Brazilian Plateau. Trestles, tunnels, and terraces are evidences of the engineering difficulties present. (Courtesy Pan American Union)

sunny autumns which are favorable for picking, washing, and drying coffee. It is difficult to prevent overproduction of this commodity in Brazil, so favorable are geographic conditions. Coffee is and has been for some time Brazil's most important export (Fig. 123).[1]

The coastal lands in the southeast are well suited to the growing of sugar cane, tobacco, cacao, and cotton, large quantities of each being exported (Fig. 7). In the south corn, beans, rice, and potatoes thrive, and are used principally for home consumption. In the northeast section of the Eastern Highlands goats are raised in large numbers, chiefly for their skins, whereas in the central and southern parts, swine and cattle are important.

In southern Brazil is one of the largest softwood timber stands in the world. Here, the Parana pine yields millions of board feet of lumber each year.

[1] James, Preston E., "The Coffee Lands of Southeastern Brazil," *Geographical Review*, April, 1932, Vol. 22, pp. 225-244.

Oruro and *Potosi*, both mining towns of about 35,000 people each, are on the plateau near rich deposits of tin and copper. They were famous silver mining towns in the days when Bolivia belonged to Spain.

PROBLEMS CONFRONTING THE PEOPLE. Less than 15 per cent of the people on the Bolivian Plateau control the good land, the means of production, and the government. The indigent natives are almost without educational opportunities. The people, many of whom are now dependent almost entirely upon mineral exploitation, should foresee the time of diminishing productivity of the mines, plan for a wiser use of the land already occupied, and look to the lowlands on the eastern side of the mountains for productive and fertile lands on which to settle. If the government should foster cooperation with the thousands who live on such a mean level, more social stability for the country might be expected. In many cases the land could be used to better advantage, but in others it might be better to resettle some of the people who now live on the poorer lands. More efficient mining methods would bring greater returns. How much leadership to solicit or accept from outside sources is a problem that must be met. Perhaps something could be done to encourage a tourist trade to this land of the ancient Inca, to increase its lure for the anthropologist, and to make more accessible its numerous natural wonders. The future of the plateau doubtless depends on adaptable forms of agriculture, because mineral production must some day decline; and when that day comes the people should be prepared to make the transition with a minimum of strife and hardship. The lowland has large possibilities, not the least of which is the prospect for petroleum. Remoteness and unfavorable climate are serious handicaps that may postpone prosperity to an indefinite date.

CHILE

Chile, although not surrounded by sea, is at least unable to get far from it. The country extends more than 2500 miles from north to south, yet no part is more than 200 miles from the Pacific Ocean; and throughout most of its great length it is less than 100 miles wide. The cold ocean current that sweeps along the shores brings life of fur and feather to mingle with that of the subtropics. The fuchia and humming bird journey southward to the Strait of Magellan, whereas the penguin follows the sardine to the *Bay of Valparaiso*.

Natural Features

Even though Chile is a narrow country, its boundaries are nearly all natural barriers—the Pacific Ocean bordering on the west and the crest of the Andes on the east. Each of its great natural features (the Andes, the coastal ranges and islands, and the interior troughs) extends practically the full length of the country (see page 147). With a great north-south extent, ranging from far within the tropics to 55° south latitude, a large variety of climates may be expected, especially since the major topographic features run at right angles to the climatic belts. In the north, Chile has a tropical dry climate, in the middle is the subtropical dry summer, and in the south the cyclonic marine prevails (Fig. 236). The cool Peruvian (Humboldt) current which flows equatorward along the coast tends to accentuate the extreme aridity in the north because all the winds blowing from this cold current onto the land are warmed, thereby gaining in water-holding capacity. This coast is almost rainless, except on rare occasions when the warm southward-flowing El Niño current displaces the cold current. Torrential downpours then may flood the mountain slopes, the desert, and the coastal lands.

Middle Chile, like California, gets its rainfall in winter—that is, at the time of year when the westerly winds have migrated farthest equatorward. Santiago in the Chilean Valley, according to a 64-year record, receives a median annual rainfall of 11.7 inches, ranging from 2.6 inches to 32.3 inches. The dependability is only 13 per cent. Thus, the Coastal Ranges, although not high, do reduce precipitation in the valley.

Southern Chile has a west coast marine climate, and hence receives much rainfall throughout the year. Valdivia receives more than 100 inches annually, most of it coming in the winter (Fig. 90). South of this station rainfall increases and the islands are subject to cool, damp weather throughout the year. Here the Westerlies, lustily blowing

unimpeded over broad expanses of ocean, are known as the "Roaring Forties."

From La Serena (median annual rainfall 4.8 inches) and Coquimbo northward stretches one of the greatest coastal deserts in the world. Scattered oases may be seen throughout the great extent of aridity, but there are hundreds of miles where little or no vegetation exists. From 30° south latitude the natural vegetation changes from semiarid grasslands and deciduous broad-leaved forests to the luxuriant deciduous and evergreen forest and rich grasslands in the southern part of the country (Fig. 237).

The mature soils, responding to the influence of climate and vegetation, range from the gray desert pedocals in the northern third of the country to the gray-brown podzolic pedalfers in the south (Fig. 238).

Cultural Features

One can well imagine the pleasant surprise of the Spaniards when, after cruising southward 2000 miles along the great coastal desert, they again saw green forests. Is it any wonder when they began to explore the subtropical coast that they named the place Valparaiso (Valley of Paradise)? The desert was not inviting, so they chose to utilize the subtropical section, especially the interior valley, the coast merely furnishing bases for harbors and forts. In their conquest of this part of South America the Spanish encountered stubborn resistance on the part of the Indians. It is no wonder that the Indians were reluctant to give up such a fine homeland with its fertile soil, invigorating climate, rich mineral and forest lands, and nearly everything man wants to satisfy his material needs. The Indians were subdued, however, and this became one of Spain's choicest colonies. Successful estate agriculture was established, the domesticated plants of the Spanish homeland thrived here, and soon the colony was self-supporting and had handsome surpluses to send to the mother country. Gold, silver, and copper were exported in vast quantities also. It was not until the nineteenth century that the nitrate riches in the northern desert began to be exploited. Then, nitrates became the leading mineral of the country.

The Chilean coastal ranges and islands are not favorable for farming. In the south the raising of sheep for wool has gained considerable prominence, inasmuch as wool is not too bulky for economic long-distance transportation. Some lumber is shipped to Argentina. The middle and northern coastal ranges support few people because rainfall is sparse and only an occasional stream flows through the coastal mountains, making irrigation water almost nonexistent. The few small towns along the northern coast of Chile are ports through which nitrates, borax, copper, and some other minerals are shipped.



Fig. 106. A Rural Scene in Chile. A pasture with cattle and horses in the foreground, a grain field in the middle and the lofty Andes in the distance. This is in the southern part of the Valley of Chile. (Courtesy Pan American Union)

The Valley of Chile, the best part of the country, is usually entered through the major seaport, Valparaiso. The isolation of this valley has contributed to a culture and a kind of progress unique to this particular area. It was necessary through the years for the people to be largely self-sufficient. The portion of Chile in the vicinity of Santiago is the most densely populated. About nine tenths of the people in Chile live in the "California Valley" of South America and the bordering coast land. The agricultural development of this valley is similar to that of the California Valley. General and truck farming, fruit growing, and dairying for both subsistence and commercial purposes are the prevailing types of farming (Fig. 106). On the upland slopes the grazing of sheep and cattle is the principal industry. Swine thrive nearly everywhere. Subtropical fruits, such as oranges, grapefruits, lemons, and grapes, are grown in the equatorward part of the valley, generally under irrigation. Here, as in California, vast quantities of grapes are used fresh and as raisins. Large vineyards near Santiago

produce millions of gallons of wine per year. Even so, Chile imports wine from California, France, and Portugal. The Chilean Valley will produce almost any type of fruit or vegetable that is grown in the United States, and the same holds true for the cereal crops, such as wheat, oats, barley, and corn.[1] Thousands of bushels of apples are exported each year from the Chilean Valley. Animals, food, and feed products are shipped to the nitrate regions in the North.

Manufactures consist of flour and food products and some steel. Because of the excellent forests in Chile held a monopoly in the output of this mineral, but now the synthetic production by a number of nitrate-consuming countries is supplying much of the world's increasing demands. Chile now provides about one fourth of the world's needs. Although price control and outmoded methods of recovery helped to destroy the Chilean monopoly, recent improved methods of processing are likely to keep Chile in the world's nitrate market for a long time. Chile trades with many countries, but about one half is usually carried on with three countries—the United States, the United Kingdom,

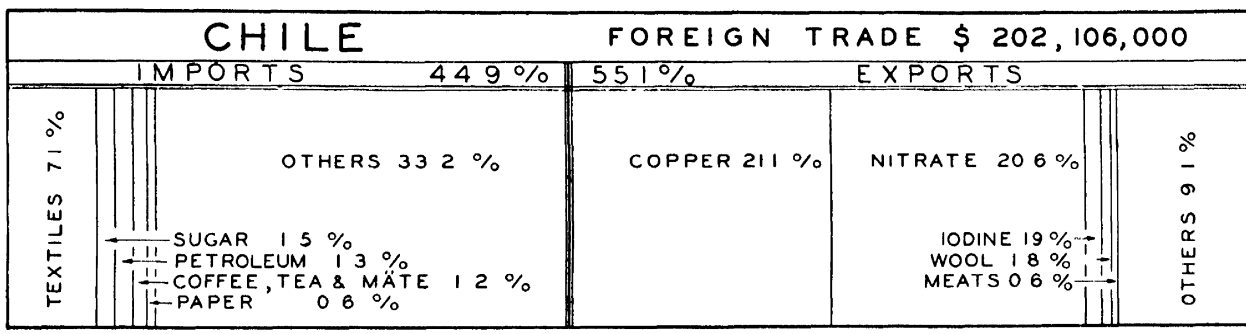


FIG. 107. CHILE'S FOREIGN TRADE. A 12-year average preceding World War II. More than 80 per cent of the exports are copper and nitrates. (From *Statesman's Yearbook*)

and surrounding the southern end of this valley, lumber industries have gained considerable attention.

Mining is one of the important industries of the region, copper, iron ore, and coal being secured in commercial quantities. Copper ore is mined in the Andes southeast of Santiago and also in the mountains east of the Atacama desert. Chile's output of copper is second in the world, and the reserves of copper ore are very large, but the mining of coal is profitable only around Concepcion. The mining of iron ore has developed recently near Coquimbo but, due to the lack of coking coal, the ore is exported mainly to the United States.

In the dry interior plateaus of northern Chile, especially in the Atacama Desert, are the world's largest deposits of natural nitrates.[2] For a long time and Germany (Fig. 107). During World War II, the United States took nearly three fourths of Chile's exports, most of which was copper.

CITIES OF CHILE. A valuable railroad extends lengthwise through the Chilean Trough from *Puerto Montt* on the *Corcovado Gulf* to Arica in the extreme north. Along this line are the main urban centers. Most of the cities are small, either mining towns or agricultural depots. The long interior railroad paralleling the coast is connected with the seashore and with Andean valleys by more than thirty branch lines. A town usually is located on each end of these branch lines—one at its junction with the main line and the other on the coast or in the mountain valley.

The coast of Chile has several flourishing urban centers, some of them among the largest in South America. Most of the larger urban units have world trade relations, and because each is primarily dependent upon the products of its hinterland, the cities vary from north to south in function and character.

[1] Moore, Robert W., "Chile's Land of Fire and Water," *National Geographic Magazine*, July, 1941, Vol. 80, pp. 91-110.

[2] Rich, John L., "The Nitrate District of Tarapaca, Chile: An Aereal Traverse," *Geographical Review*, January, 1941, pp. 1-22.

Santiago, near the northern end of the Valley of Chile, is between two gateways, one leading westward through the Coastal Range to the seaport, Valparaiso, 17 miles away and the other opening eastward through the Uspallata Pass, over the Andes to Buenos Aires (Fig. 108). Santiago is not only the most important city of the valley, the capital of Chile, and the metropolis of the region, but it also is the largest city on the west coast of the Americas

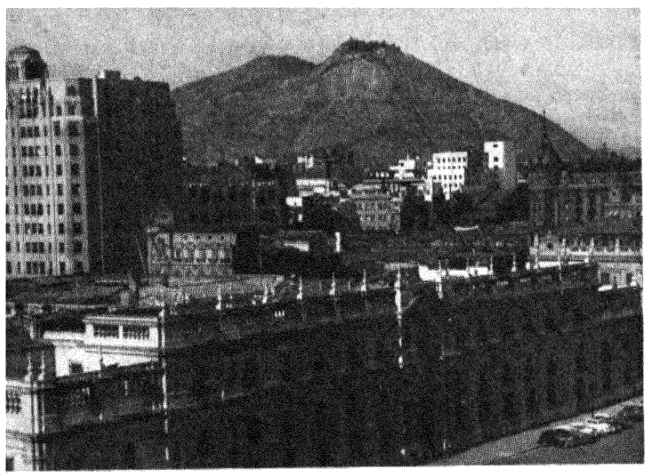


FIG. 108. A CORNER OF SANTIAGO, CHILE. The Presidential Palace in the foreground and Cerro San Cristobal, one of the foothills of the Andes in the background. This is the largest city on the west coast of South America. (Courtesy Chilean National Tourist Bureau)

south of Los Angeles. It is the outstanding city of Chile in cultural, political, and economic activities and here are located the leading schools, universities, and business houses of the country.

Valparaiso, the largest seaport on the western coast of South America, is connected by rail with Santiago in the Chilean Valley. It is also the western terminus of the Trans-Andine Railway which crosses the Andes in the Uspallata Pass. Although the bay is deep, it is not a well-protected harbor because it is wide, and breakwaters are being built to make it safer. Valparaiso owes its greatness to its location in a gateway to the ocean from the most densely populated area in the temperate region west of the Andes.

Concepcion, the metropolis of south-central Chile, is on the Bio-Bio River, which empties into the *Concepcion Bay*, one of the fine basins on the coast of Chile. Its hinterland is rich in mineral and agricultural resources.

Antofagasta is the Pacific terminus of the Antofagasta-Bolivia Railway. This city is the port for some of the world's largest copper mines which are located in the Central Andes. It is not only a Chilean port, but it also serves Bolivia.

Iquique, long famous as the world's greatest nitrate port, is about 800 miles north of Valparaiso. The city depends for its water supply entirely upon a pipe line from the Andes 75 miles away. It is connected with the long north-south railroad just east of the Coastal Range.

LOOKING AHEAD. While Chile's development has been closely connected with mineral exploitation in the past, most geographers think that its future will be predominantly in agriculture. Human occupancy of the valley could be more intensive. More forest land could be cleared, more land could be irrigated, and increased areas of grazing land, particularly in the south, could be utilized. This region should continue to raise enough surplus agricultural goods for use in the desert region to the north where nitrate and copper mines are located. Transportation and communication throughout the valley should be improved, thus leading to closer cooperation between the widely separated parts of the country. The southern lakes section offers possibilities for tourist trade and travel. This section of the country may some day become a great playground.

The prospects for the future of the Valley of Chile seem bright indeed for the climate is not only healthful and invigorating, but conditions are favorable for abundant production of the necessities of life.

Everywhere along the coast, with the possible exception of Valparaiso, the people tend to look toward the sea. Greater diversity is not probable until the minerals near exhaustion, or competition makes their exploitation unprofitable. Even now Chile is faced with the problems of competition in her nitrate industry. Synthetic production in Germany, Norway, and in other countries has curtailed

the demand for Chilean nitrate. The coast towns of the north will decline if the trade in nitrates is lost.

Adjustment to this situation is fraught with difficulties. The nitrate areas are completely dependent upon the outside for food, clothing, and other goods. Here and there are spots that might be irrigated, furnishing some opportunities for readjustments as the demand for nitrates continues to decline and the surplus of laborers increases. It is probable that thousands will be forced to migrate. When this occurs, the southern coastal islands and the southern portion of the Valley of Chile can furnish a haven for increasing numbers.

15

Interior Lowlands and Associated Uplands

THE INTERIOR LOWLANDS AND ASsociated Uplands of South America lie east of the Andean Highlands and extend from the Caribbean Sea to the Strait of Magellan—a distance of 4500 miles. Contrasts in topography, climate, natural vegetation, and soils are remarkable, for the area extends from 10° north latitude to 55° south. This portion of South America is composed of two divisions—the *Interior Plains* and *Argentinian Uplands.*

INTERIOR PLAINS

Although the Interior Plains of South America possess much physiographic unity, they contain many natural and cultural contrasts. Areas of dense population are found in Argentina; and there are districts in the Amazon Basin containing less than two people per square mile. Tropical rain forests with great trees, lianas, bright flowers; birds with beautiful plumage; monkeys with their long tails, very useful in climbing from limb to limb; large snakes—green in color—often hanging like vines from trees; and water-loving animals such as alligators and turtles, characterize the native life in the Amazon Basin. Here transportation is principally by boat, foot, or mule. In contrast, the pampas of Argentina, likewise a flat level area, contain excellent grasslands which formerly were occupied by some "gigantic forms" of prehistoric reptiles and mammals. In the drier short-grass sections, fleet-footed animals, prairie dogs, birds, and insects such as ticks, mosquitoes, and flies are abundant today—the latter being entirely too abundant In the more humid sections of the pampas, wheat and corn fields supplement the tall grasses of the prairie lands. Large herds of domestic sheep and cattle now range over the grasslands of the pampas. The eastern portion is traversed by many railroads and highways.

West of the Interior Plains are the Andes Mountains and the Argentinian Uplands; on the south and east are the Atlantic Ocean and the Eastern Brazilian Highlands; and on the north are the Northern Andes, the Guiana Highlands, and the Atlantic Ocean. These extensive plains comprise about one half of South America. They vary in altitude from sea level to about 1000 feet with most of the area lying below 500 feet.

The Interior Plains may be subdivided into four physiographic regions—namely, (1) the *Orinoco Plain,* (2) the *Amazon Basin,* (3) the *Parana-Paraguay Plains,* and (4) the *Pampas Region* All of this vast flat-lying area is underlain by sedimentary materials. The three regions to the north, underlain by recent marine sediments, have a surface veneer of alluvium, deposited by large rivers whose sources are in the Andes Mountains and in the Eastern Highlands. In the Pampas Region, the poorly cemented and unconsolidated bedrock is overlain by a coat of aeolian and alluvial materials.

ORINOCO PLAIN. The Orinoco Plain, generally known as the *Llanos,* borders the western edge of the Guiana Highlands, the northern side of the Amazon Basin, and the eastern and southern flanks of the Northern Andes. The area is approximately 1000 miles long and 100 to 400 miles wide, covering an area about as large as that of Texas.

The *Rio Orinoco* and its tributaries drain the region. The northernmost tributary, the *Rio Apure* and the *Rio Meta* farther south, both of which obtain waters from the eastern range of the North

ern Andes, flow in a northeasterly direction into the Orinoco. The southernmost tributary, the Rio Guaviare, has its headwaters in the mesa near the Orinoco-Amazon divide.

The topography of the Llanos consists of plains rising in altitude from sea level to 700 feet or more along the edges of the highlands. At the mouth of the Orinoco, the deltaic plain is a swampy land consisting of mud, silt, and sand, and it is intricately intersected by a network of streams formed by the distributaries of the Orinoco. Sometimes it is difficult to tell where the sea begins and the newly made land ends. Most of the interior parts of the Llanos country consist of dissected river plains. The topography is generally flat with a few small areas of old hills, whereas here and there recent sand dunes break the monotony of levelness. Near the mountains, the western edge of the plains rises into rolling hills.

The whole region is underlain by soft sedimentary rocks covered largely by an alluvial mantle. Parent materials for soils range from coarse gravels on the mesas and near the mountains to finer silt loams and clays in the lower portions of the plains.

Amazon Basin. The Amazon Basin, the largest and one of the most homogeneous physiographic regions in South America, varies in width from about 800 miles in the west to less than 400 miles in the east, and extends from the Atlantic Ocean to the Andes, more than 2000 miles. It is larger than all of the area east of the Mississippi River in the United States. On the northern border are the Guiana Highlands and the Orinoco Plain; to the west rise the majestic Andes; and on the south are the Parana-Paraguay Plains and the Brazilian Highlands. The eastern margin is lapped by the Atlantic Ocean.

The surface is a plain, much of which is poorly drained, although the drainage improves toward the uplands and on the outer margins of the rain forests. This vast area varies in altitude from sea level to not more than 1000 feet along the marginal uplands. At least one half of the area is less than 500 feet above sea level. This, one of the world's great river basins, is drained by the mighty Amazon and its hundred or more tributaries, eight of which are each navigable by small craft for more than 1000 miles.

Although the Missouri-Mississippi River is the longest river in the world, the Amazon discharges more water into the ocean than any other river. In some places it is 120 feet deep. The gradient is low, the last 500 miles of its course having a fall of less than one half inch per mile. Two thousand miles from its mouth, the river is only 35 feet above sea level. The major trunk of the Amazon terminates 200 or more miles from the Atlantic Ocean where it divides into numerous distributaries, two of which separate the *Marajo Island* from the mainland. The *Rio Negro* and the *Rio Japura* are large tributaries from the north. The *Rio Marañon* rises in the Andes and joins the *Rio Javary* near *Tabatinga* to form the Amazon. The most important tributary from the south, the *Rio Madeira*, is navigable by vessels of 6000 tons to *Porto Velho*.

The bedrock of the Amazon Basin is sedimentary, poorly cemented in many places. The mantle is largely of alluvial origin. Poorly drained, heavy, dark soil materials prevail along the streams, whereas on the uplands are found moderately heavy to fine sandy loams. The mature soils are badly leached and low in productivity, and much of the alluvium is water logged. Alluvial terraces and natural levees, when well drained, are rich and productive. Fertility in general is short-lived unless fertilizers are added.

Parana-Paraguay Plains. The Parana-Paraguay Plains are bounded by the Amazon Basin on the north, the Eastern Highlands on the east, the Interior Basins and Ranges on the west, and the Pampas on the south. It is separated from the Amazon Basin by a low divide of less than 1000 feet in the western Mato Grosso. The area extends about 1500 miles from north to south and is 400 to 600 miles wide.

The region is drained principally by the *Parana-Paraguay* and the *Uruguay* rivers. The central portion, along the major axis, is a low alluvial plain sloping gently southward. Low foothills are visible near the higher lands on both east and west margins. Most of the region is less than 500 feet above sea level, and there are vast areas near the major streams which are below 200 feet in altitude. Swamp lands occur in many places from the headwaters of the Paraguay to the Rio de la Plata estu-

ary. Much of the plain lying in eastern Bolivia and western Paraguay is called the *Gran Chaco* (hunting ground).

Only three rivers of importance cross the Chaco from the western mountains to the main streams. The *Rio Pilcomayo*, rising in the Bolivian Andes and serving as the boundary between Bolivia and Argentina, flows southeastward and enters the *Paraguay River* near Asuncion. The *Rio Bermejo*, about 100 miles farther south, divides into a maze of channels and becomes a braided stream after it enters the plain. These channels join farther downstream to form two major channels each of which becomes quite large during the rainy season. The South Bermejo, occupying a normal channel, is navigable to the point where the new river joins the old, about 200 miles from its junction with the Rio Paraguay. The *Rio Salado* rises in the Andes west of the city of Salta and reaches the Parana about 50 miles above Rosario.

All of the rivers are similar to those of the Great Plains in the United States in that they have braided channels and become so nearly dry during the dry season that grasses sometimes grow in their courses. Along the Paraguay and Parana rivers are numerous flood-plain lakes in which are stored much flood water during the rainy season.

The underlying bedrock is mostly sedimentary, lying generally in horizontal strata as it does in the Great Plains of the United States The mantle materials are mostly of alluvial and aeolian origin.

Pampas Region. The *Pampas Region*, an area not quite as large as Texas, includes the finest black agricultural land in South America. The area, occupying about one fourth of Argentina, extends in a half-circle on its seaward margin from Buenos Aires to Bahia Blanca and is bordered on the north by the Parana-Paraguay Plains, and on the west and south by the Interior Basins and Ranges and the Patagonian Tableland.

The Pampas region is one of the most level and uniform plains to be found anywhere. Westward from the low cliffs on the Atlantic Coast it rises only 5 feet per mile for hundreds of miles Southwest of Buenos Aires are two small mountainous areas, one, the *Sierra de Tandil*, rising to an altitude of 750 to 1500 feet and the other, the *Sierra de la Ventana*, 3000 to 4500 feet high.

The Pampas on the whole are so flat that surface drainage in many sections is imperfect. Many streams do not have well-defined valleys and many do not continue to the seas; consequently, over thousands of square miles not a river can be seen. Much of the drainage is subsurface and becomes apparent only in depressions occupied by seasonal lakes and marshes. The ground water is usually abundant and relatively near the surface. One river, the Rio Salado, originating in the northwestern section of the region, empties into the Atlantic Ocean southeast of Buenos Aires. The only stream of any significance which crosses the Pampas from west to east is the *Rio Cuarto* which enters the Parana River north of Rosario.

The bedrock of the two sierra areas is largely crystalline with some sedimentries on the flanks, but the Pampas, for the most part, are underlain with stratified sedimentaries over which are deep deposits of alluvial and aeolian materials. Much of the area is covered with loess, and in some places the surface consists mostly of volcanic ash.

ARGENTINIAN UPLANDS

The Argentinian Uplands stretch from Tierra del Fuego to southern Bolivia—a distance of 2500 miles. They vary in width from a few miles at either end to more than 400 miles in the middle, and the total area is equal to six times that of Arizona—nearly one fourth that of the United States. On the west rise the lofty Andes, and adjacent on the east are a portion of the Interior Plains, and the Atlantic Ocean. These uplands, because of differences in topography and structure, may be divided into two regions—namely, the *Interior Basins and Ranges*, and the *Patagonian Tableland*.

Interior Basins and Ranges. This region of basins and ranges in northwestern Argentina and southern Bolivia is more than 1000 miles long and has an area of 300,000 square miles. The topography is similar in some of its aspects to the Basin and Range Region of the United States. In the basins between the ranges and in the adjacent plains on the east are a number of oases which derive water for irrigation from mountain streams. The region slopes gently toward the south and

east, most of it lying below 1000 feet with ranges here and there rising from 3000 to 5000 feet in altitude. The area is chiefly one of interior drainage, with some saline deposits in the basins. However, three large tributaries of the Parana—the Pilcomayo, the Bermejo, and the Salado—flow out of the region.

Sedimentary rocks underlie most of the area. Along the streams are deposits of alluvium and the basins are generally filled with detritus from the uplands. East of the Sierra de Cordoba, the bedrock structure is favorable for flowing wells.

PATAGONIAN TABLELAND. The Patagonian Tableland lies between the Andes Mountains and the Atlantic Coast, extending from approximately 35° south latitude to Tierra del Fuego, a distance of 1500 miles. Its widest extent, near the 40th parallel, is approximately 450 miles. The east coast is an area of subsidence, making the shoreline irregular with many deep indentations, such as the gulfs of *San Matias* and *St. George*, and the Strait of Magellan.

The region is, in reality, a series of plateaus ranging in height from a few hundred feet on the eastern margin to 5000 feet at the foot of the Andes. Between the Andes and the plateaus of Patagonia is a great north-south trough or depression, extending for at least 1000 miles. The western edge of the plateaus is an escarpment below which is the trough. Among the best lands of the whole region are those in this depression. Piedmont glaciers of Pleistocene times covered a considerable portion of the tableland, and deposited morainic and glacio-fluviatile material, leaving much of the land boulder-strewn. A large part of Patagonia has been deeply dissected by streams, especially the escarpment bordering the subcordilleran trough. On the eastern slope of the Andes are many beautiful finger lakes (Fig. 109). The bedrock consists of sandstones, limestones, and some lava materials.

COUNTRIES IN THE INTERIOR PLAINS AND ASSOCIATED UPLANDS

The Interior Plains and Associated Uplands either dominate or play a large part in the interests and activities of the people of three countries—namely, *Argentina, Paraguay*, and *Venezuela*. It is true that much of Brazil is in the Amazon Basin, but politically it is only an immense outlier in the life and thought of the Brazilian people.

ARGENTINA

Argentina and Chile are on opposite sides of the Andes. In latitudinal extent they are almost equal, but Argentina is nearly four times as large. Although each has tropical, subtropical, and cyclonic



FIG. 109. LAKES AND MOUNTAINS IN ARGENTINA. Nearly 1000 miles southwest of Buenos Aires at the foot of the Southern Andes. Snowcapped Mt. Tronadon in the distance. (Courtesy Pan American Union)

climates, the climatic contrasts are remarkable largely because of the Andes Mountains. These contrasts are reflected in the differences in land utilization in the corresponding latitudes of the two countries.

Natural Features

Argentina encompasses considerable topographic diversity, and either includes or reaches into six or seven physiographic regions. Of these the Pampas, the Interior Basins and Ranges, the Patagonian Tableland, and the Parana-Paraguay Plains are the most significant in the economic life of the people (see pages 167 to 169).

Most of the northern half of the country has tropical and subtropical climates with rainfall ranging from 10 to 20 inches (Fig. 236). Tucuman, on the windward slope of the mountains in the trade winds, receives a median annual rainfall of 39 inches; but Mendoza, on the leeward slope in the westerly winds, receives a median of only 8 inches

annually (Fig. 90). Most of the Pampas have a subtropical humid climate with rainfall somewhat less dependable than in the corresponding climate in the United States. (Buenos Aires 67 per cent and Jacksonville 77 per cent). At Buenos Aires one



FIG. 110. TYPICAL VEGETATION
This area two or three hundred miles south of Uspallata Pass, is in the rain shadow of the Andes (Courtesy Pan American Union)

half of the time the rainfall ranges between 30.3 inches and 44.2 inches. All of Argentina south of 35° south latitude is on the leeward side of the Andes, and, therefore, has continental dry climate. At Bahia Blanca the median annual rainfall is 20.1 inches, whereas 160 miles northwest, at General Acha, it is 18.3 inches. Droughts in this part of the country are frequent. Farther south the precipitation drops to 5 or 6 inches annually. The subcordilleran trough, although in the rain shadow of the Andes, is somewhat better watered

As might be expected the natural vegetation is diverse, encompassing all the changes that are associated with the differences in climate (Fig. 110). Little of the country has good forests, the terrain being covered generally by grasses that vary from the rich growths on the Pampas to the semiarid and arid species in the west and south (Fig. 237).

Most of the mature soils are pedocalic—changing from chernozem in the east to chestnuts and grays in the west. Considerable areas of prairie, and red and yellow soils occur in the vicinity of the Parana and Paraguay rivers (Fig. 238).

Cultural Features

It was during the sixteenth century that the Spanish entered and occupied what is now Argentina (Silver Republic)—the eastern part of the country by way of the great rivers, and the northern part by way of the Andean Highlands. For 200 years this was a country of big estates. The native Indians were not only dispossessed but many of them were enslaved. Today the Indian population numbers less than 2 per cent. However, the southern part of Argentina was a "no-man's land" until the nineteenth century, when overcrowding and industrial disturbances in Europe impelled some Scotch, Welsh, German, and English emigrants to try making a living in grasslands of Patagonia and in the subcordilleran trough.

Early in the nineteenth century the people of the area revolted against Spanish rule, and after much strife among themselves established a stable government with a constitution modeled after that of the United States.

The prosperity and wealth of Argentina rest mostly in its soil. Nearly one third of the country



FIG. 111. BAGS OF WOOL AT RIO GALLEGOS. In southern Argentina, less than 100 miles from the east entrance to the Strait of Magellan. Evidently sheep do well in this vicinity. (Courtesy of Argentine Minister of Agriculture)

is adapted to the growing of grains, and somewhat more than one third is suited to the cattle industry. Sheep-raising is the principal occupation over much of the Patagonian Tableland Fig. 111. Aridity makes most of this region unsuitable for cultiva-

tion. However, in the subcordilleran trough some rainfall, supplemented by irrigation, makes the growing of vegetables, small grains, and alfalfa possible, but such crops are consumed locally because of the great distance to markets.

In no place in the world is the number of sheep per human inhabitant so great as in southern Patagonia, Tierra del Fuego, and the Falkland Islands. The ratio is as high as 400 sheep per person in some sections. The drier plateaus, however, are really unfavorable for sheep because the fleeces become badly matted with burrs and dust.[1] One fourth of the sheep of Argentina is raised in Patagonia. In some areas transhumance is practiced, particularly with sheep and cattle. Wool and meat are the leading exports from this part of Argentina.

Near Comodoro Rivadavia, petroleum is being produced (Fig. 112). The oil wells are operated by the government and oil is shipped from these wells to many places in the country. Although the yield is less than one sixth that of Venezuela, Argentina is second in South America in petroleum production. The lignite and coal deposits of the country are too remote from consuming centers to be mined extensively.

The Interior Basins and Ranges of Argentina have many oases, some dependent upon irrigation, others upon natural rainfall. About a dozen of these oases are important, and at least four or five are outstanding. The Tucuman and Jujuy oases are truly subtropical and, because of the abundance of orographic rainfall, produce great quantities of sugar cane, some by natural precipitation and some by irrigation. The Tucuman area alone produces four fifths of Argentina's cane sugar output. Farther poleward the decrease in rainfall makes irrigation necessary, so the farmers in the oases of San Juan and Mendoza engage in the growing of wine-producing grapes.[2] However, alfalfa occupies more land than grapes, and corn ranks third as a significant crop. Many other field and garden crops as well as fruits find a place in the agricultural economy of the region. The grazing of millions of goats and some sheep is the main industry in large arid portions of the Interior Basins and Ranges. Goat skins form a considerable item among Argentine exports. The carcasses of

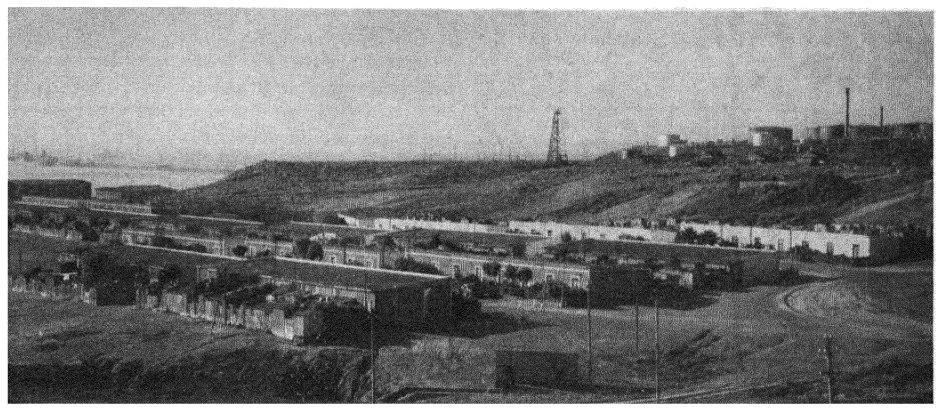


FIG. 112. A CAMP OF COMODORO RIVADAVIA OIL FIELD. On the east coast of Argentina, 1000 miles south of Montevideo. This is in the latitude of Halifax. (Courtesy Pan American Union)

[1] Furlong, C. W., "Among the Sheep Ranches of Patagonia," *Harper's Magazine*, Vol 121, 1910, pp. 53-63. Patagonia is still preeminently a sheep country.

[2] Platt, Robert S., "A Vineyard in the Andean Piedmont, Mendoza," *Latin America*, McGraw-Hill Book Company, New York, 1942, pp. 385-388.

the animals furnish meat and other products to enhance the income of the goat farmer.

Mining is important only where transportation facilities have been well developed. Most of the mines are a long distance from the Atlantic ports, and transportation of ore over the Andes is very expensive. Some gold, silver, copper, and petroleum are secured, but until demands become greater, the minerals of the Interior Basins and Ranges will not be exploited extensively.

On the Parana-Paraguay Plains of Argentina, cattle raising, the extraction of tannin from the quebracho tree, and the production of cotton, tobacco, and subsistence crops such as corn, beans, rice, potatoes, and sugar cane are the major activities. Miles and miles of foothills and valleys are covered by groves of wild orange trees which contribute to the food supply of the natives.



FIG. 113. QUEBRACHO. A depot for fenceposts and tannic logs. Large quantities of tannic compounds are now made synthetically. (Courtesy Pan American Union)

The zone of quebracho extends about 750 miles along the Parana and Paraguay rivers (Fig. 113). The width of the district varies from 25 to more than 200 miles. The tannic acid factories of the eastern Gran Chaco obtain large quantities of logs from long distances. The sites of these factories are restricted to a narrow strip near the major rivers because a relative abundance of fresh ground water is available for use in the extraction of tannin and the rivers furnish favorable shipping facilities. The tannic acid factories utilize only the heartwood of the quebracho tree which yields 20 to 25 per cent tannin. The Parana-Paraguay Plains supply most of the tannin used in the world today, but the quebracho product is now competing with chemically compounded tanning materials. The hard durable wood is used also for structural purposes and railroad ties. Quebracho trees of highest quality for both wood and tannin production grow in areas of moderate rainfall.

The cattle industry thrives in the western part of the Parana-Paraguay Plains because streams are more numerous than farther east, and the water supply is more reliable. In much of the area, the dry season causes the grasses to become dry, hard, and therefore less nutritious than in the more humid sections. In addition, the prevalence of hoof and mouth disease and cattle ticks has been responsible in part for a hardy although somewhat inferior grade of cattle. Poor transportation facilities handicap the marketing of cattle. The most favored cattle region is in the southern part of the Gran Chaco where alfalfa may be grown.

Cotton production is becoming important in the Argentine Chaco, and tobacco is also being produced in commercial quantities. The famous yerba maté, the tea of Paraguay, is produced in abundance and exported to many other South American countries. The area between the Parana and the Uruguay rivers supports millions of sheep and supplies much of the wool for which Argentina is so well known.

The Pampas, where once the thundering hoofs of millions of semi-wild cattle and the gaucho's spirited charger were the dominant life and activity, have had their rich black sod broken by hundreds of modern plows, have been planted to cereals, tobacco, and cotton, and now are associated with several important agricultural products instead of sheep and cattle alone. Wheat, cattle, sheep, corn, and flax are the products of the soils that Argentina now sends to European markets in exchange for products from other parts of the world (Fig. 114).

Cultivated crops are produced under normal rainfall conditions in the eastern part near Buenos Aires. However, in the semiarid western lands crops are grown under irrigation or by dry-farming methods, because of the low rainfall and the seasonal variability. Between the irrigated area and the region of reliable rainfall is a zone in which droughts similar to those in western Kansas, Nebraska, and the Dakotas frequently occur.

Wheat ranks first in acreage on the Pampas. The wheat belt is a crescent-shaped area extending around the droughty margin of the agricultural region from Bahia to Rosario where corn cannot be produced successfully. The fertile soils, the usually adequate rainfall, level topography suited to the use of large machinery, improved transportation, and the nearness to exporting centers are all favorable factors that make wheat production so profitable.

the Pampas. In the early days only hides, jerked beef, and wool were exported, but with better transportation and refrigeration available, the exportation of frozen and chilled meats has become more and more important. Over much of the area pure bred cattle are replacing scrub herds. Stock raising is one of the oldest occupations in Argentina and this accounts in part for the continued high social standing of the *estancieros* (cattle barons) who rank higher than the tillers of the soil.[1]

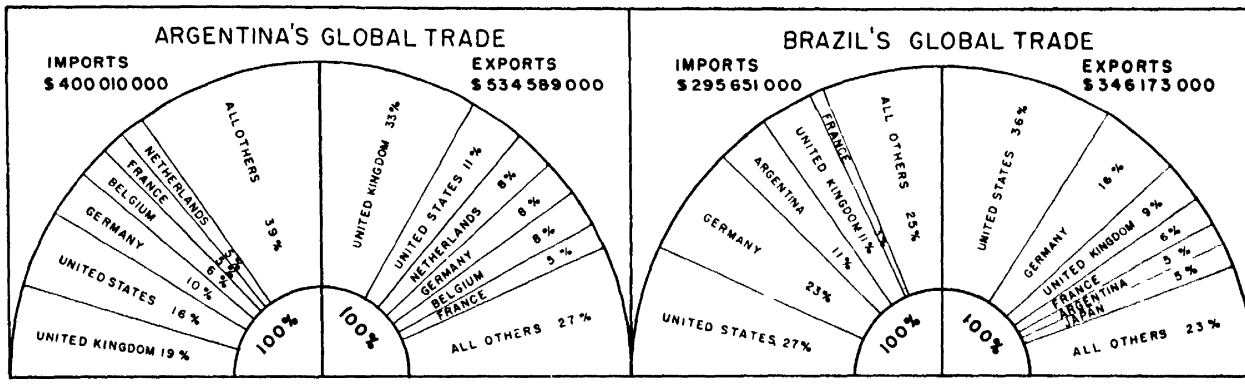


FIG. 114 GLOBAL TRADE OF ARGENTINA AND BRAZIL The trade of both these countries is rather widely distributed. However, five or six countries are especially favored Figs 116 and 121 are helpful in the analysis of the distribution. (From *Foreign Commerce Yearbook*)

The corn belt of the Pampas is not large, most of the corn growing within the northern portion of the wheat crescent. As a result of an annual rainfall of 30 to 40 inches (mostly in summer), fertile soils, and proximity to the coastal trading centers, the Pampas have become the foremost corn-exporting region in the world. The corn belt also produces flax, oats, and alfalfa, and many cattle and swine.

The deep-rooted alfalfa ranks second to wheat in acreage and is particularly well suited to the Pampas, because the roots penetrate into the ground-water zone, thus securing adequate moisture, in spite of droughty conditions. It is especially valuable for both pasture and hay during drought periods.

Flax is one of Argentina's leading export crops. It possesses drought-resisting qualities that make it an admirable crop for the Pampas. Near the large cities are many dairy, truck, and fruit farms.

The cattle and sheep industries are important in both the grassland and cultivated sections of Argentina offers more than 200,000,000 acres of grazing land almost free for those who wish to go into the cattle or sheep business.

Although the Pampas are excellent agricultural lands, they have little manufacturing because the region lacks metals and mineral fuels. The two outstanding processing industries are meat packing and flour milling. Meat, wheat, and flour are exported in vast quantities, particularly to England and western Europe.

The Pampas form one of the well-populated regions of South America, about two thirds of the people of Argentina living in this area. Examination of a railroad map of South America shows that the Pampas area is the center of one of the densest and best distributed networks of railway lines in the continent. Argentina has more than 25,000 miles of railways (40 per cent of the railway mileage of South America), about one third of

[1] James, Preston E., "The Process of Pastoral and Agricultural Settlement on the Argentine Humid Pampa," *Journal of Geography*, April, 1941, Vol 40, pp 121-137

which are government owned. There are more than 14,000 miles of all-weather highways in the country, and Argentina's four sections of the Pan-American Highway have now been completed.

URBAN CENTERS OF ARGENTINA. The Pampas are by far the most urbanized of the regions of Argentina. The chief urban centers are on the periphery of the region, reminding one of the location of the cities which encircle the Great Plains of the United States. In the central portion of the region,



FIG. 115. BUENOS AIRES. One of the wide and beautiful avenues of the world. (Courtesy Pan American Airways)

with good railroad communication, are numerous agricultural depots which correspond also to the small towns of the Great Plains. Four large urban centers dominate the Pampas.

Buenos Aires, the metropolis and largest city not only of Argentina and South America, but also of the southern hemisphere, is on the Rio de la Plata. It is often called the "Paris of South America" (Fig. 115). Numerous railroads extend into the hinterland, and steamship lines connect the city with the principal ports of the world. Banks, business houses, schools, libraries, churches, theaters, and other institutions of culture in Argentina are centered in Buenos Aires. Industrially, Buenos Aires is the first city of South America. Meat packing, flour milling, textile making, the fabrication of goods for local consumption, such as footwear, leather goods and hats, and the construction of machinery are the chief manufacturing interests. *Rosario,* the second largest city of Argentina, located near the junction of the Rio Parana and Rio Cuarto, and at the radial center for railroads, is an important trade center in the northeastern part of the Pampas. Grain elevators, flour mills, and a large sugar refinery suggest what is produced in its hinterland. *Santa Fe,* the northernmost city in the Pampas and the river port for cities of the Interior Basins and Ranges, is about 300 miles northwest of Buenos Aires on the Santa Fe channel of the Parana near the mouth of the Salado. Santa Fe is the headquarters for railroad transportation to Cordoba and Tucuman in the interior oases. *Bahia Blanca,* the most southern city in the Pampas, is near the mouth of the *Rio Colorado* and at the bend of the *Blanca Bay.* The excellent harbor, which will anchor steamers of 30 feet draft, has contributed materially to the rapid growth of Bahia Blanca. Not only has it become the southern entrepot for the Pampas and southern Argentina, but also it has been made a naval base by the national government of Argentina.

Among a considerable number of urban centers associated with the oases of the Interior Basins and Ranges, three are especially significant. *Tucuman,* an old city founded by the Spaniards, is located at the east front of a lofty spur of the Andes in the tropical portion of the region. It is the center of trade for several oases in northwest Argentina and is connected with Buenos Aires by rail. Water for irrigation is secured from the mountains The rich land in the vicinity produces sugar cane, fruits, cereals, and cattle. *Cordoba,* on the Rio Primero at an altitude of 1440 feet and in a latitude approximately equal to that of El Paso, Tex., lies on an eastward sloping plain at the foot of the Cordoba Mountains. A reservoir formed by a dam in the river about 12 miles above the city furnishes water for domestic uses, for irrigation in the valley where fruits and vegetables are grown, and for electric power used in the processing of building materials and wheat. Livestock, wool, and hides are shipped from Cordoba to the coast. This picturesque city is near lofty mountains, charming lakes, and beautiful waterfalls, all of which combine to make it a mecca for tourists and vacationists.

Mendoza, the capital of the province of Mendoza, is situated on an arid plain in the rain shadow of the Andes at the eastern entrance to the Uspallata Pass, and therefore profits from the trade

between Argentina and Chile. Two rivers from the Andes furnish water for the city and irrigation for the farms of the vicinity. The surrounding area produces fruit, grapes, alfalfa, cereals, and vegetables. Wine and raisins are exported in considerable quantities.

Corrientes and *Resistencia* are on opposite sides of the Parana River about 20 miles below its junction with the Paraguay. The commercial importance of these cities arises from their favorable situation near the confluence of the Parana and Paraguay rivers and their central location in the plain. Much of the freight for the northern and western portion of the Parana-Paraguay Plains is transshipped at Corrientes. *Parana*, 240 miles directly northwest of Buenos Aires and 2 miles from the Parana River, has a small port city called *Bajada Grande*, and thus it may be classed as a river port. The site is on a gently rolling river terrace where the main city is free from floods. Both rail and steamer connections are made with Buenos Aires. The principal exports are cotton, sheep, wool, cereals, yerba maté, and tannin.

The Patagonian Tableland, in most of its parts, is so completely unsuited to intensive occupancy that no cities of importance have developed. *Comodoro Rivadavia*, with a population of about 5000 and located on the coast of the Gulf of St. George, is the chief urban center.

PROSPECTS AHEAD. Argentina is a big country with a great diversity of possibilities. The various regions have their special problems. Much of the land of the Interior Basins and Ranges is in large estates and much is unoccupied. In the future as the pressure of population becomes greater in other countries, a little more of this land can be used profitably for irrigation but the limited supply of water makes extended development precarious. The need for large agricultural machines which must be imported, the aridity of the land, and the poor transportation facilities combine to make it difficult for the farmer with limited capital to settle in this section of the country.

With the extension of transportation lines into the Andean spurs and ranges, the mineral wealth which the area possesses will be a valuable asset. At the present, with the high cost of extracting and shipping minerals, Argentina cannot compete in the world markets. Moreover, the region is poor in coal and iron ore; hence these commodities must be imported (Fig. 116). Since natural conditions indicate that agricultural pursuits probably will continue to dominate human activities in Argentina, it is important that wise methods of using the land be inaugurated in the Interior Basins and Ranges, that adequate rural-urban communication be promoted, and that cooperation for the benefit of all the people be fostered.

Aridity will probably always limit population growth in Patagonia. However, irrigation could be practiced in some areas if capital were available and transportation facilities improved. Some coal may be mined when the demand will justify transportation charges.

The Pampas do not contain as many people as they are capable of supporting. Future possibilities in agriculture seem bright indeed. The region probably will continue to be an exporter of bulky agricultural goods, with Europe as a chief market. Increased production would result from the intro-

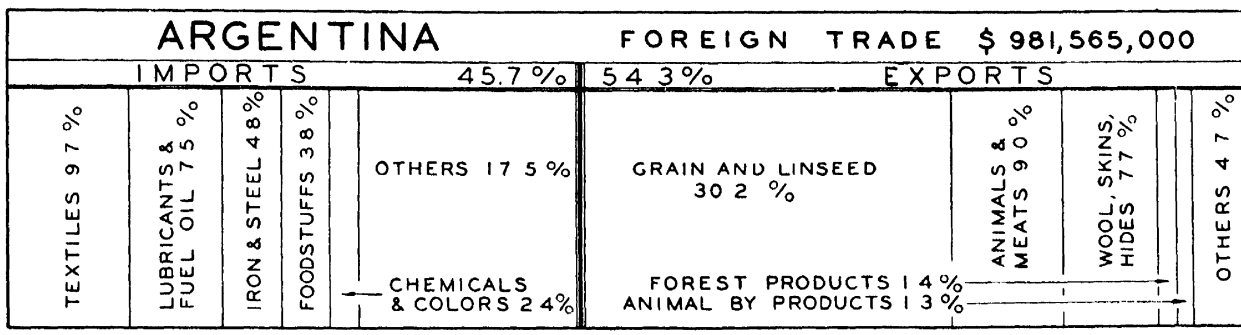


FIG. 116. ARGENTINA'S FOREIGN TRADE. A 13-year average ending in 1938 (See Fig. 114) (From *Statesman's Yearbook*)

duction of more improved methods of farming, and from greater cooperation in marketing the products. With careful planning for future markets, and constant improvement of transportation and communication, the Pampas are sure to have greater competitive power in world markets.

In this connection it is urgent that the people of the United States and of Argentina realize that there are large areas in the two countries that have similar climates, soils, and terrain, and, therefore, they produce similar agricultural commodities—corn, wheat, cotton, fruit, cattle, hogs, and sheep. Since these conditions make direct trade relations difficult, some special trade arrangements between the two countries need to be negotiated. For example, we need diamonds and coffee, Netherlands and Brazil need wheat, and Argentina needs metal goods and machinery A three-cornered trade agreement might resolve the apparent difficulty, and keep United States and Argentina from competing for the same markets. The strained diplomatic relations between Argentina and the United States in World War II had their roots deep in this basic geographic misunderstanding.

VENEZUELA

Natural boundaries encompass Venezuela almost completely—sea on the north, mountain crests mostly on the east, rivers and mountains chiefly on the south and west The only significant artificial boundary is across portions of the Llanos and upper Maracaibo Basin.

The northern part of the country is about 12° north of the equator and the extreme southern part is only about 1° north of it. In area Venezuela is nearly as large as Wyoming, Montana, and the two Dakotas combined.

Natural Features

Venezuela includes parts of four physiographic regions, each important for different commodities —namely, coffee and cacao in the Northern Andes, petroleum in the Maracaibo Basin, cattle on the Llanos and Orinoco Plain, and bauxite and precious metals in the Guiana Highlands (see pages 144, 145, 166, and 181). The northern slope of the Andes and the Maracaibo structural depression face the Caribbean Sea, but the southern slope and the rest of the country face the Orinoco Plain and the Atlantic Ocean. The tributaries of the Orinoco flowing out of the high, young Andes have piled so much debris on the lowland south of the mountains that the master stream has been crowded over close to the Guiana Highlands.

The climate of Venezuela is tropical—rainy on the windward slopes in the Andes and Guiana Highlands, but wet and dry on the lowlands (Fig. 236). The rainy season on the lowland occurs from April to October when the equatorial calms have migrated northward. During the remainder of the year trade winds prevail and the lowlands and leeward slopes are dry. At Maracaibo City the average annual rainfall is 20 inches, at Caracas in the Andes 32 inches, and on the Orinoco Plain it varies from 30 to 50 inches (Fig. 90)

The Guiana Highlands and the windward slope in the Andes have tropical rain forest, but the Maracaibo Basin and Orinoco Plains are for the most part a great grassland (Fig. 237). Much of the lowland is flooded during the rainy season, but the soils are parched and vegetation desiccated during the dry season. Some of the grasses are tender and nutritious but others grow tall and are so tough and coarse that cattle cannot eat them.

The soils in the plains vary from coarse sands and gravels near the mountains and on the sandstone-covered mesas to fine silt loams and clays in the lower portions of the plain. In many areas, swamps are caused by almost impermeable, underlying clays. The mature soils belong mainly to the laterites and the red and yellow types (Fig. 238). Wherever gravels predominate, the surface soils are parched during the southern migration of the equatorial rain belt. However, in the western part of the plain, water from the Andes sinks into the loose, sedimentary materials, and at lower altitudes rises to irrigate some of the surface soils.

Cultural Features

In 1499 when two Spanish explorers discovered the entrance to Lake Maracaibo, they found the people living in houses built on piling in the lake with waterways for streets among the buildings. They called the place "Little Venice," which in Spanish is Venezuela, and this type of occupancy

continues today. When the colony was made into a republic, the whole area was given the name Venezuela. Strangely enough, one of the explorers was Amerigo Vespucci, the same man whose name was given to the two Americas.

In the Maracaibo Basin today, agricultural practices are more or less primitive. Cacao is an important commercial crop, but sugar and coconuts are produced for subsistence purposes only. Insects, plant diseases, and an enervating climate combine to discourage agriculture on an extensive basis.

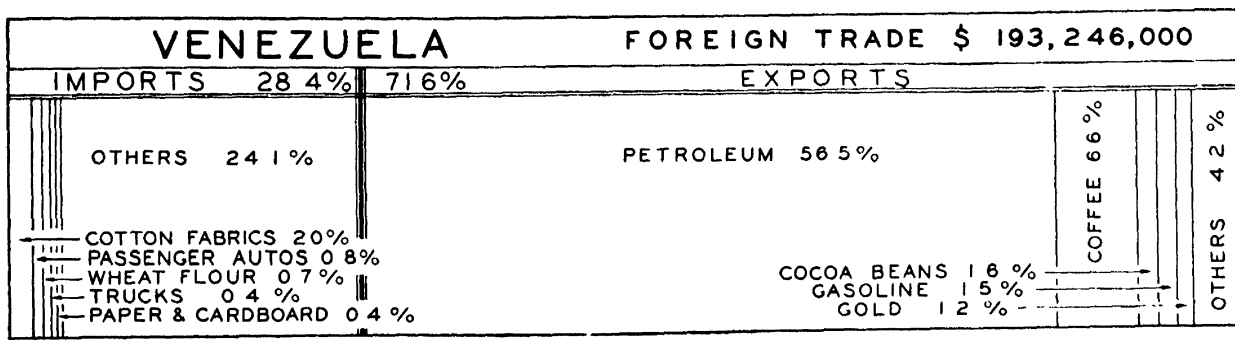


FIG. 117 VENEZUELA'S FOREIGN TRADE A 12-year average just prior to World War II (See also Fig. 118) (From *Statesman's Yearbook*)

On the savannas, grazing of cattle, goats, horses, and mules is of considerable significance.

By far the most important earth product in the Maracaibo Basin is petroleum taken from the undulating and broken folds of the underlying sedimentary rocks. This is one of the great oil-producing regions in the world. Even the rock under the lake bed yields great quantities of the "black gold." [1] Handicaps relative to the petroleum industry are the shortage of labor, unfavorable living conditions, and the great distances to markets (Fig. 117). The large profits to the oil companies are incentives to increased production. On the whole, the petroleum industry has retarded progress in agricultural pursuits because the natives have found that working in the oil fields is more remunerative.

Gold-seeking Spaniards were disappointed with their explorations in the Orinoco Plain, for none of the yellow metal which they prized so highly was found. On the other hand, the story of white men on these great plains is associated almost wholly with cattle. But the caprices of climate, the vicissitude of political succession, and the sanguinary struggles among the peoples have rendered the grazing industry precarious. Since 1548, when cattle were introduced into the region from Spain, many of the animals have run wild, supporting semi-nomadic herdsmen (the *llaneros*) who are much like the disappearing American cowboys. It is said that in 1812 there were 4,500,000 cattle on these grasslands, and in 1823 only 250,000; in 1864, 6,000,000 and in 1873 only 3,500,000; in 1883, 8,600,000 and in 1901 only 2,000,000. These figures suggest much of the story relative to human difficulties on the great Llano savannas.

Today cattle grazing, the main industry of the Orinoco Plain, takes place chiefly on the Llanos because the deltaic lands are much too wet for bovine occupancy. The cattle rancher of the Llanos has many natural factors to take into account in order to be successful. Flooding during the wet season necessitates removal of the herds to the higher lands, which is costly since many cattle perish during the migrations, and in the dry season when the pastures are parched, the llaneros must provide both water and feed for the animals.

The best-developed farming districts are on the western and northern margins of the Llanos. Good crops of cotton, corn, rice, beans, and some fruits are grown. These crops, as a rule, require irrigation during the dry season.

On the delta and in many of the swampy portions of the lowlands Indians derive most of their

[1] Miller, Eugene Willard, "Petroleum in the Economy of Venezuela," *Economic Geography*, April, 1940, Vol. 16, pp. 204-210.

subsistence from the river and from the forest.[1] Turtles and fish from the streams are common in the Indian diet, and wild cassava and yams combined with corn supply the necessary carbohydrates. The turtle shells are used for basins and cooking utensils and oil is made from turtle eggs. The shelter of the Indian is poor—usually a ramshackle house on stilts. When the river is low and the soil surface is free of water the ground under his house is infested with pestiferous insects, and in the rainy season the soil is water-logged. So the Shipping facilities are hampered by sand bars at the north entrance to the 34-mile channel from the sea. The harbor of the city is ample in size and deep enough to accommodate boats of 11-feet draft. More than half of the exports and imports of Venezuela (Fig. 118) go through Maracaibo City. By far the largest export is petroleum, but coffee and sugar are also shipped in considerable quantities. The harbor is small and congested but improvements are now being made to remedy this difficulty.

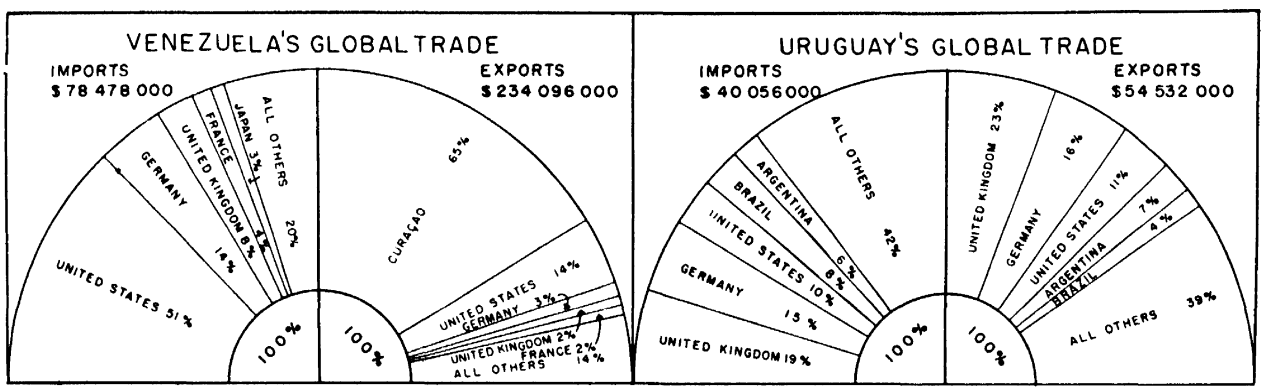


FIG. 118 GLOBAL TRADE OF VENEZUELA AND URUGUAY Venezuela's trade is rather narrowly limited, exports greatly exceeding imports (Fig 117) The trade of Uruguay is much more widely distributed (From *Foreign Commerce Yearbook*)

family lives the year around in the second story of their stilt-supported domicile. The palms supply material for thatching buildings and for making straw hats.

CITIES OF VENEZUELA. *Caracas*, the capital of Venezuela, perched in a picturesque valley far out on the eastern prong of the Northern Andes, is eight miles from its port, La Guaira, with which it is connected by railway and a good highway. In order to make the climb of 3000 feet, 25 miles of railway track are required. The city is at the eastern terminus of the *Caracas-to-Bogota Highway*—a branch of the Pan-American Highway. About 100 miles west of Caracas is *Valencia*, the chief manufacturing city of the country.

Maracaibo City, at the entrance from the Gulf of Venezuela to Lake Maracaibo, is the commercial capital and leading city of the Maracaibo Basin.

[1] Burchfiel, Jr., Lt William, "Our Tropical Outpost in Venezuela," *Journal of Geography*, May, 1945, Vol 44, pp 192-202

The Orinoco Plain has sparse population. On the delta are practically no inhabitants other than 8000 or 9000 Indians who, using the deltaic streams for local trade and transportation, eke out a subsistence living, remote from important trade routes and civilization. The whites and half-breeds live chiefly on the Llanos and in the cities which, although important to the region, are small Two cities of the region deserve special attention.

The largest town and port is *Ciudad Bolivar*, located on a small hill about 125 feet above sea level and occupying the left bank of the Orinoco River 240 miles from the ocean. It has no railway communications but does have regular steamship service with the lower Orinoco, with Port of Spain, and with the Caribbean coast. *San Fernando de Apure*, located on the Apure River about 100 miles west of Ciudad Bolivar, is a focal point for routes of trade in the northwestern Llanos.

Maturin, situated on a savanna west of the Orinoco delta 40 miles from the sea, is near one of the

productive petroleum fields of South America. In the surrounding region stock raising and the cultivation of coffee, cacao, sugar cane, cereals, and fruit are important. Maturin is the commercial center of the plains west of the delta and its prospects for the future seem reassuring.

WHAT OF THE FUTURE IN VENEZUELA? One of the things that Venezuela needs most is the unifying of the interests of the people around some all-absorbing projects. The topographic and climatic diversities tend to separate the people into groups with unrelated interests. In name, Venezuela is a republic, but the people will have to learn democratic methods if a satisfactory government is to be achieved. The obvious alternative is continuous revolution or the iron hand of the dictator, but conditions are improving. A visit recently by the president of Venezuela to several other Latin American countries was hailed as a great event, for no other chief executive ever dared leave the country for so long a time.

Some other problems are closely related to the one just stated. The country needs ambitious immigrants with capital to develop latent resources. Proximity to the Panama Canal can be a tremendous asset in the improvement of commerce and trade relations. Intelligent planning against the evil days when petroleum resources begin to decrease is very essential. Recently, capital from the outside has been attracted to the new oil fields near Maturin, but agricultural development on the Llanos has not been so fortunate. Unless transportation facilities are improved and cooperative enterprises planned for more effective land use, much of the country is certain to remain sparsely settled and backward for a long time to come.

PARAGUAY

Paraguay rides the Tropic of Capricorn. The center of the country is in the same latitude south of the equator as the center of Cuba is north. The former is a landlocked country—400 miles from the sea—the latter is washed by the sea on every side. The two countries are equal in length, but Paraguay in the continental interior is wider and much the larger.

Natural Features

The eastern one third of Paraguay is in the Parana Plateau, a part of the East Brazilian Highlands. The Parana River, flowing through a deep gorge in the plateau, forms a part of the eastern boundary of the country. The western edge of the plateau is an escarpment dropping abruptly to the level of the plains of the Paraguay. The low, flat plains between the river and the escarpment are subject to floods during the rainy seasons. The part of the country west of the Paraguay River is an eastward-sloping plain composed of unconsolidated detritus carried in from the disintegrating Andes (see page 167).

The climate of Paraguay is marginal between the tropical with a long rainy season and the subtropical humid (Fig. 236). According to the record Asuncion receives most rainfall in summer (average annual, 54.1 inches, January 6.7 inches), although no month is extremely dry (August 2.0). The temperature ranges from 63° F. in June to 80° F. in January (Fig. 90). This record of temperature and rainfall is nearly duplicated by that at New Orleans and Habana.

The country west of the Paraguay River is a scrub forest area—a portion of the Gran Chaco—but east of the river the lowland is a savanna and the plateau is a semi-deciduous forest (Fig. 237). From the types of climate and natural vegetation one must infer that the mature soils vary from the chernozems in the drier sections to the prairie, and red and yellow types in the more humid areas, corresponding to conditions in the United States from the Rio Grande eastward.

Cultural Features

One writer in his appraisal of Paraguay states that the country is a natural paradise. Open forests, good soils, rich grasslands, equable climate with adequate variability, and a variety of land forms—all these in a well-integrated balance are the heritage of the Paraguayans. Yet a human paradise has not been achieved. The reason is a long story and cannot be told here. Suffice it to say that the typical citizen is a mestizo of Indian-Spanish extraction—naturally a peaceable individual—but who, through the force of circumstances, has been

engaged in numerous wars with his neighbors, Brazil, Argentina, Uruguay, and Bolivia. So disastrous have some of these conflicts been that the male population, during one war lasting five years, was reduced to less than 10 per cent of the total. Within the last dozen years the two landlocked

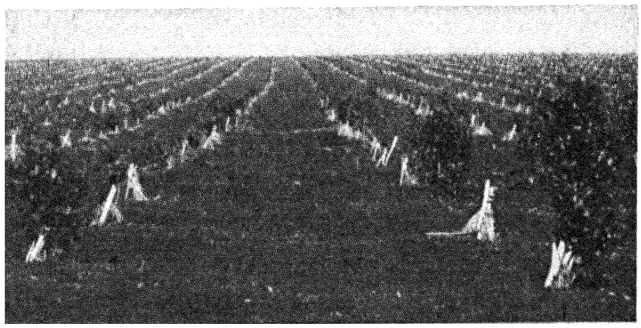


FIG. 119. A PLANTATION OF YERBA MATÉ. A brew made from the leaves of this plant is used widely in South America. (Courtesy Pan American Union)

countries, Paraguay and Bolivia, fought an exhausting war for possession of a section of the Chaco, which in its isolation probably is not worth fighting for. Neither of the two countries has the ability to promote an adequate program of regional development in the Chaco.

The Chaco country of Paraguay, although rich in capacity to support a thriving population, is almost empty; nearly all the people live east and south of the capital. Farming is the leading occupation—corn, cotton, rice, sugar cane, tobacco, oranges, and yerba maté being the chief crops (Fig. 119).[1] The north is mostly a cattle country, and along the Paraguay quebracho timber is obtained in considerable quantities.

Packing-house products, hides, cotton, and quebracho extract are the leading exports, whereas machinery, foodstuffs, and textiles are imported. Included among the countries that trade with Paraguay are Argentina, the United States, the United Kingdom, Germany, and Japan.

The paradox of Paraguay is this: How can a people fare so poorly in a land so rich in potentialities of soils, of climate, and of natural vegetation? The cause is not altogether apparent, but a few avaricious rulers have misled the people, aggressive neighbors have made the Paraguayans fearful by warring on them, the native Indian background may be a handicap, and the far inland position has contributed to their isolation. Paraguay has the resources to support several million people in luxury. Land along the Ganges in India which is no better than that in Paraguay furnishes a living for a hundred farmers on each square mile.

Today the population is about 1,000,000 and there is only one city with more than 100,000 people. *Asuncion*, over 700 miles due north of Buenos Aires, is the capital and chief trade center of Paraguay. Located near the junction of the Rio Parana and the Rio Pilcomayo, it is connected by steamer with Buenos Aires and Montevideo, and with the former city by rail.

[1] Platt, Robert S., "A Paraguayan Farm," *Latin America*, McGraw-Hill Book Co., New York, 1942, pp. 395-398.

16

Eastern Highlands and Associated Plains

FOR THE PURPOSES of this study the Eastern Highlands and Associated Plains extend from the mouth of the Orinoco River about 8° north latitude to the Rio de la Plata estuary 25° south latitude, a distance of about 3000 miles. The greatest east-west extent of the Eastern Highlands is about 2000 miles. However, from the point of view of some writers, the Patagonian Tableland might be included. The facts seem to be that the latter is old land similar to the areas farther north. In the far south, the eastern old land (Patagonian Tableland) is separated from the younger Andes by the narrow subcordilleran trough, whereas the old lands in the middle and northern parts of the continent are separated from the younger Andes by broad interior plains

Much exploratory work remains to be done in this part of the continent, but observations to date indicate that the bedrock for the most part is igneous and metamorphic, and that in places the old massif [1] is overlain with sedimentaries. Thousands of streams have dissected the Eastern Highlands, and in many places the sedimentary layers have been erased entirely.

EASTERN HIGHLANDS AND COASTAL FEATURES

This major division of South America is composed of the *Guiana Highlands and Coastal Plain*, the *East Brazilian Highlands and Coastal Plain*, and the *Interior Brazilian Plateaus*.

[1] In general, a large block of old land in which the bedrock lacks some of the lesser details of structure such as bedding, foliation, cleavage, and schistosity.

GUIANA HIGHLANDS AND COASTAL PLAIN. The Guiana Highlands in the northern part of South America constitute an old land extending 1000 miles east-west and as many as 600 miles north-south. It is sometimes called the "Guiana Island" because it is entirely surrounded by sea and rivers.

The region, as a whole, slopes northward, the southern margin being almost an escarpment facing the Amazon Basin. The highest altitudes extend to nearly 10,000 feet, but generally they average from 1000 to 5000 feet.

The Guiana Highlands are deeply dissected by numerous streams which descend from the highlands in many rapids, cascades, and waterfalls, only a few of which are well known. It is in the western portion of the highlands that the *Rio Cassiquiare* (100 yards wide) branches off from the Orinoco and flows rapidly across the divide to join the Rio Negro, a tributary of the Amazon. This is one of the few places in the world where a navigable, natural channel connects two major river systems.

The Coastal Plain, associated with the region and lying between the highlands and the sea, is about 800 miles long and from 10 to 50 miles wide. It is made up largely of unconsolidated sediments deposited by coastal ocean currents sweeping past the estuary of the Amazon and more recently by accumulations brought down by rivers from the Guiana Highlands. On the landward margin of the coastal plain where the rivers leave the hard, igneous and metamorphic rocks of the highland is a well-defined fall line. The bedrock in the Guiana Highlands is composed of sandstone areas including large mesas and numerous buttes, and these as a rule are bordered by hilly lands with

crystalline bedrock, capped here and there by volcanic materials.

EAST BRAZILIAN HIGHLANDS AND COASTAL PLAIN. The Eastern Brazilian Highlands parallel the coast from the eastern extremity of the continent to the estuary of the Rio de la Plata, a distance of about 2500 miles, and extend from 3° south latitude to 35° south. On the interior margins are the Interior Brazilian Plateaus and the Parana Para-

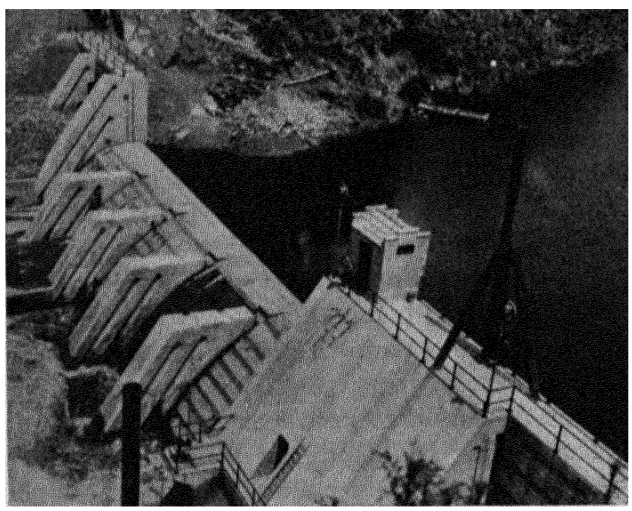


FIG. 120. HYDRO-ELECTRIC DEVELOPMENT IN THE RIO SÃO JOAO. This is near the coast 200 miles southwest of Santos. The seaward margin of the plateau abounds in potential hydropower sites. (Courtesy Pan American Union)

guay Plains. The region varies in width from 300 to 600 miles. These ancient highlands are probably of the same age as the Laurentian Upland of North America.

Bordering the seaward margin of the East Brazilian Highlands is a narrow coastal plain which varies in width from zero to 100 miles. Most of the coastal plain on its landward margin is bounded by a steep rugged escarpment ranging in elevation from a few hundred to a thousand or more feet. In a few places, as at Rio de Janeiro, the plain disappears and the escarpment rises from the sea.

Back of the coastal plain are the metamorphic and crystalline Brazilian old lands exposed throughout the entire length of the region except for a few places where they dip under the eastern margin of the Parana Plateau as in southern Brazil. As a rule the old massif is rugged, having been incised deeply by many streams (Fig. 120).

The *Parana Plateau* along the upper course of the Parana River is an area covered in part by lavas into which some of the tributaries of the Parana have carved deep gorges, and with which are associated some magnificent waterfalls. The falls of the Iguassu River are among the greatest in the world (Fig. 121).

The *São Francisco Valley* is a part of the East Brazilian Highlands in which a river has stripped much of the younger sedimentary materials from the old land and exposed the crystalline rocks, such as granites, gneisses, and schists. Among the earth materials are several minerals of commercial importance—namely, diamonds, and ores of gold, manganese, copper, and iron. Coal is mined in commercial quantities on the coastal plain from São Paulo south to the Uruguay border.

Three large rivers drain the East Brazilian Highlands—the *Uruguay,* the *Alto Parana,* and the *São Francisco,* the last of which flows northeastward paralleling the coast for nearly 1000 miles before it cuts across the escarpment into the Atlantic. Altitudes rise above 4000 feet in a few places only and in most places are approximately 2000 feet.

INTERIOR BRAZILIAN PLATEAUS. The Interior Plateaus of Brazil extend in an east-west direction from the great westward bend of the Madeira River to the northward bend of the São Francisco, a distance of more than 1500 miles. The north-south extent is about 1000 miles and the total area is equal to nearly one third of the United States. The region, occupying almost the entire central part of Brazil, has never been throughly explored, and is one of the sparsely populated sections of South America.

Most of the region is below 2000 feet in altitude, although there are some areas that range to nearly 5000 feet. This corresponds closely to the altitude of the Great Plains of the United States. In most places the southern margin is the divide between the southward-flowing and northward-flowing streams, hence the region is almost wholly within the Amazon drainage system. The large rivers that flow northward over the area parallel each other to a considerable degree. For this reason most of the interstream portions consists of long, north-

south, flat-topped ridges. One such interfluve, the *Bananal Island*, 200 miles long, is especially unique in that it was formed by the division and reunion of the *Rio Araguaya* northeast of the Plateau of Mato Grosso.

For ages streams have been cutting into the Interior Brazilian Plateaus removing much of the sedimentary overlayer of rock and exposing the old crystalline and metamorphic basement com-

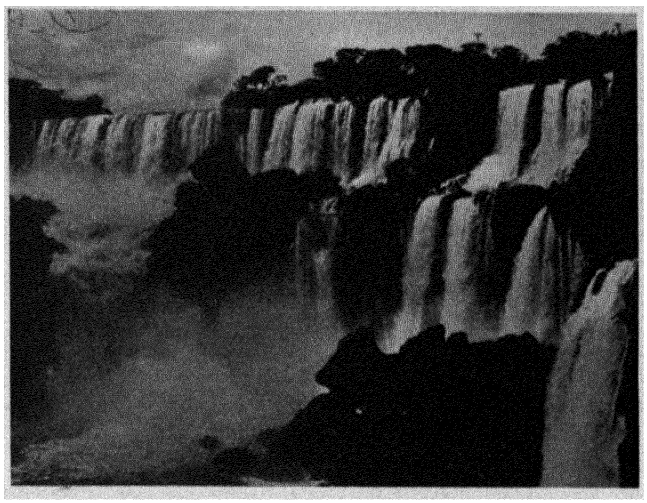


FIG. 121. IGUASSU FALLS ON A TRIBUTARY OF THE PARANA. In Brazil 500 miles southwest of São Paulo. Here a series of 20 or more magnificent cataracts descend in scintillating spray into the deep gorge at the base of the falls. (Courtesy Pan American Airways)

plex, especially in the southeast *Goyaz Plateau* section. In the interior is located the famous *Mato Grosso Plateau* (meaning great woodland), an ancient massif that has been dissected by streams whose headwaters are in the area. The Mato Grosso still retains much of its sedimentary bedrock covering.

COUNTRIES DOMINATED BY THE EASTERN HIGHLANDS

Brazil, the largest country of South America, *Uruguay,* the smallest one, and *The Guianas,* three small dependencies are associated with the Eastern Highlands.

BRAZIL

The United States of Brazil is a republic of twenty federated states, a federal district, and one territory. It is larger than the United States and has about 30 per cent as many people, most of whom live adjacent to the southeast coast.[1] In both east-west and north-south directions Brazil's extent is equal to the distance from Boston, Mass., to Los Angeles, Calif. Its position astride the equator insures a tropical climate for all but a small area in the extreme south. Even so, much of the southern part is high enough to have a climate that is not too warm. The extreme southern panhandle section of the country is subtropical humid.

Natural Features

By far the largest part of Brazil is in three physiographic regions—the East Brazilian Highlands, the Interior Brazilian Plateaus, and the Amazon Basin (see page 167). However, in the far north the country extends into the Guiana Highlands, and in the west into the Parana-Paraguay Plains (see page 167). The topographic and structural features of these regions have been discussed, but the climate, natural vegetation, and soils of the country need special consideration.

It should be recognized first of all that the climates of Brazil are dominated almost entirely by the equatorial belt of low pressure and the trade winds. Any departure from the normal pattern of climatic arrangement is controlled mostly by the areal distribution of land forms and differences in altitude. Most of the Amazon Basin has a tropical rainy climate with rain forest vegetation and lateritic soils (Figs. 236, 237, and 238). The chief exception to this condition is found south of the Guiana Highlands during the southern summer. The average annual temperature at Manaus is 79° F., and the difference between the warmest month (November) and the coolest (March) is only 4° F. (Fig. 90). The average annual rainfall is 84 inches—April being the rainiest month (13 inches) and September the driest (1.5 inches). The escarpment facing the ocean in southeastern Brazil is constantly in the trade winds, which accounts for the fact that much of this coastal strip has a tropical rainy climate.

The highland section of Brazil almost coincides with its area of tropical wet and dry climate,

[1] Gauld, Charles A., "Brazil Takes a Census," *Journal of Geography,* April, 1941, Vol. 40, pp. 138-144.

the rainy season occurring when the equatorial rain belt has moved southward. The rainfall at Morro do Chapeo (altitude 3600 feet) in the great bend of the São Francisco River is 34 inches, distributed throughout the year in about the same proportions as at Manaus. The rainfall becomes somewhat less farther inland, and for this reason the transition in natural vegetation is from scrub forests in the east to savannas in the west. Soils in the highland of Brazil are mostly of the red and yellow type. It should be noted here that, although the southeastern part of the country is well within the tropics, the climate is not excessively warm because much of it is from 2000 to 5000 feet in altitude.

Cultural Features

A basic factor in the early settlement of eastern South America was the fact that this was the part of the continent closest to Europe. Sailing for hundreds of miles along the southeast Brazilian coast early in the sixteenth century must have been a thrilling adventure to Portuguese, Spanish, and English navigators. This was the only part of the new world which the Portuguese successfully colonized. During the sixteenth and seventeenth centuries the Portuguese explorers established trading centers along this coast, and trade with the mother country was so flourishing and the colony was so valuable that the King of Portugal fled to Brazil when Portugal was invaded by Napoleon's armies in 1807. Here an empire was established with Rio de Janeiro as the capital. When the Napoleonic Wars were over the King returned to Portugal, but he left his son as regent of Brazil. The son, coerced by the merchants and traders of Brazil, piloted the country to independence in September, 1822.

Developments came rapidly in southeast Brazil after independence, and, although war and revolution were waged most of the time, the country was able to establish trade with the world powers after the Portuguese monopoly was broken. Although Brazil nominally has a representative form of government, dictators have ruled the country most of the time since the latter part of the nineteenth century.

EASTERN AND SOUTHERN BRAZIL. The areas of most intensive cultivation in Brazil are the coffee lands on the highland back of São Paulo and Rio de Janeiro (Fig. 122). In four states of this section there are nearly 2,000,000,000 coffee trees. Several physical factors combine to make this the largest coffee-growing area in the world. Among these are the rolling topography suitable for water and air drainage, deep friable soil which is fertile and high in iron and potash content, and the dry, warm



FIG. 122. RAILROAD FROM SANTOS TO SÃO PAULO. Difficulties attend the climb of 2500 feet in a distance of only 25 miles up the incised margin of the Brazilian Plateau. Trestles, tunnels, and terraces are evidences of the engineering difficulties present. (Courtesy Pan American Union)

sunny autumns which are favorable for picking, washing, and drying coffee. It is difficult to prevent overproduction of this commodity in Brazil, so favorable are geographic conditions. Coffee is and has been for some time Brazil's most important export (Fig. 123).[1]

The coastal lands in the southeast are well suited to the growing of sugar cane, tobacco, cacao, and cotton, large quantities of each being exported (Fig. 7). In the south corn, beans, rice, and potatoes thrive, and are used principally for home consumption. In the northeast section of the Eastern Highlands goats are raised in large numbers, chiefly for their skins, whereas in the central and southern parts, swine and cattle are important.

In southern Brazil is one of the largest softwood timber stands in the world. Here, the Parana pine yields millions of board feet of lumber each year.

[1] James, Preston E., "The Coffee Lands of Southeastern Brazil," *Geographical Review*, April, 1932, Vol. 22, pp. 225-244.

The yerba maté (Paraguay tea) is one of the principal forest products of the southern part of the highland.[1] Along the rainy coast tropical hardwoods and dyewoods, for which this area has long been noted, are cut and exported. Wild rubber, medicinal plants, gum, fiber-yielding plants, and resin-producing trees are distributed throughout the rainy section.

With the exception of coal mining in the south coastal plain, most of the mining of Brazil takes place in the state of Minas Geraes in the central section of the Eastern Highland. Diamonds, gold, and precious stones have long been the important minerals, the first two having been mined for more than 300 years. Only a short distance northeast of Rio de Janeiro are the vast deposits of iron ore which Brazil only recently has begun to exploit. The deposits are comparable in quality and amount to those of the Superior Upland in the United States. The ore for export is shipped via the Rio Doce to Vitoria on the coast. Metallurgical work in Brazil on a large scale suffers through lack of easily available coking coal. Manganese ore is mined and exported in considerable quantities—mainly to the United States where it is used in making steel. Copper is produced commercially in the Minas Geraes district in the extreme south. The world's largest source of fine quartz crystal, so essential in the manufacture of radios and some other precision instruments, is transported from interior Brazil by plane.

Manufacturing industries are centered in the coastal cities of southern Brazil. Here, under the protection of high tariffs, textiles, furniture, hats, shoes, beverages, and numerous miscellaneous articles are manufactured. The manufacture of cotton goods leads all other industries, the principal centers being São Paulo, Rio de Janeiro, and Bello Horizonte.

Transportation facilites, chiefly railroads, have had a greater development in southern Brazil than in any other section of South America except on the Pampas. Coastwise railroads connect most of the large cities and numerous short spurs which extend back into the highland areas join the coffee plantations, the areas of cacao, sugar and cotton production, and the mines with the seaports. Airplane accommodations unite the cities of this region with each other and with Central America, the West Indies, the United States, and other parts of the world. Paved highways, although not numerous, are increasing in mileage. Sections of the Pan-American Highway extend from the west as far as Rio de Janeiro.

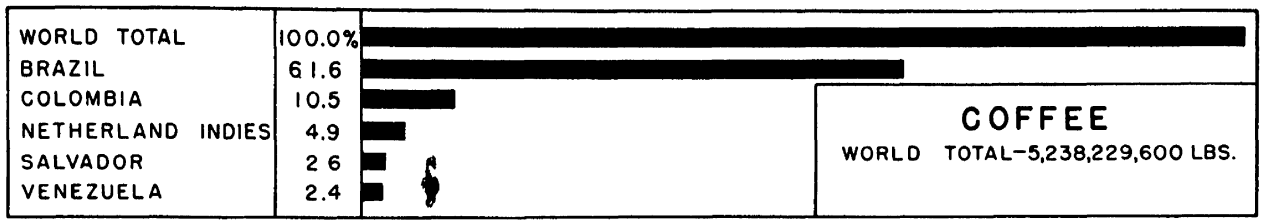


FIG. 123. WORLD'S COFFEE PRODUCTION. A 5-year pre-war average ending in 1939. (From *Statistical Yearbook of League of Nations*)

The Eastern Highlands and Coastal Features of Brazil are among the most urbanized sections of South America. The factors which account for this are favorable climate; a hinterland rich in agricultural products and raw materials, convenient connections with the main sea lanes of the world; early settlement by ambitious people, who were forced to work the land rather than to work in mines, and who therefore gained over the rest of South America the advantage of an early beginning; a series of good harbors; and the specialization in a few of the products which western European nations did not produce, such as cotton, rubber, coffee, sugar cane, dyewoods, and medicinal plants (Fig. 124).

Of the eight or more cities associated with eastern and southern Brazil, each with more than

[1] Cameron, C. R., "Maté: An Important Brazilian Product," *Journal of Geography*, February, 1930, Vol. 29, pp. 54-70.

100,000 people, seven are along the coast or on the coastal plain, and only two are actually on the highland. These two are São Paulo and Bello Horizonte. Many cities of the southern part of the country deserve attention, but only a few can be mentioned here.

Recife (Pernambuco), at the eastern extremity of South America and protected by a natural breakwater, is built on the southern end of a sandy beach between the sea and a small lagoon. Recife (Reef City) is about 4000 miles from both New York City and Liverpool, and the nearest South American city to Africa. Sugar, wax, rum, cotton, lumber, hides, dyewoods, rubber, flour, and fruits are the leading exports.[1] Several railroads connect the city with its hinterland.

Situated on the bay side slope of a rugged peninsula which extends southward from the mainland and separates the deep bay of Todos Santos from the Atlantic Ocean is *São Salvador* (Bahia, Bay City), one of the oldest trade centers of Brazil. São Salvador today is an exporter of cacao, coffee, sugar, diamonds, hardwoods, rubber, and castor oil. There are over 100 industrial enterprises in the city. Its net of railroads connects with important tributary lands in the interior.

Rio de Janeiro (January River), the capital and metropolis of Brazil, possesses a beautiful harbor that has brought world fame to the city (Fig. 125). A part of the city occupies an alluvial plain formed by the filling in of the western shore of the bay along which are nearly 20 miles of water front and above which rises the beautiful forested escarpment of the highlands. Rio de Janeiro is the center of culture, finance, and industry for the entire nation. Here are the universities, banks, libraries, and palatial homes which usually are associated with a city of its size and importance. It is the leading business and manufacturing center in Brazil. A productive hinterland furnishes raw materials, some of which are manufactured into flour, cotton and woolen textiles, silks, furniture, leather goods, and tobacco products. Coffee, sugar, hides, cabinet woods, tobacco, manganese, gold, and diamonds are the principal exports. Imports of finished goods such as luxuries, fine clothing, machinery, and miscellaneous products enter Rio de Janeiro's markets from all the great nations of the world.

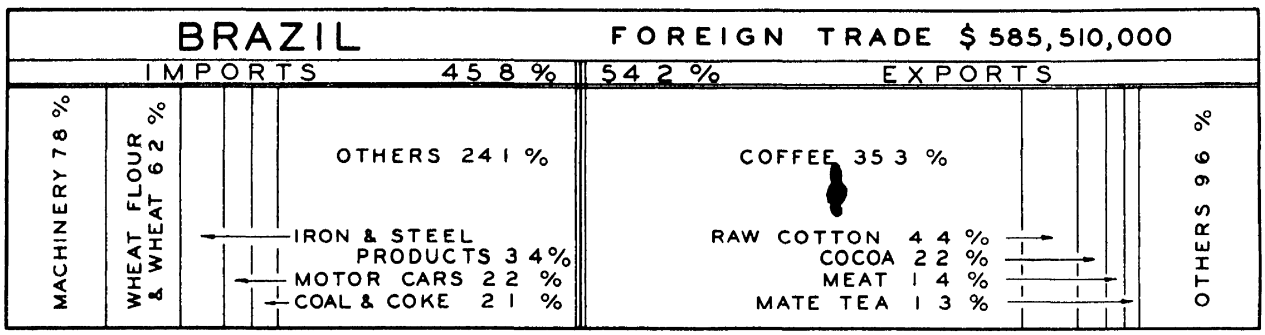


FIG. 124 BRAZIL'S FOREIGN TRADE. A 15-year average prior to World War II (See also Fig 114) (From *Statesman's Yearbook*)

Santos, the world's greatest coffee port, is on the inner side of an alluvial island formed by a tidal channel known as the *Santos River*. Santos owes its significance to its hinterland, as it is the port of São Paulo, the "Heart of Coffee Land."

São Paulo, on an elevated open tableland, is about 25 miles from the coast. Coffee and other agricultural products account for this great highland trade center. Manufactures include textiles, footwear, clothing, food products, furniture, and domestic utensils.

In the highlands about 200 miles north of Rio de Janeiro is *Bello Horizonte*, the capital of a rich Brazilian state. Besides having a fine agricultural hinterland, it is in the center of the most prosper-

[1] Straun, Warren, "Carnauba Wax 'Brazil's Monopoly Product,'" *Journal of Geography*, April, 1942, Vol. 41, pp. 121-129.

ous mining district in Brazil which produces gold, diamonds, and manganese.

One of the chief commercial centers of southern Brazil is *Porto Alegre,* situated at the northern extremity of the coastal lake, *Lagos dos Patos* (Lake of Ducks). The five rivers which enter the lake to the west of Porto Alegro are all navigable in their lower courses. The harbor is shallow, and large steamers must anchor out at sea and be serviced by lighters. The manufactures consist of cotton fabrics, footwear, furniture, household goods, and foodstuffs.

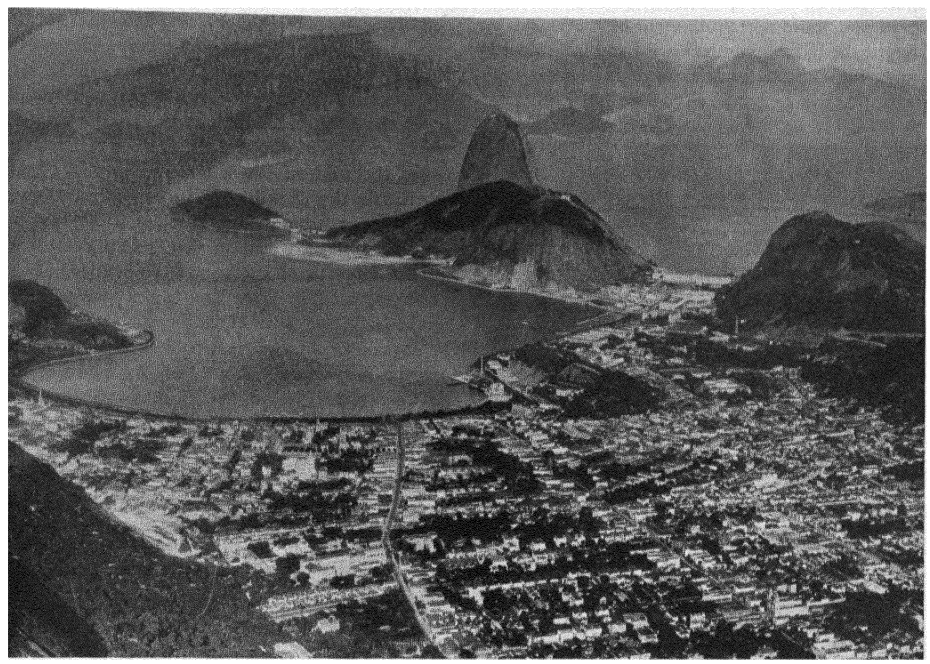


FIG. 125 RIO DE JANEIRO FROM CORCOVADO MOUNTAINS (2310 FEET) The drowned margin of the plateau has made an incomparably fine and beautiful site and a deep and spacious harbor for the city (Courtesy Canadian Pacific Railways)

INTERIOR BRAZILIAN PLATEAUS. Settlement in this part of Brazil has been slow, most of the people having entered by way of the Parana-Paraguay River basin. When Brazil was a Portuguese colony little was done to open up this vast, remote area. Transportation facilities have always been limited and the distances were too great for commercial communication. Population density is less than two per square mile throughout most of the region except in the extreme east and near the Paraguay River in Mato Grosso. An area has been set aside on the southern edge of this plateau country for the future capital of Brazil.

The interior plateaus of Brazil constitute one of the great potential grazing areas of the world. At present it is scarcely utilized at all, partly because it lacks transportation, and also because the pressure of population has not necessitated its occupancy. Two poor railroads extend into the southern margin of the region, and two or three run back a short distance from the Atlantic Coast.

About 8,000,000 cattle occupy these grazing lands, but the animals are of poor quality, and, as a rule, are utilized only for hides and for jerked beef.

In the northern portion where rainfall is relatively heavy and dependable, there are good forests in the valleys. However, these are of little value now because of their remoteness and inaccessibility. Development of this large inland empire awaits the more complete occupancy of more favored and more accessible areas of the world. At present the native population is little interested in improving cultural conditions or introducing efficient methods of land use. There has been practically no urban development in the Brazilian interior. Trade centers usually are located along river valleys and on the two railroads. The two principal cities serving this district in the south are *Corumba* and *Cuyaba* on the headwaters of the Rio Paraguay. Some of the inland towns are more than 50 miles from a railroad. Small, dingy, agricultural depots and some mining towns of less than 1000 people are widely scattered through the plateau country. Most of these places are shut off from the rest of the world because of lack of transportation. Subsistence agriculture is the chief human activity of the area.



FIG. 1 [illegible] PLANTATION ON THE TAPAJOZ RIVER. One hundred forty miles from the Amazon. Numerous stumps of the primeval forest may still be seen in the rubber orchard. (Courtesy Ford Company)

NORTH BRAZIL (AMAZON BASIN). Except for very small areas, the hand of man has done very little to alter the natural landscape in the Amazon Basin. Only the great forests of the Soviet Union exceed the forests of Brazil in uninterrupted extent. Early settlements were made along the Atlantic Coast, and trade was conducted with the natives of the interior. Enormous distances, the jungle, unfriendly Indians, and poor means of communication have kept most of the white men near the coast. In the primeval forest the natives have found sufficient diversity within small areas to give them a living and make small villages possible, but this has not necessitated trade with neighboring tribes and, consequently, many tribes living remote from the regular channels of commerce seldom, if ever, see a white man.

Collecting native rubber is the principal industry in the Amazon Basin. The production of plantation rubber in the Far East, however, has affected the wild rubber industry adversely. *Hevea brasilensis,* the world's principal rubber tree, was discovered growing wild in Brazil, and the Amazon country led the world in production of rubber until a larger production of high quality rubber was made possible in the East Indies by plantation methods. World War II, however, initiated a rejuvenation of the Brazilian rubber industry which may or may not continue with the close of the emergency. In 1927, an experimental rubber plantation was started at Fordlandia on the Rio Tapajoz, a tributary of the Amazon. Unexpected difficulties arose on this site, so a more favorable place was selected at Belleterra farther downstream. The Brazilian government now is in control of this project. At present, the plantation method of rubber production in Brazil is still in the experimental stage (Fig. 126). Moreover, the desperate need for rubber during World War II gave synthetic rubber production such a boost that natural rubber can no longer hold the exclusive position that it once possessed.[1]

Other forest products from the Amazon Basin are chicle, balsa, and hardwoods. Although there is an abundance of excellent cabinet woods such as mahogany, ebony, rosewood, and dyewoods, lumber from the Amazon area cannot compete with that from other parts of the world because the chief centers for Brazilian hardwoods are far from transportation and markets, and some of the woods are too heavy to float down the streams to market. Pure stands of merchantable timber are not extensive, thus increasing the expense of exploitation. The

[1] McClintock, John C., "The Battle of the Amazon," *Journal of Geography,* Jan., 1944, Vol. 43, pp. 27-33.

production of Brazil nuts is increasing, the chief center being near Manaus and Belem. Agricultural development has been slow. Foodstuffs from the forests are scarce, and the high wages paid for gathering rubber have retarded agricultural expansion. The principal cultivated crops are sugar cane, cacao, corn, rice, manioc, and fruits, especially bananas. Most of the products are marketed locally or used for subsistence purposes. Cattle and sheep do not thrive because of tropical diseases, insect pests, and the lack of nutritious, palatable grasses.

The population is sparse in the Amazon Basin. Of the approximately 1,500,000 people, more than one half live near the Amazon below Manaus or along the Atlantic seaboard with access to water highways. Only four cities can be given special mention. *Manaus* (Manaos), 908 miles above the mouth of the Amazon, is the capital of the State of Amazonas (Fig. 127). The site is a slight eminence 106 feet above sea level on the bank of the Rio Negro 12 miles above its junction with the Amazon. This river port is the commercial center of the whole Amazon region. Two steamboat companies operate regular service from Manaus direct to New York and Liverpool. Nearly all manufactured and finished goods are imported. Exports consist of cacao, rubber, fiber, and dried fish. *Belem* (*Para*), 86 miles from the Atlantic Ocean, is the principal commercial center for northern Brazil and the entrepot for the Amazon Basin Steamers from all parts of the world anchor in the harbor and carry away rubber, cotton, dyewoods, cacao, and drugs.

LOOKING TO THE FUTURE. Southern Brazil is one of the choice regions of South America. Here nature has devised a combination of natural conditions which not only challenge man's interests but which also yield richly in return for his expended energy. Rainfall is adequate over most of the region and great tracts of land have never been placed under cultivation.

The situation is not without its adverse features, however. One of them concerns the production and marketing of the great cash crop and export—coffee. Whether to produce an abundance and accept lower unit production prices or to produce scantily and expect higher prices has long been a problem to Brazil. Experiments with crop and price control have proved costly, for other regions with favorable conditions immediately began to grow coffee. This region now faces serious competition with other coffee-producing lands. How to adjust its production to the changed conditions is not an easy problem (Fig. 114). A promising innovation is that of interplanting tung trees in the coffee orchards, thus overcoming the handicap of a strictly one-crop economy.

Much savanna upland is available for the extension of grazing of cattle and sheep and other agricultural utilization, but transportation facilities



FIG. 127 MANAUS, SHOWING WHARVES, BOATS, AND HARBOR EQUIPMENT. The city is in the center of the great Amazon Lowland nearly 1000 miles from the Atlantic. (Courtesy Pan American Union)

are inadequate for marketing the products. Added attention to this phase of Brazilian economy will pay good dividends.

Brazil's great storehouse of iron ore is being developed rapidly, and no doubt will enter extensively into export trade. If coal production can be increased or imported cheaply, manufactures of iron and steel will develop at an increasing tempo.

Population pressure has not yet demanded extensive use of the Amazon Basin. The long distances to good agricultural lands of the Amazon country, the vast swamps which lie along the great river and its tributaries, the enervating climate, and the hostile, intractable aborigines combine to discourage the settlement and profitable use of this part of Brazil.

In the future the Amazon Basin has the possibilities of furnishing to a waiting world vast quantities of raw materials such as rubber, cacao, tropical woods, spices, and medicinal plants. Until recently more accessible areas were supplying these goods in sufficient quantities to satisfy the demand.

Almost unlimited volumes of hydroelectric power in Brazil's mighty rivers are awaiting development. The challenge for the future in this connection is alluring indeed. A projected development for the Rio São Francisco corresponds to the Tennessee Valley Authority in the United States.

Finally, it should not be assumed that the friendly relations between Brazil and the United States during World War II were purely accidental. Geographic differences in climate, mineral products, and location naturally drew the two countries together. The rubber, coffee, manganese, and quartz of Brazil were desperately needed in the United States, and we were willing to pay well for these commodities and for air-base concession in eastern Brazil. The marked contrast in our diplomatic relations with Brazil and Argentina has been based in large measure on geographic conditions (see page 182).

THE GUIANAS

The Guianas—British, French, and Dutch—are between Venezuela with its Spanish background and Brazil with its Portuguese setting. These colonies are mostly forested and it should not seem strange that the Spanish and Portuguese should shun such areas and that the British, French, and Dutch could easily maintain possession of them. It was in 1667 that the Dutch traded Manhattan Island for the British hold on what is Surinam (Dutch Guiana), and the Dutch seemed well satisfied with the bargain. Together the Guianas are about four times as large as Louisiana, the British colony being as large as the other two combined It seems desirable to discuss these colonies together rather than separately.

Natural Features

The three Guianas occupy the east half of the Guiana Highlands and Coastal Plain, and each extends southward to the highland crest. For the most part the climate is tropical rainy. The area is in the belt of the equatorial calms from May to October and consequently receives much rainfall at that time. During the remainder of the year the heavy precipitation is due to the orographic rainfall of the northeast trade winds on the windward slopes but the precipitation is much less on the steep leeward slope at this time. Rainfall on the coast varies from 90 to 120 or more inches, and is best expressed by the average annual rainfall received at three coastal cities: Georgetown, 90.4 inches; Cayenne, 123.3 inches; Paramaribo, 90.4 inches. The temperature in the tropical rainy climate is monotonously warm, the yearly range in mean monthly temperatures being only 2.3° F. at Georgetown. In the interior portions, on the high plateaus and on leeward slopes, the rainfall is frequently less than 40 inches annually (Figs. 90 and 236).

In the tropical rainy portions of the region the rain forests are luxuriant and almost impenetrable. Among the most abundant tropical trees are balata, greenheart, dyewoods, fine cabinet woods, and resinous trees. On some of the plateau sections and especially on the leeward slopes, savannas prevail (Figs. 236 and 237).[1]

Most of the mantle rock consists of residual and alluvial materials and, where the soils have lain undisturbed long enough to develop a profile, red lateritic soils have developed. Much of the savanna lands are on soils derived from sandstones, whereas dense forests grow on much of the soil weathered from the crystalline rocks.

Cultural Features

This part of South America did not yield riches to the mother countries in gold or silver when first settled, but it has been a source of rich trade for hundreds of years. To satisfy the demand for sugar in Europe during the seventeenth century, slaves were imported to this region from Africa, and great sugar plantations were developed. The Guianas were made a melting pot of tropical laborers by the western European nations. Javanese, Portuguese, Indians, Chinese, and many Negroes imported from Africa worked on the large tropical estates.

About one third of the cultivated land in British Guiana today is devoted to sugar production, and one half to rice. As a result of greater mineral resources and of wiser use of the land, British Guiana

[1] Shaw, Earl B., "The Rupununi Savannahs of British Guiana," *Journal of Geography*, March, 1940, Vol. 39, pp. 89-104

has had a fuller development than either Dutch or French Guiana [1]

The enervating tropical rainy climate of the Guianas together with inaccessibility combine to keep human progress at a low ebb over most of these colonies. In the back country, which begins quite near the coast settlements, land cultivation in forest clearings produces subsistence crops of yams, cassava, plantains, bananas, and corn. On the plains sugar and rice production have developed into important industries through the use of imported coolie labor. On the lowlands, too, tropical subsistence crops play a large part in the agricultural economy. The Guianas have the world's largest supply of greenheart, a heavy tropical timber used extensively in shipbuilding. It is cut and shipped on light wood rafts via the streams to the coast where most of the logs are exported. Balata is also one of the principal products in trade.

In the highlands accessible only to river boats is the famous Mazaruni diamond field, Georgetown exporting annually several million dollars' worth of industrial diamonds For a long time gold mining has been one of the most important industries of the Guianas, but recently the mines have been running low in production. Bauxite, in the past few years and especially during World War II, has become one of the principal products for export, British Guiana having one of the world's large deposits of this ore.[2]

Only small portions of the Guianas are being exploited and these rather intensively so that the trade in proportion to white population is much greater than in some of the other countries—six times as great as in Ecuador, four times as great as in Venezuela, and three times as great as in Colombia and Brazil. On the whole, however, it is conceded that the Guiana region would still repose in primitive jungle insignificance had the British, French, and Dutch not introduced European management.

[1] Platt, Robert S., "Plantations in the Coastal Lowlands" (British Guiana), *Latin America*, McGraw-Hill Book Co., New York, 1942, pp 160-176

[2] Collier, James E., "The Aluminum Industry of the Western Hemisphere," *Economic Geography*, October, 1944, Vol 20, pp 229-257.

URBAN CENTERS OF THE GUIANAS. The urban centers of the Guianas are not located on the highland. In each of the colonies, a city on the lowland dominates the trade, the government, and the culture.

Georgetown, British Guiana, situated at the mouth of the navigable Demerara River, is the principal city of the whole region. It has a good harbor and trades with nearly all parts of the world, exporting gold, bauxite, sugar, timber, diamonds, rice, and cocoa. Small industrial establishments manufacture chocolate, footwear, cigars, and soap. Only 10 per cent of the population is white. About 17 miles from the sea on the banks of the Surinam River is *Paramaribo*, the capital and exporting center for Surinam (Dutch Guiana). The principal exports are coffee, cacao, rubber, sugar, and rum. *Cayenne*, the capital of the French Guiana, once a penal colony for political offenders, is situated on the northwest extremity of the island of Cayenne near the mouth of the Cayenne River. The exports of the city are gold, cacao, phosphates, hides, spices, and tropical woods.

These are the last remaining colonial cities on the continent of South America, and each has a significant trade with its mother country. While none of the three cities is a metropolis, it must be remembered that each serves as the trade, governmental, and cultural center for a considerable area, and is the link with the outside world for thousands of people in the Guianas.

THE GUIANAS IN THE FUTURE. Dependence upon mother countries, which are more or less apathetic concerning the welfare of the colonies, is probably the chief factor in the way of progress. This arises from the fact that the colonies seem unable to compete successfully with areas more favorably located for the production of commodities adapted to the region. It might be desirable to exploit to a greater extent the forest products, especially tropical woods. To succeed, in any of the possible lines, however, an infusion of energy from the outside seems necessary, and better transportation and communication with the interior are essential. Progress will always seem far off unless the mother countries undertake to raise the standards of living for the people by encouraging education and efficient production, by raising standards of health,

by diversifying and intensifying the agriculture, and spending considerable money on the improvement of transportation and communication.

URUGUAY

Uruguay, the smallest country in South America, is somewhat larger than Georgia in the United States, and lies in a corresponding latitude but south of the equator. However, the country supports about two thirds as many people. Although Uruguay has a fine frontage on the sea and on the Rio de la Plata estuary, it rests uneasily between two powerful neighbors—Argentina and Brazil.

Natural Features

Uruguay occupies the extreme southern part of the East Brazilian Highlands. Bordering the sea is a narrow coastal plain back of which rises rather rapidly a hilly country nearly 2000 feet in altitude. From the crest of the hills, mostly less than 100 miles from the coast, the land slopes toward the interior, draining into the Rio Uruguay.

The climate of Uruguay is subtropical humid—the rainfall a little less and not quite as even or as reliable as it is in southeastern United States (Figs. 90 and 236) A large part of the country has a covering of tall grass prairie, forests occurring along the streams and in the lowlands bordering the Rio Uruguay. Although the parent materials are different, the mature soils of most of Uruguay are similar to those of central Texas—that is, a prairie type.

Cultural Features

Uruguay owes its existence as an independent buffer country to the territorial rivalries between the Spanish and the Portuguese plus the intermediary good offices of the British. The little country was launched in 1828, and, although frequently beset by both political and economic storms, today looks forward to continued progress among her South American neighbors.[1]

It was not until the seventeenth century that cattle were introduced into Uruguay, and these were allowed to multiply and run wild. Little or no attempt was made to improve the breeds of cattle until early in the present century when refrigeration methods of processing meats were introduced. Grazing now is by far the most important industry of the country. The growing of high-grade wool and mutton sheep today even outstrips cattle production, for wool alone accounts for nearly one half of the country's export trade—cattle and cattle products amounting to a little more than 20 per cent of the total exports.

Only a small portion of Uruguay is not suited to crop production, although only 7 per cent of the cultivable land is actually in crops. It is evident that the people as a whole are cattle- and sheep-minded. Yet it must not be concluded that farming is unimportant. Wheat, oats, corn, and flax are grown—wheat and linseed being substantial items of export. Grapes, peaches, oranges, and pears are produced for local consumption.

Uruguay's global interests are indicated by her trade with Japan, Germany, United States, United Kingdom, Argentina, and Brazil (Fig. 118).

Urban Centers and Transportation This little pastoral country has nearly 2000 miles of railway, one fourth of which is state owned. A branch of the Pan-American Highway runs through the country, and the services of the Pan-American Airways are available The chief waterways are the Rio Uruguay and the Rio de la Plata.

Of the total population of Uruguay (2,146,545 in 1943) more than one third live in the capital city, Montevideo. Only one other city has more than 30,000 people. This is evidence of the unity of the people around their one large interest—pastoral life.

Montevideo ("I see the mountain") is on a rocky headland which projects westward between the sea and an almost circular bay which forms the harbor. The city is now growing to the east into the rolling country and northward around the eastern shore of the bay. Manufacturing is not significant and the limited amount is chiefly for home consumption. Exports consist mainly of livestock, meats, hides, wool, wheat, flour, corn, and some other agricultural products. Most of the luxuries, machinery, and finished goods, are imported. Montevideo is one of the important winter resorts of South America.

[1] Lemert, Ben F., "Uruguay and the Uruguayans," *Journal of Geography*, November, 1934, Vol 33, pp. 289-303

PROBLEMS OF THE PEOPLE. With such a high percentage of her land suited to farming, and such a small percentage under cultivation it would seem that Uruguay is in a position to achieve notable progress. Grazing lands may be improved and more intensively utilized. Increased production of feed grains would accelerate the development of the cattle and sheep industries on the ranges. It cannot be expected that cattle and sheep men will become interested in farming, so it might be desirable to encourage immigrants who are skilled in the cultivation of the land. Uruguay's pastoral economy, dependent to such a great extent on the export of wool and meat, is hazardous, too, because the tide of trade often is disrupted by events beyond the borders of the country This seems to indicate that an increased diversity of economic and industrial interests should be promoted.

Part Three

EURASIA

Introduction

THE CONTINENT OF EURASIA occupies more than 35 per cent of the land surface of the earth and contains nearly 80 per cent of the world's population. Only 13 per cent of this great continental land mass is suited to cultivation. About 11 per cent of China, 35 per cent of India, 25 per cent of western Europe, and only 5 per cent of the Soviet Union are cropland. A casual inspection of a population map shows that some parts of Eurasia must be more fa-

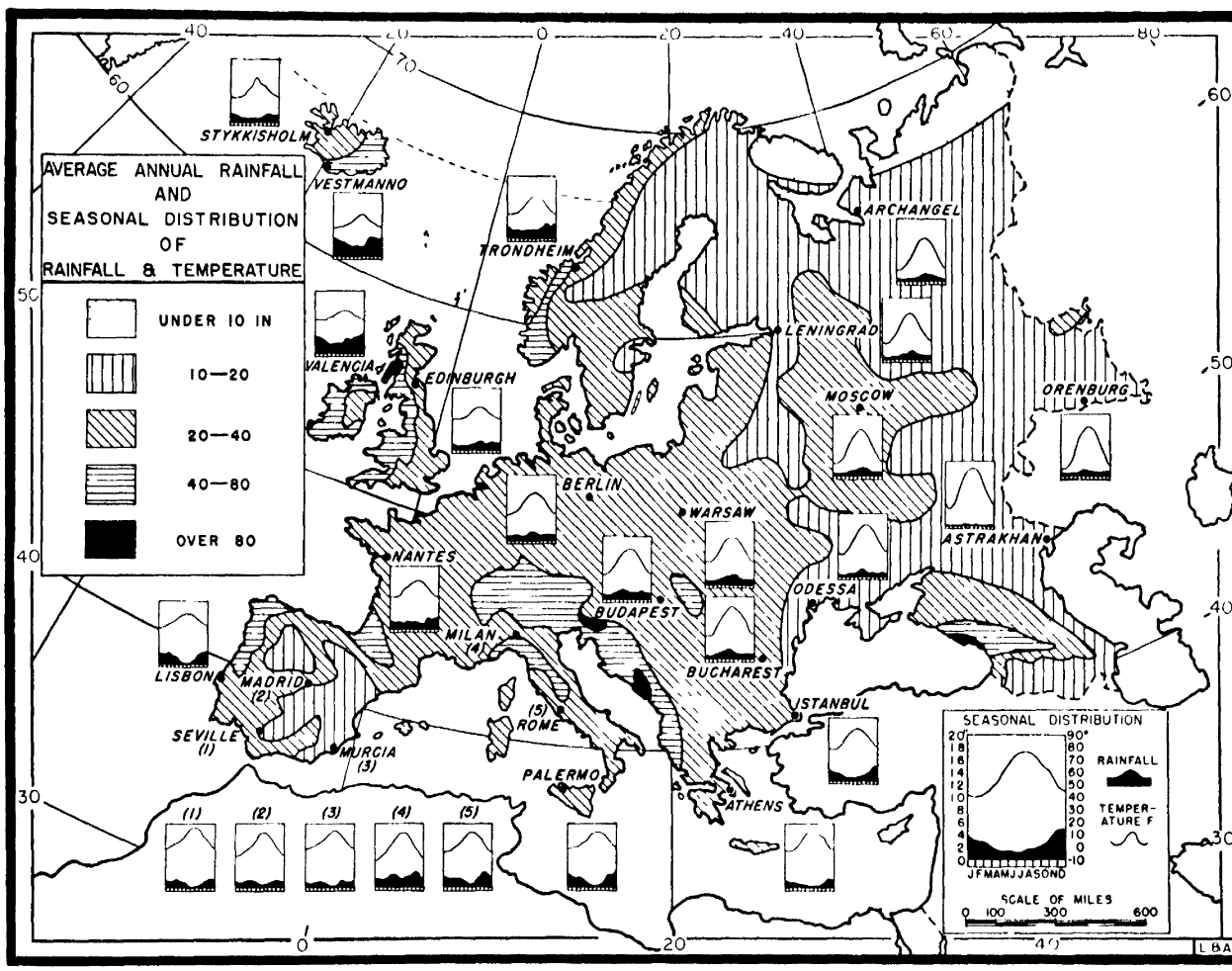


FIG. 128 MEAN ANNUAL RAINFALL OF EUROPE AND THE MONTHLY DISTRIBUTION OF TEMPERATURE AND RAINFALL FOR SELECTED STATIONS. The graph for Istanbul has been enlarged for convenience in the interpretation of the record at other stations.

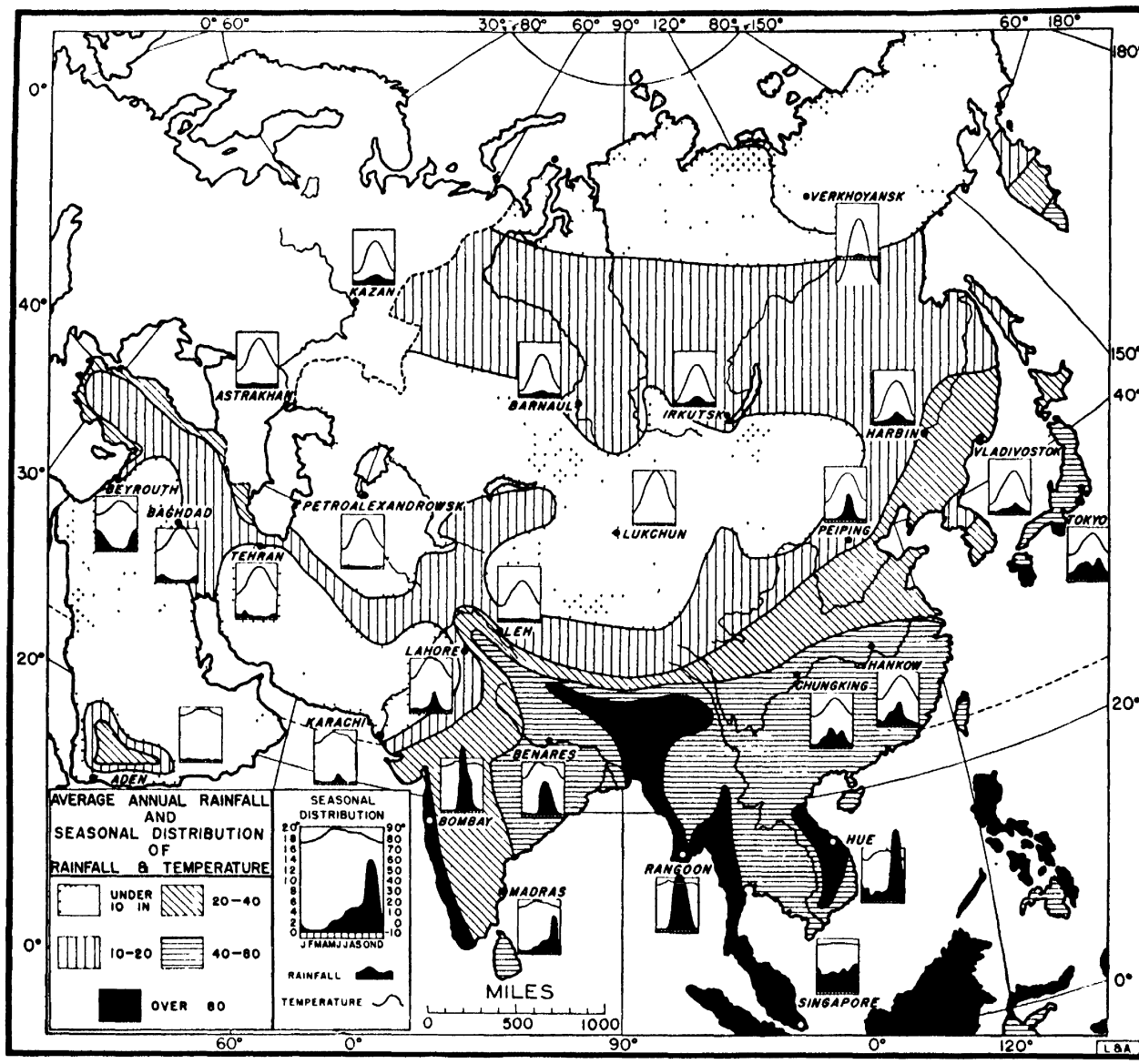


FIG. 129 MEAN ANNUAL RAINFALL OF ASIA, AND THE MONTHLY DISTRIBUTION OF TEMPERATURE AND RAINFALL FOR SELECTED STATIONS. The graph for Madras has been enlarged for convenience in the interpretation of the record at other stations.

vorable for human occupancy than others are (Fig. 9). Some plains support many people, such as the plains of Central Europe, the plains of China and of the Ganges in India, whereas other plains, such as those of northern and eastern Eurasia and the plains east of the Caspian Sea, contain but few people Some of the mountainous areas are almost uninhabited, such as those of Norway, Sweden, and central Eurasia, whereas the mountains of Switzerland and Austria support large populations. The contrasts in the utilization of plateaus also are often remarkable. The population map shows that high cold plateaus of Tibet and Mongolia support only a small number of people, a condition which contrasts sharply with conditions in the central plateau of France and the plateau of Anatolia. Some of the reasons for these contrasts are not difficult to find.

It is well known that the location of an area with

reference to its distance from the equator is an important factor as related to human occupancy. Most of Eurasia is in middle latitudes, and for this reason is generally said to be favorably located. Toward the poleward margin of the continent the climatic conditions become more and more unfavorable and consequently the number of people becomes fewer and fewer (Figs. 128 and 129).

Distance from the ocean, too, seems to be a controlling influence More people live near the warm oceans and the navigable streams flowing into them than live in central parts of the continent. The deep water indentations on the eastern, western, and southern margins of the continent lend emphasis to the influence of the ocean in the distribution of people, more especially before the coming of air transportation and rapid land communication.

It is apparent, therefore, that man's material welfare depends in a large measure upon the intelligence with which he utilizes the resources nature has placed at his disposal. In primitive days the places where people lived were determined almost wholly by the availability of natural resources, particularly plants and animals, because specialized industries, the arts of trade and means of transportation had not been developed. Along the coast of what is now France, England, and Norway early peoples gained much of their living from the sea by fishing.

In the tundra regions near the Arctic coast the reindeer was the only domesticated animal, and here farming was impossible, so the life of the people centered around the animal that made life possible to them. As a result they eked out a poor existence, moving from place to place in search of feeding grounds for their reindeer. Today the Lapps of northern Europe are an example of a people who because of the environment continue to follow primitive modes of living (Fig. 179).

In the forested area of what is now Germany, Russia, and in much of Siberia, the people formerly lived in scattered villages near rivers which they used principally as highways. The activities of the people centered around hunting, timber-cutting, boat-making, fur-trading, and such other industries as were suited to a forest habitation. In parts of Siberia human occupance today approximates these conditions.

On the plains of Hungary, Ukraine, and Turkestan the life of the people in early days depended largely on the care of cattle and horses, because they followed their flocks and herds from place to place in search of ever-better feeding grounds. The nomads of the Kirghiz steppes still make their living in this way.

When our ancestors in Europe were living in primitive simplicity, peoples of southern and eastern Eurasia had discovered how to cooperate with natural environmental conditions so as to satisfy the increasing needs of a growing population. For thousands of years before the Christian era the plains of the Hwang and Yangtze rivers were supporting hundreds of people per square mile, and no doubt the same was true of the plains of the Irrawaddy, the Brahmaputra, the Ganges, and of the Tigris and Euphrates river valleys. We may be sure that these plains areas also have a primitive human history in which the activities and interests of the people were of the most elemental nature, no trace of which is left today except as they may be brought to light through the diligent researches of the archeologist.

The multiple ways in which man has applied intelligence to improve conditions under which he lives have enabled him to extend immeasurably the sphere of his activities. His development of technology, and of means of transportation, his improvement of plants and animals, and his use of products from mines, fields, and forests have made possible methods of making a living many times easier and richer than were ever possible in earlier times. To understand how the method of intelligence has been applied and developed it is necessary to study what the environmental conditions are under which these changes have been wrought.

17

The Central Eurasian Barrier and Gateways

TREND OF MAJOR RELIEF FEATURES

WHEN THE AMERICAN PIONEERS moved westward across the interior of North America, immense plains spread out before them in all directions. The natural tendency was to stop and occupy these rich areas. What a contrast this situation was to that which faced the explorers and travelers who undertook to cross from the south to the north in Eurasia.

The major relief features of North America trend chiefly in a north-south direction, with extensive plains lying between marginal highlands. As far as human interests are concerned, these plains were a unifying factor because they were well suited for human occupancy. In South America much of the great north-south plains with their continuously warm, humid climate is enervating to the people who live therein and serves largely to discourage unity.

Quite in contrast to the conditions in the Americas the great relief features of Eurasia trend in an east-west direction and a formidable barrier of mountains, plateaus, and deserts extends through the middle from east to west.[1] Gateways and corridors cut through this great barrier, and millions of people have surged through these passageways in search of more favorable living conditions (Fig. 130). Nevertheless, the barrier through scores of centuries has separated the peoples living on opposite sides of it. In a study of the geography of Eurasia it is well to keep in mind how the activities and interests of the people of the continent have been and still are affected by this complex east-west barrier.

SOME CHARACTERISTICS OF THE CENTRAL BARRIER

The Central Eurasian Barrier may be traced from the Bering Strait on the Pacific Coast southward and westward to the Atlantic Ocean, terminating at the west end of the Pyrenees Mountains. It is an extension, 12,000 miles long, of the 10,000-mile cordilleran mountain system in the Americas which stretches from Cape Horn through Central America to the Bering Strait. Throughout the whole distance from the Strait of Magellan to the Pyrenees only two natural water routes cut through the 22,000 miles of highland—namely, the Bosporous-Dardanelles (Hellespont)[2] Breach and the Bering Strait. The Central Barrier in the west or the European section, because of a number of low gateways penetrating it, is not as difficult to cross as it is in the central and in the eastern parts where it becomes broader, higher, and more continuous, and where it is broken by only a few gateways which, for the most part, are long and difficult of passage and often dangerous.[3]

Not only has this great transcontinental barrier obstructed the easy north-south flow of humanity across Eurasia but also it has hindered movements of plants and animals. Large groups of people have

[1] The east-west barrier feature in Eurasia is variously designated: Central Eurasian Barrier, Mid-Eurasian Highland, Mid-Eurasian Barrier, Central Barrier, and Barrier. Because of the variety of terms used, the authors deem it wise not to differentiate sharply among these expressions.

[2] The term *Hellespont* is often used for *Dardanelles* in historical reference.

[3] Semple, Ellen C., "Influences of Geographic Environment," Henry Holt and Company, New York, 1911, Chapter XV.

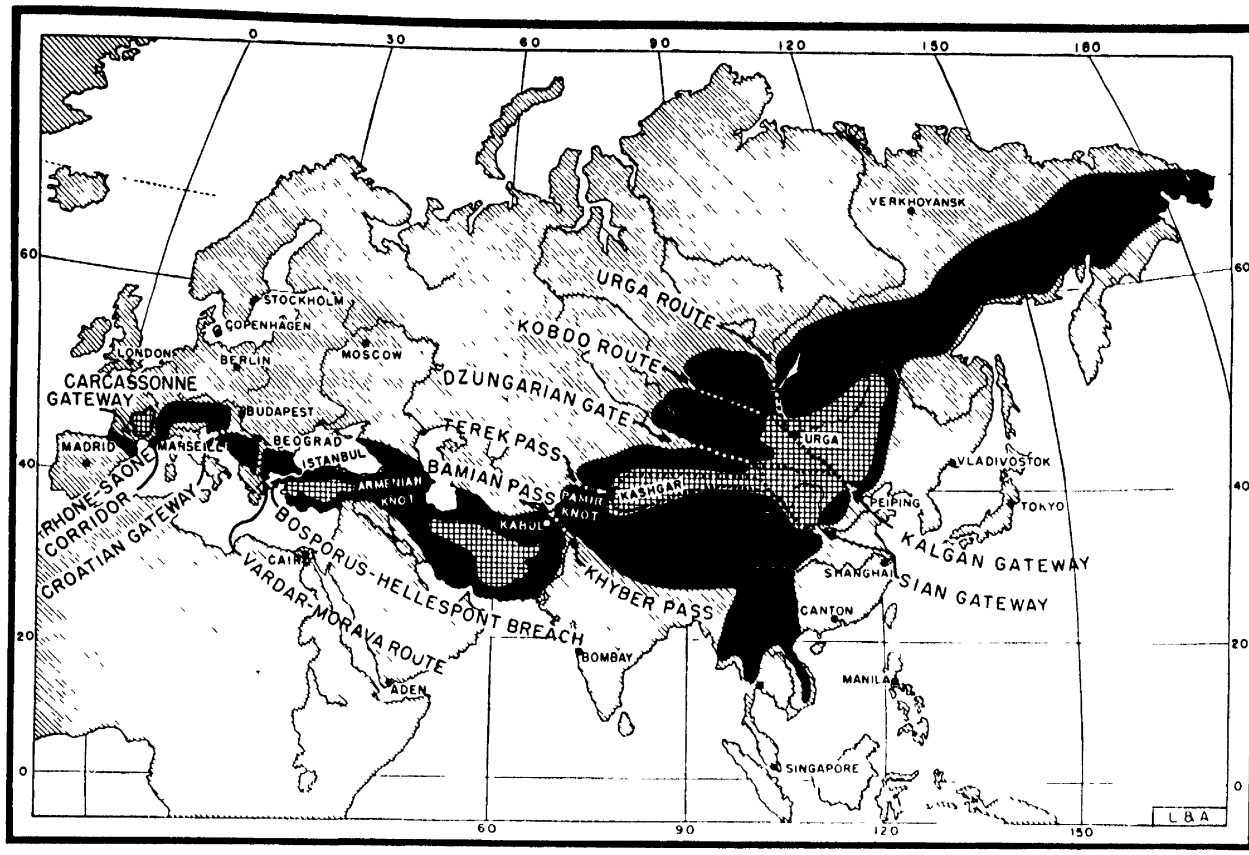


FIG. 130 CENTRAL EURASIAN BARRIER AND GATEWAYS The Great Barrier extends through Eurasia from the Bay of Biscay to Bering Strait. The gateways and passes all have historic as well as present-day interest

been isolated so effectively that the exchange and blending of ideas, customs, and cultures across the barrier has often been retarded if not entirely inhibited.

The high altitudes, rugged relief, and the extensive areas involved were not the only difficulties encountered in crossing the continent The associated ranges in temperature and the rainfall deficiencies were often as difficult to surmount as were the land forms.

GATEWAYS IN THE WEST

The barrier feature in the western part of Eurasia is near the southern margin of the continent, and consists chiefly of mountain ranges projecting at different angles, but on the whole extending in an east-west direction. Through this highland area are five major gateways that are today, as formerly, strategic routes for travel and trade. In World War II both the United Nations and Axis Powers realized the tremendous significance of some of these routes.[1]

THE CARCASSONNE GAP. The Carcassonne Gateway between the *Pyrenees Mountains* and the *Central Plateau of France* is an easy land route from the Mediterranean Sea through the barrier to the plains of western France and the Atlantic Ocean. This gateway is only 620 feet above sea level at its highest point and undoubtedly was a strait connecting the Atlantic Ocean and the Mediterranean Sea before its emergence from the sea in late geological times (Figs. 130, 131, and 132).

This gap was the passageway of migrating peoples, the site of an old Roman road, and today it is the route of a barge canal Through this gateway Rome received gold and silver from the Pyrenees,

[1] Semple, Ellen C., "Geography of the Mediterranean Region," Henry Holt and Company, New York, 1931, Chapter X

the *Iberian Plateau*, and the Central Plateau of France. Also tin for the manufacture of bronze was transported to Rome from Brittany in western France and from Cornwall in Great Britain. The importance of the route is attested by ruined walls and moats that surround a considerable number of cities and towns. The route today is traversed by

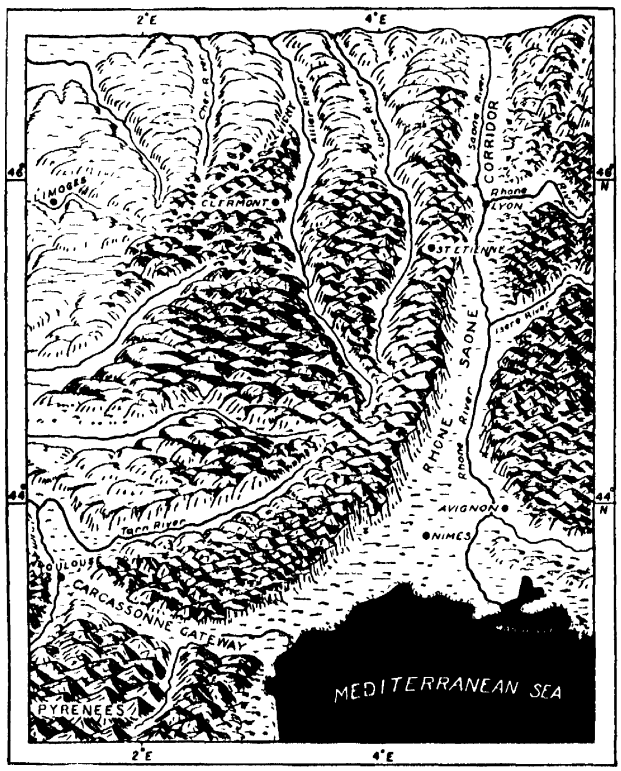


FIG. 131. CENTRAL PLATEAU OF FRANCE. Note the rugged character of the margin of the area facing the Carcassonne Gateway and the Rhone-Saone Corridor.

one of the leading railways of France—the line from Bordeaux to the Mediterranean Sea—and Toulouse near the divide is the key city. The Carcassonne Gateway as a major route also opened a way to northern Spain through several passes across the Pyrenees and into northern France by the *Poitou Gateway* to the valleys of the Loire and the Seine. In 732 A.D., a decisive battle (Battle of Tours) between Islam and Christianity was fought in the vicinity of the latter gateway (Fig. 132).

THE RHONE-SAONE CORRIDOR. The Rhone-Saone Corridor, another major route through the barrier in Europe, is the long narrow valley of the *Rhone River* and its main tributary, the *Saone*. West of this gateway is the Central Plateau of France and on the east are the Alps Mountains. The stratification of sediments in the valley indicates that it was at one time an inlet of the sea (Figs. 131 and 132).

Civilization spread slowly into western Europe and the Rhone-Saone Gateway became important after the Romans gained control of all the lands around the western Mediterranean (west of Sicily and Italy). Not only did Roman civilization move up the valley but it spread its influence far and wide through a number of subsidiary gateways. The *Belfort Gateway* is a gap 18 miles wide and 1138 feet in altitude leading from the Rhone-Saone Corridor to the valley of the *Rhine*. This was the major route of medieval times from the Mediterranean to the North Sea (Fig. 184). The headwaters of the Saone River connect with the *Moselle River* at Epinal by a broad pass only 1135 feet above sea level. A little farther west is a low gateway leading from the valley of the Saone to that of the *Meuse River*. Still farther westward the same valley is connected by a pass 1550 feet in altitude with the valley of the *Marne*. The old Roman road to the valley of the *Seine* branches off westward from the middle of the Saone valley. That this route dates back beyond written history is evidenced by the ruins of ancient structures which still may be seen. The northern portion of the Rhone-Saone Corridor thus commands a semicircle of minor routes that enticed civilized peoples northward and westward and later served as a focus for barbarian invasions from the north into the heart of the Roman Empire. Today the trunk-line railway from the Mediterranean Sea to Paris and the Atlantic Coast follows the Rhone-Saone Corridor, and the transport of goods by river and canal through this gateway is of great significance In World War II, an American army attacked Germany through this corridor.

THE CROATIAN GATEWAY. The highland barrier in Europe extends 500 miles eastward from the Rhone-Saone Corridor before another major breach appears. The northern end of the *Adriatic Sea* and the eastern part of the Plain of the Po (Lombardy) are connected with the upper course of the *Danube-Sava* valleys by the Croatian Gateway (formerly *Peartree Pass*), a route 2897 feet in altitude at its highest point over the karst (cavern-

ous limestone) plateau (Fig. 150). The route lies between the *Julian Alps* on the north and the *Great Kapella Mountains* in the south. The pass formerly provided means of communication and Moreover, a land route ran from the Aegean Sea and the *Strait of the Dardanelles* into northern Italy by way of the Croatian Pass. It was in the vicinity of this gateway that the Yugoslav guerillas

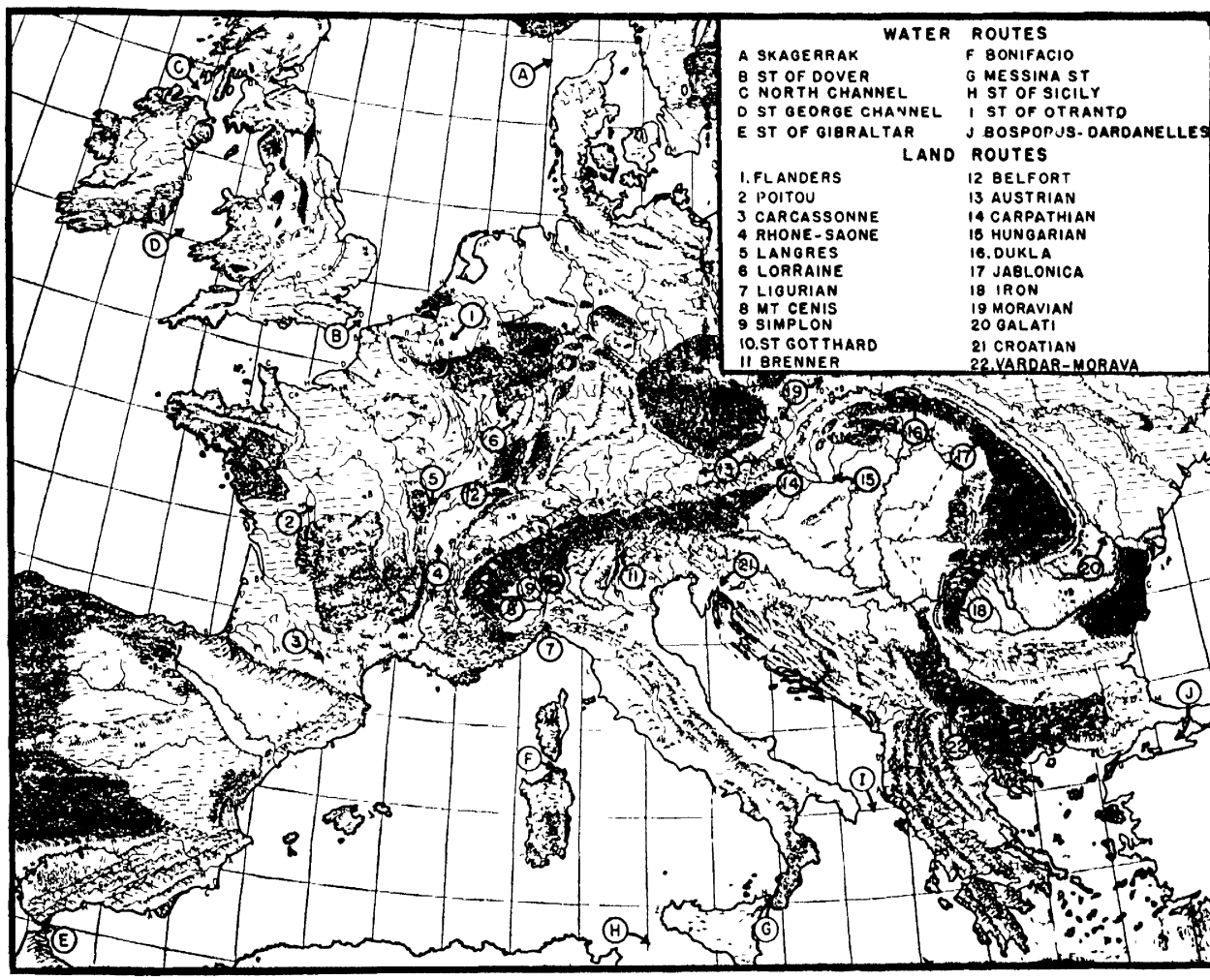


FIG. 132 SECONDARY GATEWAYS AND PASSES IN EUROPE These routes have great present-day as well as historic significance. Several were of special interest in World War II. (Courtesy Armin K. Lobeck)

trade between industrialized, cultured Mediterranean lands and the nomads and agriculturalists of the area north of the barrier. As a major route it led to the *Moravian Gate* just west of the Carpathians and connected the plains of the Danube with the plains south of the Baltic Sea. Almost due east of the Croatian Gateway is the *Iron Gate* which, in turn, opens into the *Walachian Plain* and the Central Plain north of the Black and Caspian seas by way of the *Galati Pass* (Figs. 133 and 186). contended so bitterly and courageously with the Germans in World War II (Figs. 130 and 132).

THE VARDAR-MORAVA GATEWAY. At the northern end of the *Aegean Sea* is the entrance to one of the major breaches (the Vardar-Morava Gateway) through the Eurasian transcontinental barrier. It runs up the *Vardar* valley over the *Uskub Pass* (1508 feet) near the gateway city of Skoplje, and down the *Morava* valley to the *Plains of Hungary* on the middle Danube. This route also leads

to the Plains of Lombardy on the south side of the Alps by way of the Croatian Pass—a distance of more than 500 miles. In early times this land route into northern Italy from the east was often preferred to the longer and sometimes more dangerous sea route, in spite of the fact that the highlands were the rendezvous for bands of robbers. Adjacent to the northern end of the Vardar-Morava Gateway is the *Iron Gate* of the Danube leading into the plains of the lower Danube often designated as the Walachian Plain (Figs. 130 and 132).

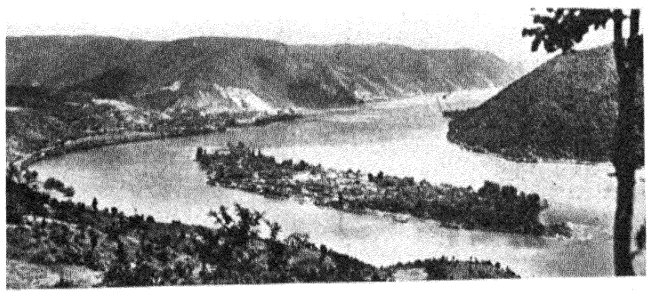


Fig. 133. The Iron Gate. Here is where the Danube breaks through the mountain ring that encircles the Plains of Hungary. (See Figs. 132 and 186.) (Courtesy Royal Rumanian Legation)

Near the northern end of the Vardar-Morava Gateway, connection was made with the great Roman highway from northern Italy by way of the Croatian Pass to Constantinople. The highway left the gateway road at the location of the modern city of Nish (Niš), followed a tributary of the Morava, crossed the divide at *Trojan Pass* (2765 feet), and then trailed down the valley of the *Maritsa* and thence to Constantinople.

Subsidiary to the Vardar-Morava route, and six or seven hundred miles north and west are several passes through the *Carpathian Mountains* and adjacent highlands to the west. Among these are the *Hungarian Gate*, the *Austrian Gate*, the *Carpathian Gate*, the *Moravian Gate*, the *Galati Gate*, and the *Gukla* and the *Jablonica* passes (Fig. 186).

It was probably through the Vardar-Morava Gate that the prehistoric Greeks came from the north and through which too the Ostrogoths invaded northern Greece in the latter part of the fifth century. For a long time Serbia has been the custodian of the Morava valley and for this reason has borne the brunt of attack by numerous invading peoples from both the north and the south. Today an important railway from the Aegean Sea to the *Hungarian Plain* follows this route, and it was in this gateway that the Greeks and British fought so valiantly but vainly to keep the Germans out of Greece in 1942.

The Bosporus-Dardanelles Gateway. The only water breach through the 12,000 miles of Eurasian Barrier is the Bosporus-Dardanelles Gateway which connects the Mediterranean and Black seas. In this vicinity a portion of the highland barrier has sunk to such an extent that only the mountain tops remain above sea level in the large area known as the Aegean Sea. Thus, the *Balkan Peninsula*, extending southeastward toward the *Peninsula of Anatolia*, is separated only by the depressed area represented by the Bosporus-Dardanelles water gap. Moreover, valleys converging on the sunken breach both from Greece and from Anatolia have made this area the principal land route between Europe and Asia, only the narrow Aegean Sea separating the two continents (Fig. 153).

Natural conditions, therefore, have caused this drowned depression to become one of the world's strategic crossroads. Not only is this crossroad important in modern times, but archeological studies show that even in prehistoric times rival groups of people were struggling with each other for the control of this route. One important feature lending added value to the waters in the vicinity has been the great shoals of fish that thrived in the waters of the Black, Marmara, and Aegean seas. Ancient custodians of the Bosporus-Dardanelles Gateway levied tribute on the boat loads of grain and fish that passed that way. Ancient Troy, at the west entrance to the narrow water route, was the keeper of the toll gate until the city was destroyed by the Greeks. It was this gateway that the Allies tried so desperately to wrest from the Central Powers in the first World War.[1]

Perhaps no less important were the guardians of the land route over this bridge from Asia to Europe. It was by the land route that the Persians under Darius and Xerxes attempted to conquer the Greeks. This was the route, too, by means of which

[1] Stolz, Carl L., "The Human Geography of the Dardanelles," *Life in Asia*, McKnight and McKnight, Bloomington, Ill., 1936, pp. 29-42.

the Turks entered Europe in the fifteenth century. The Germans, previous to the first World War, planned to reach Mesopotamia by constructing a continuous rail route by way of this crossroad, and thus to promote their dream of empire and world domination.

The conflict of nationalities and interests in the vicinity of this strategic crossroad is thought by some to justify to a great extent the naming of the Balkan area the "Cockpit of Europe."

Controversy over the control of the Bosporus-Dardanelles Gateway is today as it has been in the past—a problem of international concern. This is the only water route to the ocean highway from Romania and Bulgaria, and the Soviet Union feels keenly the need of a free outlet to the ocean from her Black Sea ports. At present Turkey controls most of the adjacent land but the water route probably will remain internationalized.

GATEWAYS IN THE EAST

Not any of the breaches through the Eurasian Barrier in the west are high or especially difficult to traverse. Moreover, one or more railways have been constructed through each of the land routes. The barrier in its eastward extent, however, is crossed by only two railroads between the Bosporus-Dardanelles Gateway and Bering Strait, a distance of nearly 8000 miles. One of these is the Trans-Siberian Railroad and the other the Trans-Iranian. One of the reasons, in addition to the formidable character of the barrier, is the fact that the lands to the north of the eastern section of the barrier (Turanian Plains and the Siberian Plain and Uplands) are not so attractive to traders and settlers as they are north of the barrier in the west.

All of the many routes over the barrier east of the Bosporus-Dardanelles breach are crossed with

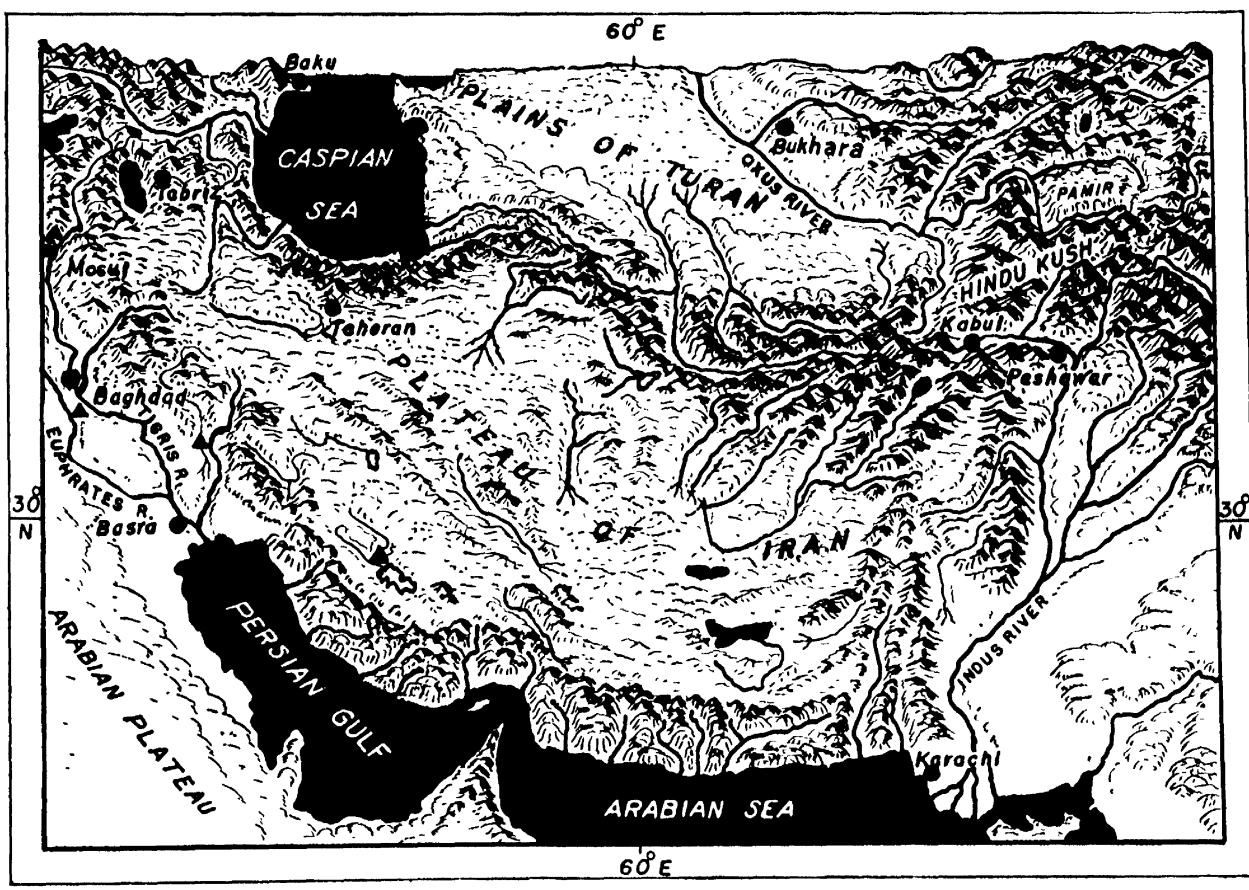


FIG. 134 THE PLATEAU OF IRAN. The Khyber Pass is between Kabul and Peshawar. This plateau is an arid section of the Central Barrier

considerable difficulty. Three or four, however, are conspicuous because of the amount of travel, trade, and the great numbers of migrating people that have passed through them.[1]

THE KHYBER GATEWAY. The Khyber Pass is about 2500 miles east of the Bosporus-Dardanelles Breach—more than the distance from New York City to San Francisco. No route of major consequence, however, crosses the barrier throughout this great stretch of highland and semiarid area (Figs. 130 and 131).

The Khyber route, 30 miles long and not more than 70 feet wide in some places, leaves northwest India through a narrow gorge between the *Hindu Kush* and the *Sulaiman* mountains. The *Kabul River* with its source high in the mountains also cuts through the barrier near the Khyber Pass. Kabul, the capital of Afghanistan, commands the *Khyber Pass* to the east of the city and also the *Bamian Pass* (8400 feet in altitude) northward over the Hindu Kush Mountains into the Turanian Plain.

Alexander the Great in 329-327 B.C. crossed and recrossed the Bamian Pass and thence made his way into India by way of the Khyber route There are other combinations of routes from India and Iran (formerly Persia) through the barrier, but the Khyber Pass is the best known and most used. Moreover, there are several very difficult routes from India across the Himalayas but none of them may be classed as major passageways.

The reorientation in recent centuries of so much of the world's trade and transportation to water and air has led to the eclipse of the Khyber Pass as a strategic route. The countries adjacent to this gateway in recent decades have been facing away from rather than toward each other, thus contributing to the neglect of this renowned route.

THE SIAN GATEWAY. The Sian entrance to the Eurasian Barrier, about 100 miles west of the sharp, upstream, northward bend in the *Hwang Ho*, is more than 2000 miles from the Khyber Pass. The route closely follows the *Wei Ho* (a tributary of the Hwang Ho) westward, and thence near the Great Wall to *Suchow* (Fig. 135). Westward from Suchow the route divides—the south road following the south side of the Tarim Basin whereas the north road skirts the north side (Fig. 143). The routes reunite at Kashgar and cross the barrier in the *Terek Pass* just north of the Pamirs—sometimes called "The Roof of the World." A branch from the north road passes north of the Tien Shan Mountains by way of the broad, low *Dzungarian Gate* into the Siberian Plain. The route through the Sian Gateway is long, tedious, and dangerous—traversing mountains, plateaus, and deserts for more than 2000 miles. Nevertheless, from ancient times down through the Middle Ages and even to early modern times, the route has teemed with travelers, missionaries, and merchants. The chief lure was to the merchant who sought the rich trade in silk and tea which centered in the association of the western world with the Chinese, and to the missionaries who longed to Christianize the "heathen Chinee." One of the great travelers of the Middle Ages who entered China by this route was the world-renowned Marco Polo. In recent years, Sven Heden, a Norwegian, has made notable explorations in this portion of the barrier. Even today, however, not a single mile of railway serves this long route, but it is altogether possible and feasible to build good motor roads through this age-old gateway. (See also Fig. 130.)

THE KALGAN GATEWAY. Hardly less important than the Sian has been the Kalgan Gateway west from Peiping (old Peking) through a pass in the *Great Khingan Mountains* across the extensive *Desert of Gobi* in Mongolia to Siberia. A branch of the Kalgan route follows the Hwang (Hoang) Ho, and the *Great Wall* to join the Sian route from the south. The Kalgan route diverges westward into several branches (Fig. 135) One branch leads almost directly west through the broad Dzungarian Gate to the *Kirghis Steppes* in the vicinity of *Lake Balkhash;* one northwest, following north of the Altai Mountains, crossing near the west end of the range into the Siberian Plain; and one northward to *Lake Baikal.* These routes across the mountains and deserts of the great barrier vary in length from 1200 to 2000 miles. It was by the Kalgan route that the Mongols from the north, under the leadership of *Genghis Khan,* having established head-

[1] Cressey, George B., "Asia's Lands and Peoples," McGraw-Hill Book Company, Inc., New York, 1944, pp. 144-145, 152, 344-345, and 470-471.



FIG. 135. SOUTHEASTERN ASIA The land routes through the Central Barrier are shown on this sketch—the Sian and Kalgan routes The desert character of the country makes these routes long and dangerous

quarters at *Karakorum* in northern Mongolia, advanced into and conquered China in the thirteenth century. (See Fig 130)

SUMMARY

The eight major routes through the Central Eurasian barrier have played important roles in many historical movements This was especially true before the great period of exploration in the sixteenth century, when the evolution of ocean transportation and the discovery of new land areas burst suddenly upon a "sleepy" world. These routes receive much attention today especially by the peoples who live adjacent to them, because free, open roads mean much in increasing interrelationships so vital to the happiness and well-being of different groups of people. The automobile and motor road are bound to accentuate and accelerate traffic through the central Eurasian Barrier; but a competing factor that must be taken into account is the phenomenal increase in the use of airplanes and airways.

Not much less significant than the major gateways are some of the subsidiary routes that lead to the major ones, such as Brenner Pass, and the Moravian and the Flanders gateways. The importance of some of these will be amplified in the treatment of the lands on the north and on the south of the Central Barrier.

PHYSIOGRAPHIC DIVISIONS AND REGIONS OF EURASIA

The surface configuration of Eurasia is very complex as compared with that of the other continents. However, this complexity of features (bays, gulfs, seas; islands, isthmuses, peninsulas; and mountains, plains, plateaus, and basins) helps immeasurably in dividing the continent into physiographic units. For purposes of this study, regional boundaries do

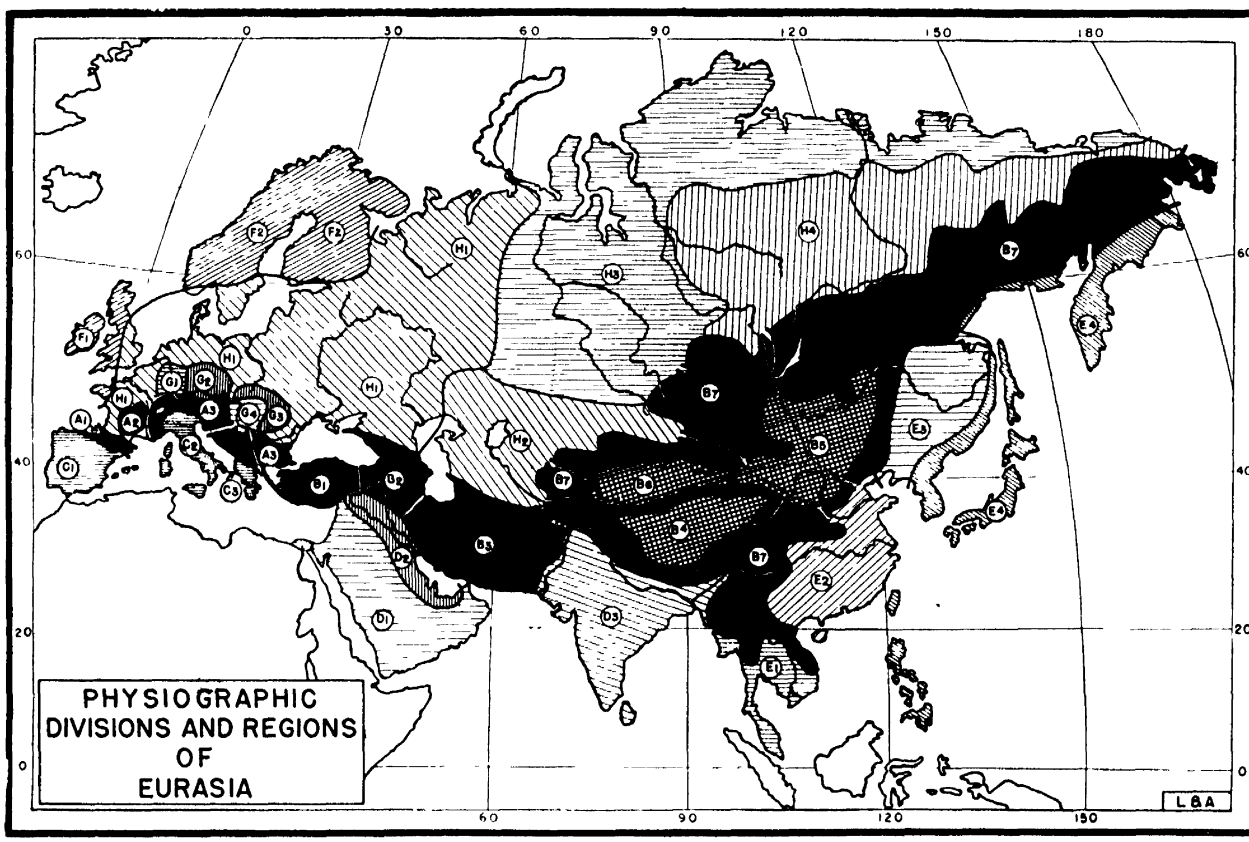


FIG 136 PHYSIOGRAPHIC DIVISIONS AND REGIONS OF EURASIA See next page for the names of divisions and regions Each of the regions listed has an independent description in the context

not call for meticulous delineation, although accuracy within reasonable limits is necessary.[1] Detailed studies of small regions no doubt would require some revision of the broad boundaries used in this survey. The following outline of regions will serve as a guide in the study of Eurasia (Fig. 136).

I. CENTRAL EURASIAN BARRIER
- A. Central Barrier in Europe
  - 1. Pyrenees Mountains
  - 2. Central Plateau of France
  - 3. Alpine Highlands
- B. Central Barrier in Asia
  - 1. Anatolian Plateau
  - 2. Armenian Plateau
  - 3. Iranian Plateau
  - 4 Tibetan Plateau
  - 5. Mongolian Plateaus and Basins
  - 6. Tarim Basin and Associated Basins
  - 7. Greater Mountain Features

II. LAND FEATURES SOUTH AND EAST OF THE CENTRAL EURASIAN BARRIER
- C. Mediterranean Peninsulas and Associated Islands
  - 1 Iberian Peninsula
  - 2 Italian Peninsula
  - 3 Grecian Peninsula
- D Indian Ocean Borderlands
  - 1. Syrian-Arabian Plateau
  - 2 Mesopotamian Valley
  - 3. Indian Plains and Plateau
- E. Pacific Ocean Borderlands
  - 1. Indo-Chinese Peninsula (including Malay Peninsula)
  - 2. Chinese Plains and Uplands
  - 3 Manchurian Plains and Uplands
  - 4 Volcanic Islands and Peninsulas

III. LAND FEATURES NORTH OF THE CENTRAL EURASIAN BARRIER
- F. Northwest Highlands
  - 1 British Isles and Brittany
  - 2. Scandinavian Highlands and Finnish Peneplain
- G West Central Highlands and Associated Lowlands
  - 1. Rhenish Highlands
  - 2 German Uplands and Bohemian Plateau
  - 3 Carpathian-Transylvanian Highland
  - 4. Hungarian Plain
- H Interior and Northern Plains and Uplands
  - 1. Central Plains
  - 2 Turanian Plain
  - 3 Siberian Plain
  - 4. Siberian Uplands

[1] Lobeck, Armin K., "Physiographic Diagram of Europe," The Geographical Press, Columbia University, New York, 1939

18

Central Eurasian Barrier

THE CENTRAL BARRIER of Eurasia, extending in a general east-west direction, is one of the three major parts into which the greatest of the continents may be divided. In each of the Americas the central topographic feature is an immense north-south plain flanked by highlands on both east and west. In Eurasia, the central topographic feature is a great barrier consisting of an east-west succession of mountains, plateaus, basins, and deserts flanked on the north and on the south by features of considerable variety including plains, peninsulas, highlands, and deserts. Any comprehensive understanding of the human drama in Eurasia requires a knowledge of the mid-continental barrier and its important regions.

Since the width of the Central Eurasian Barrier varies considerably throughout its extent, the lengths of the passageways crossing it vary greatly also. In the west the Carcassonne Gap, the Rhone-Saone Corridor, the Croatian and Vardar-Morava gateways, and the Bosporus-Dardanelles Breach are associated with the Pyrenees, the Central Plateau of France and the Alpine Highland. Each of these routes is comparatively short, but the routes in the east across the Plateau of Tibet, the Mongolian Plateau, the Plateau of Iran, and the Anatolian Plateau often involve hundreds of miles. In order to gain a satisfactory overview of the Central Barrier, it is necessary to discuss in some detail those large regions within the barrier that lie between the gateways. These lands vary greatly in their capacity to satisfy man's needs, and as a rule are much less important for human use than the lands either north or south of the barrier.

The Central Barrier includes not only mountains that are difficult to cross, but also many intermontane plateaus, basins, and deserts, some of which are larger and more forbidding than those in the Americas. A study of Eurasian gateways and corridors, moreover, emphasizes the great distances involved in crossing the Central Barrier.

In order to understand the intermontane features of the Central Barrier, it will be helpful to observe that imposing mountain ranges diverge from two centers or knots—namely, the *Pamir Knot* and the *Armenian Knot*. Diverging from the former near the center of Eurasia are five lofty mountain ranges—the Himalaya, Kunlun, Tien Shan, Hindu Kush, and Sulaiman. From the latter knot lying between the Mediterranean and Caspian seas diverge four ranges—the Taurus, Pontic, Elburz, and Kurdistan mountains (Figs. 134 and 140).

Between the Pamir and Armenian knots and en compassed by mountains on all sides is the *Plateau of Iran*, a high, arid, intermontane area 600 miles wide, 1000 miles long—more than twice as large as Texas. Westward from the Armenian Knot between the Taurus Mountains on the south and the Pontic Mountains on the north is the *Plateau of Anatolia*, an area about as large as Nebraska. The Armenian Knot, however, is not a tight knot, for within it is a high, dry, intermontane area, the *Armenian Plateau*, approximately as large as Ohio.

The large intermontane areas of the Central Barrier are east of the Pamir Knot. The *Plateau of Tibet*, between the Himalaya and Kunlun mountains at 15,000 feet above sea level, is approximately five times as large as California. The *Tarim Basin*, some parts of which are below sea level, is between the Kunlun and Tien Shan mountains, and is equal to the combined areas of Montana and the two Dakotas. The *Mongolian Plateau*, another

intermontane region lying north and east of the Plateau of Tibet, is nearly half as large as the United States.

In addition to these major intermontane features, there are numerous smaller features within the Central Barrier of Eurasia, a study of which is not essential in this survey. Although the area as a whole is not well suited to human use, some sections are densely populated It will serve the purposes of this discussion to separate the Barrier into two parts· (1) the Central Barrier in Europe and (2) the Central Barrier in Asia.

THE CENTRAL BARRIER IN EUROPE

The profound significance of the Central Barrier in Europe is realized at once when one ponders the activities of the contending armies in both World Wars I and II. The government of France retreating to Vichy, the Austrian-Italian conflict over the Alps, the conferences and scheming at Brenner Pass, the German invasion into the Balkans and Greece, and the Allied drive into southern Europe in their advance on the Axis stronghold; these are only a few of the events of recent years that emphasize the potent influence of the Barrier in shaping the activities of men in Europe.

The Barrier in Europe presents three well-known features—the Pyrenees Mountains, the Central Plateau of France, and the Alpine Highlands, extending in a great north bending arc from the Atlantic Ocean to the Bosporus-Dardanelles Gateway. Four major routes pass through this portion of the barrier—namely, the Carcassonne, the Rhone-Saone, the Croatian, and the Vardar-Morava gateways (see pages 201 to 204).

THE PYRENEES MOUNTAINS. The young Pyrenees, which separate Spain and France, are narrow and almost continuously high. They extend from the Atlantic Ocean to the Mediterranean Sea where they sink into the sea. In some places they reach above the snow line which is 9000 feet on the north slope and 10,000 feet on the south slope. The many cirques and U-shaped valleys provide abundant evidence of former extensive glaciation.[1]

[1] Moore, W. Robert, "Skyline Drive in the Pyrenees," *National Geographic Magazine*, October, 1937, Vol 72, pp 434-452

Under a col (saddle) in the range near the western end is a railway tunnel and there is also another tunnel under a mountain spur at the eastern end. Three or four other passes in the Pyrenees at altitudes of 4000 to 5000 feet occur in the 300 miles of their extent.

Not only have the height, ruggedness, and continuity of the Pyrenees made them a barrier, but the contrasts in topography and climate of the lands adjacent on the north and south have so conditioned human activities that moving from one side of the Pyrenees to the other often requires difficult readjustments (Fig. 149). Making a living on the high, rugged, semiarid plateaus of Spain is different indeed from that on the humid plains of western France.

THE CENTRAL PLATEAU OF FRANCE. The Central Plateau of France, rising northeast of the Carcassonne Gateway, is an old, worn-down block with its upturned edge facing the Rhone-Saone Corridor (Fig. 131). North-south transportation and travel always have avoided this region, preferring to follow the gateways to the south or the east.

The region may be divided into three contrasting parts· the central mountainous, forest and grass-covered section; the plateau portion which encircles the rugged center; and the marginal stream-incised section with valleys which radiate in all directions. Among these streams are the *Loire*, and tributaries of the *Garonne* and the Rhone.

The mountains attain the same altitude as the Blue Ridge in North America, but they differ from it in that some of the peaks are of recent volcanic origin. Numerous hot mineral springs account in part for the many health resorts and spas. The views in the mountainous section are extremely grand. Jagged peaks, vari-colored rocks in sharp contrast to the green grass-covered tableland, the flowered glades, and the azure of the sky all lure the traveler and vacationist.

THE ALPINE HIGHLANDS. The Alpine Highlands Region, about equal in area to the Iberian Peninsula, extends from the Rhone-Saone Corridor to the Bosporus-Dardanelles Breach. The region varies much in width, altitude, relief, structure, and accessibility.

The western portion is high, rugged, and not

easily entered except by way of river valleys, many of which lead to passes which range from 1600 to more than 8000 feet in altitude. Several large rivers, such as the *Rhine*, the *Rhone*, the *Danube*, and the *Po*, have their sources among the glaciers in this section of the highland. Glaciation accounts for many of the U-shaped valleys, cirques, and numerous alpine lakes, among which are *Lucerne*, *Geneva*, *Constance*, *Como*, *Maggiore*, and *Garda*.

East of the Adriatic Sea the highland is composed in part of folded limestones and other sedimentaries and is so thoroughly dissected by streams that travel and transportation are difficult. The chief mountains in this portion are the *Dinaric Alps*. The western edge of this section of the Alpine Highlands, known as the *Dalmatian Coast*, is an escarpment abutting the Adriatic Sea. Many caves, caverns, natural bridges, sinkholes, and underground streams have been formed by percolating waters which have dissolved and carried away portions of the underlying limestone. In this respect the area is similar to portions of Kentucky and Tennessee, this type of landscape being known as *karst topography* (Fig. 150).

Farther eastward and reaching almost to the Black and Aegean seas, the ranges extend in an east-west direction and are known locally as the *Balkan* and *Rhodope* mountains Four of the leading rivers of this section are the *Sava*, the *Vardar*, the *Morava*, and the *Maritsa*.[1]

The major routes through the Alpine Highlands are the Vardar-Morava and the Croatian gateways. Among other passes over the Alps which deserve attention are the *Brenner*, the *Genevra*, the *Mt. Cenis*, the *St. Gotthard*, the *Simplon*, and the *Great St. Bernard*. The Brenner Pass is the lowest of these; it was used extensively in medieval times, and also is of great importance today (Figs. 132 and 150).

COUNTRIES ASSOCIATED CHIEFLY WITH THE BARRIER IN EUROPE

Nearly a dozen countries are encompassed wholly or partly within the European division of the Central Eurasian Barrier. Four of these countries—namely, *Switzerland*, *Yugoslavia*, *Bulgaria*, and *Albania*—are so dominated by the rugged aspects of the barrier that they deserve special attention. The last three of these together with Greece occupy the area generally known as the Balkan Peninsula. The other countries extending into the Central Barrier of Europe will be considered later.

SWITZERLAND

This little mountainous country, perched high in the Alpine Highlands (see page 211), is one half as large as South Carolina, but has more than twice as many inhabitants

Natural Features

Switzerland is composed of three topographic strips of unequal size—namely, the folded *Jura Mountains* in the northwest, the high central Alps in the south, and the *Swiss Plateau* in the heart of the country. The third area occupies about one fourth of Switzerland but contains nearly three fourths of the people, with more than 250 per square mile.

The climate is typically mountainous, similar to that of the Cascades in Washington. At Zurich on the plateau (1565 feet), the average annual temperature is 48° F. The warmest month is July (64° F) and the coldest January (33° F) The median annual rainfall at the same station is 42 inches, no month having less than 2 inches, and no year according to a 67-year record receiving less than 28 inches. At Säntis (8200 feet), the average annual temperature is 28° F., and the average annual rainfall is 100 inches (Fig. 128).

The natural vegetation is zonal, broad-leaved deciduous trees predominating on the lower slopes, giving way to conifers at higher levels, and to grasses, tundras, and snowfields at successively higher altitudes.

Cultural Features

The Swiss probably have no more natural resources than the people of the Balkan countries, yet they rank among the most progressive people of the world, whereas the latter are victims of their

[1] Beaver, S. H., "Railways in the Balkan Peninsula," *Geographical Journal*, May, 1941, Vol 97, pp. 278-294

isolation, fears, and prejudices. The agriculture of Switzerland is zonal. On the Swiss plateau and in the hill sections near the base of the mountains, grains, vegetables, fruits, and grapes are grown, and animal-rearing is practiced. In the higher mountainous portions, the Alpine pastures are utilized in summer for dairy cattle; whereas in winter the animals are sheltered in the lower valleys.[1]

More than 40 per cent of the people of Switzerland are engaged in manufacturing (Fig. 137). Although raw materials are scarce, superior workmanship and abundance of water power have enabled the Swiss to produce an amazing variety of manufactured goods, such as watches, embroidery, and articles from metal, straw, cotton, and silk. Considerable wood from the mountains is used by the wood carvers for the exquisite handcarved articles which are so popular with the tourists.

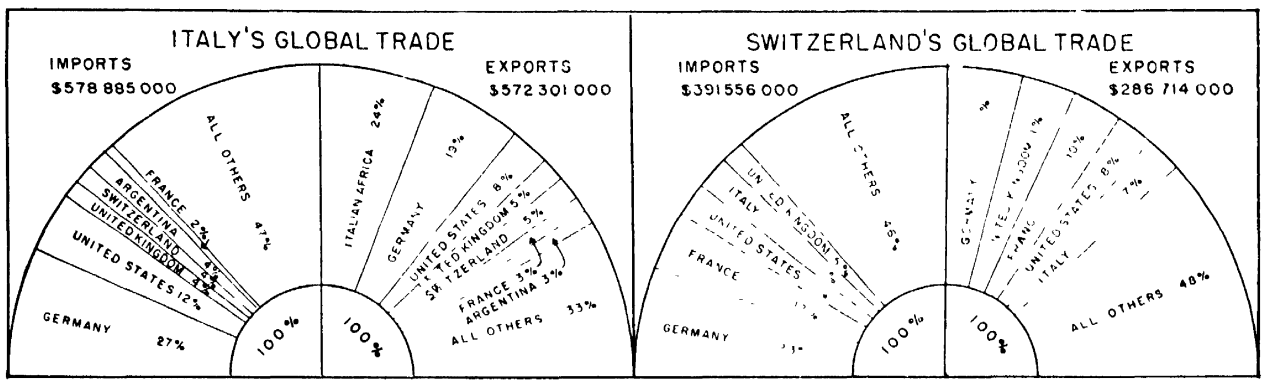


FIG 137. GLOBAL TRADE OF SWITZERLAND AND ITALY Human activities in both Switzerland and Italy range through a great diversity of interests The fact that no one or few countries monopolize their trade is indicative of this world-wide range Fig 152 shows the broad span of Italy's interests (From *Foreign Commerce Yearbook*)

Switzerland is one of the leading playgrounds of the world, and as many as $100,000,000 have been spent by tourists in a single year during normal times. The lure includes glaciers, snow-capped peaks, forest-bordered lakes, beautiful waterfalls, attractive hotels, good roads, courteous guides, and skillful advertising.

CITIES OF SWITZERLAND. *Zurich*, located on a tributary of the Rhine, was a pre-Roman settlement (Fig. 138). It is the most populous city of Switzerland and was the center of the Swiss struggle for independence. Today, among the many industries, silk manufacture is most important.

Geneva (Geneve), formerly the capital of the League of Nations, is on the Rhone where it flows west out of Lake Geneva. This city is noted for many famous educators, scientists, and writers. Here were born Rousseau and de Candolle, and here lived Voltaire, Shelley, Ruskin, Byron, and George Eliot. The *Simplon Tunnel* connects the city with Italy Geneva specializes in clocks, watches, music boxes, and jewelry

The second city in size in Switzerland is *Basel* (Bâle), at the southern end of the rift valley of the Rhine. Communication into Italy from Basel is by way of the *St. Gotthard Tunnel*. Fifty per cent of the Swiss imports and exports go through Basel by way of the Rhine Valley.

Berne, on a high bluff overlooking the Aare valley, commands a magnificent view of the snowy Bernese Alps 30 miles to the south. Other well-known cities of Switzerland are *Lucerne, Lausanne,* and *Locarno*.

LOOKING TO THE FUTURE The ruggedness of Switzerland, the lack of seacoast, the high industrialization, the dense population, the dearth of agricultural land and mineral resources, and the mixed language groups pose several problems of major significance The difficulty of commercial intercourse of the Swiss with their neighbors near and far is one of the most perplexing of these problems.

[1] Erickson, Franklin C, "Transhumance in the Land Economy of Schachtenthal," *Economic Geography*, January, 1938, Vol 14, pp 38-46.

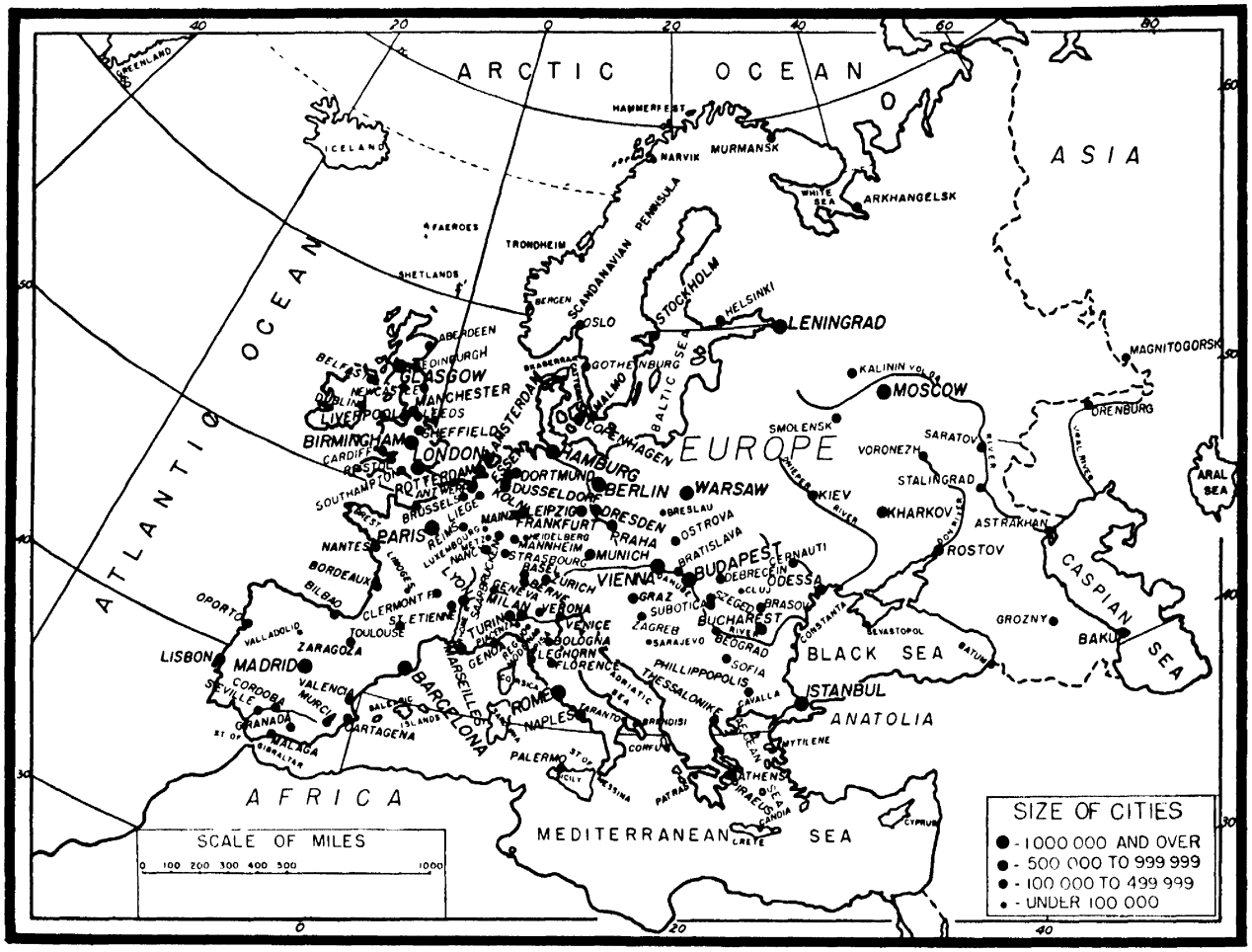


FIG. 138 CITIES OF EUROPE Most of the cities mentioned in the textual reading matter are shown on this map. Note the key to relative size of cities

YUGOSLAVIA

Yugoslavia, a little larger than Oregon, is one of the Balkan countries and has about three fourths of its area in the Alpine Highland. The remainder consists of rich plains located chiefly along the Danube and Sava rivers.

Natural Features

The western portion of the country which borders the Adriatic Sea is composed of mountains and high plateaus which, in general, are very rugged, the relief becoming greater toward the south. This karst section of Yugoslavia is one of the most inhospitable regions in Europe (Fig. 150). The lowlands in the north are a part of the Hungarian Plain (see page 305). The Dalmatian portion of the Adriatic coast is rough land, well suited to maritime activities, but is cut off from the interior by high mountains. In eastern Yugoslavia are the valleys of the Morava and Vardar rivers which together form an important gateway from the Aegean Sea to the Hungarian Plain (see page 203).

The climate of Yugoslavia varies much with altitude and distance from the sea. The climate of the Dalmatian coast is subtropical, but on the interior plains section it is continental (Fig 236). At Belgrade the average annual temperature is 52° F., with a range of 42° F. The average annual rainfall (24 inches) comes mostly during the summer.

The natural vegetation on the highlands is largely mixed forests, dominated by oak, beech

and conifers. Because of the low rainfall the plains section originally was grassland (Fig. 237).

Cultural Features

Although nearly 90 per cent of the people of Yugoslavia speak Slavic, the country is made up of numerous unfriendly groups among which are *Serbs, Slovenes, Bosnians, Herzegovinians,* and *Montenegrins.* These groups are all strongly independent and conservative, and have yet to learn the great advantages of cooperation and national unity. The country has insufficient mineral fuels, and only a small part of the people are engaged in manufacturing. Agriculture, the leading occupation, is practiced on small tracts in the mountainous areas and on large farms in the plains sections.[1]

Cities of Yugoslavia. A former Austrian city, *Graz,* located about 100 miles southwest of Vienna, has a picturesque setting in a valley of the forested eastern Alps which opens toward the Hungarian Plain. The city has good rail connections with Vienna and other points northward, with the Hungarian Plain to the east, and with *Fiume* and *Trieste* on the Adriatic coast

Zagreb, two miles from the Sava, a tributary of the Danube, is surrounded by vineyards. The city has access by rail to Fiume on the Adriatic coast. The people are interested in the manufacture of tobacco, leather, linen, and porcelain goods.

Sarajevo, in a fine highland valley in the center of the country, deserves mention chiefly because it was here that the Archduke of Austria was killed by a Croatian student, the tragedy which led to the opening of World War I.

Belgrade (Beograd), another old Slavic city, is the capital of Yugoslavia. Its site is on a crystalline promontory within the confluence of the Sava and the Danube rivers. Railroad connections in all directions to the principal passes and gateways of the region give Belgrade a large hinterland. For centuries this has been the strategic military city at the north end of the Vardar-Morava Gateway and near the west entrance to the Iron Gate.

A Look Ahead. It is hoped that the urge toward unity of national purpose during World War II will eventuate in a true spirit of cooperation among the various Yugoslav groups in peacetime. The modernization of agriculture, the addition of emphasis on industrial enterprises, the promotion of political participation, and the expansion of commercial intercourse are goals which the people may profitably pursue.

[1] Roucek, Joseph S., "Resources of Yugoslavia," *Economic Geography,* October, 1933, Vol 9, pp 418-425.

BULGARIA

Bulgaria, a rectangular area about as large as Kentucky, has a population of 125 per square mile. Eastward it slopes down to the Black Sea and northward to the valley of the lower Danube. It is in the eastern part of the Alpine Highlands (see page 211)

Natural Features

Four major features dominate the landscape of this Balkan country. On the north, considerably dissected and well populated, is a plateau that slopes toward the Walachian Plain South of the plateau are the Balkan Mountains, a rugged east-west area of folded ridges and valleys. On the southern margin of the country are the Rhodope Mountains, a high, mountainous mass—Alpine in character, containing numerous cirques, tarns and moraines. The deep gorges, high waterfalls, lofty peaks, and abundant winter snows surpass all other mountains in the eastern part of the Alpine Highlands.

Between the Rhodope and Balkan mountains are two east-west basins extending almost the full length of the country. The capital and several other cities are within basin areas.

Bulgaria is in approximately the same latitude as Nebraska and because of its altitude has a climate that is similar, except near the Black Sea where the subtropical, dry, summer type of climate prevails.

Cultural Features

The east-west basins in Bulgaria have been the site of an intercontinental highway for many hundreds of years—a route connecting the Hungarian Plains with the Bosporus-Dardanelles crossroads. Today the railroad from central Europe into southwest Asia passes through this basin area. In

this region was the capital (Philippopolus) of the ancient empire of Philip of Macedon.[1]

The limestone plateau in the north is the most intensively farmed section of the country—wheat, corn, and barley being the leading crops. The low, folded Balkan Mountains are utilized chiefly for lumber and pasture, the latter furnishing the basis for a considerable transhumance activity between the plateau and the mountain grasslands.

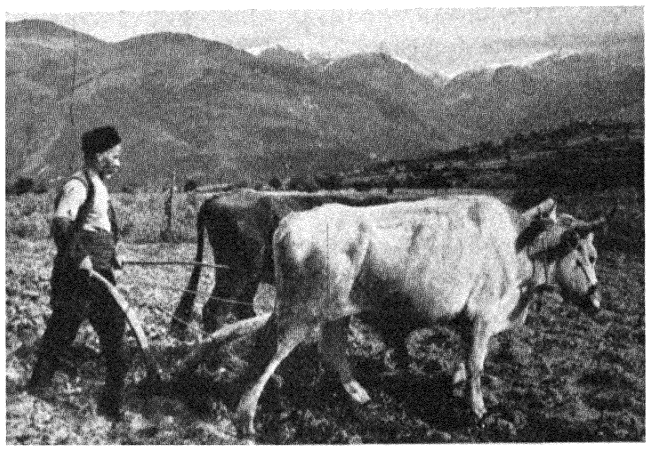


FIG. 139. A BULGARIAN FARMER. The faithful ox is still the important work animal in this part of the Alpine Highland Region. (Courtesy Royal Bulgarian Legation)

Although the central basin area has productive soil, the age-old conflict between the Bulgars and Turks has hindered development. Today tobacco, grapes, and attar of roses are among the leading products of foreign trade. On the whole Bulgaria is a poor agricultural country. Holdings are small and farming methods are primitive, but the peasants are industrious, and in recent years conditions have been improving (Fig. 139).

The mountains are rich in coal, and in ores of lead, zinc, aluminum and copper, but these minerals are not being mined to any great extent. The mineral resources, however, augur well for the future of the country after peace returns to the Balkan world.

Highways are poor, but river transportation is important. The Black Sea provides ports for foreign trade, but Bulgaria needs port facilities on the Aegean Sea. Although these have been promised they have not yet materialized.

CITIES OF BULGARIA. There are only two cities in the country with more than 100,000 people. *Sofia* (Sofija), on a plain between the Balkan and the Rhodope mountains, is on the main line of the railroad between northern Europe via Belgrade into the Morava Valley, thence up the Nišava tributary and over a pass to Sofia Basin, and from there into the Maritsa valley and on to Istanbul. In the vicinity are hot mineral springs. The manufacturing activities center around the processing of hides, roses, wheat, and fruit.

Philippopolis (Plovdiv), built on and among several granitic hills rising out of the fertile Maritsa plain, is the second city of Bulgaria in size. It is on the main line of the Berlin-Istanbul Railway between Sofia and the *Strait of Bosporus*. The position of Philippopolis so near the intercontinental bridge and the Bosporus-Dardanelles Breach has subjected it to extreme violence.

LOOKING TO THE FUTURE. More than 80 per cent of the people of Bulgaria are rural. This does not mean that it must remain so, for the mountains are rich in minerals and the country is astride a great intercontinental highway. If the Bulgars cultivate peace, train leaders with vision, strive to develop their large potential resources, a few decades should witness the rise of Bulgaria from a poor nation of farmers to a country of dignity and influence in which well-being among the people is the rule instead of the exception.

ALBANIA

The Adriatic Sea borders Albania on the west, and on the east are Yugoslavia and Greece. The country is nearly 200 miles long and 45 to 50 miles wide—an area approximately equal to that of Vermont. However, Albania has 1,000,000 people and Vermont has only 350,000. Both are mountainous areas, the latter occupied by a peace-loving, conservative people and a small part of a large nation, the former by a belligerent, backward people in an isolated section of war-torn Europe.

[1] Muir, Lady, née Nadejda Stancioff, "A Look at Bulgaria," *Scottish Geographic Magazine*, June, 1941, Vol. 57, pp. 51-58.

Natural Features

For the most part Albania, another of the Balkan states, is a country of rugged mountains with some fertile valleys and small coastal delta lands (Fig. 150 and 153) The trend of the mountain folds is from northwest to southeast. The rapid-flowing streams moving down the steep western slope have partly filled numerous bays along the coast, thus furnishing considerable areas of potential farming land. The country has some iron and copper ores, and coal, but these are not much exploited nor sufficient in quantity to support large industrial enterprises.

The latitudinal extent of Albania furnishes some variety of climate, but differences in altitude are more potent for diversity in temperature and rainfall. The climate of the coastal lands is subtropical—the south having decidedly dry summers, whereas the north has rainfall quite evenly distributed through the year The uplands have lower temperatures than the coast, and the western edge of the uplands receives most precipitation, much of which is snow in the winter.

The coastal area has subtropical vegetation but the mountains are covered with mixed forests of oak, chestnut, beech, pine, and firs Temperate grasslands occur in the drier sections

Cultural Features

The Albanian people, living in the "Cockpit of Europe," pride themselves on their long line of ancestors—a kind of hereditary aristocracy which holds them together. In spite of centuries of pressure from all sides by Greeks, Romans, Slavs, Turks, and others, they have been able to maintain themselves in the isolation of their mountain fastnesses.[1]

The people are largely self-sufficient, hunting and working for the necessities of life but not for markets Only 10 per cent of the land is under cultivation. Fishing is good, but not much is done. Agriculture is carried on in a crude way and corn is a staple crop. The chief animals grown are cattle, sheep, goats, and swine. The forests abound in game animals

The industrial life is very limited, centering mostly around the processing of agricultural products--flour-milling, olive-pressing, and cheese-making. Of these products, some are exported and in return farm machinery is imported.

The cities of Albania are all small, *Tirana* is the capital and *Scutari*, the leading city in the extreme north, is on a small alluvial plain on the shore of a lake by the same name.

Albanian Prospects. The scenery in Albania, the picturesque costumes, the ancient associations are all attractive to tourists. If the Albanians aspire to capitalize on these assets, then road building is the chief problem, for today there are less than 2000 miles of highways in the country and their first railroad, about 10 miles long, was begun in 1941. Much of the travel in the interior is on narrow trails by use of pack animals.

THE CENTRAL BARRIER IN ASIA

The Central Barrier in Asia is a gigantic arc extending from the Bosporus-Dardanelles Breach to Bering Strait In all this great distance there is not a water gateway through the barrier, and none of the land routes are easy. Of the three main routes, the Khyber is high and dangerous and the Sian and Kalgan routes run for many hundreds of miles through high cold plateaus or immense deserts (see page 206) There are six major regions within the Asiatic portion of the barrier and the reader should become well acquainted with each of these.

Anatolian Plateau. The Anatolian Plateau, perhaps better known as Asia Minor, is in reality a great peninsula reaching westward from Asia toward Europe between the Mediterranean and Black seas. It is sometimes called the "Threshold of Asia." With the Black, Aegean, and Mediterranean seas bordering Anatolia on the north, west, and south, respectively, and with the rugged Armenian Plateau on the east, the area is nearly encompassed by natural boundaries (Fig 140). From the landward side, the plateau is most accessible

[1] Atkinson, A J, "Albania and her Sons," *Scottish Geographic Magazine*, February, 1941, Vol 57, pp 85-38

near the southeastern corner by way of the *Cilician Gateway* through the *Taurus Mountains.*

The general east-west trend of the mountains and valleys, which are a continuation of the corresponding features of the Grecian Peninsula, has contributed to making the plateau an east-west highway of migration and travel in spite of its ruggedness and semiaridity. This trend of mountains and valleys also has made north-south travel difficult. From the mountains of the low western margin, which are nearly buried in the Aegean Sea, the plateau rises toward the east and extends nearly 1000 miles between the *Pontic Mountains* on the north and the Taurus on the south. These mountains unite at the *Armenian Knot* farther eastward.[1]

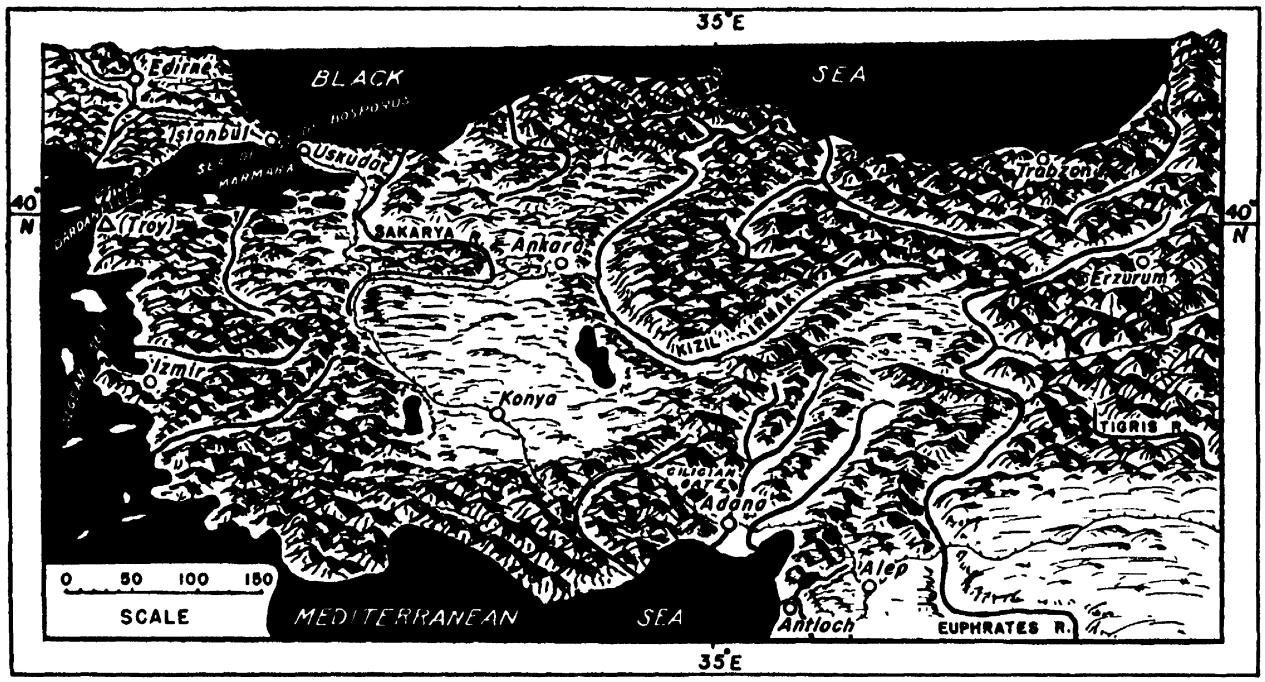


FIG. 140 PENINSULA OF ANATOLIA. This area is generally known as Asia Minor or Turkey. It is a part of the land corridor from the Near East to Europe. Note that some of the names on the map have not been anglicized

ARMENIAN PLATEAU. The Armenian Plateau, in approximately the same latitude as Kansas, occupies the center of the triangular area between three seas—namely, the Black, the Caspian, and the Mediterranean.

The crown of the region is the Armenian Knot. Several mountain ranges diverge from the point of coalescence, historic *Mt. Ararat.* The Pontic and Taurus mountains extend westward almost encompassing the Anatolian Plateau, and projecting southeastward are the Elburz and the several ranges on the southern rim of the Plateau of Iran. The general level of this section of the Central Barrier is more than a mile above sea level, and some of the peaks reach altitudes of more than three miles. For purposes of this study the *Caucasus Mountains* also are included in this area.

Three basin lakes—namely, *Van* (about the size of the Great Salt Lake) *Urmia,* and *Gokcha*—receive the drainage from the interior slopes of the region, and several large rivers carry water from the exterior slopes. Among the important rivers are the *Kura,* the *Tigris,* and the *Euphrates,* the two latter having several of their headwater streams on the south slopes of the region.

In the north, the Caucasus, a faulted and folded mountain complex of sedimentary and igneous materials, with few passes, stretch northwestward from Baku on the Caspian in an almost unbroken

[1] Plummer, George H., "Adjustments to Climate in Alpine Mediterranean Asia," *Life in Asia,* McKnight and McKnight, Bloomington, Ill., 1936, pp. 48-54

chain of lofty peaks. Between the Armenian Knot and the Caucasus is the broad valley of the Kura River, a low, level plain consisting of alluvial deposits from the mountains flanking its sides.

IRANIAN PLATEAU. The Plateau of Iran, an area one third as large as the United States, is enclosed by the rim of mountain ranges which coalesce at the Armenian and Pamir knots (Fig. 134). Countries partly or wholly within the region are Afghanistan and Iran (see pages 226 and 227).

Much of the area is a land of interior drainage which accounts for the large number of salt lakes and marshes. Many of the rivers, flowing from the mountains on the margins toward the interior, disappear entirely, either because of irrigation or of sinking into the loose, thirsty mantle rock. The interior of the region varies from 3000 to 5000 feet in altitude, but the mountain ridges transversing the margins are much higher, often rising precipitously several thousand feet above the level of the adjacent plateau

The occurrence of limestone in the subsurface is a natural phenomenon of great benefit to the people. Rivers disappearing through the limestone often run for miles through subterranean caverns under desert areas. Agriculture by irrigation is made possible by tapping the subsurface water supply. The only minerals of economic significance are petroleum and iron ore. Iron ore occurs in the northwest and the most important petroleum deposits are found in the western margin near Shushtar The crude oil is piped about 150 miles to Abadan near Basra in Iraq for refining. The British monopolize all the working fields in the region. The Russians recently have gained concessions in the north, and the Dutch have large unexplored concessions in the northwestern part of the area.

TIBETAN PLATEAU The Tibetan Plateau lies mostly between three mighty mountain ranges, the *Kunlun* and the *Karakoram* on the north and the *Himalaya* on the south (Fig. 141). The plateau, combined with its massive barrier rims, constitutes the most inaccessible portion of the Central Eurasian Barrier because the region not only has great altitudes but its area is about one fourth that of continental United States.

The region, an immense upland from 10,000 to 15,000 feet above sea level and surrounded by the world's mightiest mountain peaks, many more than 25,000 feet in altitude, is one of the little known areas of the world. Exploration has revealed, however, that it is not a flat plateau, but a complex area of great relief accentuated by many short mountain ranges into which glaciers and streams have cut deep, impassible gorges. In several sections great valleys have been filled with debris from the surrounding mountains. The fact that some of these valleys are now being eroded by rapidly flowing streams suggests that the region once may have been more arid than it is now.

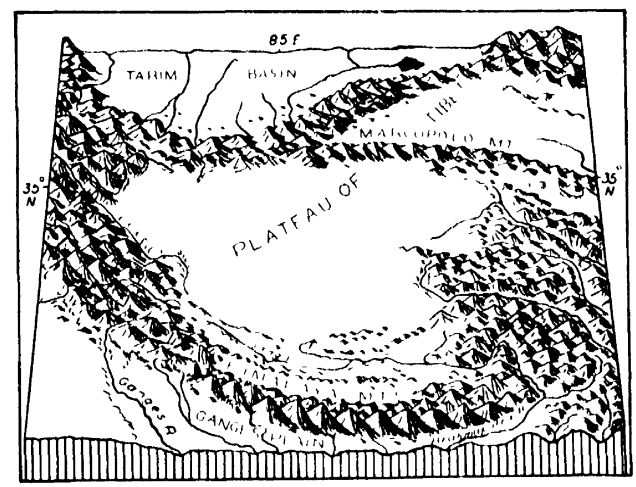


FIG. 141. PLATEAU OF TIBET This is the highest extensive plateau in the world. Note that it is encircled by mountains.

The headwaters of two great rivers, the *Indus* and the *Brahmaputra*, are north of the Himalayas in southern Tibet near the sacred *Lake Manasarowar*. The former river flows westward 600 miles before breaking through the mountains to the Plains of India, and the latter flows 800 miles eastward before finding an exit to the lowlands of the *Ganges*.

Eastern Tibet is mostly a region of north-south mountain ridges and deep valleys, and embraces the sources of several large rivers, among which are the *Mekong* and the *Yangtze*. A little farther northward on the plateau are the headwaters of the Hwang Ho (Fig. 142).

In the northeast at an altitude of about 10,000 feet is the swampy *Tsaidam Basin*—an area with interior drainage.

Great snow-clad ranges, thousands of glaciers, and numerous mountain lakes furnish water for irrigation of millions of acres of crop land on the flanks of the region.

The Tibetan Plateau is in the rain shadow of the lofty Himalayas and has a high altitude or

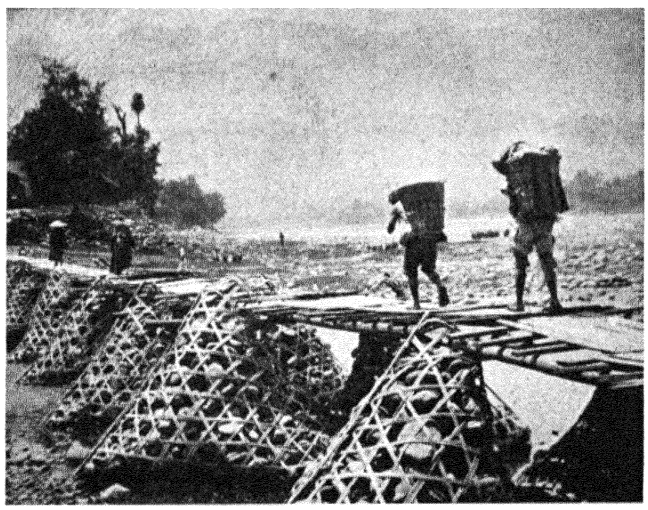


FIG. 142. A STONE BASKET BRIDGE. About 200 miles west of Chungking. The bridge washes out and has to be replaced every year. (Courtesy American Geographical Society)

mountain type of climate, which is cold and dry. The unusually high altitudes bring low summer temperatures which average from 50° F. to 68° F., and winter temperatures which are consistently below zero. Because the summer monsoon winds are forced to lose most of their moisture on the southern slopes of the Himalayas, the region is arid, the annual precipitation in general amounting to less than 10 inches. Most of the precipitation is in the form of snow which covers everything during the long winter. The thaws in spring and summer create torrential streams and large lakes, and feed the great rivers which have headwaters on the plateau.

MONGOLIAN PLATEAUS AND BASINS. The Mongolian Plateaus and Basins Region, a vast intermontane area more than one half as large as Brazil, is in the same latitude as the Columbia Plateau and the Great Basin in North America. The region is considered a portion of the Central Eurasian Barrier on account of its aridity and because it is surrounded on all sides by the lofty mountain ranges of Central Asia. On the south and east are the *Nan Shan* and the *Great Khingan* mountains, respectively, whereas to the north and west are the *Yablonovoi* and *Altai* ranges.

The interior portion of this region is the Gobi Desert, an immense sea of sand lying at an altitude of 2000 to 4000 feet. On the edges of this great central desert, small east-west ranges enclose smaller desert basins, similar to the basins and ranges in western United States.

There are few streams in the region, and those which exist are intermittent because of the lack of precipitation and the high rate of evaporation in summer. In the southern portion, the Hwang Ho flows several hundred miles within the area before turning abruptly eastward thus avoiding most of the Gobi Desert.

The principal erosion agent in this region is the wind. In winter when the high pressure area of Asia lies just to the northwest of the Gobi Desert, the winds pick up thousands of tons of sand, silt, and clay and carry them seaward. The famous dust storms of Peiping and north China probably have their origin here and, too, the enormous loess deposits of north China are thought to have been blown in from this area.

The climate of the Mongolian Plateaus and Basins is distinctly continental arid with very cold winters and hot summers. Because the area lies in the interior of a vast continental mass, surrounded by lofty ranges, it is susceptible to great seasonal temperature ranges. Urga, at an altitude of 3445 feet and in the latitude of Duluth, Minn., has a January mean of −15° F. and a July mean of 63° F. Winter temperatures lower than −40° F. are not uncommon in the north. Rainfall throughout the region is low and in some sections years may pass without any rain; nevertheless, sudden convectional deluges sometimes occur which help to maintain an average annual rainfall of 10 inches or less.

Vast wastes of sand and of salt marshes under arid conditions have prevented the growth of vegetation of any kind over wide areas, but the marginal sections are largely rolling semiarid grass-

lands (Fig. 237). The peripheries of the plateaus and some basins are watered in the spring when the short mountain streams, descending to the alluvial fans and piedmonts, are in floodstage from melting snow and ice. It is reported that by means of irrigation such areas can support luxuriant gardens of such crops as melons, fruits, cereals, and vegetables.

TARIM BASIN AND ASSOCIATED BASINS. The Tarim Basin, a pear-shaped depression in the "Dead Heart of Asia," is in the same latitude and about three times as large as the Great Basin of the United States. On three sides, the basin is buttressed by lofty mountain ramparts, the Kunlun and *Altyn Tagh* on the south, the *Tien Shan* on the north, and the ranges of the Pamirs on the west (Fig. 143). On the east the area is separated from the Pacific watershed by the Nan Shan Mountains and their low northward extension. The highland rim around this basin is from 15,000 to 25,000 feet in altitude, but there is one depression in the north near Tulufan that is below sea level. Many of the ranges which surround the basin rise 4 to 5 miles in altitude, and one of the great disappointments to travelers in the Tarim Basin is the inability to see the adjacent mountain ramparts because the dust haze continually hanging over the region shuts out what otherwise would be magnificent views.

Many streams, fed by melting snow in the mountains, unite within the basin to form the large *Tarim River,* which rises in the glaciers of the *Karakorum Range* and flows intermittently eastward about 1250 miles before it loses itself in the sandy basin of *Lop Nor*, a former salt lake but now a marsh land. Innumerable small streams flow into the area from surrounding mountains, and much of the water is used either for irrigation or is quickly lost in the thirsty sands.

In some respects the climate of the Tarim Basin is similar to that of the Great Basin of the United States. However, it is more completely enclosed by the surrounding mountains which are higher and much more continuous than those bordering the Great Basin and this, too, accounts for the greater aridity. Famous travelers such as Hedin, Younghusband, and Huntington have described the climate in their journals, and because few weather statistics are available, geographers must rely upon the observations of these explorers. In summary, the winters are cold and the summers are very warm. Younghusband says that he had to hold his hands in front of his face to keep the hot wind from scorching it. Hedin tells of a January temperature of −25° F. in the middle of the Takla Makan, the desert in the Tarim Basin. Ellsworth Huntington reports that he was able to sleep under a sheepskin in the open air with a temperature of

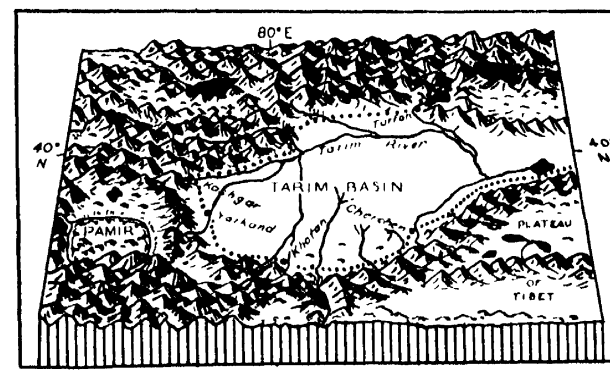


FIG. 143 THE TARIM BASIN This great dry depression is rimmed about by lofty mountains. If the area were not so arid it would be a great sea instead of a great desert.

−6° F., because of the dryness and the stillness of the air. The peripheral highlands consume considerable moisture from the passing winds, but the rainfall in the Tarim Basin is less than 10 inches per year, thus making it one of the world's great deserts.

COUNTRIES WITHIN THE BARRIER IN ASIA

Three countries in Asia—*Turkey, Iran,* and *Afghanistan*—are almost wholly within the Barrier area, but other portions of it are chiefly under the control of countries whose homeland lies either north or south of the Barrier itself.

TURKEY

The Republic of Turkey and the Anatolian Plateau are nearly coextensive (see page 217). The country, which is twice as large as Montana, includes a small area the size of Vermont lying in

Europe The population today is nearly 20,000,000, having increased at least 40 per cent in the last 10 or 15 years. The Turkish people are mostly Moslems, and there is only a small contingent of non-Islamic population within the country.

Natural Features

The major land forms of Turkey trend in an east-west direction—the Pontic Mountains bordering the Black Sea, the Taurus Mountains bordering the Mediterranean, and a generally rugged plateau lying in the interior. These large features have a profound effect on climate, vegetation, soils, and human activities.

Portions of the interior are arid, receiving less than 8.0 inches of rainfall annually, but the concentric isohyets indicate that precipitation increases toward the margins. The north coast, which is in the belt of westerlies part of the year, receives most rainfall. The climatic types represented are subtropical dry summer on the coastal margins and subtropical dry in the interior (Fig. 236). The Black Sea coast usually receives more than 30 inches of precipitation annually, but the rainfall increases to more than 100 inches on the northern slopes of the Pontic Mountains in the eastern section. On the Mediterranean coast 350 miles south of the Pontic Mountains, the rainfall is less than 10 inches (Fig. 129). The mountains on the north and the south account in large measure for the low rainfall of the interior. The Black Sea coast has mild winters and summers, the interior and the Mediterranean coast are scorched with heat in summers, and winters on the interior plateau sections are severely cold.

Luxuriant vegetation characterizes the Black Sea border, varying, of course, with altitude. The interior is largely a steppe and desert scrub area, trees appearing only along the water courses (Fig. 237). On the west and southern coastal lands occurs typical Mediterranean vegetation which consists of myrtle, oleanders, and thorny bushes at lower levels changing to pines, oaks, and cedars at successively higher altitudes.

The soils are derived chiefly from limestone and volcanic material, and when mature are of the pedocalic types in the interior, but pedalfers have developed in the north where the climate is more humid (Fig. 238). The country is richly endowed with minerals but they are not worked much at present. Good coal is found on the northern rim of the plateau, and lignite occurs in several places. There are large copper deposits in Anatolia but they are not now being worked extensively. Silver, gold, lead, zinc, manganese, mercury, and iron ore abound, although they are mined but little at present Borax, salt, emery, and meerchaum are important. Metal working is limited chiefly to brass and copper utensils.

Cultural Features

The mountain tops that project just above the surface in the Aegean Sea made it comparatively easy and perhaps exciting for the seafaring Greeks to sail from mountain to mountain on their way from their homeland eastward to the "Land of the Rising Sun," or as they would say, *Anatolia*. Turkey has aptly been called the corridor connecting Asia, Africa, and Europe. Inter-continental trade and conquest have dominated this corridor for thousands of years. Caravans by the tens of thousands have wended their way in and out through the passes, over the mountains, and across the arid plateaus of Anatolia. Among the renowned conquerors that passed this way were Darius, Xerxes, and Alexander the Great, not to mention numerous leaders in more recent centuries Testifying to the antiquity and dominating activity of Anatolia may be mentioned Troy on the south shore of the Dardanelles, the ancient city that levied toll on all who wished to fish in the Sea of Marmara or in the Black Sea.

As a rule, the people living adjacent to such well-traveled routes are among the most enlightened in the world, and this held true in ancient days in Anatolia. The blight of the conquering Mongols and the semi-nomadic Turks fell upon the region, however, and Anatolia is just now recovering from the terrific shock.

The vicissitudes of time have left their marks on modern Turkey. The country has suffered from economic stagnation for hundreds of years. The present Turkish government has shaken off the yoke of lethargy and more progress has been

made within recent decades than in several preceding centuries.[1]

Large amounts of tobacco, grown on the northern coast, are exported for use in blending with varieties grown in other countries. Cereals, especially wheat, maize, barley, and millet, are grown widely. Grapes, citrus fruits, and some cotton are produced in the west. Olives do well in the vicinity of ancient Troy. Smyrna is best known for its figs. Much of the more arid interior is an area of pastoral nomadism. Forests thrive on the rainy, higher lands but in deforested areas, soil erosion is serious.

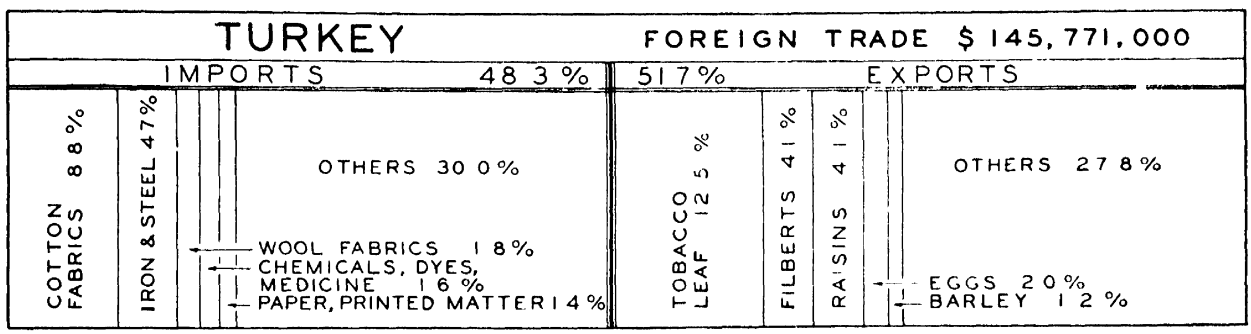


FIG. 144. TURKEY'S FOREIGN TRADE A 10-year average prior to World War II and ending in 1937 (From *Statesman's Yearbook*)

Only a little manufacturing is done in factories, but carpets, rugs and textiles are woven in the homes. The available water power is great, especially in the north and west, but not much has been developed.

Commerce and trade within the country as a whole are not noteworthy, many of the people living on a subsistence basis, even to the making of their own farm implements (Fig 144) Fisheries on the coasts of the Aegean, Marmara, and Black seas furnish employment for large numbers of people.

Tobacco, hazelnuts, cotton, and raisins are the leading exports. Included among the imports are cotton piece-goods, iron and steel products, and machinery.

Transportation facilities in Anatolia are inadequate. The country has fewer than 5000 miles of railway and there is a deficiency of improved highways. Both highways and railroads need to be extended if the forests, minerals, and agricultural resources are to be developed adequately. In the past, caravans took care of transportation needs in Anatolia but progress in the modern world depends on the development of motor roads, airlines, and rail transportation. The chief railroad is a section of the well-known projected line from Berlin to Baghdad and runs from Istanbul southeast across the peninsula and thence eastward into Iraq.

CITIES OF TURKEY. There are only three cities with more than 100,000 population in Turkey. It is probable that some of the ancient cities on the west coast were as large or larger than these (Fig. 145).

Constantinople (Istanbul), the largest city of the Republic of Turkey, occupies a hilly promontory between the Sea of Marmara and the Strait of Bosporus It is not in Anatolia, however, but in Europe. The *Golden Horn*, a deep narrow inlet, extends 4 miles northwestward from the strait, dividing the city into a southern Mohammedan section and a northern Christian and foreign section. The city was founded by the Greeks in the sixth century B.C. A panorama of Constantinople from the sea, enhanced by a picturesque site, the white buildings on the slopes, and the numerous mosques, kiosks, and gardens, is magnificent. The cosmopolitan population is due in large measure to the crossroads location of the city between two continents in one direction and two seas in the other Constantinople is the key city in the Bos-

[1] Williams, Maynard Owens, "The Turkish Republic Comes of Age," *National Geographic Magazine*, May, 1945, Vol 87, pp 581-616.

porus-Dardanelles Breach in the Central Barrier of Eurasia. It is on the railroad which the Germans hoped to extend from Hamburg and Berlin via the ruins of the Greek citadel. The vicinity is rich in archeological treasures. Smyrna is noted for carpets, rugs, and figs.

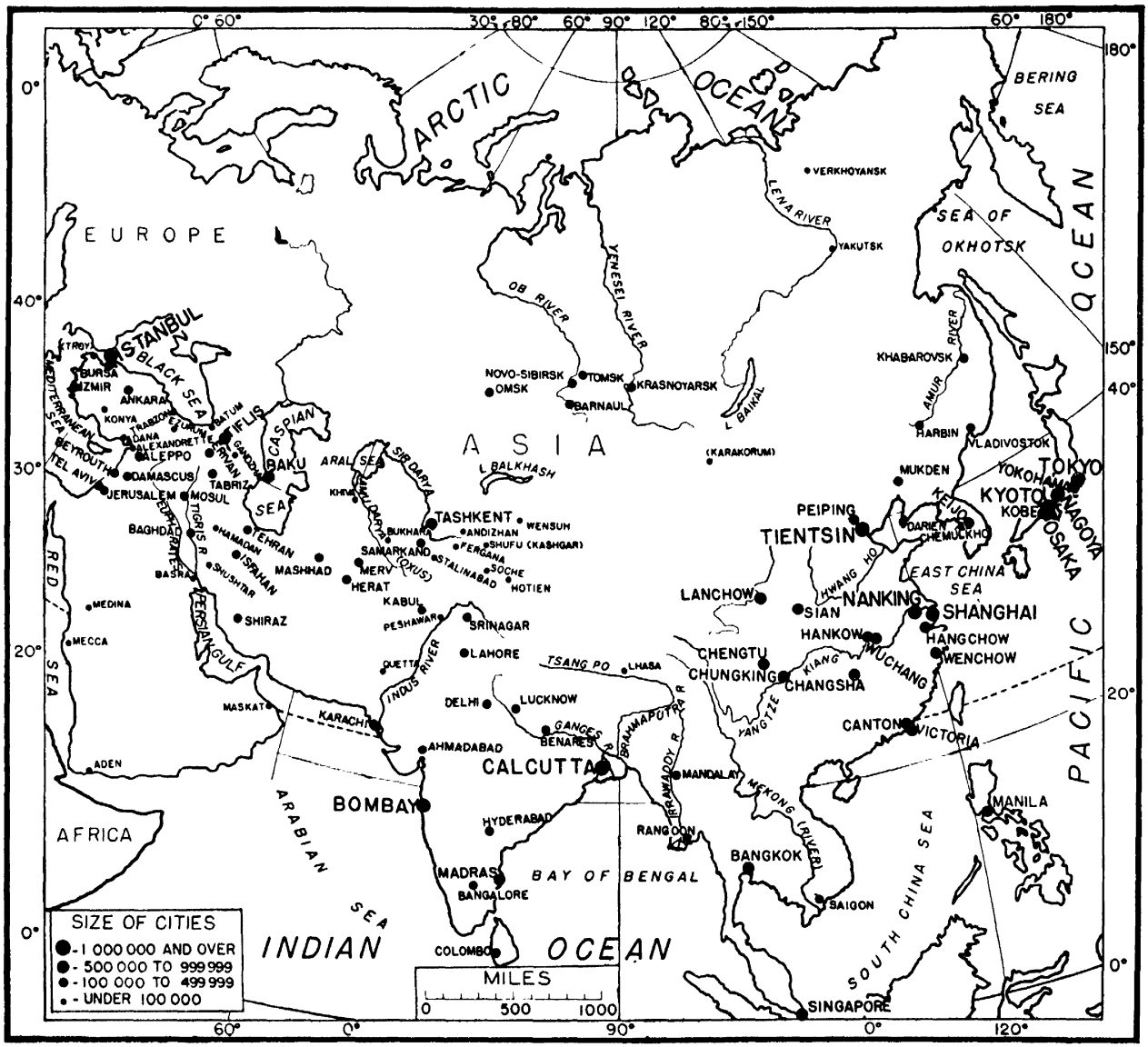


Fig. 145 Cities of Asia. These are the cities of Asia that are mentioned in the book Study the key in the lower left hand corner of the map.

Prague to Alexandrette and thence to the Persian Gulf during World War II.

Smyrna (Izmir), the chief city and seaport of Asiatic Turkey, was founded by Greek colonists at least 1000 years B.C. The site is at the head of the *Gulf of Smyrna*. On the heights above the city are

Ankara (Angora), the capital of Turkey built on the alluvial plain of the Enguri Su at the foot of a fortified hill, is about 200 miles southeast of Istanbul. The city is unattractive, with narrow streets and many houses of sun-dried brick. It was made the capital because it was safe from sea attack and

possessed a hinterland that supplied the city's needs. The position of Ankara in the great intercontinental corridor has subjected it to the whims and violence of crusaders and conquering monarchs. Today the city is making rapid progress under the direction of the new government of Turkey.

Adana, on the alluvial plain of the *Seyhan River,* is 30 miles from the Mediterranean Sea. It commands the southern entrance to the Cilician Gate through the Taurus Mountains. Adana is on the famous intercontinental rail route and exports cotton, corn, sesame, and wool.

Bursa, 60 miles south of Istanbul, was founded in 185 B.C. at the suggestion of the Carthagenian general, Hannibal. It has been noted for a long time for its hot mineral springs, both iron and sulphur. Fruit, grapes, and silk manufactures are leading products.

Konya, at the southwest edge of the semiarid interior plateau of Anatolia more than 3000 feet above sea level, for centuries was a famous station on the cross-country caravan route, and is now on the Berlin-to-Baghdad railway. The city and vicinity depend on water from the mountains for both domestic use and irrigation.

On the high eastern margin of the Anatolian Peninsula and surrounded by lofty rounded mountains is *Erzurum,* 6000 feet above sea level, in the bare open valley of the western Euphrates. The landscape is almost devoid of trees except where irrigation is possible. It is on the main caravan route from Trebizond on the Black Sea to northwestern Iran. It is not unusual for winter temperatures to reach 20° below zero Fahrenheit, which adds much to the danger of travel and the rigors of living in the vicinity.

Trebizond (Trabzon), on the Black Sea, is picturesquely located on a narrow protected tableland reaching out to the sea. The high continuous mountains back of the city anciently afforded protection from enemies in the interior. It is the seaward terminus of caravan trade from the interior and from the Plateau of Iran (Persia) and it has been an emporium of trade ever since its founding by the Greeks. The ancient harbor has become so silted that large vessels now must anchor offshore in deeper water and be serviced by smaller craft.

A discussion of Anatolia would not be complete without mention of some of the many ruins of ancient cities. *Troy,* on the northwest promontory of Anatolia, guarded the route from the Mediterranean to the Black Sea and levied tribute on all who went that way in ships. The place of Troy has been recorded in Homer's poems, the *Iliad* and the *Odyssey. Miletus,* an ancient seat of Greek learning, was the home of such teachers and philosophers as Thales, Anaximander, and Hecataeus. *Ephesus,* a renowned city in Biblical times, also was a Greek city located on an estuary at the eastern margin of the Aegean Sea. This was a great commercial center and the seat of a magnificent temple erected to the goddess Diana. Excavations by archeologists in Anatolia reveal that several different cultures have existed on numerous sites, and are evidences that this corridor between continents is very ancient and has been utilized intensively.

PROBLEMS OF THE PEOPLE. Even though the Anatolian Peninsula for thousands of years has been on an intercontinental route of travel, yet the region, although progressing some today, is still in a condition of stagnation. The new Turkish government is taking advantage of numerous conditions looking toward a better future. Archeological expeditions have uncovered many interesting features of earlier civilizations. Improved conditions for travel and transportation may lure many tourists into the region. Large possibilities for hydroelectric power mean increased opportunities for manufacturing industries. Through the centuries hand labor has characterized human activities, a burden which may be relieved to a large extent by modern machinery. Large areas in the north and in other mountainous sections have good stands of forests making possible a systematized lumbering industry. Considerable iron ore and coal, although chiefly in remote areas, offer opportunities for future exploitation. These conditions, among others, augur well for Anatolia, provided the people take advantage of the opportunities offered.

IRAN (PERSIA)

The country of Iran, formerly Persia, was already an ancient empire when Rome was in her glory. Today the area of Iran is equal to all of the intermontane area of the United States and contains about five times as many people. Iran is an agricultural country, crop production depending almost wholly on irrigation. Perhaps 20 per cent of the inhabitants are pastoral nomads.

Natural Features

Iran, mostly in the Iranian Plateau, is a country nearly rimmed with mountains (see page 219). This, together with the marginal location between the westerlies and the trade winds, helps to explain the aridity of its climate.

The median annual rainfall is 4.1 inches at Isfahan in the western part of the plateau, and at Mashhad in the north it is 9.0 inches. Winter is the rainy season and the summer is hot, dry, and clear. Most of the precipitation on the hills and uplands comes in the form of snow which thaws in spring and summer thus watering the oases of the desert (Fig. 129). On the plateau, winter temperatures are often below freezing, and in summer rapid insolation sends temperatures in many places to well over 100° F.

The aridity, cold winters, and strong desiccating winds limit natural vegetation to scrub woodlands and grasses (Fig. 237). Bare wastes of salt flats and playa lakes cover wide areas Soils, wherever mature, are pedocalic and generally of the gray desert type. Much of the soil is saline and therefore unfit for cultivation.

Cultural Features

It was in the fifth century B C. that the far-flung Persian Empire included the whole of this plateau as its domain. Outside of the region the emperors, Darius and Xerxes, claimed dominion from the Indus to the Danube. In his memorable invasion of the East, Alexander the Great in 334 B C. crossed and recrossed the Plateau of Iran in his conquest of India and Turkestan (Turanian Plain).

When sea routes in the fifteenth century began to supplement land routes to the Orient, Persia declined; and during modern times, it has become one of the backward areas of the earth. Today fewer than 15 per cent of the people can read and write. After World War I, rekindled ambition promised some rejuvenation, and since then—because of political reorganization and the development of mineral resources, chiefly petroleum—the efficiency of government has increased, advanced educational opportunities have been offered, and a considerable increase in foreign trade has been achieved.

Much of the land is not used, but the hilly areas are often centers of pastoral nomadism, the grazing of sheep and goats being one of the most important occupations. For centuries irrigation has been practiced in this area with the aid of subterranean aqueducts (kanats) which lead from the snow-covered slopes of the mountains and hills. By this practice, such crops as cotton, dates, tobacco, wheat, grapes, rice, millet, and beans are raised.

Iran has won world fame because of its fine rugs. Persian rugs are made by hand, and are one of the important household luxuries of the world. The rugs are sold for high prices in many foreign countries, the chief market being in the United States. Small textile mills which manufacture cotton and woolen cloth have been built, but the country is not even self-sufficient in textiles. Under British management the petroleum resources, reserves of which are very large, are being tapped and are not only adding new wealth to an old region, but in World War II were the major source of petroleum products in the Indian Ocean area.

The animal caravan continues to be the chief means of transportation and communication for thousands of small urban centers in Iran.[1] Railway development has been slow. Only one main line crosses the Iranian Plateau and it connects the head of the Persian Gulf and the Caspian Sea by way of Hamadan and Teheran. Although this railroad has played but a very small part in the life of the Persian people, yet in a few short months in World War II with the aid of Americans it was converted into a marvel of efficiency in transporting promised supplies to the Soviet armies When the full story is told another chapter will have been written concerning American enterprise. The large number of Iranian workers trained in this project should add

[1] Harrison, J V, "Some Routes in Southern Iran," *Geographical Journal*, March, 1942, Vol 99, pp. 113-129.

measurably to the country's capacity for progress. At present a few branch lines from the Trans-Iranian Railway enter the countryside for short distances.

CITIES OF IRAN. Large cities have not developed in the central part of the Iranian Plateau but cling to the outer mountain rims. Nearly every city of the country is characterized by dusty, narrow streets, by one- and two-story dried-mud houses and buildings, by busy market squares where peddlers hawk their wares, and by caravans which bring goods to the cities and carry away products received from their hinterlands.

Tabriz, on a small river about 36 miles above Lake Urmia, is an important trade center of Iran. For centuries Tabriz has been on a great caravan route and today it is the principal emporium for the trade of western Iran, having rail connections with *Tiflis* and other important cities. Some of the leading products of Tabriz and vicinity are silk, cotton goods, carpets, leather goods, and dried fruit.

Teheran (Tehran), situated on a high, level plain a few miles south of majestic *Mt. Demavend* and the *Elburz Mountains*, is the capital of Iran. It is by far the largest city of Iran and is on the railroad which extends from the Caspian Sea to the Persian Gulf.[1] Caravan routes, centuries old, connect Teheran with other cities of the plateau. The city is unique in that it is not located by any river but secures its water supply through conduits from the snow of the Elburz Mountains 7 miles to the north. The eyes of the world turned to Teheran after the conference of the leaders of the Allied Nations was held in the city during World War II. This adds more historic luster to the city.

Other commercial centers of the region are *Mashhad*, *Isfahan*, *Shushtar*, *Hamadan* and *Shiraz*.

PROBLEMS OF THE PEOPLE. This semidesert country with its vast areas of waste land, lacking most of the fundamental raw materials necessary for manufactures, must depend upon oases and pasture lands for human necessities.[2]

Some areas in the United States just as arid have been making substantial progress toward high standards of living. Could the people of Iran by comparable methods achieve a better life, or perhaps retrieve some of the prominence for their homeland that formerly was enjoyed? What does arid Iran lack that the people of arid areas in the United States have?

AFGHANISTAN

Afghanistan, a landlocked, buffer country in west central Asia, was designed by treaty to keep the Russian "Bear" from getting into trouble with the British "Lion." The country is nearly as large as Texas, and it has a high mountainous panhandle less than 50 miles wide and more than 200 miles long reaching to the Chinese frontier. One of Asia's noted rivers, the *Oxus* (Amu Darya), has its source in the Afghan panhandle.

Although three fourths of the country is mountainous and much of the plain and plateau portions is semiarid to arid, but even so the land supports 12,000,000 people—more than twice as many as live in Texas. The isolated position, the mountainous retreat, and the indomitable spirit of the Afghans have been important factors in helping them (like the Swiss) to maintain their independence.[3]

Afghanistan is a farming and grazing country. Much of the farming is promoted through irrigation, both by canals and kanats. The chief crops are wheat and barley (winter crops), and corn, millet, sorghum, and rice (summer crops). Fruits (apples, peaches, pears, apricots, etc.) are grown in abundance. The grazing lands produce one- and two-humped camels, fat-tailed sheep, and humped cattle. Manufacturing is limited chiefly to the processing of the products of the fields and pastures.

Afghanistan has no railroads and river navigation is negligible. However, there are hundreds of miles of fair-to-good motor highways. Most of the foreign commerce is transacted through Khyber Pass with India over the Hindu Kush with Russia, and with Iran.

CITIES OF AFGHANISTAN. *Kabul*, capital of Afghanistan, is a short distance from the west en-

[1] Clapp, Frederick G., "Tehran and the Elburz," *Geographical Review*, January, 1930, Vol 20, pp 69-85

[2] Hindle, W. H., "The Trouble Isn't Over in Iran," *Harper's Magazine*, February, 1946, Vol 192, pp 136-144

[3] Huntington, Ellsworth, "Afghan Borderland," *National Geographic Magazine*, September and October, 1909, Vol 20, pp 788-799 and 866-876

trance to the Khyber Pass. The location of the city near the converging points of all the ancient roads to India has made it a prominent trade and distributing center as well as a strategic military point.

Herat, in northwestern Afghanistan, is in the long, fertile valley of the *Hari Rud*. Its importance is due to its location in one of the most luxuriant valleys of the plateau. Canals from the river carry water to irrigate the fields which produce bountiful crops of wheat, barley, peaches, apricots, grapes, plums, walnuts, almonds, opium poppies, and vegetables.

19

Lands South and East of the Central Eurasian Barrier

THE LANDS south and east of the Central Eurasian Barrier are broken into a number of partially isolated areas which include plains, plateaus, and mountains with widely varying capacities for human use Six of these are south-projecting peninsulas or spurs of the Central Barrier separated from each other by seas, bays, and gulfs. This division of Eurasia includes many islands of which the Islands of Japan are the most important, and also the extensive districts of Manchuria and old China in the southeastern part of the continent.

The east-west extent of Eurasian lands south of the barrier is even greater than that of the Central Barrier itself, reaching as it does from the Atlantic Coast of Spain by the way of Arabia, India, Malaya, and Japan to the Bering Strait—an extent equal to more than half the distance around the earth at the equator. It is convenient to separate the lands south of the barrier into three major divisions—the western one, tributary to the Atlantic Ocean; the middle one, on the margin of the Indian Ocean; and the eastern division, bordering the Pacific.

MEDITERRANEAN PENINSULAS AND ASSOCIATED ISLANDS

The western division of the lands south of the Central Barrier includes the regions north of the Mediterranean Sea. The history of human occupancy of these areas antidates the Christian era by hundreds of years Notable in particular were the Greek, Roman, and Iberian civilizations.[1] The homeland of each of these peoples was a peninsula which will be treated as three regions—namely, the *Iberian Peninsula*, the *Italian Peninsula and Associated Islands*, and the *Grecian Peninsula and Associated Islands*.

THE IBERIAN PENINSULA. The Iberian Peninsula as a section of the Mediterranean borderland is bounded by natural features (Fig. 146) The Pyrenees Mountains on the north are a part of the Central Eurasian Barrier; on the west, south, and north is the Atlantic Ocean, and on the east is the Mediterranean Sea. The isolation of the region is reflected in the unique Spanish culture and the unity of interests of the people which have continued through the centuries Moreover, the plains, plateaus, and mountains of the peninsula provided conditions which have resulted in considerable diversity of interests among the people within the area

Nearly all of the Iberian Peninsula is a highland composed of a central plateau, often designated as a *meseta*, and high mountains on the north and south margins. The eastern margin of the meseta terminates in an escarpment near the sea, and in the west it disappears beneath the Atlantic Ocean. Two fertile wedge-shaped lowlands, the valley of the *Ebro* on the northeast and the valley of the *Guadalquivir* in the southwest, project far into the interior highlands North of the Ebro lowland are

[1] Simpich, Frederick, "Mediterranean Checkerboard," *National Geographic Magazine*, April, 1942, Vol 81, pp 527-550

the Pyrenees and the *Cantabrian* mountains, and south and east of the Guadalquivir lowland are the lofty *Sierra Nevada* ranges. The plateau section constituting about three fourths of the peninsula is deeply trenched by large streams, the most important of which, the *Douro*, the *Tagus* (Tajo), the *Guadiana*, and the Guadalquivir, rise near the eastern margin of the plateau and flow westward to the Atlantic Ocean. The only large river flowing into the Mediterranean is the Ebro. The region is occupied by two countries, Spain and Portugal (see pages 231 and 234).

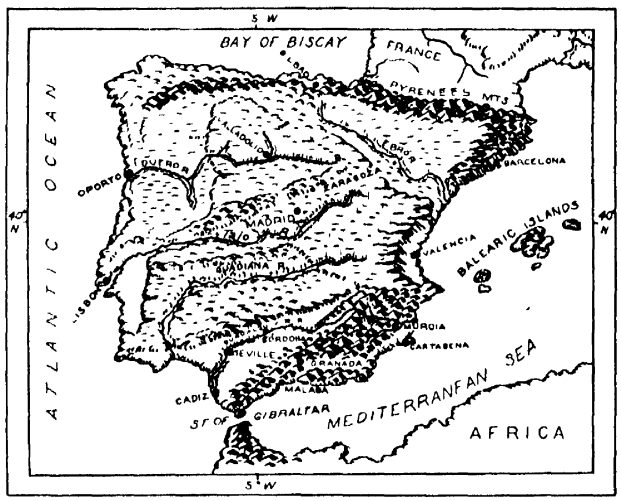


FIG. 146. IBERIAN PENINSULA. The region is surrounded by mountain and water barriers. The sketch represents the rugged, plateau character of the terrain.

THE ITALIAN PENINSULA AND ASSOCIATED ISLANDS. The Italian Peninsula, projecting 600 miles southeastward from the Alps Mountains, occupies a commanding position in a great intercontinental sea—the Mediterranean. The large island of *Sicily*, together with the many small associated islands and the submarine platform, indicate that Africa and Europe in ancient times may have been connected by a land bridge. *Malta*, a British-owned island south of Sicily, was fiercely attacked by the Axis powers and suffered thousands of bombing raids during World War II. Two other large islands, *Corsica* and *Sardinia*, may be considered a part of this region.

The *Apennines*, 700 miles long, extend lengthwise through the Italian Peninsula. Although much of the peninsula is rugged, the mountains are not high, and most of them are quite dry and barren with adjacent small plains and valleys which are highly productive. East and north of the Apennines is the *Lombardy-Adriatic* depression, the western part of which is the *Plain of Lombardy*, an area composed of deposits of alluvial and glaciofluviatile material carried from the Alps and the northern Apennines. The deposits from the Alps are so great that the main river, the *Po*, has been crowded far toward the Apennine side of the plain. That portion of the plain between the river and the Alps is known as the *Piedmont*, and is made up mostly of alluvial fans at the base of the bordering mountains.

In the Apennines and in Sicily and Sardinia are abundant evidences of recent crustal disturbance. Broad areas of basaltic lava exposures and many volcanic cones help to tell the story. Two of the most famous active volcanoes of the world, *Mt. Etna* in Sicily and *Mt. Vesuvius* near Naples, are in this region. A severe eruption of Vesuvius occurred during World War II. (For Italy, see pages 235 to 241).

THE GRECIAN PENINSULA AND ASSOCIATED ISLANDS. As the Italian Peninsula reaches across the Mediterranean Sea by way of Sicily to Africa, so the Grecian Peninsula reaches across the Aegean Sea by numerous islands to Asia. The former continuity of the mountains in the Grecian and Anatolian peninsulas is suggested by the many islands, the latter being mountains nearly submerged in the sea. The long, parallel peninsulas and water indentations of the southern part of the region are further evidences to the same fact, and also testify as to the folded structure of the land. The Grecian Peninsula is, in fact, a southward extension of the Balkan Peninsula of which it is a part. The region, about 200 miles long and 125 miles wide, is approximately equal in area to that of New York state.

The region may be divided into three parts—namely, (1) the massive section between the Aegean and Adriatic seas, (2) the southern peninsular portion (*Peloponnesos*) connected to the first by the narrow *Isthmus of Corinth*, and (3) the island archipelago and Crete.

The Grecian Peninsula is composed chiefly of parallel ridges and valleys of folded sedimentary

and metamorphic rocks, mostly limestones and marbles. The area has many caves, caverns, sinks, and underground streams, which are similar in origin to those in Kentucky, Tennessee, and Virginia. Many of the surface rivers run in deep gorges through parts of their courses. The ridges extend generally in a northwest-southeast direction with many isolated small valleys and alluvial plains. This makes east-west communication difficult. Since many of the valleys open southward to the sea, travel and trade by water have always been important The west coastal lands are higher and more rugged than those of the east coast. As a result, the eastern portion of the peninsula for centuries has been a better place for human occupancy than the west, and it is here that most of the people live. (For Greece, see pages 241 to 244.)

EUROPEAN COUNTRIES SOUTH OF THE CENTRAL EURASIAN BARRIER

The Mediterranean Sea, an immense, sheltered gulf of the Atlantic Ocean, borders on three continents. It not only provides a safe place for landmen to become seamen, but the lure of the numerous islands, the many peninsulas and headlands, and the productive shores enticed the embryonic sailor ever onward, encouraging him to make ever better and better ships so he could the better satisfy his insatiable curiosity Four countries are associated with the Mediterranean Peninsulas—namely, *Spain*, *Portugal*, *Italy*, and *Greece*.

SPAIN

Spain is wholly within the Iberian Peninsula (see page 229) The marginal portions which border the sea are the most favorable for human use, and it is in these areas that most of the people live. Spain is a little more than twice as large as Oregon and contains 25 times as many people, an average of 125 per square mile.

Natural Features

The plateau meseta has a continental dry climate with more sunshine than nearly any other part of Europe. Although insolation in summer is high, radiation is also rapid. Piercing winds often sweep the plateau in winter (Fig. 128). Northwestern Spain has a marine climate, but the south and east sections have the subtropical dry summer type (Figs. 236, 237, and 238).

The mature soils of the interior are pedocalic of the gray and chestnut types, whereas those on the Atlantic margin are pedalferic, belonging to the gray-brown soils. On the Mediterranean borders the more humid portions have the red and yellow pedalfers.

Madrid receives a median annual rainfall of 15.9 inches, only two months (July and August) receiving less than 1 inch. The average annual rainfall at Barcelona is 28 7 inches with three months (June, July and August) receiving less than 1 inch.

Spain does not have large forested areas. In the more humid northwest the forests are like those of central Europe, but the characteristic scrub prevails in the south. Olive trees grow abundantly along the Mediterranean coast. Most of the drier portions of the interior are natural grasslands.

Cultural Features

Although Spain borders both the Mediterranean Sea and the Atlantic Ocean, transportation facilities are not good because roadways to the interior and the trans-peninsular facilities are difficult and inadequate. Roadways into France cross the rugged Pyrenees, but the Mediterranean Sea and Atlantic Ocean separate Spain from Africa.

The natural boundaries of Spain have enabled the people to maintain their national integrity in spite of the fact that the country has at times been under the sway of foreign rulers. Settlers from Carthage early occupied portions of the Iberian Peninsula. Later the Romans succeeded the Carthaginians but did not gain full power until the beginning of the Christian era Early in the fifth century the Vandals, crossing the Pyrenees, overran much of Spain and three centuries later the unhappy land was the prey of the Mohammedans who crossed into Iberia from Africa The steady northward march of the invading, conquering Moors was halted in 732 A D at Tours in France, but the intruders from Africa were not expelled for more than 700 years. Not until 1492 during the reign of King Ferdinand was Moslem power driven

from Iberian soil. The meteoric rise of Spanish power in the world followed the discovery of America by Columbus. Disastrous civil wars at home and poor colonial policies abroad eventually led to the expulsion of the Spanish from their strongholds in the western world. The recent internal strife in Spain, abetted by neighboring countries, has taken terrible toll of life and treasure, and many decades will be required to retrieve the losses.

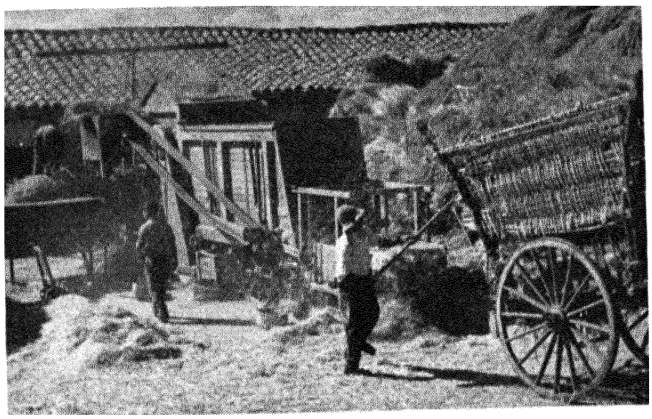


FIG. 147. THRESHING SCENE IN SPAIN. This is primitive equipment as compared with outfits used in United States and Canada. (Courtesy Spanish Library of Information)

As a rule the rural people of Spain do not live on isolated farmsteads as they do in the United States, but in numerous villages from which they travel back and forth to operate their near-by holdings.[1] The people are dependent chiefly on products from the soil. About one fourth of the land is quite unproductive because of its ruggedness, and another one fourth, due to low rainfall, is fit only for pasture, and indeed much of this is very poor pasture. Less than one half of the land is cultivated. Good crops of corn, wheat, and barley are grown in the northwest and other portions of the peninsula produce cereal crops either by dry farming or by irrigation methods (Fig. 147). In the valleys of the Ebro and Guadalquivir, and on the Mediterranean coastal lands orcharding is a thriving industry. Oranges, lemons, olives, pomegranates, figs, grapes, and almonds grow in abundance. The citrus fruits require irrigation, but the olive thrives without it. Apples are produced along the *Bay of Biscay,* grapes grow in the limestone soil wherever water is available, and the olive, because of its drought-resisting qualities, thrives over all but the northern portion of the country. Dried fruits are among the outstanding articles for home consumption and for export (Fig. 148). Sheep are the most important domesticated animals, the merino being of world renown because of the fine quality of its wool (Fig. 149). Cattle, donkeys, horses, mules, and goats also find a favored place in the economic life of the people.

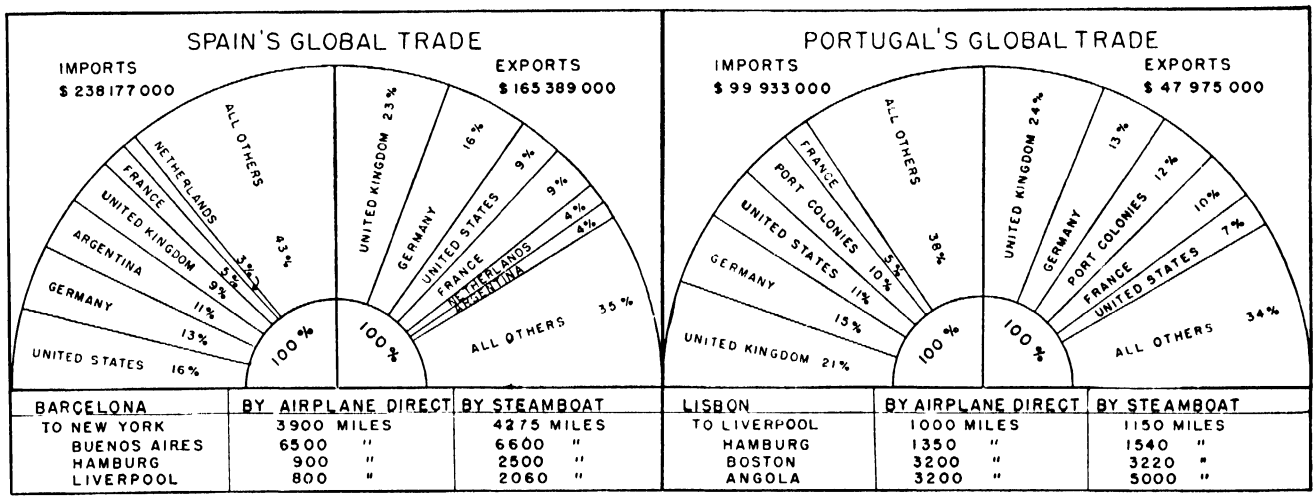
Although the mining of numerous ores is a major industry in Spain, the value of the sardine catch is three fourths as remunerative. The manufactures in Spain include wines and other liquors, cotton and woolen goods, paper, glass, and pottery.

CITIES OF SPAIN. Increase in manufacturing in Spain has resulted in the recent rapid growth of cities (Fig. 138). Only two cities, Madrid and Barcelona, have more than one million people each. Each of five others, however, has more than 100,000. At least 28 cities have more than 50,000 people each. Most of the large urban centers are maritime cities. The following descriptions give conditions as they were before the recent internal war. The natural features remain practically as they were but the changes in cities themselves show the effects of war upon the number of people and their morale, and upon the buildings.

Madrid, on the meseta in the center of the country, has been the capital of Spain for many years. Its site on several hills overhanging a small intermittent stream is not inviting. The aridity and heat of summer and the cold penetrating winds of winter make up a year of trying extremes. The central position of Madrid helps to make it a prominent railway center, but it owes its importance chiefly to political factors. No other city on the plateau has more than one hundred thousand people.

Barcelona, with its excellent harbor on the tideless Mediterranean coast, is built in a natural amphitheater facing the Mediterranean and backed by a chain of coastal mountains. Both railways and highways follow the entire east coast of the peninsula. In addition to being on this route, Barcelona has excellent inland communication by way

[1] Dobby, E. H. G., "Agrarian Problems in Spain," *Geographical Review,* April, 1936, Vol. 26, pp. 177-189.



BARCELONA	BY AIRPLANE DIRECT	BY STEAMBOAT
TO NEW YORK	3900 MILES	4275 MILES
BUENOS AIRES	6500 "	6600 "
HAMBURG	900 "	2500 "
LIVERPOOL	800 "	2060 "

LISBON	BY AIRPLANE DIRECT	BY STEAMBOAT
TO LIVERPOOL	1000 MILES	1150 MILES
HAMBURG	1350 "	1540 "
BOSTON	3200 "	3220 "
ANGOLA	3200 "	5000 "

FIG. 148. GLOBAL TRADE OF SPAIN AND PORTUGAL. Thirty-five to forty per cent of the trade of these two countries is widely distributed, the remainder falling within the trading sphere of five or six countries. Distances as shown in the table may loom large in future trade intercourse. (From *Foreign Commerce Yearbook*)

of adjacent valleys to the broad, rich basin of the Ebro. Barcelona, like Boston, is a great manufacturing and industrial city surrounded by a number of satellite towns whose welfare depends on the large urban center. The chief imports are comestibles (eatables), raw materials, and some manufactured goods. Exports are wine, olive oil, silk, woolen, paper, and silk.

Valencia, the second city in size on the eastern coast of Spain and about 2 miles from the sea, is situated on the alluvial plain of a small river flowing from the plateau. On account of the low precipitation most of which falls in winter, irrigation is practiced in producing fine groves of oranges, lemons, and mulberries. One of the most interesting features of the mountainous districts in summer is the picturesque scenery of the dry river channels. Silk is the chief article of manufacture. Valencia has good roadways paralleling the coast and also to the interior.

Seville (Sevilla), 54 miles from the ocean and on the left bank of the Guadalquivir, a stream traversed in ancient times by Romans, Arabs, and Vandals, has always been one of the chief outlets of Spanish wealth. Relics of foreign occupancy are in evidence in many places.

Only a small portion of Seville is more than 30 feet above sea level, and owing to the floods of winter, elaborate systems of defenses have been constructed against the Guadalquivir and its several tributaries. Seville is the terminus of three railways from Madrid and of others from Cadiz and Lisbon.

In a picturesque setting among the hills on both sides of the River Nervion and about 8 miles from the river's mouth, is *Bilbao*, the greatest Basque town of Spain and the leading port on the north coast of the peninsula. The rapid growth of Bilbao in the nineteenth century was due to the high-grade iron ore shipped from the port, and to the mining and metallurgical industries in the vicinity.



FIG. 149. SHEEP IN THE FOOTHILLS OF THE PYRENEES. The best known fine-wooled sheep the merinos—were developed in Spain. (Courtesy Spanish Library of Information)

Malaga, on the southern coast less than 100 miles northeast of the Strait of Gibraltar, is at the south-

ern base of an outlier of the Sierra Nevada on the bank of a torrential stream flowing from the highlands. The place attained considerable significance even during the Carthagenian period. Malaga has good rail and highway connections with the plains of the Guadalquivir.

Murcia, in the center of a fertile, low-lying valley surrounded by mountains, is 40 miles from the Mediterranean. Although near the sea, the temperature is subject to considerable variation, summer heat being severe and frosts occurring occasionally in winter. Mulberry trees and silkworms are grown which furnish raw silk for a thriving silk-manufacturing industry—an enterprise established by the Moors. The city was founded long before the beginning of the Christian era.

Twenty-seven miles southeast of Murcia is *Cartagena,* a fortified seaport and naval arsenal with one of the most spacious and safe harbors in the Mediterranean region. The site was selected by the Carthaginians in the third century, B.C. The excellent ores of lead and iron in the vicinity account chiefly for the importance of the smelting industry and the high place held by the city as a mineral port.

On the northern slope of the Sierra Nevadas is *Granada* founded by the Moors in the eighth century. It attained its greatest splendor in the thirteenth century when the magnificent Moorish palace, the *Alhambra,* was constructed. Today this structure is the marvel of visitors. Toward the west the city overlooks a fertile lowland which is kept productive by irrigation. *Cordoba,* on the Guadalquivir River and on the southern slope of the *Sierra de Cordoba,* is in a rich country planted to olive and orange groves. In the tenth century under Moorish rule Cordoba had half a million people. Today most of the former splendor is in ruins and in recent years many of the people have depended on tourist trade for a living. Modern industries include brewing, distilling, and the manufacture of textiles and fine gold and silver filigree.

One hundred miles northwest of Madrid is *Valladolid,* situated near the confluence of the Duero River and one of its important tributaries. Agricultural interests control the activities of the people. Valladolid is at a strategic crossing of highway and rail routes and its industries include the processing of agricultural products—flour, leather, wine, and beer—and the manufacture of chemicals and metal goods.

Zaragoza, the chief city in the Ebro valley, is in an oasis of well-cultivated land which is irrigated by numerous distributaries from the Imperial Canal. It is a cross road center in the Ebro valley and a gateway city for one of the principal routes over the Pyrenees.

PROBLEMS AND PROSPECTS. It is estimated that 2000 years ago Spain had twice as many people as it has today. Why there has been such a decline in population is not definitely known, but it is known that many of the now barren hills were once forested. The irrigation systems constructed by the Moslem invaders from Africa have been allowed to deteriorate. Many streams possess great possibilities for hydroelectric power and the mountains are still rich in minerals, but Spanish talent has not turned toward the ever-increasing development of natural resources. It has preferred to revel in cheap luxury and allow foreigners to become rich on Spanish resources. Spain needs effective leaders to initiate and prosecute a progressive program of development, but any advance probably will wait for the stabilization of the government and the abolition of internecine strife.

PORTUGAL

Portugal has been an independent country for more than 700 years. The country together with its colonial possessions totals 800,000 square miles—one fourth as large as the United States—although continental Portugal is only as large as Indiana. With its population of over 200 people per square mile it is far off the beaten track of land traffic but holds an enviable place near the great Gibraltar gateway.

Natural Features

The east edge of Portugal is in the meseta, but along most of the coast there are rich lowlands (see page 229). Three large rivers which have their sources far east on the meseta cross the country in productive valleys. These are the Douro, Tagus and Guadiana.

The northern two thirds of the country has a

marine climate, but the southern part is subtropical with dry summers. The average annual temperature at Lisbon is 60° F. with a range of only 21° F. The rainfall at the same station is 28.7 inches, most of which comes in the winter months. The evenness and dependability of rainfall according to a 67-year record are 59 and 67 per cent, respectively.

Portugal has a widely varied flora. In the highlands of the north are fine forests of oak, chestnut, and pine. In the south the cork oak abounds. The mature soils are chiefly pedalfers, mostly of alluvial origin in the lowland but of residual origin on the meseta.

Cultural Features

It is not strange that the little country of Portugal should have been a leader in the great period of discovery in the late fourteenth and early fifteenth centuries. Her position facing the Atlantic, the fine lumber resources for building ships, and the enthusiastic and resourceful Prince Henry gave Portugal an early start in world exploration. The trail-blazing voyages of Diaz and da Gama antedated the memorable trips of Columbus. The fact that the official language of one of the large nations in the western hemisphere (Brazil) is Portuguese is testimony to the far-reaching influence of this small country.

The leading occupation in Portugal is farming, followed by forestry and fishing. Cereals, wine, olives, figs, and rice are grown, and the forests produce cork, naval stores, and lumber. Fishing employs many thousands of men—sardines and cod being the principal catch. Portugal is comparatively poor in minerals, and the manufacturing industries are limited to a few relatively unimportant activities among which is the processing of agricultural products.

Transportation facilities include rail, highway, steamship, and airway. Today, the remote continental position of Portugal is a valuable asset for airports—inviting and supporting intercontinental activities. The foreign trade of the country includes exports of sardines, cork, and wine, and such imports as raw cotton, iron and steel, and coal (Fig. 148).

Cities of Portugal. The rural character of Portugal's population is shown by the fact that she has only two cities with more than 40,000 people (see Fig. 138).

Lisbon (Lisboa), the capital and leading port of Portugal, located on the Tagus River near its entrance into the Atlantic Ocean, was built on a succession of terraces up the slope of a range of hills. The view from the river as one travels toward the city with its white houses and many parks and gardens is comparable to the approach to Naples or Istanbul. The climate is equable and mild, whole decades sometimes passing with only one or two snows. The modern city dates from the great catastrophe in 1755, when fire and an immense tidal wave added destruction to the heap of ruins following an earthquake shock.

Oporto (Pôrto), famous as a wine-manufacturing and exporting city, is on the north bank of the Douro, only 3 miles from the ocean. The heavy winter rains in the highland subject the city to sudden and violent floods. The silting of the river's mouth renders it useless for navigation for large vessels. Among those who have been in possession of the city through the centuries were the Romans, the Visigoths, the Moors, the French, and the British, as well as the Portuguese themselves.

ITALY

Italy with an area about twice that of Georgia has one third as many people as the whole of the United States. Four fifths of the country is hilly or mountainous, but less than 8 per cent of the land may be classed as unproductive. This does not mean that the land is used intensively, in fact, only 40 per cent is in sown crops, the remainder of the productive land being occupied by forests or pastures.

Natural Features

Italy is surrounded by natural boundaries (Fig. 150). As a country it is conterminous with the Italian Peninsula, under which heading the land forms already have been described (see page 130). Some other natural features, also, deserve attention.

Although Italy is in the latitude of Oregon, the climate is distinctly subtropical with dry summers

(Figs. 128 and 236). The average annual temperatures at Palermo, Rome, and Milan are 63.1° F., 59.7° F., and 54.5° F., respectively. At Palermo and Milan the coldest month is January, at the former inches. At Milan the corresponding figures are about 5.0 inches higher.

The mature soils of Italy are mostly of the red and yellow type. Through hundreds of years of

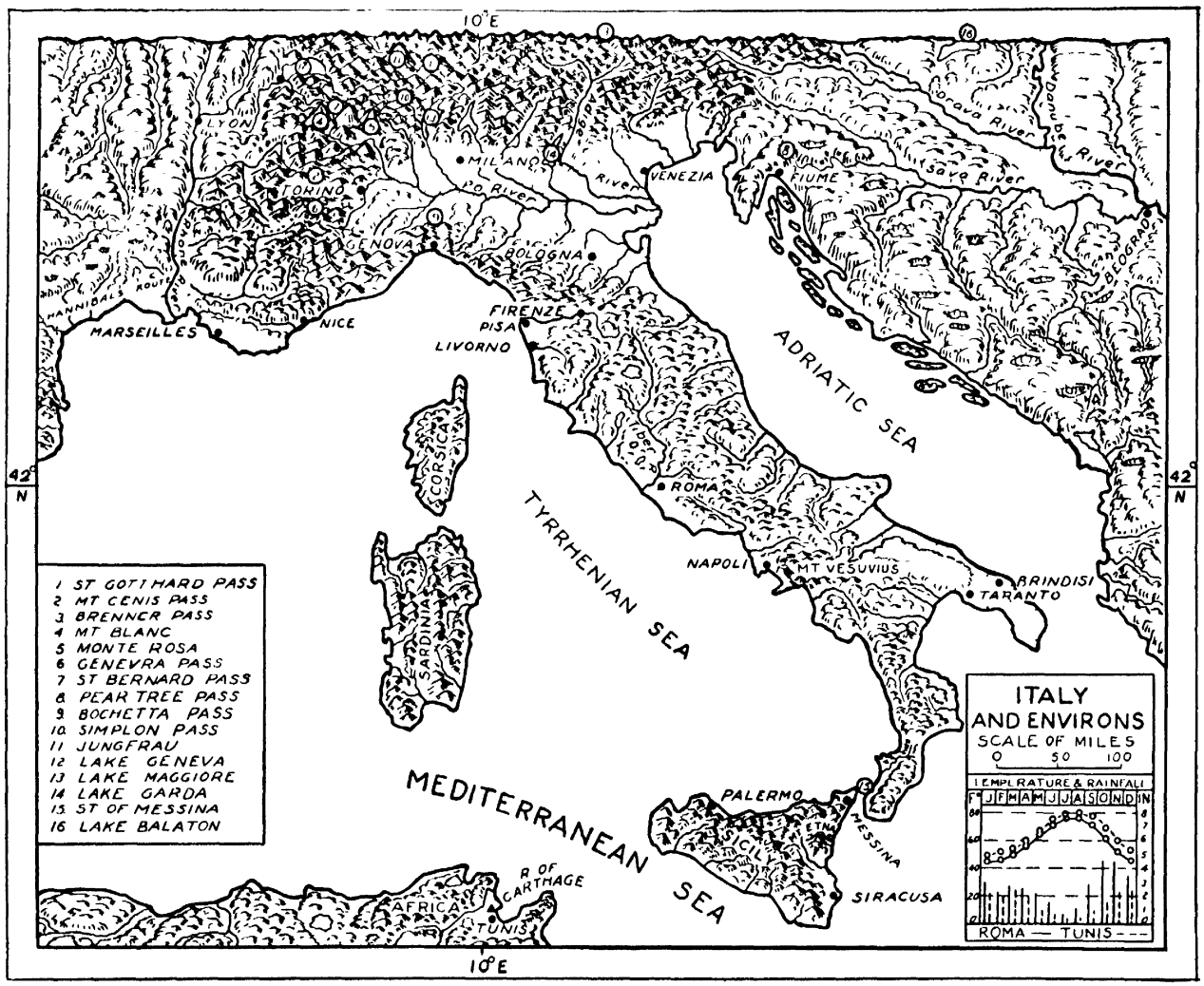


FIG. 150 ITALIAN PENINSULA In the key at the left are listed eight passes out of northern Italy, and at the right is a graph showing monthly temperature and rainfall distribution at Rome and Tunis. Note that some of the names on this map have not been anglicized

near the sea 50° F., and at the latter farther north and in the interior 32.4° F. Thus it is seen that differences in latitude and distance from the sea are controlling factors in relation to temperature. The median annual rainfall at Rome (149 years) is 32.1 inches, and nearly all of it falls in the winter. One fourth of the time, 37.0 or more inches have fallen, and three fourths of the time 28.3 or more

indifferent soil management and with inadequate reforestation policies, much of the soil is low in productivity. Erosion has greatly depleted the fertility, but recently intelligent efforts have been directed to soil reclamation and rejuvenation.

Italy is poor in minerals. Sulphur is plentiful in Sicily and some zinc and lead are found in Sardinia, but these in no way compensate for the shortage

of the basic minerals, coal, and iron ore. Building stones and clay for pottery and brick manufacture are abundant. Large quantities of the most beautiful marbles in the world are quarried in Italy, the purest white marble known being obtained at Carrara.

Cultural Features

The Italian Peninsula, separating the eastern part of the Mediterranean Sea from the western part, has for thousands of years occupied a strategic and commanding position in human affairs. In this respect it differs markedly from the Iberian and Grecian peninsulas, the influences of which have been limited to small sections of the great intercontinental sea.

The position of Rome in the center of the Mediterranean realm was an important factor in its dominance over the activities and interests of the people of the area. The rivalry between Rome and Carthage centered chiefly on the control of the two routes between the eastern and the western portions of the Mediterranean—one between Sicily and Italy, and the other between Sicily and Africa. The people of Italy from time immemorial also have controlled the passes over the Alps, and thus have profited by trade between Mediterranean lands and the lands beyond the mountain rim (Fig. 151). The wealth of Rome through centuries has been a constant inducement for less favorably located peoples to encroach upon Italian lands; among these peoples were the Gauls from the west in the fourth century B.C., the Goths from the east at the beginning of the fifth century A.D., and the Lombards from the north in the latter part of the sixth century.

More than one half of the people of Italy are engaged in agricultural pursuits, yet about two thirds live in towns of over 3000 inhabitants. This means that a large proportion of Italian farmers live in villages and towns and travel back and forth to their small holdings, and that isolated farmsteads as we know them in America are not the rule.

The hills, valleys, and plains of Italy have been intensively cultivated for more than twenty centuries. However, the glory and power attending foreign conquests and the resulting importation of grain and other provisions from conquered lands



FIG. 151. HIGHWAY IN THE ALPS. In the Alpine section of Italy are many highways leading to places of scenic grandeur. (Courtesy Italian Library of Information)

contributed to the neglect of soil conservation at home.

Much of the slope land in the Apennines is terraced and produces grains, olives, grapes, and other fruits up to 3000 feet altitude, above which pastures predominate. Because the growing season is the dry season, irrigation is essential in the production of most crops. Rice as well as wheat thrives in the Po Valley, and near Milan the growing of silkworms make the mulberry tree a conspicuous feature of the landscape. Among the domesticated animals chickens and goats are seen almost everywhere. The dry summers have encouraged the fruit-drying industries.[1]

Next to agriculture, industry claims the special attention of about one fourth of the people. The quarries have yielded the stone for the construction of hundreds of beautiful buildings—palaces, coliseums, castles, and cathedrals, as well as the homes of the humble peasants. Even today stone is the chief building material because the land was denuded of forests long ago, and the dire need in recent centuries for crop land has discouraged reforestation.

The country is deficient in basic raw materials, especially coal. More than 90 per cent of the coal used has to be imported. However, the abundance of water power partially supplements the inadequate supplies of fuels. It is unfortunate that water power facilities are so unevenly distributed. About three fourths of the power is generated in the streams of the Alps and less than one fourth in the Apennines. Moreover, the development of water power already has been extended nearly to its profitable limits, and additional power will need to come from imported coal or other fuels.

A redeeming feature of Italian industry is the abundance of cheap labor, a considerable portion of which is skilled. This condition, together with small supplies of raw materials, indicates that the light rather than the heavy industries should be the profitable ones to pursue. The manufacture of textiles and leather goods ranks first, followed by the metallurgical and engineering industries.

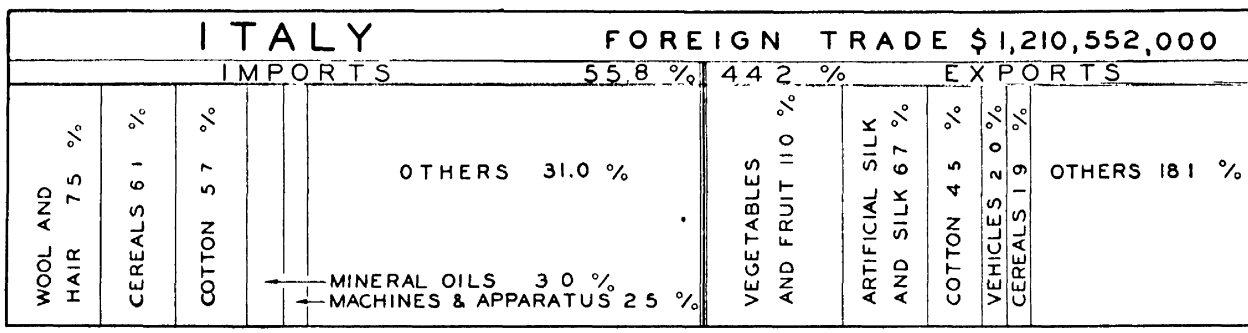


FIG. 152. ITALY'S FOREIGN TRADE. A 10-year average prior to World War II and ending in 1937. (See also Fig. 137.) (From *Statesman's Yearbook*)

For many years the imports of Italy have far exceeded the exports (Fig. 152). This excess of imports has been paid for in large part by the money spent by tourists in Italy, and by emigrants who are continually sending some of the money which they earn in foreign lands back to the mother country (Fig. 137). The invigorating winter climate, the attractions of the Alps, the art galleries, and the landmarks of ancient Roman supremacy are among the features that lure thousands of travelers and tourists to Italy every year.

CITIES. The location of many of the large cities of Italy has been a response to geographical conditions. Turin, Milan, and *Verona* are on the Piedmont where important rivers from the Alps flow into the plain. Each of these cities, together with Venice, commands one or more passes over the Alps. Skirting the Apennines on the south side of the Plain of Lombardy was an ancient Roman highway—the Aemilian Way. At strategic places on this route were the important cities of *Bologna*, *Modena*, *Reggio*, and *Piacenza*. The ancient high-

[1] Blanchard, W. O., "The Plains of the Po," *Journal of Geography*, March, 1937, Vol. 36, pp. 81-92.

way system of Italy centered at Rome on the *Tiber River* near the western coast. *Florence* (Firenza) was on the Cassinian Way, and the Appian Way ran close to Naples and through *Taranto* to *Brindisi.*[1] Genoa commands *Bochetta Pass,* the chief route from the sea through the northern Apennines to the Plain of Lombardy. *Pisa, Leghorn* (Livorno) and Palermo are coastal cities (Fig. 138).

That Italy (including Sardinia and Sicily) is an urbanized country is shown by the fact that, prior to World War II, with an area a little larger than that of New Mexico, it had 2 cities (Rome and Milan) with more than 1,000,000 people each; 6 with over 500,000 each, 22 with more than 100,000 each; 56 with more than 50,000 each; and more than 1000 cities with over 5000 each. Of all the people in Italy fewer than 5 per cent live in isolated homesites or in towns of less than 1000. Of these many cities only 7 will be given special attention.

Rome (Roma), on the left bank of the Tiber River 17 miles from the sea, had its beginning in the eighth century B.C. on a cluster of seven low hills. The site was easily defended, high enough above the swampy flood plain to be healthy, and far enough from the sea to be safe from pirates. After the fall of Carthage in 146 B.C., Rome became master of the western Mediterranean, and later came to control the whole intercontinental sea and the lands bordering it. In those ancient days it could be truly said that "All roads lead to Rome." From the Euphrates to the *Gates of Hercules* (Strait of Gibraltar), and from the North Sea to the Sahara, tribute poured into the coffers of the "Eternal City," and with this fabulous wealth the Romans constructed their marvels of architecture, the ruins of which are admired by the people of the world today. To one who revels in antiquities, Rome is a veritable paradise. The Forum, the Temple of Jupiter, the Place of the Caesars, St. Peter's, the Corinthian Columns, and the Coliseum at the foot of Esquiline Hill are only a few samples. Even today Rome is almost exclusively a political, intellectual, and cultural city. Like Washington, D. C., no industrial development has entered to mar its traditional or modern prestige. The Roman Catholic world today looks toward Rome, the "Eternal City" in which the Vatican (Palace of the Popes of Rome) is located.

Milan (Milano), on the Alpine Piedmont about 25 miles from the mountains, is the leading city of the north. Routes from the Simplon and St. Gotthard passes in the Alps converge at Milan, and Bochetta Pass leads over the Apennines to Genoa. The route from Venice at the head of the Adriatic Sea to the Rhone Valley skirts the foot of the Alps and passes through Milan. Many of the satellite towns surrounding Milan are engaged in various manufacturing enterprises, so that today industry even overshadows the great cathedral. In ancient and medieval days this city was one of the first in Italy to feel the impact of invading forces from beyond the Alps, but these disadvantages became decided advantages in times of peace and account in considerable measure for the surpassing importance of Milan as a commercial and industrial city.

Genoa (Genova), on the northern shore of the western Mediterranean, hangs on the seaward slope of the *Ligurian Apennines.* Its early importance was due in part to the Bochetta Pass that leads to the upper Po Valley and the Alpine passes, and in part to its harbor which, although quite inferior, was the best on this part of the Mediterranean coast. During the Middle Ages Genoa and Venice were rivals for the commerce of the *Western Mediterranean,* but when the trade with the Far East shifted from the land route to the Atlantic Ocean, Genoa profited by the change. In recent times Genoa and Marseilles have been rivals in trade. The construction of the Simplon and St. Gotthard tunnels through the Alps and another under Bochetta Pass has given a fresh impetus to the commercial status of Genoa. The type of commodities entering into Genoese trade is unfortunate because the imports are chiefly heavy materials such as coal from Britain and the United States, grain and oil from Russia and the United States, and ores from Algeria and Spain, whereas the manufactured goods in the hinterland are largely light materials which are shipped by rail to northern Europe. Thus, the imports are equal to six times the exports. Genoa and environs rank first in Italy in the manufacture of machinery.

[1] McCartney, First Lt. Benjamin C., "Return to Florence," *National Geographic Magazine,* March, 1915, Vol 87, pp. 257-296.

Naples (Napoli), on the southern slope of a succession of volcanic hills, occupies a beautiful site on the north shore of the *Bay of Naples*. East of the city across a broad flat area 10 miles away is the renowned volcano, Mt. Vesuvius, on the slope and near the base of which are numerous villages and the classic sites of *Herculaneum* and *Pompeii*. The place was first settled by the Greeks because the natural acropolis had great strategic value. As an Italian port, Naples is a close rival of Genoa. The city is a terminus of many transatlantic steamship lines, rail and highway connections are good both north and south, and labor is cheap and plentiful, thus furnishing favorable conditions for the sugar-refining, automobile, spinning, weaving, and leather-goods industries. It was at *Salerno* in the vicinity of Naples, and at *Anzio* south of Rome where some of the most severe conflicts in World War II took place.

Turin (Torino), nestling close to the Alps on the left bank of the Po in the remote end of the Plain of Lombardy, is one of the great industrial cities of Italy. This is due primarily to the hydroelectric power from Alpine streams. The city is noted especially for the manufacture of automobiles and felt hats. In 218 B.C. it was taken by Hannibal who crossed the Alps which lie just west of the city. The advantages of its site relative to the passes of the western Alps have given the city comparatively easy access to trade with France by way of the Rhone-Saone Corridor.

The best view of Turin and environs may be had by climbing to the Turin Hill on the right bank of the Po and looking westward over the city to the snow-capped mountains beyond. The feature creating the most pleasing impression is the city's magnificent position on the edge of the tree-covered plain with the mountains rising like a great amphitheater from the green, forested semicircle in the background.

Venice (Venezia) is at the head of the Adriatic Sea near the mouth of the Po and about 40 miles from the foothills of the Alps. It is built in a lagoon on a group of more than 100 islands formed from the rock debris carried down from the mountains by rivers. The city owes its origin to the fact that the people of the region sought refuge in the marshes when barbarian hordes swept over the Alps into the Po Valley. Venice is the nearest Adriatic port to the lowest Alpine gateway—the *Brenner Pass*. During the Middle Ages it was the leading commercial city of Mediterranean lands, dealing especially in goods brought from the Far East and destined for markets north of the Alps. It may well be called the "Water City" because its streets are strips of water and canals, the Grand Canal being the city's main thoroughfare. No vehicle of any kind is permitted in the city, the gondola being the only means of travel. The shores of the lagoon in which the city is built have become an extensive truck-farming area. The city is world renowned for the fine quality lace and embroidery made by the women and children. Exquisite glassware and jewelry are other articles of manufacture widely and favorably known. The city is losing in importance today in part because of the growth of Fiume and Trieste on the east shore of the Adriatic—the cities serving as outlets to the sea from the Danubian countries.

Palermo, in the northwestern part of Sicily on a well-watered plain, is about 250 miles south of Rome. Because the harbor does not have a good natural protection, Palermo really does not engage extensively in commerce. Its position on the roadstead between the eastern and the western Mediterranean has given the city a checkered history. Founded probably by the Phoenicians, it has at various times fallen under the domination of the Epireans, the Carthaginians, the Romans, the Vandals, the Saracens, the Normans, and the French. Palermo was badly battered in World War II. The small plain adjacent to the city is rich in gardens and orchards. Fishing is an important industry. Many tourists traversing the Mediterranean stop at Palermo.

ITALIAN PROSPECTS. In 1936 Italy had an average population density of 355 per square mile. One department, Campania, has a density of more than 700 and in a few places the density is much higher. During the last several years the gain in population per year by the excess of births over deaths was about 400,000. With a poverty of resources of soils, of basic minerals and of forests, with a mostly mountainous terrain, and with a disastrous adventure in a recent war of aggression, the country is encountering acute problems in rehabilitation and

in finding profitable employment for an impoverished and ever-increasing population. Under the fascist government an attempt was made to place Italy as nearly as possible on a self-sustaining basis. To think intelligently about Italy's dilemma, many factors must be taken into account, among which are: (1) soil erosion menace; (2) deforested mountain slopes; (3) reclamation of marshlands; (4) more intensive land use, (5) further use of hydroelectric power for manufacturing; (6) increase of the fishing industry, (7) encouragement of tourist visitation; (8) securing minerals from outside, (9) production of increased quantities of artistic goods, (10) migration to other countries; (11) perils of imperialistic expansion; (12) curbing population growth, (13) a cultivation of friendly sympathetic neighbors both near and far; (14) capitalizing upon unique and famous features and characters in Italian history, and (15) renouncing the desire to regain Italy's one-time splendor and glory by any means other than peaceful.

GREECE

Greece occupies nearly all of the Grecian Peninsula with its many small attached peninsulas, and in addition hundreds of islands in the Aegean and Ionian seas (see page 230). The largest of the islands are *Crete* (3199 square miles) and *Euboea* (2216 square miles). The total area of the country including the numerous islands is 50,270 square miles, and the population is about 7,000,000.[1]

Natural Features

So rugged is Greece that only one fifth of the country is arable land, although, as is true in Italy, much of the area that is not cultivated is pasture land or forested (Fig. 153).

Greece is in the latitude of the northern two thirds of California and the climate of the coastal area is subtropical with dry summers (Fig. 236). In the higher interior the climate approaches the continental in characteristics. At Athens the median annual precipitation is 15.2 inches, one fourth of the time 17.6 or more inches fall, and three fourths of the time the precipitation is 13.9 or more inches (Fig. 128). Summer temperatures are high (July average, 81.1° F.), and winters are mild (January average, 47.5° F.).

The forests at the lower levels consist of narrow-leaved and of broad-leaved deciduous trees such as the olive and the cork oak, and the acacia. These lose their leaves periodically because of seasonal droughts. Forests of chestnut, beech, oak, and conifers grow on the higher slopes. The grasses are usually brown in summer because this is the dry season.

The mature soils belong to the red and yellow group. However, the soil is youthful over most of the region because of the large percentage of slope land where the mantle is being removed by erosion and in the valleys where deposition is taking place. Minerals are present but not much mining is done. Stone for building purposes is plentiful almost everywhere.

Cultural Features

The well-protected coves and harbors, the many small sheltered valleys and plains, and the numerous adjacent islands have always lured the people of Greece toward the sea.[2] Isolation and non-intercourse have been the rule in the past, but modern means of transportation and communication are certain to effect a continual change in the region, both as to internal affairs and foreign relations.

During ancient times in Greece many of the little valleys and glens nurtured small city-states. The isolation of each state was its protection, and just as truly also isolation was the reason for mutual suspicion and distrust. However, under the stimulus of environmental factors, ancient Greece produced patterns of thinking, of statecraft, and of art that even today are continually presented as models to be studied and emulated—for thinking, Aristotle, Plato, Hipparchus, Socrates; for statecraft, Lycurgas, Pericles, Solon; for art and literature, Phideas, Demosthenes, Homer, and Aeschylus.[3]

Only danger from the outside seemed to unite

[1] Ogilvie, A. G., "Population Density in Greece," *Geographical Journal*, May-June, 1943, Vol. 101, pp. 251-260

[2] Myres, J. L., "The Islands of the Aegean," *Geographical Journal*, March, 1911, Vol. 97, pp. 137-156

[3] Stillwell, Richard, "Greece, the Birthplace of Science and Free Speech," *National Geographic Magazine*, March, 1944, Vol. 85, pp. 273-254



FIG. 153. GREECE This sketch shows the rugged character of the terrain of Greece and surrounding lands The Bosporus-Dardanelles Breach is well shown, too Not all of the names on this map have been anglicized

the city-states of Greece, but so bitter were some of their quarrels that even this finally failed as a cohesive force During the brief ascendency of Philip of Macedon and his son Alexander, the city-states were welded into a unity, but at the death of Alexander, disintegration was rapid and eventually fatal for Grecian unity.

The vicissitude of the Grecian people since the Roman occupation is a long story. The location of the country athwart the great Bosporus-Dardanelles Breach accounts in part for the checkered career of Greece throughout recorded history.

The land in Greece is so rough and broken that only 20 per cent of it can be cultivated. Most of the people live in the small alluvial valleys and plains The low rainfall, the topography, the thin soils, and the deep, narrow valleys make irrigation difficult. For these reasons farming is hazardous.

The leading grain crops are wheat, barley, and corn. The region is outstanding in the production of currants, dried grapes, and olives Oranges, lemons, figs, and tobacco receive considerable attention, one of the leading exports being tobacco (Fig. 154). The mountain slopes are used extensively for the growing of olives, sheep, and goats.

On the whole the people depend for a living

almost entirely on the products of the soil. Even the limited amount of manufacturing is dependent chiefly upon the processing of agricultural raw materials.[1]

THE PEOPLE AND THEIR CITIES. The average number of people per square mile in Greece is 150, a high figure for such a rugged area with a dearth of precipitation, little agricultural land, and a poverty of mineral resources. There are only two cities in Greece with more than 100,000 people each—namely, Athens and Thessalonikē (Fig. 138).

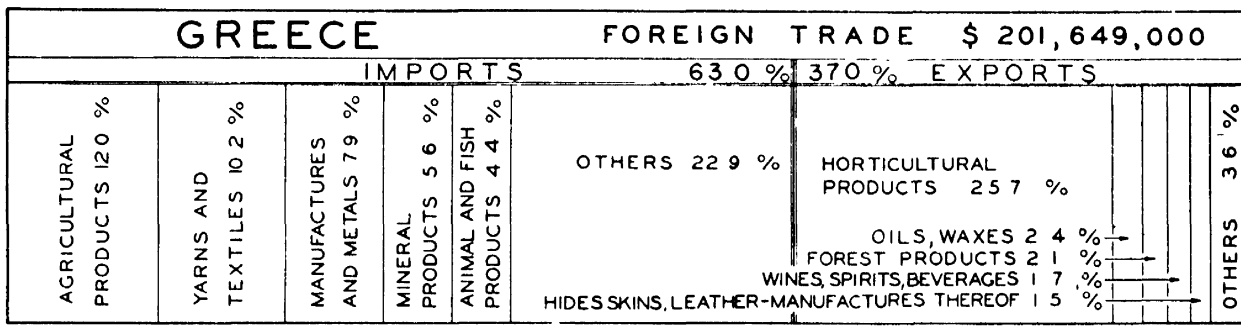


FIG. 154. GREECE'S FOREIGN TRADE A 10-year average just prior to World War II Note the relatively high percentage of imports (From *Statesman's Yearbook*)

Athens (Athenai), the capital of Greece built on a plain at the base of a steep crag, the Acropolis, commands the narrow route between the mountains east of the city and the sea on the west. Old Athens was built on the Acropolis, and this hill is still the pride of the new city. Twenty-five hundred years ago the Acropolis was crowned with magnificent temples to the gods, but today ruins are in evidence everywhere, except for the Parthenon which has been partially restored. In ancient days the Acropolis was a citadel to which the farmers of the plains could retreat for safety in case of war. Thus this crag became the ruler's residence and the symbol of protection, but as the cultural life of the people unfolded, the temples in general and the Parthenon in particular became the spiritual center of the Athenians. As Athens grew, the small adjacent plains would no longer supply the needs of the city-state, and the inevitable result was the development of sea-borne trade over the protected waters in the vicinity. Whereas in ancient days boats were dragged over the Isthmus of Corinth on a skidway, today a ship canal provides a safe route for large seafaring vessels. As in early days, the port city of Athens is little *Piraeus* (Peiraievs) only a few miles away. The ruins of Troy, the ancient rival of Athens, are 200 miles northeast across the Aegean Sea at the entrance to the Bosporus-Dardanelles Breach.

Thessalonikē, at the northern end of the Gulf of Thessalonikē (Thermaikos) on the margin of a rich delta and alluvial plain, is at the seaward entrance to the Vardar-Morava Gateway. This is the most convenient route from Central Europe to the Aegean Sea. Although this route through a wild and rugged country in ancient days was beset by bandits and marauders, today it promises to become more and more important, a railroad now following it from Belgrade to Thessalonikē. In fact, the strategic location of Thessalonikē favors its growth into one of the great centers of commerce in the eastern Mediterranean lands. Many well-preserved ruins testify to the antiquity and early importance of the site.

The chief seaport of the Grecian west coast is *Patras* (Patrai), on a fertile plain at the entrance to the Gulf of Corinth The site is dominated by a citadel-crowned ridge which formerly afforded protection from invaders. Patras is the leading city of Greece in the export of currants *Candia* (Frakleion), founded by the Saracens on the north coast of Crete in the ninth century, was conquered and fortified by the Genoese in the twelfth century and three centuries later it was held by the Venetians. *Kavalla*, on the north shore of the Aegean

[1] Roucek, Joseph S, "Economic Geography of Greece," *Economic Geography*, January, 1935, Vol 11, pp 91-104.

Sea, *Mytilēnē,* on the island of Lesbos, and *Corfu* (Kerkyra), a resort city on the island of the same name, are other cities of considerable importance.

Looking to the Future. Civilized people have occupied Greece for more than twenty-five centuries. The region, like California, has low rainfall (15 to 20 inches) practically all of which comes in the winter. The land is comparatively poor for farming except in the valleys where irrigation is possible. A few cattle, especially dairy cows, are grown but sheep and goats thrive in large numbers. Deforestation on the mountains and slopes has promoted erosion and rapid runoff of winter rain. Stagnant marshland in flood plains and on deltas in summer is a menace to health. The area is rich in some minerals such as lead, silver, and iron ores, but coal and petroleum are almost absent, except for some poor lignite. At present the ores are exported. Some water power is available but not much has been developed. Transportation facilities could be greatly improved The extensive ruins of one of the most remarkable civilizations of ancient days, the excavations, the museums, and the reconstructed edifices attract ever-increasing tourist visitation.

It is hardly possible for the people to rebuild "the glory that was Greece," but among the numerous possibilities for making a better use of Grecian resources several may be cited. A program of reforestation and the impounding of winter rains and increased irrigation would help the people. It might be advisable to improve roads, construct hotels, extend travel conveniences, and advertise to increase the tourist industry. The continued reclamation of marshland certainly would make the area a better place in which to live. The location near the Bosporus-Dardanelles Breach and the Vardar-Morava route now as well as in ancient days can be utilized to increase trade; and advantageous trade agreements could be arranged so as to help the people capitalize more profitably on the lead, silver, and iron ores, the fruits, and other products of the country (Fig. 7).

20

Lands South and East of the Central Eurasian Barrier (Continued)

INDIAN OCEAN BORDERLANDS

THAT PORTION of the Central Eurasian Barrier between the Bosporus-Dardanelles Breach and Indo-China covers a distance of more than 4000 miles. Through this section there is only one important breach (Khyber Pass), although there are a number of lesser significance. Some of the world's earliest civilizations rose and fell south of this part of the Barrier. Several of the outstanding religions of the world, among which are *Judaism, Christianity,* and *Mohammedanism,* found their first disciples here, but today in this part of the world are some of the best examples of social and economic stagnation.

For purposes of this study it is convenient to divide the Indian Ocean Borderlands into three major regions—namely, (1) *Syrian-Arabian Plateau,* (2) *Mesopotamian Valley,* and (3) *Indian Plains and Plateau.* Among the large water features associated with these regions are the Mediterranean, Red, and Arabian seas, the Persian Gulf, and the Bay of Bengal.

SYRIAN-ARABIAN PLATEAU. Some geologists and climatologists insist that the Arabian Peninsula is more like Africa than it is like Asia. The former show that it is separated from Africa by the Red Sea, just a narrow rift in the earth's surface (Fig. 155). The latter can prove easily that the climate is, in reality, a continuation of the great desert of northern Africa. The physiographic unity of the area, however, is well defined by its boundaries—water on east, west, and south, and on the north the Mesopotamian Valley and mountains of southern Armenia. The area of the region is more than 1,500,000 square miles, one half as large as the United States.

The margin of the region is accessible from the sea on all sides except north, but because of general aridity nearly the whole area is a land of pastoral nomads with here and there an oasis where water for irrigation is available. In or near the western edge of the Syrian-Arabian Plateau is an escarpment facing a great rift valley, extending from the *Gulf of Aden* to northern Palestine—a distance of nearly 2000 miles. For a distance of 1500 miles this valley is filled by the Red Sea, whereas the northern portion is occupied by the *Jordan Valley* and the *Dead Sea.* From the high west margin of the rift valley in the north, the land slopes steeply westward to the Mediterranean Sea. Only in the extreme north is there a lowland opening across the region from the Mediterranean Sea to the Mesopotamian Valley.

From the edge of the rift valley the land slopes eastward to the Indian Ocean, Persian Gulf, and the Mesopotamian Valley. Most of the southern section of the plateau is a great sandy desert. The interior consists chiefly of hard-surfaced areas of poor steppe land, sand dunes, and arid gravelly uplands. In the west central portion are some stretches of sharp corrugated lavas which are almost impossible to cross. Dry river beds or wadies, which carry the water from the few torrential rains, break the monotony of general levelness which character

izes much of the plateau (For associated countries see pages 247 and 250.)

Mesopotamian Valley. The term "Mesopotamia" really means the area between rivers, and originally designated the land between the Tigris and the Euphrates rivers. Today the meaning has been extended to include all the large land depression, most of which is in the country of Iraq, between the Plateau of Iran and the Arabian Plateau.

The great hollow south of the Plateau of Iran has been partly filled by detritus brought mostly from the mountains of Armenia and Kurdistan by two great rivers—the Tigris and the Euphrates. The river from the junction of these two streams to the sea is known as the *Shat-el-Arab* During the last 700 years the upper end of the Persian Gulf has been converted to land at the rate of about 3 miles per century.

The lower part of the region, especially between the rivers, is quite flat, whereas the land is undulating 400 or 500 miles from the gulf. In the upper part of the valley just south of the mountains of the Armenian Knot, there is a well-defined piedmont area over which most of the east-west travel and transportation has taken place for thousands of years On the lower portion of the delta of the Shat-el-Arab are large areas of dreary swampy land, unhealthful and useless, especially during the flood stage of the rivers.

The undulating folds of the underlying sedimentary rocks on the margin of the Mesopotamian Valley provide conditions favorable for the accumulation of petroleum This is true especially in the vicinity of Mosul on the east side of the valley and also on the south side of the Persian Gulf. (For Iraq, see pages 253 to 255)

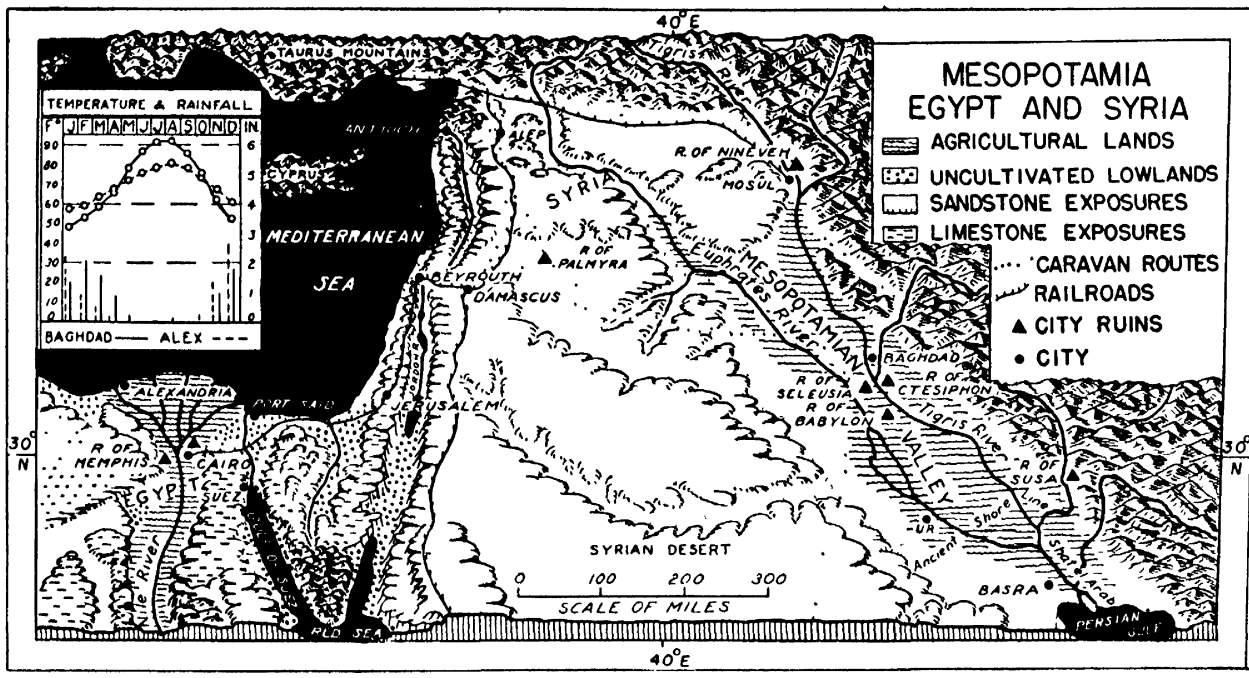


Fig 155. Mesopotamia, Syria, and Egypt. For thousands of years this has been and still is one of the strategic corners of the world. Note the numerous city ruins and interlacing caravan routes. (See Fig 1) Some of the names on this map have not been anglicized.

Indian Plains and Plateau. At the dawn of recorded history India already possessed a very old civilization. The region is completely shut in by water and mountain barriers On the north is the wall of the mighty Himalayas, on the east are the folded ranges and valleys of Indo-China; on the south is the immense Indian Ocean, and on the west the Arabian Sea and the Sulaiman and Kirthara ranges are backed by the arid Plateau of Iran. More effective boundaries are seldom found.

The Indian Plains and Plateau Region covers a large area. The east-west and north-south extents are 2500 and 2000 miles, respectively; and it contains 1,800,000 square miles, an area which is 60 per cent as large as the United States. The region provides homes for approximately 400,000,000 people—nearly three times the population of our own country.

The only land routes into India from the west traverse the high, dry plateau of Iran or the lofty Hindu Kush Mountains, and enter the region by the *Bolan* and Khyber passes. Although these routes are hazardous, some trade and travel passed through them even before the beginning of the Christian era and have continued to the present. Because India and China have always raised similar crops, little trade has ever been attempted over the rugged intervening terrain.

The coastal margin of the region is comparatively regular with few indentations; consequently, harbors are few. In addition to this, the sea along the east coast is shallow, making approach to the shore with large vessels dangerous or impossible. The only port of much importance on the east coast is Madras which has a man-made harbor.[1]

The three great surface features of India are the *Himalayas*, the *Indo-Gangetic Plain*, and the *Deccan Plateau*. The Himalayas are the highest mountains in the world—many peaks towering to nearly 30,000 feet in altitude. These mountains precipitate the rain from the summer monsoons, thus insuring great quantities of irrigation water for agricultural operations on the adjacent plains.

The Indo-Gangetic Plain is almost as level as a floor. Scarcely a hill is visible throughout its 2000 miles of east-west extent. The slopes are so gradual, as a rule, that they are imperceptible. The large rivers flowing over this plain always carry much water derived from the rains and snows on the adjacent mountains and thus are excellent for transportation. Because of the great amount of level land near the rivers, conditions for irrigation are especially favorable.

The rivers of the Deccan, however, are not constant; they flow in deep, narrow valleys and are not open to navigation. It may be seen, therefore, that the plateaus of India do not have as good lands for farming as do the plains. (For India, see pages 255 to 262.)

[1] Staats, J Riley, "India East Coast," *Life in Asia*, McKnight and McKnight, Bloomington, Ill, 1936, pp 71-88

COUNTRIES ASSOCIATED WITH THE INDIAN OCEAN BORDERLANDS

Included within the Indian Ocean Borderland are several countries—*India*, *Iraq*, *Palestine*, *Syria*, *Saudi Arabia*, and some other countries of lesser importance. Not all of them are independent, and a separate discussion of each will not be attempted. It seems desirable, however, to give India and Iraq separate consideration and to divide the small countries of the Syrian-Arabian Plateau into two groups—namely, the Arabian and the Syrian groups.

ARABIAN PLATEAU COUNTRIES

Arabia is not a country, but an immense peninsula more than one third as large as the United States (see pages 245-246). The Kingdom of Saudi Arabia occupies all of the interior and more than half of the Red Sea coast. Other more or less independent states are *Yemen* in the extreme southwest, *Aden* and *Hadhramaut* bordering the Indian Ocean, and the *Sultinate of Oman* and *Muscat* (Masqat) in the east next to the Arabian Sea.

Natural Features

Rising above the general levelness of the Arabian Plateau are several rugged areas The best known of these is the high, upturned western edge of the peninsula, which at the same time is the eastern wall of the Red Sea rift. This escarpment extends from the *Sinai Peninsula* to the *Strait of Bab-el-Mandeb*—only 2000 feet in altitude in the north but rising to 8000 feet in the south Bordering the *Gulf of Oman* is a mountainous area—some peaks towering to nearly 10,000 feet. Running northward through the Arabian interior from Yemen toward the head of the Persian Gulf are a series of more or less isolated granitic peaks nearly buried in the desert wastes.

Only in these highland areas does the climate of Arabia depart from its intensively desert character. Typical of the general aridity are the conditions

at Aden where the rainfall is 2.3 inches annually, and the temperature ranges between 76° F. in January and 89° F. in June (Fig. 129). As a rule the rains come in the form of torrential showers.

In some of the higher valleys of the mountains, crops can be grown from the orographic rainfall from the trade winds which blow constantly over the area mostly from a northerly direction. Along the numerous intermittent streams and wadies farming is practical with the aid of irrigation.

Cultural Features

The population of Arabia is estimated at about 10,000,000—fewer than 30 persons per square mile. In the desert interior are immense areas never visited by other than Arabian nomads. Since nearly all the people are Moslems, the annual pilgrimage to Mecca and Medina is of unusual significance. Three routes are especially important for these journeys—the railway from Damascus southward, the all-caravan route from Baghdad across the interior, and the Red Sea water route. Numerous tributary caravan trails traverse the peninsula in all directions, especially near the margin. The trans-peninsular trails usually follow the wadies from oasis to oasis. The people on the main routes depend for a living chiefly on their trade with the pilgrims.

The life of the people is centered about three types of land—the oasis and cultivated lands held by sedentary farmers; the semiarid steppes and near deserts, occupied by nomads; and the true uninhabited deserts composed of hard gravel plains, soft dune sands, and rough, sharp lava tracts which are almost impassible to man or animal.

The products of the oases are dependent on irrigation from the wadies, wells, cisterns, and underground conduits.[1] Dates and coffee are export crops, and although some cereals are grown, not enough are produced for home use—hence grains are imported. The animal industry includes the raising of sheep, goats, camels, and horses. Arabia is the leading camel-breeding country of the world. Trees are almost absent in Arabia and although some minerals exist they are little exploited, except salt, large quantities of which are processed at Aden. The general handicap in respect to minerals is lack of fuel for smelting purposes. Manufacturing is confined almost wholly to handicrafts which deal with animal products and skilled work in the making of gold and silver wares.

The social turbulence that has always been characteristic of the region and its margins is thought by some to be a response, in part at least, to natural environment. The area is conducive to health and strong physiques. The birth rate is high, although infant mortality is high, too. Longevity is the rule. The capacity of Arabia to produce the necessities of life, particularly food, is severely limited. It should not be surprising, therefore, that at more or less frequent intervals the increase in population should press hard on the food supply. What could be more natural, then, than organized expeditions of nomadic peoples into the lands of more favored sedentary peoples on the margin? Through centuries wave after wave of pastoral nomads have surged out of the desert carrying their culture with them and profoundly modifying the cultures with which they mingled.[2]

SAUDI ARABIA

Saudi Arabia is by far the largest country of Arabia, occupying most of the east coast of the Red Sea, and extending to and bordering the Persian Gulf for more than 200 miles. The government is patriarchial and based mostly on the old religious laws of Islam. The area contributes dates, hides, and skins to global trade, and takes in exchange automobiles, tea, sugar, rice, and textile piece goods.

Saudi Arabia has one of the greatest untapped petroleum reserves in the world. Its known reserves are five billion barrels, but it is probable the total approaches 20 billion barrels—a quantity surpassed only by the United States and Iran. Much of it is only 5000 feet below the surface of the desert. The Arabian-American Oil Company holds exclusive rights to these rich Arabian fields, an actual con-

[1] Twitchell, K. S., "Water Resources of Saudi Arabia," *Geographical Review*, July, 1944, Vol 34, pp 365-386

[2] Van Ess, John, "Forty Years Among the Arabs," *National Geographic Magazine*, September, 1942, Vol 82, pp. 385-420

cession of 450,000 square miles. How to get the oil out of the country is a big problem.

YEMEN

Yemen is almost as large as Kansas and contains about twice as many people. Because of its highlands it receives considerable rainfall and produces better crops of grain than any other part of Arabia. It is noted for its export of coffee.

ADEN AND HADHRAMUT

Aden and Hadhramaut are British protectorates. The significance of Aden depends chiefly on its position guarding the southern entrance to the Suez Canal. In other respects it is relatively unimportant. The area of the two is a little less than that of California, and the population is about one half million.

OMAN

Oman is twice as large as Ohio with about half as many people. The mountains south of the Gulf of Oman cause enough precipitation to make a rich fertile strip along the sea. Dates are an important crop and together with dried fish are the chief exports.

KUWAIT AND BAHREIN

The States of Kuwait and Bahrein are British protectorates, the former at the head of the Persian Gulf and the latter a group of islands near the middle of the Gulf. Bahrein from ancient times to the present has been the center of the famous pearl fisheries of this region, but very recently has become even more famous as a rich petroleum field. The oil field is operated by American interests. In 1932, $50,000 worth was realized; in 1941, the yield amounted to $2,000,000; and today it is much more. Immense new refineries have recently been constructed.

Cities of the Arabian Countries. There are no large commercial cities in all this vast territory of sparse population. However, four towns deserve some attention (Fig. 145).

In a hollow among the hills on the dissected western edge of the Arabian Plateau, 45 miles from the Red Sea, is *Mecca*, the holy city of Islam. The sterile valley in which the city lies is surrounded by slopes where springs, wells, gardens, and fruit trees are quite abundant. In very ancient days Mecca was the focus of caravan trade routes. It was in this great market that Mohammed was born and grew up to proclaim his Islamic faith, and now it is the holy shrine of the Mohammedan world. The entire population makes a living administering to the needs of thousands of the faithful who visit Mecca each year. *Medina*, in a basin at the uptilted edge of the Arabian Plateau, is located in an agricultural region that depends on irrigation. It was here that Mohammed died at the age of 62 years. The torrential rains in the neighboring mountains have made the surrounding area one of the best-watered spots in northwestern Arabia. Wheat, barley, and fruit are grown. Dates from the neighboring oases have become one of the most important articles of trade. Rail connection with Damascus is an important factor in the city's prosperity but the road is now in a state of disrepair.

Aden, on a small, barren, desolate peninsula at the southwest corner of Arabia, 100 miles from the Strait of Bab-el-Mandeb, is a strategic military outpost guarding the eastern entrance to the Suez Canal. In addition to being a fueling station, it ranks high as a transshipment port on the Red Sea route to the Far East. *Muscat* commands the entrance to the Persian Gulf. The exports are fish from the coastal regions and pomegranates brought from the interior.

The Future of Arabia. In numerous places in the world, especially in Africa and Mesopotamia, where camels formerly were used so extensively for transport purposes, the automobile and transport truck are now being utilized. Caring for the impoverished people is a problem of first magnitude.

All of Arabia awaits the improvement of transportation—perhaps motorization is the solution. In the train of such improvement will follow the problem of substituting new activities for the Bedouin camel breeders, for this will be largely discontinued as a major activity. The position of the Arabian-Syrian countries adjacent to water and air routes from Europe to the Near and Far East pro-

vides an excellent opportunity for trade and for cultural contacts.

SYRIA AND ASSOCIATED COUNTRIES

The interests of the Christian and Jewish world in this area are very significant and far-reaching. Here the high priest of the Christian faith was born and died, and here was the ancient homeland of the Jews.

The chief countries today included in this part of the Syrian-Arabian Plateau are Palestine and *Trans-Jordan* (British mandates), and Syria and *Lebanon* (French mandates) (see pages 245-246). The region borders the Mediterranean Sea for a distance of 400 miles, and has an area nearly equal to that of Colorado.

Natural Features

The most remarkable physical feature of the region is the split highland ridge that parallels the Mediterranean Sea for several hundred miles. The great north-south cleft in the top of the ridge is 50 to 100 miles from the sea and varies from a few hundred feet in depth to about 2000 feet. This is the best known rift valley in the world and it is the northern end of the giant rift that reaches almost to southern Africa (Figs. 1 and 212). From the crest of the split ridge, the land slopes steeply to the Mediterranean coast, but the slope eastward down to the Mesopotamian Valley is long and gradual.

The plain along the Mediterranean is narrow, and although the uplands are not high throughout their length, they effectively screen the rainfall from Trans-Jordan and the interior of Syria. These countries are in the latitude of southern California and consequently the western slope has a subtropical dry summer climate, but the leeward interior borders more and more on aridity (Fig. 236). Only in northern Syria are the lands sufficiently low for any considerable amount of rainfall to reach the eastern part of the country.

At Beirut on the Mediterranean Coast 30 or more inches of rain falls 80 per cent of the time, and 41 or more inches 20 per cent of the time. The rainiest month is December (7.5 inches), and July the driest (0.02 inches). Two hundred miles south of Beirut at Gaza the annual rainfall dwindles to 16 inches, and at Damascus east of the Lebanon Range the aridity assumes desert proportions (Fig 129).

On the higher parts of the western slope are some forests that remind one of the trees of California. The famed cedars of Lebanon furnished lumber for the ancient Phoenician ship builders to construct the vessels they used in exploring the shores of the Mediterranean. Because the altitudes are less in Palestine than in Lebanon, and also because it is farther equatorward, the natural vegetation of the former is scrub forests or grasses. East of the Jordan poor grasslands and deserts are characteristic of the landscape.

About the only good soils are in the river valleys. There is much dune sand along the coast, residual soils are dominant on the highland slopes, and in the trans-highland country the mature soils are of the chestnut or gray desert type.

Cultural Features

The unique location of this little corner of the world has exerted an influence all out of proportion to its size and productivity. So rich is the area in shrines, ruins, memories, and religious meanings that Christians, Jews, and Mohammedans everywhere know something of its history and terrain.

The countries in this area for thousands of years have occupied the triangular roadway between Egypt, Mesopotamia, and Europe. Small wonder that it became a region of confusion of tongues and diffusion of ideas from many lands. Even today Jews, Arabs, English, French, and numerous other diverse peoples in this area are attempting to integrate their differences—a discouraging task in the face of such a turmoil of prejudices.[1] The British and French mandates set up at the close of World War I over these countries are unstable, unsatisfactory to nearly every one concerned, and promise little in the way of positive help at this time.

SYRIA

Syria of today in both name and area is only a remnant of its former self. The name comes from *Assyria,* formerly a great empire extending from

[1] Ben-Horin, Elhahu, "The Future of the Middle East," *Harper's Magazine,* December, 1944, Vol 190, pp 82-90

the Nile River to the Persian Gulf. The western portion of the country is similar in structure and land forms to Palestine. However, religious sentiment has decreed that Palestine be separated from Syria.

The area and population of Syria are about equal to that of Georgia in the United States, but in Syria the people are concentrated near the Mediterranean Sea, whereas they are quite evenly distributed in Georgia. In other words, only the western part of the country is well watered, the central and eastern parts being poor grassland and deserts. Syria is essentially an agricultural country. Wheat and barley are the leading grains, and grapes, citrus fruits, olives, and apricots rank high in production. The country is poor in minerals and manufactures. Global trade includes such exported goods as fruits, textiles, and animal products, and such imports as metal goods, chemicals, textiles, sugar, and petroleum products.

Aleppo (Alep), on a small plateau in the valley of the Kuwaik 10 miles above the place where the river is lost in a salt marsh, was founded more than 4000 years ago. The older parts of the city are enclosed by a wall within which is the ancient citadel on an artificial mound surrounded by a moat. Gardens line the banks of the river for many miles. Aleppo is the chief trade center of northern Syria. Formerly it profited largely because it was on the triangular trade route to three continents—namely, Europe, Asia, and Africa. Three reasons account for its continued decline: (1) the discovery of the Cape route to India; (2) the Egypt-Red Sea route to the Far East; and (3) the construction of the Suez Canal.

Alexandrette, on a marshy delta with an extremely unhealthy climate and nearly surrounded by a girdle of foothills at the base of the Taurus Mountains, is located on the route to the Cilician Gateway leading to central Anatolia and Europe. It is the chief port of Aleppo, the Mediterranean terminus of the Baghdad railroad, and is built near the site where Alexander the Great won his victory over the Persians at the Battle of Issus in 333 B.C. The *Beilan Pass* just east of the city was one of the important gateways in the ancient triangular trade route. *Homs*, in the valley of the Orantes and about fifty miles south of Aleppo, has railway connections with Damascus and Beirut. *Tripoli* is the Mediterranean terminus of a petroleum pipeline from Iraq.

Fifty-seven miles east of Beirut is *Damascus*, on both banks of the Arada, 2200 feet above sea level. It lies in a pocket of hills exposed to the desiccating northeast trade winds in summer. The surrounding territory is amazingly productive due to irrigation. Summers are extremely hot and distressing but winters are mild with occasional frosts. From earliest times Damascus has been a desert market—a collecting mart for products of desert and oasis as well as a distributing center for imported goods. It is a crossroads for both rail and motor transportation. One hundred and fifty miles northeast are the remarkable archaeological excavations of *Palmyra*—an ancient oasis city of the Syrian Desert. Damascus was renowned in ancient days for its fine steel and art metal goods. Today leather goods and filigree are important among its industries.

PALESTINE

Palestine is the ancient Jewish homeland and a land sacred to all Christendom. It lies on the Mediterranean slope of the split ridge that contains the Jordan Valley and the Dead Sea (Fig. 156). The area is a little over 10,000 square miles and contains about 1,500,000 people, of whom more than 900,000 are Moslems, 400,000 Jews, and less than 200,000 Christians. Most of the people are agriculturalists and the leading crops are wheat, barley, durra, vegetables, and fruit. The chief contribution of Palestine to global trade is citrus fruits, and machinery constitutes the main import.[1]

Jerusalem, on the high divide between the Dead Sea and the Mediterranean Sea, 14 miles from the former and about 31 miles from the latter, is really on a rocky plateau 2500 feet above sea level and is underlain by thinly bedded limestone (Fig. 1). The streams flowing away from the vicinity are intermittent, small amounts of water being received from the winter rains. The intense heat of summer is made bearable by the breezes from the sea. In spring and autumn the steady desiccating northeast trade winds are enervating. The history of the city

[1] Casto, E. Ray, "Economic Geography of Palestine," *Economic Geography*, July, 1937, Vol. 13, pp. 235-259.

dates back nearly 5000 years. In song and story Jerusalem holds a high place in the esteem and affections of Christians, Jews, and Mohammedans.

Jaffa, the port of Jerusalem only one mile from the thriving new Jewish city of *Tel Aviv* (founded in 1909), is the gateway for pilgrims to the holy city of Jerusalem. As seen from the sea it is on a conical hill with two sparkling minarets reaching into the

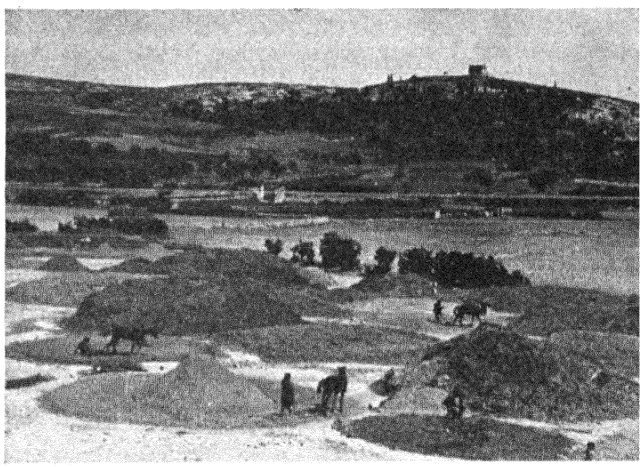


FIG. 156. A NAZARETH THRESHING FLOOR. One might be justified in the conclusion that the threshing process in Palestine had not been improved much since the days of Solomon. (Courtesy Near East Foundation)

usually cloudless Syrian sky. Jaffa was an old Phoenician city dating back to more than 15 centuries B.C. The cedars of Lebanon used in constructing King Solomon's temple were floated on the Mediterranean to Jaffa and then transported overland 35 miles to Jerusalem.

The comparatively new port of *Haifa* about 75 miles north of Jaffa has a strategic location relative to coastal and interior trade by way of the *Plains of Esdraelon* to the Jordan Valley. It is at the western terminus of the pipe line from the *Kirkuk* oil field in Iraq.

LEBANON

The Lebanese Republic is just north of Palestine and mostly west of the rift valley. The major physical feature of the country is the *Lebanon Range* (meaning white) from which it takes its name. Here lived the ancient Phoenicians—a people who had little agricultural land but plenty of good timber for shipbuilding, and therefore turned to the sea to make a living.[1] The country is now under the protectorate of France.

Beirut (Beyrouth), chief seaport of Syria located beautifully on a promontory and backed by the Lebanon Range, dates at least to the fifteenth century B.C. The harbor is shallow and lighter (barge) service is essential for deep draught vessels. Beirut has rail connections north to Aleppo, east to Damascus, and south to Jerusalem and Cairo, and also motor transport service across the Syrian Desert to Baghdad.

TRANS-JORDAN (KERAK)

This is an Arabic country under the protection of the British. The *Damascus-Mecca* railway runs south on the crest of the highland east of the well-known Jordan Valley and the Dead Sea. The land sloping west (about 20 per cent of the country) precipitates some rainfall in winter from the westerly winds, and is relatively high in agricultural value. The remainder of the country is arid and inhabited only by nomads. The country is gaining some importance from the sites of antiquity visited by archaeologists and tourists.

LOOKING TO THE FUTURE. For many hundreds of years the ancient Jewish homeland has been occupied largely by Arabic Mohammedans. The attempt of some of the western nations to reclaim Palestine for the Jews is meeting with violent opposition among the present occupants.

The Syrian countries lie between two great routes from Europe to the Far East—namely, the Suez Canal route and the Berlin-Baghdad rail route. It seems that the people of the region might profitably take advantage of this favorable position.

A proposed power and irrigation project similar to the Tennessee Valley Authority in the United States seems promising. The plan calls for the utilization of the fresh water of the Jordan watershed in irrigating more than a half million acres in the Jordan Valley. The power feature involves bringing the water from the Mediterranean Sea to the Dead Sea depression (1300 feet below sea level) through the highlands of Palestine. The Mediterranean salt water would thus maintain the Dead

[1] Fish, W. B., "The Lebanon," *Geographical Review*, April, 1944, Vol. 34, pp. 235-258.

Sea at its present level and provide the necessary power for the industrialization of the Jordan Valley and vicinity.

IRAQ

Iraq includes most of the Mesopotamian Valley, some of the northern slope of the Syrian-Arabian plateau, and extends northward well into the foothills of the Armenian Plateau (see pages 218 and 246). Its latitude corresponds to that of Arizona, but it is twenty per cent larger and much lower in altitude. The population consits of about three and one half million people—approximately 30 per square mile. Iraq has been an independent country since 1927.

Natural Features

Central and northern Iraq is in a subtropical dry climate, but it merges into the tropical arid on the Arabian border Iraq is an area of winter rains, nearly all of which fall when the cyclonic lows of the westerlies pass just to the north, causing southeast winds from the Persian Gulf. When the storm centers have passed, strong and often violent winds cross the valley, blowing into the lows from the southwest. At Baghdad, according to a 36-year record, the median annual rainfall is 5 8 inches. Three fourths of the time 3.8 or more inches have fallen, and one fourth of the time there were 8 5 or more inches (Figs. 129 and 236). Mild temperatures characterize the winters, but the summers are among the warmest in the world, the thermometer readings at Baghdad frequently mounting to well above 100° F. Since temperatures are high, the rate of evaporation is also high, and hence the low rainfall is of little value in crop production. During the hot part of the day people often retire to the protection of cellars and caves.

The mature soils of Iraq, because of the low rainfall, are pedocalic—largely of the chestnut and gray types. The agricultural land consists chiefly of young soils, deposited by winds and water. The alluvium in the valley is rich and deep, requiring only irrigation to produce good crops.

Most of Iraq is a barren or poor steppe area producing acacia scrub or coarse pasture vegetation. Winter pastures are excellent in the upper part of the valley near the mountains but in summer the land is dry and parched.

Cultural Features

The surge of peoples up and down the Mesopotamian Valley dates back to times immemorial. The vicissitudes of the time have wrought remarkable changes in this cradle of human civilization. The political history of the Chaldean nation began about 3800 B C and continued for nearly 2500 years, at the end of which time the Assyrians, descending from the north and west "like a wolf on the fold," came into control of the valley. About 625 B.C. the Babylonians in the lower portion of the valley succeeded in breaking the yoke of the Assyrians, and the new Babylonian monarchy began its short march through time. The great city of Babylon, with its architectural marvels, including the hanging gardens, under Nebuchadnezzar became the scourge and wonder of the ancient world The Babylonians even rivaled the Pharaohs in the building of monumental structures. Today the ancient metropoli of the valley, Babylon and Nineveh, are only memories. Excavations by archaeologists in recent years are revealing some of the splendor that had been buried for centuries even when Alexander the Great went on his rampage in the valley in about 332 B C

Just as it is today, the fertile Mesopotamian Valley of ancient days was open to attack by nomadic tribes from the highlands both north and south. The rich crop-covered lands were a constant lure to the less-favored peoples in the hill country The most fateful of all conquests was that of the Arabs. As the sedentary owners were dispossessed, irrigation works were neglected. Later Turks, Mongols, and Tartars completed the desolation which the Arabs had begun, and thus the area was almost completely abandoned to the nomad.

Today about 8 per cent of the valley is under irrigation, although the possibilities are much greater. Because the Tigris in its muddy course is a fast-flowing stream, it does not deposit its load of silt until it nears its junction with the Euphrates The Euphrates, on the other hand, is a sluggish stream in the vicinity of Baghdad and, therefore, has deposited so much of its load that its channel is 25 feet above the Tigris. As a consequence, in

this portion of the valley, irrigation water flows from the Euphrates toward the Tigris. However, in the lower courses of the two streams the channel of the Tigris is higher due to the deposition of its load of silt. Here the direction of the irrigation water is reversed and flows from the Tigris toward the Euphrates.[1]

Much remains to be done to restore and improve the irrigation works that served the ancient people so well. At present one third of the world's date trees are in the Mesopotamian Valley, and three fourths of the world's commercial supply of dates comes from there. One half of the trees are along the valley of the Shat-el-Arab. The incoming tide from the Persian Gulf backs fresh water onto much of the riverine area, thus providing for natural irrigation. Pump irrigation by use of petroleum-powered motors is becoming more and more important. Leading crops aside from dates include wheat, millet, sesame, corn, tobacco, sugar cane, rice, and barley.

Transportation is becoming modernized. Camel caravans are being superseded by railroad, steamboat, motor truck, and airplane. The long-awaited railway between Baghdad and Istanbul was completed in 1940. The rail trip by way of Mosul, Aleppo, and Ankara (about 1000 miles) can now be made in three days. The Euphrates, because of its shallow and shifting channel, is navigable only by small boats, but steamboats go up the Tigris to Baghdad, and smaller craft go as far as Mosul

The petroleum fields of Iraq are among the most important in the *Middle East* area. During World War II, the region supplied much oil to the British forces. The British tried to cap and smother the "eternal fires" (burning natural gas), first noticed in Biblical times, so that Axis night bombers would not be able to locate the wells.

The development of rich petroleum fields near Mosul gives western nations a vital interest in the Mesopotamian Valley, and consequently a large bifurcated petroleum pipe line has been constructed, carrying the precious fluid to Tripoli (French) in the Republic of Lebanon and to Haifa (English) in Palestine, both on the Mediterranean coast Today the United States contemplates building a pipe line from the Barien field on the south shore of the Persian Gulf to Haifa.

Manufacturing is limited almost entirely to handicrafts in the homes of the people and centers around the processing of agricultural products.

Although Iraq today is numbered among the minor nations, the global nature of the interests of the people is shown by her far-reaching foreign trade, more than 50 per cent of both imports and exports being with the distant countries of Great Britain, United States, and Japan. Trade by way of the Mediterranean Sea, however, was nearly nonexistent during most of World War II.

Cities of Iraq. Only three cities in this great valley will be given special attention. Many pages could be written, however, about the splendor of numerous ancient cities now buried in the sands of time. *Baghdad,* in the middle of the Mesopotamian Valley where two great rivers, the Tigris and Euphrates, are only 25 miles apart, has been the leading city of the region for more than a thousand years It is near the head of navigation for large boats on the Tigris River. In the vicinity are the buried ruins of several ancient metropoli, among them *Babylon, Ctesiphon,* and *Seleucia.* Although the Tigris flows through the city, the major portion of Baghdad is on the east bank. During the Middle Ages Baghdad was a nodal point on caravan routes between East and West, as well as on the way to Mecca between the upland country north and east of Iraq and the Arabian desert. With the revolution in transportation and with more stable government in the valley, Baghdad has prospects of regaining some of its unrivaled commercial position in the Near East (Fig 157). Air travel and air transportation, motor caravan routes, and improved rail connections will all play a large part in the rejuvenation of the city of the "Arabian Nights."

Basra, often called the "Date City," on the west side of the Shat-el-Arab about 50 miles from the Persian Gulf, is an oasis city dependent upon irrigation. It is said that in every direction, one sees what appears to be a never-ending date forest. The site is monotonously flat, but the richness of color along the streams would be difficult to match anywhere. The city is connected by rail with Baghdad. Not only dates but camels, horses, galls, gems, car-

[1] Boesch, Hans H., "El Iraq," *Economic Geography,* October, 1939, Vol. 15, pp 325-361

pets, wool, and wheat are exported. Coffee, rice, spices, and textiles are the leading imports.

Mosul, on the west bank of the Tigris in the northern part of the country, is just across the river from the ruins of *Nineveh*—the capital of the ancient Assyrian Empire and "Mistress of the East" for several centuries. The houses of Mosul are made of sun-dried brick or of local stone. Formerly, the vicinity was the center of a rich agricultural district which included a thriving livestock industry. Today Mosul is handicapped by



FIG. 157. PONTOON BRIDGE AT BAGHDAD. This is the Tigris River. Note the several types of small water craft, and the merchandise piled on the bank awaiting transit. (Courtesy Near East Foundation)

lack of adequate transportation, although motorized highways are becoming more important. The location, favorable for trade and transportation up and down the valley, as well as with Caspian, Mediterranean, and Black Sea ports, points to an improved future when the area as a whole recovers from its long stagnation.

LOOKING TO THE FUTURE. The interest of the people of the world in ancient civilizations is an asset to this country. The excavations at the ancient cities of *Ur,* Babylon, Nineveh, and other places are very attractive to visitors. The railroad from Basra to Baghdad affords access to some of the sights.

The motorization of transportation and travel in the Near East has played havoc with the camel-breeding industry among the Bedouins who are pressing upon the valley area for a living.

Iraq is a region of great potentialities, as history well proves. The soil is rich, water for irrigation is available, petroleum is found in abundance for motor travel and for pump irrigation. These conditions favor the rejuvenation of the valley, so that once again the region may be one of great rich cities and thriving industries.

INDIA

India, under the jurisdiction of the British, has an area of nearly two million (1,808,679) square miles—60 per cent as large as the United States. From Western Baluchistan to eastern Assam is 2300 miles and from southern Ceylon to northern Kashmir is 1900 miles. About one fourth of the country is composed of Indian states or principalities which have a large measure of governmental autonomy. The population of India (395,822,250 estimated in 1941) is nearly three times that of the United States and for several decades has been rapidly increasing—about 50,000,000 in the last 40 years.

In a region in which a high degree of civilization has held sway for many thousands of years, it might be expected that the population would have become almost homogeneous. However, this is far from the truth in India, where people with diverse physical traits, and perhaps as many as 200 dialects characterize the populations. The ancestors of the Aryan element of the population, which now numbers more than 200,000,000, entered India from the northwest nearly 4000 years ago and settled along the banks of the Ganges.

Natural Features

India so nearly occupies the Indian Plains and Plateau Region, which has already been described, that little more need be said about the topographic features (Fig. 158 and pages 246-247). The western edge of the plateau section, known as the *Western Ghats,* is an escarpment from which the land slopes eastward across the peninsula to the Bay of Bengal. This is why all the longer rivers of southern India flow eastward, and also accounts for the heavy rainfall on the Western Ghats and the relatively lesser rainfall in the interior (Fig. 129).[1]

India is the best example in the world of a

[1] Strain, Warren, "Geography of the West Coast of India," *Life in Asia,* McKnight and McKnight, Bloomington, Ill., 1936, pp. 89-108.

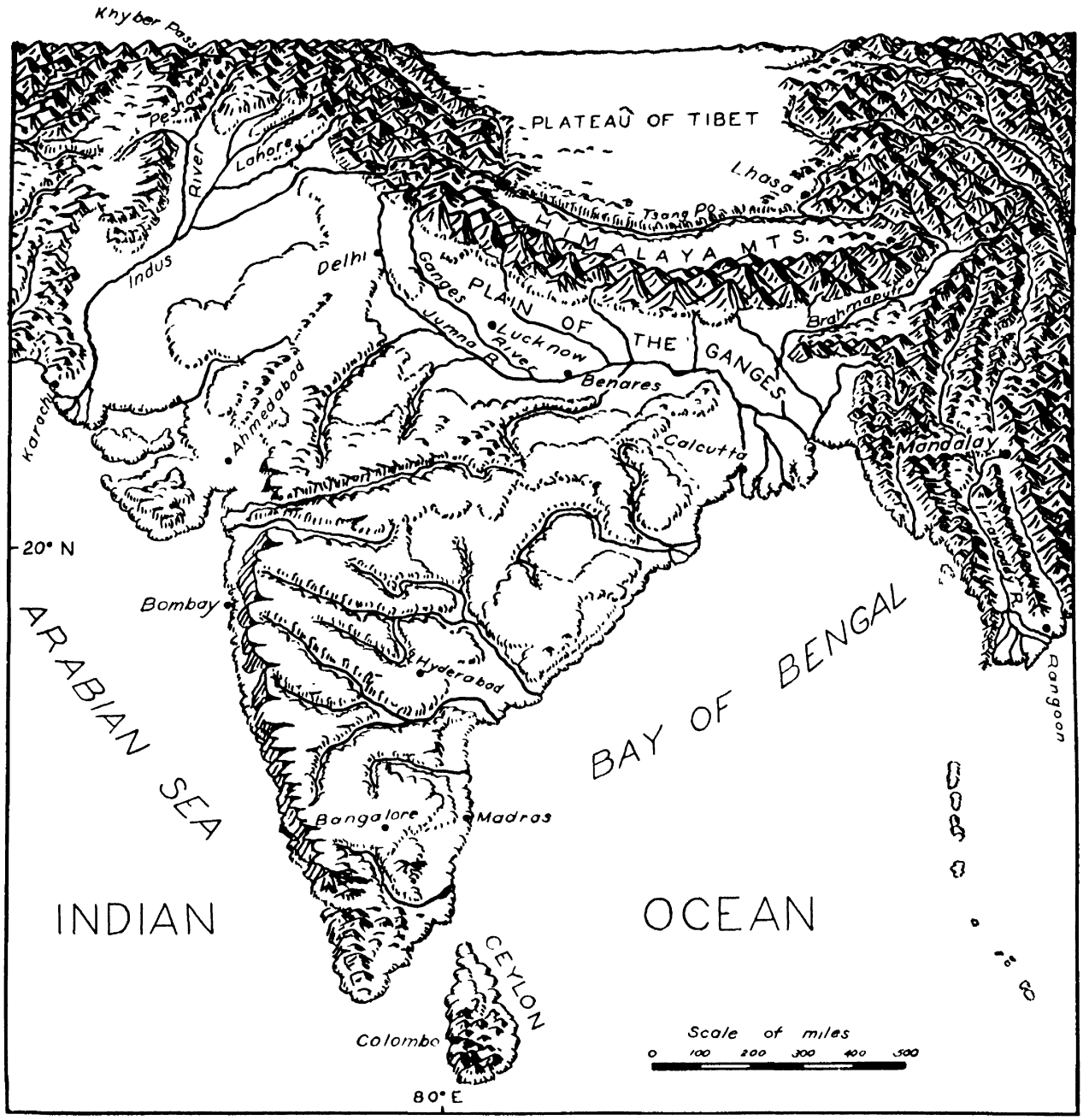


FIG. 158 INDIA. The mountains and water barriers that surround India have been effective in isolating the area from adjacent parts of the world.

monsoon climate. The temperature contrasts between summer and winter in the south are not great—at Colombo in Ceylon only about 10°—but in the north and northwest the January temperatures are below 40° F., whereas in summer they range up to 80° F. and higher.

The outblowing monsoon winds of winter are dry and cool, but the inblowing winds of summer bring bountiful rainfall. Remarkable contrasts, however, are in evidence. At Hyderabad near the center of the peninsula the median annual rainfall, according to a 63-year record, is only 6 inches,

while three fourths of the time there is less than 12 inches. On the other hand, Calcutta, near the mouth of the *Ganges* with a 101-year record, has a median annual rainfall of 63 inches, while one fourth of the time more than 70 inches fall. It may be noted that northwestern India has dry climates of the tropical and subtropical types, whereas most of the country has a tropical wet and dry climate (Fig. 236). The upper valleys of the Ganges and Brahmaputra enjoy a subtropical humid climate, although rainfall is not as evenly distributed throughout the year as it is in southeastern United States. The southern slope of the Himalayas are literally drenched with rain in summer, a median of 100 inches not being unusual, whereas at Cherrapunji 300 miles northeast of Calcutta the median annual rainfall according to a 59-year record is more than 400 inches, and the highest on record is 641 inches—more than 53 feet. It should be remembered, too, that almost 300 inches of this rain comes during the three months of June, July, and August. With these remarkable ranges in climatic features, it should not be surprising to learn that there are great ranges in density of population, human activity, and general welfare.

The annual ranges of temperature and of rainfall in India are such that a wide variety of mature soils is to be expected. India has both tropical and subtropical pedalfers (Fig. 238). Laterites prevail in the areas of excessive and evenly distributed rainfall on the western coast and in Ceylon, but conditions are favorable for the red and yellow soils along the eastern coast and on the Ganges delta.

Three of the pedocals occur in the northwest section of India due to the diminishing rainfall. There is a large area of chernozem soils in central India, north of which as the climate becomes semiarid chestnut soils become important.[1] In arid western India along the Indus River is a considerable area of gray or desert soils. Over a number of sections of the Deccan Plateau very old, abnormal soils are found. In these places the land is strewn with residual boulders composed of indurated fragments of old hardpan which, in ages gone by, had accumulated in the B-horizon.

Large areas of youthful soils occur on the deltas, the steep slopes, and the flood plains because normal soil profiles cannot be developed where deposition or erosion is continually taking place.

With such a variety of temperature and rainfall conditions India has several types of natural vegetation (Fig. 237). The continuously rainy areas on the west coast and in the highlands east of the Ganges delta are occupied by tropical rain forests. The decreasing rainfall from the east coast to the Indus Valley accounts largely for a corresponding transition in vegetation from deciduous monsoon forests, to dry forests, grass and scrubland, and to poor grasses and desert shrubs. The densely populated Indo-Gangetic deltas and plains have been farmed since the dawn of recorded history. Of course, crops of various adapted kinds are grown throughout all parts of the country.

Cultural Features

The impact of western civilization during the last 2500 years has had little influence on the people of India. In the sixth century B.C., Darius I, king of the Persians, determined to extend his frontier eastward by breaking into India by way of the western passes. About 150 years later Alexander the Great, in his spectacular eastern expedition, entered India by way of Khyber Pass. This was the first time that the culture of the Indian Aryans came into significant contact with the so-called progressive nations of the West. About 1800 years later Christopher Columbus pointed his three little caravels westward across the Atlantic in his projected search for the riches of India.

The beginning of the *British East Indian Empire* began with the formation of the *East India Company* in 1600 by Queen Elizabeth. This trading company managed the government of India until the time of the Sepoy Mutiny in 1858 when the English crown took over control. Under British dominion India has enjoyed a degree of unity and prosperity never before experienced. Yet self-determination springs eternal in the breasts of a large part of the population, and whether the British will long be able to control the seething situation is problematical. It should not be overlooked

[1] Christian, John Leroy, "A Reconnaissance Tour in Western India," *Geographical Review*, October, 1944, Vol. 34, pp. 612-620.

that an Indian army of more than 500,000 men served overseas in World War II, and that the success of the British African campaign must be shared in large measure with the Indian troops.

India is essentially an agricultural country. The three leading food grains are rice, wheat, and millet—rice on the rainy flat lands, wheat in areas with less rain, and millet in sections with semiarid

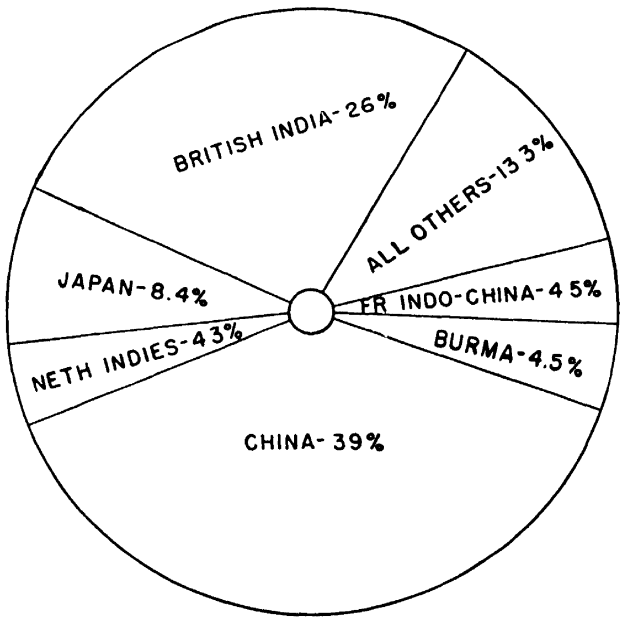


Fig. 159 World's Rice Production A 7-year average just prior to World War II India produced more than half, with Japan a poor second (See also Fig 160) (From *Foreign Commerce Yearbook*)

climate. As far as grain is concerned, India is practically self-supporting. In fact, considerable quantities of rice and wheat are exported (Fig. 159). Of course, each of these three crops is grown in some sections by irrigation In many places even today methods of irrigation are almost primitive in their simplicity. For example, on the plain of the Ganges one writer states:

Here are two peasants drawing water all day from the well to irrigate their rice, one guides the bucket down to the water, the other runs out on the long lever arm of a horizontal pole, and so brings up the bucket Here is one watering the field by hand, carrying pots and emptying them over the thirsty plants Here again is the classical picture, the two mild-eyed cows harnessed at the well mouth The rope passes over a pulley and draws up a huge skin full of water as the cows recede from the well, then, as they remount the slight slope, the skin again falls to the water. To and fro go the cows. One man guides them, another empties the skins into the water channel; and so all day long the work continues.[1]

Threshing and processing of crops in many places also are carried on in a simple fashion as they were decades ago. Huntington, in his book on Asia, writes:

Like bees the brown-skinned, cheerful people swarm in the village streets. In one part of the village people can be seen threshing rice by driving oxen around upon it. Others are throwing the broken, threshed straw up into the wind to winnow out the grain Women in sheds are husking the rice by working a beam which rises and falls, pounding the kernels. In other sheds oxen are walking round and round, turning a stone mill which presses linseed oil from the seed of flax. Another mill, perhaps standing out of doors, is pressing out the juice of the sugar cane, which is put into large pans and boiled down to sugar The people are very poor but they seem happy and contented.[2]

India is the first country in the world in the acreage of sugar cane, but the yield is so low that India is an importer of sugar Other important crops in the region are peanuts, coconuts, coffee, and tea.[3] Among the crops of India, cotton ranks third in acreage, the production centering chiefly on the lava soils of the northern part of the Deccan. In 1938 the total yield of cotton in India was 4,000,000 bales as contrasted with nearly 12,000,000 bales produced in the United States. Jute, a fiber crop peculiar to India and grown almost exclusively on the Ganges delta, is used for the manufacturing of burlap and gunny sacks (Fig. 160). Jute and burlap were among the scarcest of needed articles during World War II

Although little meat is eaten in India, the country supports more than 100,000,000 oxen (both male and female cattle), 30,000,000 buffaloes, 20,-

[1] Carpenter, Edward, *From Adam's Peak to Elephanta*, E P Dutton and Company, New York, 1904, pp 249 250

[2] Huntington, Ellsworth, *Asia*, Rand McNally and Co, Chicago, 1912, pp 312-313

[3] Young, Ernest, "In the Tea Gardens of Assam," *Life in Asia*, McKnight and McKnight, Bloomington, Ill, 1936, pp 183-188

000,000 sheep, 40,000,000 goats, 2,000,000 horses and ponies, 1,500,000 mules and donkeys, 500,000 camels, and some elephants. These animals, except for the sheep and goats, are used chiefly for draft and transportation purposes Camels thrive especially in the arid northwest and the buffaloes in the wet lowlands. Most of the elephants are in the wooded areas of Burma Cattle are considered sacred in India and consequently large numbers are raised but permitted to die a natural death instead of being slaughtered.

use of river water for irrigation. Airways are rapidly cutting travel time from India to other parts of the world. The time from Bombay to New York via South America is only a few days, as contrasted with several weeks by boat Projected routes across the North Pole will greatly reduce both time and distance.

The value of India's global trade for 1939 was $1,500,000,000, 46 per cent of which were imports and 57 per cent exports. Of the imports, mechanical vehicles and cotton goods were most important;

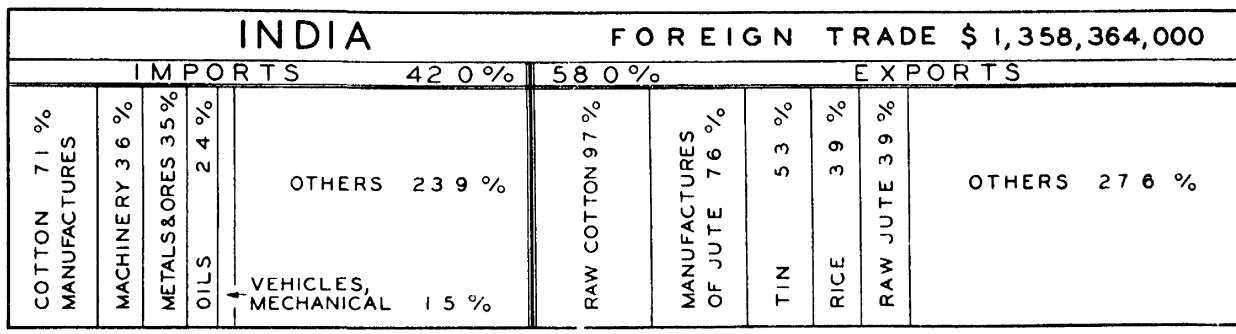


FIG 160 INDIA'S FOREIGN TRADE A 13 year average prior to World War II and ending in 1938 Note the small export of rice (See Fig 159) (From *Statesman's Yearbook*)

The industrial revolution has not yet reached the hundreds of millions of Indian people. Seventy-three per cent of the population are still engaged in simple agricultural and pastoral pursuits Yet, it must not be assumed that changes are not in progress; factory industries are rather rapidly replacing the old handicrafts However, the migration of workers to the factories is not equal in number to the old craftsmen who are dying. At least 25 per cent of the factory workers are engaged in textile manufactures. Numerous industries of ancient origin claim a considerable number of workers in wood, metal, and jewelry. India has immense reserves of iron ore which hold great promise for future industrialization

Railways, next to highways, constitute the chief means of transportation and communication in India. Of the 40,000 miles of railway, 30,000 miles are state owned. The leading railway centers are Calcutta, Bombay, Karachi, and Madras Rivers are not used for transportation as much as formerly because of railway competition and the increased

of the exports, cotton, jute, rice, and tea were outstanding.

Although a very large proportion of India's total production is consumed at home, her trade with the United Kingdom, Japan, and the United States is indicative of the global aspects of her trade interests (Fig 161)

PEOPLE AND CITIES OF INDIA. The supreme agricultural interest of the people of India is emphasized by the fact that only 10 per cent of the people live in towns of more than 5000 people. This is quite in contrast to the urbanization of the United States where approximately 52 per cent live in towns of more than 5000 and in Italy where the percentage is 69. But even so, India has two cities (Bombay and Calcutta) each with more than 1,000,000 people, and 37 with more than 100,000 each Because of lack of space it will be impossible to discuss many of the cities However, a few will be given special mention (Fig 145)

Calcutta, 70 miles from the Bay of Bengal and more than 100 miles from the mouth of the Ganges, is a river port situated on the east bank

of the *Hooghly River*, one of the numerous distributaries of the delta of the mighty Ganges. The river is navigable for large vessels, but dangerous for small craft because of the periodic rush of the tide up the channel.

On the west side of the river at *Howrah* are the railway termini from Delhi, Madras, and Bombay. A bridge of boats spans the Hooghly connecting Calcutta with the railroads from the west. A number of transportation canals connect the city with

1668, the city's rapid growth began as a cotton market during the American War between the States.

Madras, located on the east coast in southern India, does not have a large rich hinterland such as that of Bombay, Calcutta, and Karachi. Although Madras is a coastal city threaded by a small river, it has no natural harbor, and so it was necessary to construct an artificial one. The flat terrain on which Madras has been built gives it an in-

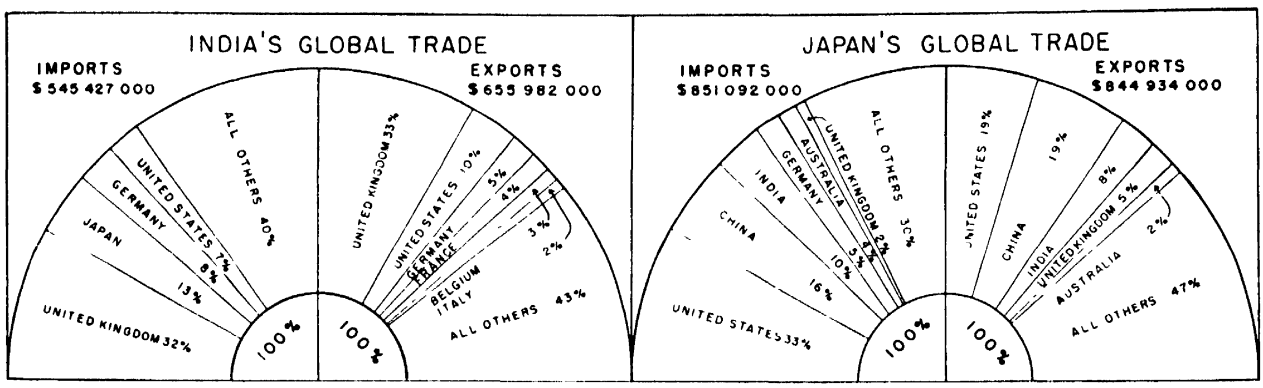


FIG. 161. GLOBAL TRADE OF INDIA AND JAPAN. The United Kingdom accounts for one-third of India's foreign trade, both imports and exports. Otherwise India's trade interests are world-wide. It is not hard to see Japan's interests in China. Figs. 160 and 174 are helpful in the analysis of the trade of these two countries. (From *Foreign Commerce Yearbook*)

the eastern and northern portions of the immense Ganges delta. Calcutta is the commercial capital of India, and in size ranks next to London in the British Empire.

Bombay, the "Gateway of India," like the great gateway city of New York, is located on an island about the size of Manhattan Island. Like Manhattan Island, Bombay Island is separated from the mainland by a small tidal stream, crossed by numerous bridges or causeways. The harbor lies to the east of the city and is both spacious and protected. As viewed from the deck of a steamer, the city is very picturesque, with its irregularly constructed streets and buildings against a background of hills which are covered nearly to their summits with coconut and other waving palm trees. Sheltered among the palms may be seen numerous white bungalows gleaming here and there amidst the green foliage.

Although founded in 1534 by the Portuguese and ceded to the British East India Company in

conspicuous and disappointing appearance when viewed from the sea. Not only is the city served by important railroads from north and west, but also by a salt-water navigation canal which parallels the seashore for some 250 miles. The low latitude, the east coast position, and the lack of protecting natural features, exposes Madras continuously to violence from the waves of the sea, and at all too frequent intervals to terrifying tropical hurricanes.

Karachi, nearly 600 miles northwest of Bombay on the north edge of the Indus delta, is the western gateway to the Indo-Gangetic Plain. Much of the valley of the Indus is almost as dry as the valley of the Nile. In fact the irrigated territory tributary to the great river is often called the "Gift of the Indus." Karachi has a natural, rock-protected harbor and is third among the ports of the country, wheat and cotton being the leading commodities exported. Imports include cotton goods, sugar, iron, and steel. Extreme aridity characterizes the land for hundreds of miles north of the city and a

thirsty, hilly, and sandy landscape prevails as far as the eye can see, punctuated here and there with stunted shrubs and tufts of coarse grass.

Delhi, in the upper part of the valley of the Ganges, is nearly equidistant from Calcutta, Bombay, and the Khyber Pass. At the head of navigation on the Ganges, Delhi for many centuries has been the meeting place of traffic through the mountains with the traders on the river. Another reason for its strategic location is its position at the northern edge of the *Thar Desert* around which, rather than through which, travel has tended to move. The present city of Delhi, situated on two rocky eminences, is surrounded by a red sandstone wall about 30 feet high. The ancient splendor of the city began to decline in the first decades of the nineteenth century. However, early in the twentieth century the British moved the capital from Calcutta to Delhi and since that time some rejuvenation has taken place. The capital is now at *New Delhi,* a few miles south of the old city. Many railroads converge at Delhi and the trade territory includes not only the surrounding plains but also Kabul and the adjacent high valleys and plateaus of Kashmir.

Benares, on the middle course of the Ganges about 400 miles northwest of Calcutta, is the sacred city of the Hindus. The city, on a wide bend of the river and rising to high eminences from the river's edge, presents a magnificent panorama of Oriental architecture, of tapering minarets, of beautiful mosques, and of well-constructed ghats. For several miles the margin of the river is lined with ghats or stone walls down which are many staircases leading to the sacred water From dawn to sunset the faithful from near and far and of every caste and color may be seen performing their sacred ablutions at this place The city is an important trading center, and specializes in the manufacture of silk brocades, gold filigree, silver thread, embossed brass, and lacquered toys.

Peshawar, on a small plain only 11 miles from the Khyber Pass, is a mountain gateway city. The people of this mud-walled town have beheld the march of conquering armies through the narrow pass for scores of centuries Caravans of traders and travelers have gone this way into and out of India for thousands of years. Today trains from Calcutta, Madras, Bombay, and Karachi connect with the rail route through Peshawar and Khyber Pass to Kabul, the capital of Afghanistan.

Lahore, an ancient Indo-Mogul city more than 700 miles from the sea and only about 100 miles from the foothills of the lofty Himalayas, is half way between Delhi and Peshawar and about the same distance from the equator as is New Orleans. In summer it is one of the hottest places in the world. Semiaridity characterizes the climate, but an intricate network of irrigation canals drawn from Himalayan streams turns the surrounding territory into a rich agricultural area. In addition to the preservation of ancient handicrafts, Lahore has cotton and flour mills as well as factories specializing in the manufacture of oils, soaps, and leather goods.

Srinagar (City of the Sun), a mile above sea level in the *Vale of Kashmir* (Happy Valley) encompassed by a dazzling succession of snowy Himalayan ranges, is located on the meandering course of the *Jhelum River,* a tributary of the Indus. So winding is the river that it is spanned by eight bridges, and so important is transportation through the city by boat that Srinagar is sometimes called the "Asiatic Venice"

The foregoing descriptions by no means include all the important cities of India, but lack of space forbids more than mere mention of some others *Hyderabad,* near the center of the Deccan Plateau, is the fourth city of India in size. Crops in the vicinity are grown by irrigation from water impounded in tanks (small ponds) during the rainy season.[1] Practically all of the people in this area live in villages and 70 per cent of them are farmers Rice, cotton, and millet (jowar) are the leading crops. *Bangalore,* on the Deccan Plateau 200 miles west of Madras, is a railway center and supports a number of oil, cotton, woolen, and silk mills, as well as iron and brick works.

Ahmadabad, 300 miles north of Bombay and in the same latitude as Havana, Cuba, is situated in the midst of a vast, fertile plain. The city is famous for its handicrafts as well as for its modern manufacturing enterprises *Lucknow,* on a tributary of

[1] Sundaram, K J G., "A Deccan Village in India," *Life in Asia,* McKnight and McKnight, Bloomington, Ill., 1936, pp. 125-133

the Ganges that flows from the Himalayas, is close to the forested foothills of the mountains. Formerly an important capital with some marvelous Oriental structures, it is now falling into decay. The anticipation born with a distant view turns to disappointment when one enters the city. *Colombo* in *Ceylon* is the leading harbor of the Indian Ocean, and a port of call for all ships plying between the gateways of Suez and Singapore.

AN INDIAN APPRAISAL. India includes many diverse elements. Rainfall ranges from arid to extremely wet, and temperatures vary from mild to intensely warm. The land surface varies from the greatly dissected Deccan Plateau and the lofty Himalayas to the immense, flat areas of the Indo-Gangetic Plains. Human adaptation to these diverse physical conditions is rendered more difficult by the complex social and economic arrangements in the country. Added to the difficulties attendant on the 200 spoken dialects are the religious and economic caste systems that divide the people into almost innumerable non-sympathetic and mutually suspicious groups. The situation is rendered even more complex by the Indian clamor for self-determination. Yet, so bitter is the disaffection between the Hindus and the Moslems that ascendancy on the part of either group might precipitate a religious war. Such a calamity would probably have repercussions throughout the Moslem world, and would amount to a major disaster in present-day affairs. A satisfactory self-determination for the people of India postulates mutual respect among all groups concerned. It is fair to assume that the British government would not hesitate to grant dominion status to India, if reconciliation between the two major religious groups were assured.

One of the most critical needs is agrarian reform. The poverty-stricken, debt-ridden peasants with their tiny strips of individual holdings and primitive methods of cultivation cannot produce food enough to satisfy the increasing population. Government assistance, encouraging consolidation of holdings and cooperative endeavor by the use of mechanized equipment certainly would bring a greatly increased production. Enlarged state irrigation and power projects are grievously needed. However, these reforms are opposed, quite generally, by the large Indian landowners who profit by maintaining the status quo.

A very large percentage of the people of India live in extreme poverty. Very little of the industrial revolution has reached the teeming millions of the country. If the capacity of the people to buy were increased and the standard of living could be raised, enormous quantities of manufactured articles could be utilized. The solution of this problem is closely related to the ones previously stated, and no one is more interested in the attack on this problem than the British who control India.

21

Lands South and East of the Central Eurasian Barrier (Concluded)

PACIFIC OCEAN BORDERLANDS

WHATEVER UNITY may be claimed for this portion of Eurasia comes mainly from the fact that on the seaward edge it faces the world's greatest ocean—the Pacific, and on the landward margin is the world's most effective land barrier—the mountains, plateaus, and deserts of inner Asia.

From the *Bay of Bengal* to the *Sea of Okhotsk* is a distance of 3000 miles, and the distance from the volcanic islands fringing the eastern coast to the Central Barrier varies from a few hundred to 2000 miles or more.

The terrain consists of a great variety of land forms ranging from the rugged parallel mountain ridges of Indo-China to the flat monotonous deltaic plains of the Hwang Ho and Yangtze Kiang. In structure the Pacific Borderland is very complex. Immense crystalline blocks with faulted edges occupy portions of southern China, Manchuria (Manchukuo), and Korea (Chosen). There are numerous folded ridges in Indo-China, and in the island festoons off the eastern coast, volcanic peaks by the hundreds—many of them active today—dot the landscape from *Kamchatka* to *Formosa* (Taiwan)

The latitudinal range of the Pacific Borderland from the Bering Sea to Indo-China insures a large variety of climates—tropical rainy near the equator and polar littoral near the Arctic Circle (Fig 236) The isolation of this part of the world from western civilizations has been more complete than that of any other densely populated lands except India. One of the most ancient social cultures still persisting in the world is that of the Chinese, which at the same time is one of the best illustrations of the inertia and the depressing influence of stereotyped customs and institutions

There are numerous physiographic provinces and regions into which the Pacific Borderland may be divided, depending largely on the complexity of detail with which the investigator is concerned. For purposes of this study it seems desirable to recognize four major physiographic regions—namely, the *Indo-Chinese Peninsula*, the *Chinese Plains and Uplands*, the *Manchurian Plains and Uplands*, and the *Volcanic Islands and Peninsulas*.

INDO-CHINESE PENINSULA (INCLUDING MALAY PENINSULA).[1] Southeast from the Plateau of Tibet, a portion of the Central Barrier extends into the longitudinally corrugated peninsula of Indo-China (Fig. 162). (For countries of the region see pages 266-271.) The northern portion of the Indo-Chinese Peninsula is difficult to penetrate because of the rugged land and dense tangle of tropical vegetation, whereas farther southward swamps and delta lands predominate. From the southern part of the major peninsula and extending almost to the equator is the narrow Malay Peninsula On the west margin of the region is the Bay of Bengal, and on the east lies the *South China Sea*. The direction and great length of the Malay Peninsula, a southern extension of the major peninsula, make the sea route from India to the Far East extremely long. Archaeological research is bringing evidences

[1] Often shortened to Indo-China

of great advances in civilization formerly attained in the region. As the name of the area suggests, the character of the people and their social cultures have their roots in both India and China.

At the east end of the Himalayas and associated east-west mountains, the ranges turn southward almost at right angles. The extension southward includes three prominent ranges—one bordering the Bay of Bengal and Plain of the Ganges, another bordering the South China Sea, and a third, the backbone of the region, running north and south through the middle of the peninsula. The narrow, mountainous Malay Peninsula extending almost to the equator is a prolonged section of the middle range. Associated with the mountains in the peninsula are several small lowlands some of which are marshy. Several large rivers flow southward between the ranges. Among these are the *Irrawaddy*, the *Salween*, the *Menam*, and the *Mekong*, the first of which is navigable for 700 miles and the last for about 300 miles. The other two have obstructions to navigation not far from the sea. As a rule, the rivers have falls and rapids in their middle and upper courses. Although the many ranges are crowded close together in the north, they diverge so much toward the equator that there are several broad alluvial plains and deltas. It was across the rugged northern ridges that the famous *Burma Road* from *Lashio* to Chungking was constructed.

A feature of special interest concerning the Malay Peninsula is its low altitude (100 feet) at the *Isthmus of Kra* (10° north latitude) It has been proposed that a ship canal be constructed across the isthmus at this place, thus shortening the sea route from China to India by about 1000 miles. It was southward on this narrow strip of land that the Japanese approached and captured the fortifications at Singapore in World War II.

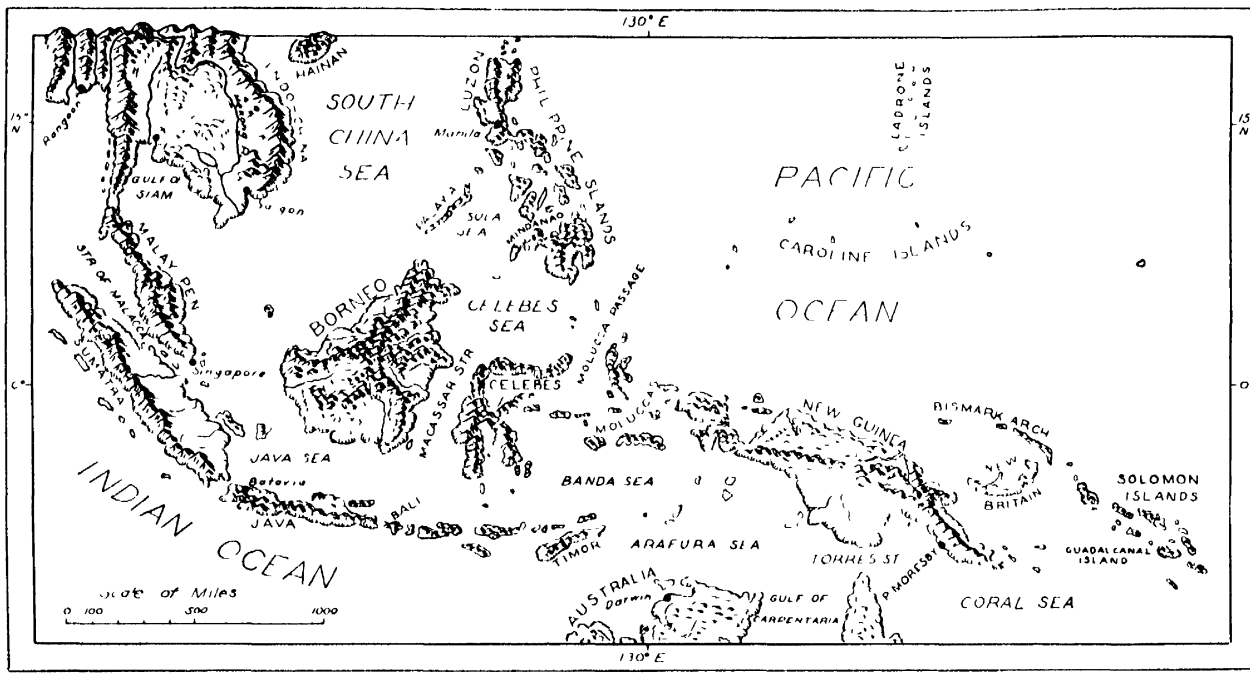


FIG. 162. INDO-CHINA AND MALAYA The sketch shows well the rugged and insular character of the terrain For a long time this has been one of the politically critical areas of the world

CHINESE PLAINS AND UPLANDS. The Chinese Plains and Uplands Region includes all of the area south and east of the Central Eurasian Barrier which lies between the *Yellow Sea* and Indo-China. (For China, see pages 272-276.) The northern boundary is the Desert of Gobi—approximately the location of the Great Wall—and the ramparts of the Tibetan Plateau constitute the western boundary. To the south and east is the Pacific

Ocean. China's mighty rivers, the *Hwang Ho* and the *Yangtze Kiang*, rising in the lofty mountains of eastern Tibet, flow through rugged ranges over extensive uplands, and thence eastward across level plains to the ocean. The *Si Kiang*, with its headwaters in the *Yunnan Plateau*, is the chief river in the south.

If the geography of the Chinese Plains and Uplands be associated with these three great rivers, then the region naturally falls into three important sections—namely, the northern, central, and southern. The northern section (the Hwang Ho basin) is separated from the central (the Yangtze Kiang basin) by a rugged massif extending 1000 miles eastward from the Plateau of Tibet and then dipping under the delta plains of the Yangtze. The central section is separated from the southern (the Si Kiang basin) by another broad giant massif reaching from the Tibetan Plateau to the Pacific Ocean.

The Hwang Ho (Yellow River) drainage area is composed of a low eastern alluvial plain, and a large western plateau where an ancient mountain mass has been almost completely buried under hundreds of feet of wind-blown loess. Associated with the northern section is the *Shantung Peninsula*—a portion of the ancient block that lies partly buried under the deltaic plains of the Hwang Ho.

The Yangtze, flowing from the Plateau of Tibet eastward through the center of the region, is in the latitude of New Orleans. Near the headwaters and just east of Tibet is the isolated, nearly circular *Red Basin*—an ancient lake bed about as large as Nebraska. This basin, which is 3000 feet in altitude, is surrounded by mountains. Running out of the Red Basin through a deep scenic gorge, the Yangtze emerges into the large central basin, another depression between the highlands on the north and south, and likewise an ancient lake country. Because the Yangtze flows out of the central basin through a constricted channel the basin often is flooded far and wide during the rainy season. The delta lands of the Yangtze are continuous with the delta plains of the Hwang Ho.

The Si Kiang (West River) and associated uplands occupy the southern part of the region. Most of the highland massif north of the Si Kiang drains into the Yangtze or directly into the sea.

There are numerous deep harbors in the south where the highland borders the ocean, but there are few harbors in the deltas of the north. Delta building by the Hwang Ho more than once has changed the course of the great river from one side to the other of Shantung Peninsula.

Manchurian Plains and Uplands. The Manchurian Plains and Uplands embrace broad alluvial plains and residual hills lying to the east of the Great Khingan Mountains and south of the *Stanovoi Ranges*. (For Manchuria, see pages 277-279.) The eastern boundary consists chiefly of the ranges bordering the sea. The region is composed of the central river valleys and plains surrounded by forested hills and large mountain ranges. In the north the drainage is through the *Amur River* which empties into the Sea of Okhotsk, and in the south it is largely by way of the *Liao* which flows into the Yellow Sea. Other leading rivers are the *Yalu*, the *Nonni*, and the *Sungari*. The plains lie generally at altitudes of less than 1000 feet and are separated only by low watersheds of residual hills and uplands. However, in the north the *Little Khingan Mountains* rise between the Sungari and Amur drainage basins.

The rock mantle is chiefly alluvial material in the plains and residual on the uplands. The plains for the most part are underlain by horizontal sedimentaries, whereas the rocks in the upland areas are sedimentaries occasionally faulted and tilted and containing some intrusions of igneous rocks. Among the important mineral deposits of the region are iron ore, salt, and natural soda. Considerable gold is found in the gravels of some of the streams.

Volcanic Islands and Peninsulas. The Volcanic Islands and Peninsulas of eastern Eurasia include a section of the so-called *Circum-Pacific Mountains*. The peninsulas of Kamchatka and Korea, the *Kuril Islands*, *Sakhalin*, the mountains on the continent adjacent to the *Sea of Japan*, the islands of Japan, and Formosa are all a part of the continuous series of arc-like ranges associated with the western mountains of the Americas. (For Japan and Korea, see pages 279-286.)

Mountains are the chief physical features throughout the region. From northern Kamchatka

to Formosa, a distance of more than 3000 miles, folded, faulted, and volcanic mountains form the backbone on all the islands, and closely related to these in structure and bedrock are the coastal mountains of the mainland and of Korea. The presence of many volcanic cones, some active and others dormant, attests the unstable conditions which characterize the earth's surface in this region.

The bedrock is very complex. Ancient crystalline rocks have been covered by younger sediments and since then, faulting, folding, and volcanism have increased the complexity. Someone remarked that Japan corresponds to a new style house constructed of ancient materials, and this condition probably holds true concerning many parts of the region.

As a rule, the rivers are short in the mountains and foothills, and rushing torrents are common. Where the streams enter the coastal plains the velocity is decreased, hence they deposit thick layers of alluvial sands and gravels, together with soluble salts and other enrichers of soil, and form deltas. In many cases the rivers follow faults and rift valleys.

The coastal plains of the region are relatively narrow because the highlands are close to the sea. The plains in general are used intensively and provide sustenance and homes for tens of millions of people.

COUNTRIES ASSOCIATED WITH THE PACIFIC OCEAN BORDERLANDS

That portion of the great area south and east of the Eurasian Barrier which borders the Pacific Ocean contains two major nations—*China* and *Japan*—and two minor nations, *Siam* and *Korea*. In addition to the independent countries there are several dependencies—namely, *Burma*, *British Malaya*, *French Indo-China*, and *Manchuria*. Each of these countries will receive some attention within the physiographic framework just described, but China and Japan deserve more consideration than the others—the former because of its great population and the latter because of its recent aggressiveness.

COUNTRIES OF THE INDO-CHINESE PENINSULA

The Indo-Chinese Peninsula is two fifths as large as the United States and contains four major political units—namely, Siam, Burma, the *Federated Malay States*, and French Indo-China. The first is classed as an independent country and the others are dependencies of the British and French, respectively. The population of the region is more than 50,000,000, almost half of which is in French Indo-China.

The northern portion of the peninsula has a tropical wet and dry climate (typically monsoon). The warmest month at Mandalay is April (89° F.) and the coolest is January (69° F.). The median annual rainfall at Mandalay is 33 inches, with 28 inches falling in the summer (May to October). Fifty per cent of the time the annual precipitation has ranged between 29 and 42 inches (Fig. 129).

At Penang the annual temperature range is only 3° F., whereas the annual rainfall (109 inches) is well distributed through the year, although the range between the wettest month (September, 19 inches) and the driest month (February, 3 inches) is considerable. At Saigon the average annual precipitation has ranged between 68 and 85 inches 50 per cent of the time.

Winds are typically monsoon—southwest in summer and northeast in winter. The eastern coast is subject to destructive hurricanes (typhoons), especially during the summer months.

Much of the peninsula is underlain by intricately folded ridges of both crystalline and sedimentary rocks. On the crest of the high ridges granites and related rocks are usually exposed, whereas in the valley sides and in the lowlands limestones, sandstones, and shales, including their metamorphosed forms, are prevalent. On the slopes most of the rock mantle is residual, and in the valleys it is water-transported (Fig. 163).

The mature soils belong to the lateritic, and red and yellow types, depending on the temperature and rainfall distribution (Fig. 238). Because of the color of the soils, many of the streams run red during the rainy season. The rich, fertile soils in the lowlands are generally young, having been deposited by streams; whereas the soils on the

mountain slopes are young because surface materials are continually being carried away by erosion.

Coal and zinc are mined in the eastern and northeastern parts of Indo-China, and tin is mined in the Malay Peninsula which leads in world production. The tin ore is recovered almost wholly from alluvial deposits by placer methods. In some places thick deposits of overburden must be removed before the sand and gravel tin-bearing beds are exposed. Even the age-old panning process is used to some extent.

The Indo-Chinese Peninsula was originally a forested country. Today much of the lowland is used for the growing of crops, but the mountains and hilly lands as a rule are still covered with tropical forests (Fig. 237). Among the important products of the forest are teak and mahogany woods. Large areas of formerly forested land of the Malay Peninsula have been replaced by huge plantations of rubber trees.

The north-south ridges and valleys of the Indo-Chinese Peninsula have nearly forbidden east-west travel and transportation. However, for thousands of years peoples from the interior of Asia, especially from Tibet, have trekked down the valleys of the region. Here they mingled with Indians, Chinese, and Malayans, and consequently, after a long time a complicated admixture of peoples has taken place—the *Annamese* living in the eastern part of the peninsula, the *Burmese* in the west, and the *Siamese* in the central part.

In sections of Indo-China are found many ruins of ancient Buddhist temples, erected by early immigrants—people who apparently had much more initiative than their posterity who now occupy the land. Even in uninhabited forests one may find remnants of these temples which once thronged with people, but are now overgrown by trees and support only clinging vines that slowly but surely are pulling down the walls and obliterating the traces of man's occupancy.

The most important industry in Indo-China is agriculture. The staple food of the people and the chief cash crop is rice. On the alluvial plains and deltas of the rivers people devote their energies assiduously to the growing of rice, their one great food crop. Other crops claiming considerable attention are coconuts, sugar cane, tobacco, bamboo, and pepper.

A large part of the world's supply of natural rubber comes from the plantations of the Malay Peninsula and the adjacent islands of Sumatra and Java. The hilly portions of French and British Indo-China produce great quantities of tea, much of which is exported.

The forests of Indo-China are rich in tropical woods, especially teak. This wood is so heavy before it is dried that the logs have to be floated down the rivers on bamboo rafts to keep them from sinking. Elephants are used extensively in the handling of teak logs. Throughout Indo-China oxen are the work animals, but in the wetter rice-growing sections the heavier water buffaloes are utilized. Some goats and sheep are raised in the drier, more hilly lands.

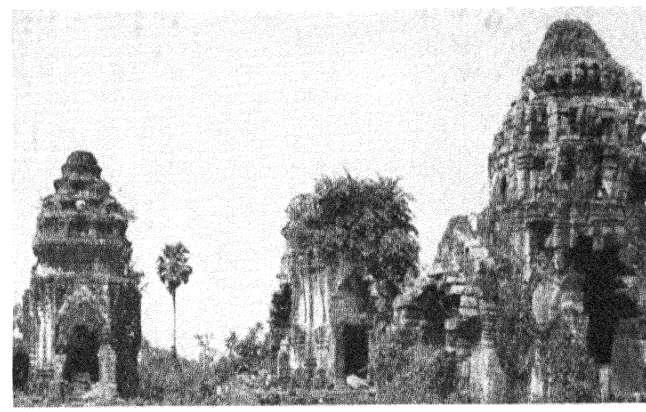


FIG. 163. ANCIENT TEMPLE OF INDO-CHINA. This structure was built of indurated laterite of which there are large quantities in this region and in portions of India. (Courtesy American Geographical Society)

Just as rice is the staple cereal food at every meal, so fish in some form is used to flavor the food and furnish variety and a balanced ration. Fishing is one of the outstanding industries of Indo-China.

There are about 6000 miles of railway in Indo-China, nearly all of which is government owned and operated.

Siam (Thailand)[1]

The way Siam is hemmed in on the west by the British and on the east by the French is an indica-

[1] It is reported that Thailand now has resumed its former name of Siam.

tion of the general debility of the nation. Although the country is only a little smaller than France, has 13,000,000 people, tills large areas of land, and contains rich forests and many minerals, yet the standard of living is low and the national spirit and vigor are feeble. In order to cast off the lethargy that seems to possess the people the heavy hand of outside exploitation must be removed.

Siam may be divided into four sections, three of which are nearly equal in area. The northern mountainous section has numerous north-south ridges and valleys, with relief that decreases southward (see page 263). On the lower slopes tea and tobacco are grown, but rice is the leading crop in the alluvial valleys. In this section of Siam are the world's best-known teak-wood forests. Not only is teak used extensively in the Orient but it is prized highly in all civilized countries.

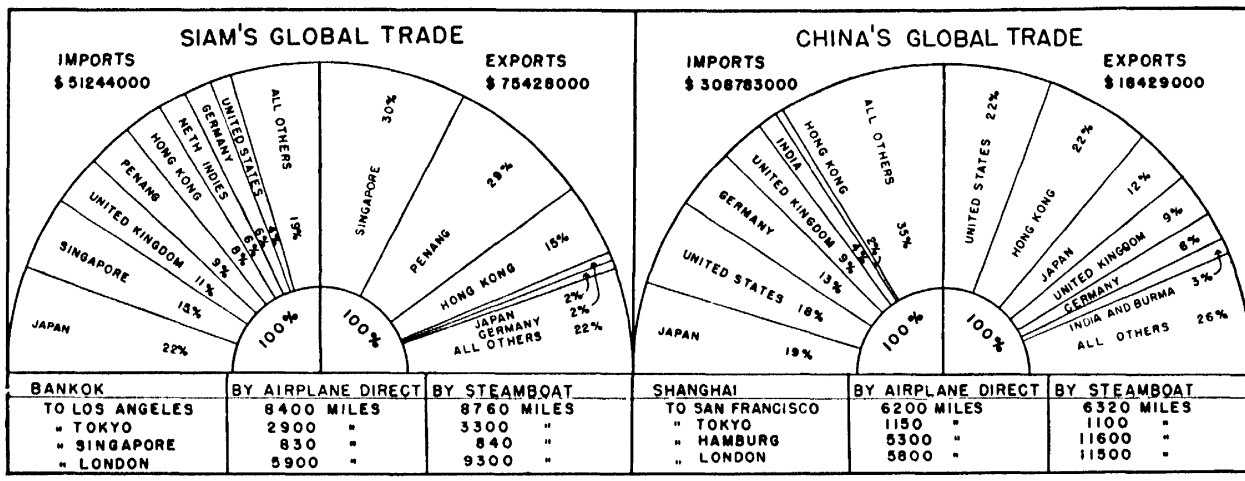
Central Siam is a low plain about as large as Iowa, and is threaded by sluggish meandering streams that flood extensively during the rainy season. This is the great rice-growing part of the country. Although rainfall generally is heavy, the variation is considerable, so facilities for irrigation are necessary to guard against crop failures. The rice festival at the beginning of the planting season is one of the important holidays of the country.

The eastern section of Siam in the basin of the Mekong ("me" in Siamese or Thai is river) is an inhospitable area of poor hills and swamp land —a scrub jungle in the rainy season, but a brown, parched waste in the dry season. This is an isolated, backward, disease-ridden area with sparse population and subsistence agriculture.

The southern section of Siam borders the Gulf of Siam for some 600 miles. It occupies all of the middle of the Malay Peninsula, and shares the northern part with Burma. The commercially exploited resources in this area are rubber and tin —interests closely associated with the Federated Malay States.

The manufacturing industries of Siam are narrowly limited—associated generally with the processing of rice, lumber, and tin. Of the country's contribution to global export trade, 55 per cent is rice and 17 per cent tin—most of the former going to Japan (Fig. 164).

Bangkok, astride the Menam and about 20 miles from the sea, is the principal city of Siam and sometimes called the "Venice of the East." There are three sections to the city. The main part is on an island in the river. Around this island is the floating section built chiefly of wooden houses on bamboo rafts which are moored to the bank and extend out into the water in rows often six or eight houses deep. The third section is another island



BANKOK	BY AIRPLANE DIRECT	BY STEAMBOAT
TO LOS ANGELES	8400 MILES	8760 MILES
" TOKYO	2900 "	3300 "
" SINGAPORE	830 "	840 "
" LONDON	5900 "	9300 "

SHANGHAI	BY AIRPLANE DIRECT	BY STEAMBOAT
TO SAN FRANCISCO	6200 MILES	6320 MILES
" TOKYO	1150 "	1100 "
" HAMBURG	5300 "	11600 "
" LONDON	5800 "	11500 "

FIG 164. GLOBAL TRADE OF SIAM (THAILAND) AND CHINA It is evident that the United Kingdom participated extensively in Siam's trade before World War II However, the imports into each of these countries from Japan far exceeded the exports. Fig. 168 shows the chief exports of China. Note contrasts in distances by airplane and by steamboat (From *Foreign Commerce Yearbook*)

on which is built the king's palace with a high wall around it for protection.

The sides of the river are lined with timber, sawmills, and rice mills. From the mills rise many tall chimneys and much black smoke which spoils the landscape, but really no more so than do the squalid bamboo huts along the river banks. Many shopkeepers can easily move their floating places of business to new locations if conditions seem to warrant removal. On the river in the city are ocean-going steamers and sailing vessels, amidst an endless variety of native canoe-like boats darting about. Pretty little houseboats, rice boats from far inland, and flat-bottomed freight craft also may be seen going through shallow water. In the rainy season great teak-wood rafts 1000 feet long on which huts have been constructed for the temporary use of the steermen may be seen floating down the river.

Burma

Burma is under the control of the British and politically is a part of India. However, it is so effectively cut off from India by a mountain barrier that it could well be designated British Indo-China, corresponding to the eastern portion of this great peninsula which is known as French Indo-China. The latitude of Burma corresponds to that from the Isthmus of Panama to Florida and its area is about equal to that of Texas From the edge of Tibet two great rivers, the Irrawaddy and Salween, flow southward between mountain ridges through Burma and into the Indian Ocean.

The country is composed of three well-defined areas, the *Arakan Highland*, the *Shan Plateau*, and the *Central Basin*. The first of these, the Arakan Highland, is the lofty mountain barrier between the Ganges and the Irrawaddy valleys. The westward or windward slope is covered with tropical rain forests and possesses little agricultural value (see page 263).

The Shan plateau occupies the eastern part of the country and extends southward into the Malay Peninsula. In the north it is a rugged region with thin laterite soils affording scanty support to a sparse population. In the south it shares in the tin and rubber industries of the Malay Peninsula.

The Central Basin is a sunken block between the marginal highlands and is the best part of Burma. Lying as it does on the leeward side of the Arakan Highland the rainfall in places is less than 40 inches, most of which falls May to October, inclusive (Fig. 129). In the Central Basin mixed farming is the rule, and the chief cereal is pearl millet On the delta lands of the Irrawaddy and Salween where the rainfall reaches 100 inches or more, large crops of rice are grown [1] The middle section of the Central Basin has several important petroleum fields

The famous Burma Road was constructed in 1939 by the Chinese over the Shan Plateau from *Kunming* in China to Lashio in Burma, a distance of 726 miles [2] Over this motor road the Chinese were able to get war supplies after their eastern coast had been blockaded by the Japanese. When the Japanese overran Burma this route was cut off During the remainder of the war much freight and many troops were flown over the "Hump" by Allied aviators.

Cities of Burma. Burma has only two large cities, Rangoon and Mandalay, but there are numerous small towns that have local importance.

Rangoon, on the east bank of the Rangoon River, is 20 miles from the sea. Not only is it near the sea, but accessible to it are 900 miles of the navigable waters of the Irrawaddy of which the *Rangoon River* is a distributary. The city is built on comparatively level land and the whole landscape abounds in tropical foliage, which in some sections nearly hides many of the numerous bamboo and teak huts. Rangoon is the center of Burmese religious life. Here the wonderful *Golden Pagoda* (temple), gradually tapering to a spire and covered with gold leaf, blazes brilliantly under a tropical noonday sun.

Rangoon is the center of the Burmese railway system which, together with many wharves and docks, is the terminus of the rich trade of the whole delta and much of the valley of the Irrawaddy.

Mandalay, 400 miles from Rangoon and at the junction of the Irrawaddy with a minor tributary,

[1] Young, Ernest, "In the Rice Fields of Burma," *Life in Asia*, McKnight and McKnight, Bloomington, Ill., 1936, pp 151-157

[2] Fayman, Nelson Grant, "Stillwell Road Land Route to China," *National Geographic Magazine*, June, 1945, Vol 87, pp 681-698

is the capital of Burma. Although the city was made world famous by Kipling's "On the Road to Mandalay," it would be difficult to make an impressive scene out of sandbanks, barren hills, and muddy water. The yearning of the British soldier to return to Mandalay could hardly have been because of the beauty of the place. Through many centuries the Irrawaddy and its tributaries have been the principal highway of Burma. Mandalay has no railway connection with India proper or with any neighboring country but a main-line connection runs from Rangoon and on northeastward to Lashio, the southern terminus of the Burma Road. There is not even a motor road up the valley to Mandalay. Aside from the river and railways, travel in the vicinity is limited to bullock carts, elephants, or mules. *Moulmein* is an important city at the mouth of the Salween.

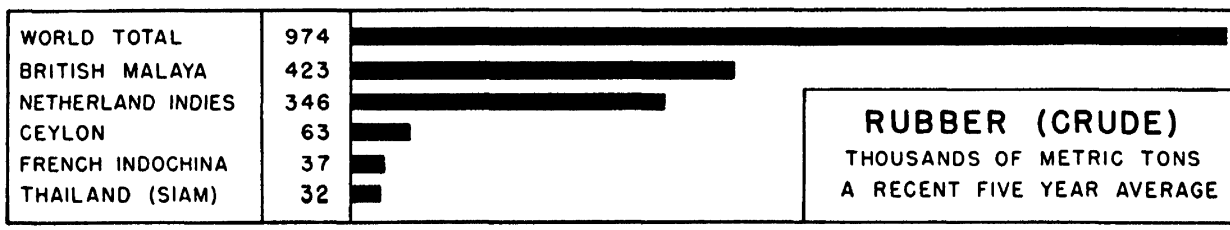


FIG 165. WORLD'S RUBBER PRODUCTION. A 5-year pre-war average ending in 1938 Japan for a while had control of all the countries listed except Ceylon. (From *Statistical Yearbook of the League of Nations*)

Malay States

The distance from Singapore on an island at the southern extremity of the Malay Peninsula to northern British Malaya is 500 miles. The area is equal to that of Iowa, but its population is twice as large.

The mountain ranges through the center exceed 7000 feet in altitude. The western coast, on the tranquil waters of the *Strait of Malacca,* has numerous good harbors and is densely populated (see page 264). The eastern coast has some good sites for harbors, but the boisterous northeast monsoons make the whole eastern slope and coast inhospitable and therefore it is thinly populated. The mature soils are relatively poor and covered by tropical forests, but the young soils on the western slopes and coastal lowlands produce three important crops—rice, rubber, and coconuts.[1] Of the three, rubber is best known because the area for a long time practically held a world monopoly in the production of this useful commodity (Fig. 165). Other crops grown for local use are numerous. For many years, too, this area has led the world in the output of tin which was recovered from alluvial deposits by the placer process. Both tin and rubber production went into an eclipse when the area was ravaged by the Japanese, with the result that the United States was cut off from its major supply of both products.

CITIES OF BRITISH MALAYA *Singapore,* guardian of the "Gateway to the Far East" on the Strait of Malacca and the only city of considerable size in British Malaya, is on an island where the southern end of the Malay Peninsula sinks into the sea. It is one of the most strategic trade and military stations in the world and belongs to the British. For three years during World War II, Singapore was under Japanese sovereignty. Here, only 90 miles from the equator, freight and passenger vessels sailing from the Orient to Europe halt for fuel and provisions. Singapore is the southern terminus of the railway running northward into Thailand. The island is not large—27 miles long and 14 miles wide The city is located on an undulating landscape rising in some places to green hills, on many of which are mansions. Singapore is the leading mart in the world for tropical wild animals, snakes, monkeys, and birds such as are seen in circuses and zoological gardens. It is also one of the most important defense bases for the British.

[1] Young, Ernest, "The Rubber Growers," *Life in Asia,* McKnight and McKnight, Bloomington, Ill., 1936, pp 330-335

French Indo-China

French Indo-China is a little larger than France, the controlling country, and contains about half as many people. Its latitudinal extent is 1000 miles and its greatest width about half as much. One of the world's great rivers, the *Mekong*, rises in Tibet and flows southward, bordering or running through the country for a thousand miles. The area may be separated into three physical divisions (see Indo-Chinese Peninsula, page 263).

The *Laos-Annamese* highland includes the Laos plateau in the northwest and the long, hooked Annamese mountains skirting the east coasts. The plateau is a rugged forested area, containing tropical woods, gold, tin, and some precious stones. The Annamese ranges are high and may be crossed only with difficulty through two or three passes. Some narrow lowlands along the coast are intensively cultivated by a crowded population. Eighty per cent of the rainfall at Hue (average annual, 102 inches) is brought by the northeast monsoons in the late autumn and winter (Fig. 129).

The *Red River* basin in the northeast is a rolling to hilly area with a population of nearly 200 per square mile. The area is richly mineralized with coal, zinc, tin, and graphite. The processing of phosphates and the making of cement provide work for many people. Rice is the leading crop, but a dearth of level land imposes a severe limit to the expansion of rice growing.

The lower Mekong basin includes the extensive delta of the great river, about one fourth of the total area. An outstanding feature in the center of the basin is *Tonlé Sap*, a large lake, which receives backwater from the Mekong during the rainy season and slowly gives up the water for irrigation of the rice fields during the dry period (Fig. 166). Much of the Mekong delta is marshland, but of the 1,000,000 acres (40 per cent of the delta land) under cultivation, 90 per cent produces rice.[1] Above the delta the land supports only one fourth as many people per square mile. Rice, cotton, coffee, and pepper are grown, and cattle breeding is a thriving industry. Fishing in the Tonlé Sap engages the attention of large numbers of the people.

[1] McCune, Shannon, "Saigon, French Indo-China," *Journal of Geography*, January, 1937, Vol. 36, pp. 24-33.

The rivers and the sea are the chief arteries of trade and transportation. Of the 2000 miles of railroad, three fourths belong to the government. The Red River basin is best supplied with railroads. *Hanoi* on the Red River is the capital of French Indo-China. Two other cities each with over 100,000 population are *Saigon* and *Cholon*, both in the southern part of the country.

Looking Ahead in Indo-China. Lying as it does between the two most populous areas in the world

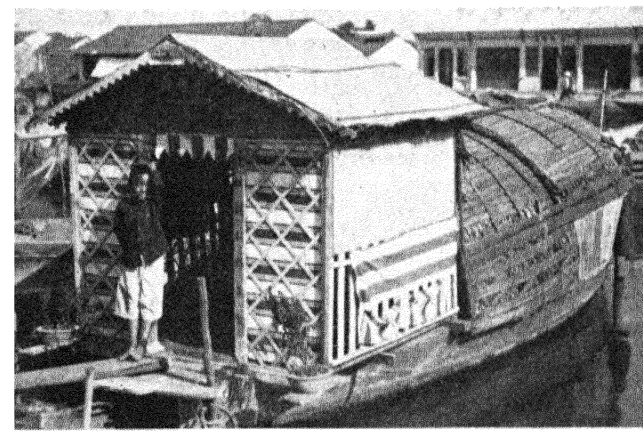


Fig. 166. A House Boat in Saigon. The owner seems to take considerable pride in ornamenting his domicile. (Courtesy Cunard White Star, Limited)

—India on the west, and China and Japan on the east—it might appear that the Indo Chinese Peninsula is in a strategic location to profit by extensive trade relations. However, land transportation is handicapped by high ridges and deep valleys that cut directly across possible land routes. Railway mileage is low and tracks and rolling stock are poor. Highways, as a rule, are unimproved. The Singapore route from India to China is long and unpleasant due to high temperatures and high humidity. The route could be shortened by 1000 miles if a canal were to be constructed across the Isthmus of Kra. The great international gateway from west to east by way of Singapore offers attractive opportunities for trade to the people of the Indo-Chinese Peninsula. Because of the heavy rainfall in nearly all of the region, soil erosion is serious where cultivation is undertaken on sloping land.

On the whole the region is one of poverty for the masses of people, due in part to exploitation of

both resources and people by outside agencies. It would mean much to the people if the country could be managed for the benefit of the natives rather than for the enrichment of outsiders.

REPUBLIC OF CHINA

China including *Sinkiang, Mongolia, Tibet,* and *Manchuria* is one third larger than the United States; and the population is nearly one half billion. From the farthest reaches of Tibet to the Pacific Ocean is a distance of 3000 miles, and it is 2000 miles from the South China Sea to the Siberian border. It will be recognized at once that more of the republic is within the Eurasian Barrier than lies south of it. Important as these great interior areas may be, they are, however, so remote, so arid, so nonproductive, and so sparsely populated, that they will not receive much attention in this discussion of China. Manchuria will be given special attention because of the special tribulations through which it has been passing during recent years. That portion of the country about which this discussion is concerned lies south and east of the Central Barrier, contains nearly all of the people and is known as China Proper.

Natural Features

China proper embraces chiefly the region described as the Chinese Plains and Uplands (see pages 264-265). With such a great east-west extent, with altitudes that vary from sea level to 10,000 or more feet, and with latitudinal distances from the equator that range from 20° to 40° north latitude, significant differences in climate, vegetation, soils, and human activities are to be expected.

The seasonal reversal of the monsoons of southeastern Asia dominates the climate of China.[1] The southeastern coast receives an abundance of summer rainfall which usually averages from 60 to 80 inches annually. However, the monsoon rainfall gradually decreases toward the interior. The 40 inch isohyet in China follows the Yangtze River much as it does the Ohio River in the United States. The rainfall diminishes rapidly toward the north, Peiping receiving annually only 25 inches (Fig. 129).

In winter the northern plains are cold, dry, and windy, with frequent dust storms; whereas in the south, temperatures are higher and there is little dust. The Yangtze River is near the boundary between the subtropical humid climate of the south and the continental humid long summer type of the north (Fig. 236). The north is the land of quilted suits made of cotton and the south is the land of the umbrella.

At one time most of China probably was forested, but centuries of intensive human occupancy have denuded the land of trees to such an extent that it is now difficult to find large forests anywhere in the northern hills or on the plains. The hills and mountains of the south, however, are partially covered by evergreens. In some places tea and mulberry trees have covered much of the landscape so long that they may almost be considered native (Figs. 237 and 238).

The differences in distribution of temperature and rainfall are responsible for a considerable diversity in the mature soils which vary from the red and yellow in the south to the gray-brown and chestnut soils in the north. More of the mature soils in China Proper belong to the pedalfers than to the pedocals. Because of the great amount of wind and water erosion and deposition, much of the area has young soils.

Cultural Features

China! Empire of the centuries! What a flood of associations is brought to mind merely to contemplate the word China (Fig. 167). Land of many inventions, land of intensive Oriental agriculture, farmers of 40 centuries, land of the conquering Khans; for a long time it must have seemed to the Chinese that theirs *was in truth* the *Celestial Empire*. Chinese civilization with a mammoth empire was in full swing before Rome was built. Centuries ago this civilization enticed the merchant and sailor of the Occident through uncharted seas and across burning deserts in search of priceless silks, spices, and lacquer goods. It was the lure of the goods of Cathay that took the European to the Orient, and it is the desire for the market in this land of hundreds of millions which today is causing much

[1] Dobby, E. H. G., "Winds and Fronts over Southeast Asia," *Geographical Review*, April, 1945, Vol. 35, pp. 204-218.

anxiety among some of the modern industrial nations. Only within the past hundred years has China looked to foreign shores for any of life's necessities, but today ships of every maritime country in the world cast anchor in her ports; and bankers of London, Berlin, New York, Paris, and Rome compete with each other in planning and financing railways, airlines, and sea lanes to this land of ancient splendor.

As in the days of the empire, so today there exists a mighty but subdued surge of power, a straining, masterful energy, the mingling of life and soil. It is the peasant of China who has supplied the grist of empire and trade. The geography of China is the story of man and his soil. Contact with the Occident has not changed the Chinese much even though there are new weapons, new products, and a new government.

Cultivating the land is the chief activity of the Chinese people, and with few exceptions, methods are typically Oriental. Several factors combine to characterize Oriental agriculture—namely, (1) exceedingly high yields per acre, (2) generally low returns per man, (3) constant fertilization of the soil, (4) paucity of livestock with emphasis upon food crops rather than feed, (5) planting more than one crop per year wherever climate permits, and (6) reliance upon human power. This combination of conditions results in a subsistence type of agriculture which supports a high population density. Wherever possible cash crops such as tea, silk, and tobacco or opium are cultivated on the poorer land to supplement the grain or garden crops.

In general, there are two distinct types of agriculture in China, the climate usually dictating the type that prevails. On the loess plateau and the delta plains of the north such hardy crops as wheat, beans, soybeans, oats, barley, millet, and kaoliang are grown. The absence of an all-year growing season in northern China limits to a large extent the practice of two-crop agriculture. However, on the lowlands after the winter wheat is harvested, some of the later summer crops such as corn, beans, and millet are grown.

On the lowland of the middle Yangtze River, rice is produced in summer by irrigation. After the rice harvest in October, wheat may be sown, the latter crop attaining much of its growth in the dry winter season. In this area agricultural methods are primitive indeed, practically all work being done by hand labor. Here, too, and on the Yangtze delta are the leading cotton fields of China.

In the Red Basin on the upper Yangtze irrigation is essential for successful farming, but the land is so rolling or hilly that much terracing is necessary. It is warm enough in the Red Basin for a two-crop system of agriculture which in many respects is like that in the Yangtze basin. This is one

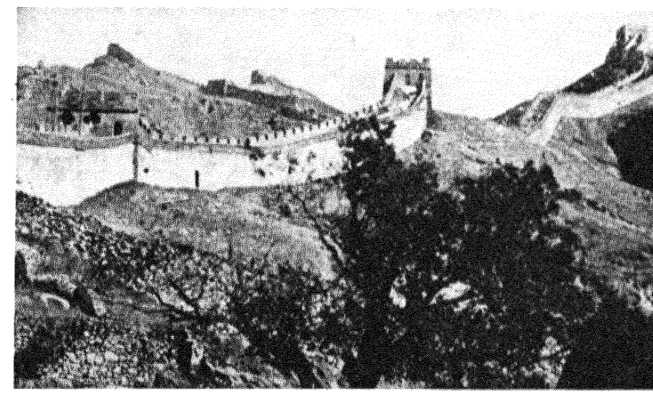


FIG. 167. SECTION OF THE GREAT CHINESE WALL. This portion of the Wall is at Nankow Pass. Note the bastions that surmount the Wall at numerous intervals. (Courtesy Canadian Pacific Steamships)

of the most intensively occupied areas in China. During the Japanese aggression the capital of the country was moved to Chungking in the Red Basin.[1]

The Si Kiang basin in the south is, in general, a hilly country but many of the hills are terraced and rice and sugar cane are cultivated intensively. The tropical climate makes it possible to grow two and three crops per year. Oranges and even bananas are produced. Silkworms are at home in this part of China where as many as six or seven crops per year can be grown on the leaves of hundreds of thousands of acres of mulberry trees. It takes about 20 pounds of cocoons to yield 1 pound of silk.

The highland regions both north and south of the Yangtze support many people. Although but little level land is available for cultivation, hillside terracing is practiced extensively, rice being

[1] Lattimore, Owen, "China Opens Her Wild West," *National Geographic Magazine*, September, 1942, Vol. 82, pp. 337-367.

the leading crop. On the slope land in this part of China, too, is more than 50 per cent of the tea lands. These old highlands contain considerable quantities of coal, antimony, lead, zinc, and tungsten but the static Chinese economy has not encouraged their exploitation.

The plateau country of southwest China has a smaller percentage of tillable land than other parts of the country. In spite of this, rice is the chief crop, and wheat, corn, beans, millet, sugar cane, kaoliang, tea, and tobacco are also grown. The large amount of rugged land encourages the livestock industry—cattle and water buffaloes being used as work animals, goats furnishing skins for trade and export, and hogs—the most numerous of the domesticated animals—providing meat and bristles. This is an area rich in unexploited minerals, and it is noteworthy also for wood and wood products from certain kinds of trees, among which are the chestnut, walnut, tung, camphor, cypress, and fir.

The coastal lands of the southeast possess characteristics not found in other parts of China; the relatively rugged hinterland turns the interests of many of the people to fishing, to trade, and to intensive cultivation of the limited amount of tillable land. On much of the area rice may be grown in either of two seasons—(1) in the early part of the year during the rainy monsoon period; or (2) later by means of irrigation A rather wide diversification thus is possible, two or three crops a year being not uncommon (Fig. 166).

China has been called the *Land of Famine*, because agricultural production under optimum conditions barely takes care of the needs of the population. When the comparatively frequent droughts or floods occur, surpluses are not available to supply critical needs, consequently, disaster to crops means famine in a land that has the capacity to produce necessities only and not luxuries.[1]

Two kinds of manufacturing are practiced in China—namely, the cottage and the large factories types. Most of the articles for home use in China are made in cottage workshops. These include iron and copper cooking utensils, simple agricultural implements, baskets, ropes, boats, jewelry, porcelain, cotton cloth, and hosiery. The production and processing of iron ore, copper, coal, cotton, and silk chiefly account for the modern industrial activities. Before World War I, European nations had opened markets in China for some factory-made goods, and when these supplies were reduced by the European conflict from 1914 to 1918, numerous small factories were set up in China. However, large manufacturing plants usually are located near or in large cities, and will be discussed in connection with the various cities.

The recent Japanese invasion drove tens of thousands of skilled artisans from the coastal cities into the interior of the country, thus furnishing the stimulus and essential workmen for industries in interior and western China

A population map of China shows that many people live along the southeastern coast. The fishing industry contributes largely to this condition. Many millions of Chinese people depend upon fish for food in place of meat. This part of China as a fishing area has provided the training in seamanship for many sailors so essential in coastwise trade and in interareal commercial enterprises.

Until the last few decades, transportation and communication in China depended entirely upon human and animal carriers or upon waterways. Although these three methods are still important in trade and commerce, western civilization has contributed newer and more efficient means—namely, the airplane, the power boat, the railway, the telephone, the telegraph, and the radio. All great cities are connected with each other by rail. In the interior, however, human carriers are still common and the large rivers and their tributaries constitute one of the most important means of commerce with the outside world. Once China looked to the interior for trade, but today she looks toward the Pacific and to the mouths of her large rivers for contact with the near and distant countries. The speed and efficiency of ocean travel have nearly destroyed the ancient caravan routes through the Central Eurasian Barrier (Fig. 168); but motor roads are coming more and more into use.

URBAN CENTERS. China is a land of many large cities. Most of the cities overlook rivers or harbors. If located on the plains in the north, elevated sites were chosen because they are less susceptible to

[1] Clubb, Edmund, "Floods of China, A National Disaster," *Life in Asia*, McKnight and McKnight, Bloomington, Ill., 1936, pp 226-236.

flood. The Yangtze basin alone has at least 25 cities of more than 100,000 people each. It will be impossible to describe or even to mention all of the large cities of China. A few of the most important and strategic will be discussed briefly (Fig. 145).

Shanghai, one of the world's great trade centers, is situated on the deltaic plain of the Yangtze about 50 miles from the sea where the Whangpoo, a small tributary of the Yangtze, empties into the master stream. Shanghai is really a dual city, consisting of an inner and older one which is walled, and the outer or commercial city which is modern and predominantly composed of foreign concessions. The unique importance of Shanghai is due to its enormous tributary area.[1] Practically the entire basin of the Yangtze may be considered its hinterland, including more than 25,000 miles of navigable waterways and a concourse of cities extending from the coast to the Plateau of Yunnan. Large boats navigate the Yangtze as far as *Ichang,* about 800 miles from the sea. Shanghai is a producer of silk, cotton, and other manufactured goods many of which are in the luxury line. The city ranks high among the great ports of the world, which explains in part why it is one of the principal banking centers of the Far East. As a center of cultural influence, Shanghai is the most important city of China. More foreigners live here than in any other city. Cosmopolitan ideas entering China from other cities of the world as a rule arrive in Shanghai first, and the process of blending is accelerated by the continual changing personnel in the consulates

[1] Smith, Helen L., "Shanghai and Its Hinterland," *Journal of Geography,* May, 1939, Vol 38, pp 173-180.

(Fig. 169). Its location at the apex of a mammoth market, together with a healthful, invigorating climate are advantages that augur well for the city among the urban centers of the Orient.

Tientsin, on a vast alluvial plain at the junction of two rivers and 30 miles from the ocean, is the leading port of the north China plain. The harbor, because it requires constant dredging, is very expensive to keep in condition for shipping, which means that the silt-carrying rivers of the north plains have contributed some very definite geographic handicaps. The hinterland of Tientsin, nevertheless, is of such consequence that it pays to continue this harbor improvement. Through hundreds of years this city has been the northern terminus of the *Grand Canal,* the chief artery of commerce between the Yangtze hinterland which extends into the Plateau of Tibet and the plains of northern China

Peiping, at the northern apex of the Plains of China, is only 25 miles from the Great Wall which follows the scarpland 4000 feet above the plain.[2] The caravan routes from the Mongolian desert converge on Peiping by way of the Kalgan Gateway. For thousands of years the cultural and economic conflicts between the Mongol nomads and the Chinese farmers have centered in the vicinity of the city. During most of the time since the thirteenth century Peiping has been the capital of China.

Hankow, on a great bend of the Yangtze 600 miles from the sea, is the chief city of central China. Except during the dry season the river is navigable

[2] Coulter, John Wesley, "Peiping," *Life in Asia,* McKnight and McKnight, Bloomington, Ill., 1936, pp. 215-225

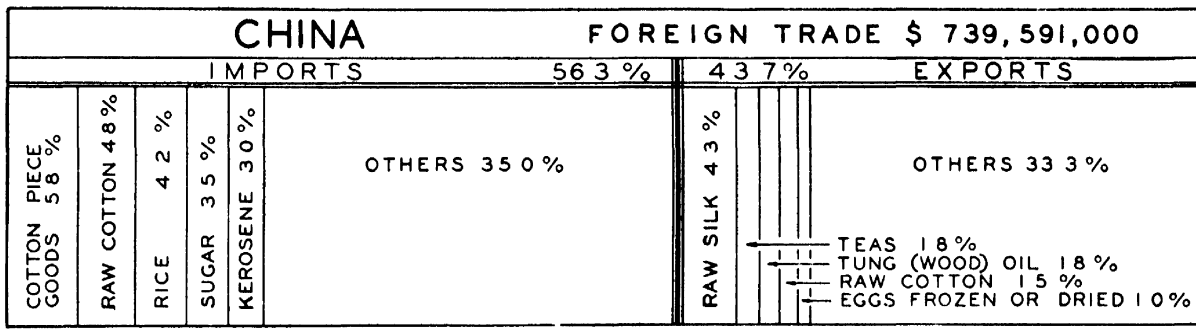


FIG 168 CHINA'S FOREIGN TRADE A 10-year pre-war average ending in 1937. Note the excess of imports over exports. (See also Fig 164) (From *Statesman's Yearbook*)

600 miles above the city. It is also the leading city on the railway between north and south China, and ranks high in manufacturing as well as in commerce.

Chungking, the collecting and distributing center par excellence for western China, is in the well-known Red Basin on the great Yangtze River. Not only is the city an outlet for the silk, tea, and rice of the Basin but also for the skins, hides, and wools of the mountain borders.



FIG. 169. WILLOW PATTERN TEA HOUSE. This beautiful structure is at Shanghai. Note the intricate ornate designs. (Courtesy Canadian Pacific Steamships)

Victoria (Hong Kong) is on the *Island of Hong Kong* near the mouth of the Si-Kiang, and next to Shanghai is probably the most influential city in China. It has an excellent harbor which can accommodate many ships.[1] The significance of Victoria, a British Crown Colony, is due to the fact that for a long time it has been a free port and is supported by a hinterland which includes several big cities.

Canton, 70 miles from the sea on a rich alluvial delta formed by the junction of several rivers (Si-Kiang, *Pei-Kiang*, and *Tung-Kiang*, that is, the West, the North, and the East rivers, respectively), began to trade with the outside world hundreds of years ago, the Arabs and the Portuguese being among the first to participate in this trade. The British, who until recently dominated the commercial activities of the city, did not enter until the nineteenth century. The great loads of detritus carried by the converging and debouching rivers keep the waterway to the sea shallow. Victoria, nearly 100 miles away, serves as the port of Canton. The city is intersected in every direction by canals and much of the traffic is by boat. Large numbers of people live in houseboats on the rivers and canals.

Several other large cities along the coast are *Tsingtao* on the south side of the Shantung Peninsula, *Hangchow* on the Yangtze delta, and *Wenchow* and *Foochow* on the rugged mid-China coast. *Nanking* is on the river margin of the Yangtze delta, and *Changsha* on the southern margin of the middle Yangtze lowland.

AN APPRAISAL FOR THE FUTURE. Many factors combine to produce numerous critical problems in China. Among these are (1) the enormous population, (2) the constant threat of drought and flood, (3) the immense amounts of land in graveyards, (4) the interest of foreigners in China, and (5) the devastation wrought by years of warfare.

Some of the proposals for alleviating the critical problems that beset the Chinese people are: (1) reduction in the birth rate, (2) scientific agriculture, (3) utilization of gravelands for the growing of crops, (4) continued development of transportation facilities and more adequate and efficient means of communication, (5) increased use of mineral resources in industries,[2] (6) establishment of a national language, (7) improvement of education, (8) and perhaps most important of all for the people to learn to cooperate among themselves, to develop responsible government, and to strive for internal peace.

It may be expected that a free China at the close of World War II will move rapidly toward an improved economy. The great aviation fields recently constructed will inspire a desire for more air traffic. A dearth of railways and rugged terrain should encourage aviation. The dispersion of Chinese artisans by Japanese encroachments should help to spread industrialization. The dissemination of education will bring a desire for improved standards of living, which in turn should accelerate both domestic and foreign intercourse and trade.

[1] Von Engeln, O. D., "In a Chinese Harbor," *Life in Asia*, McKnight and McKnight, Bloomington, Ill., 1936, pp. 234-236.

[2] Wang, Kung-Ping, "Mineral Resources of China," *Geographical Review*, October, 1944, Vol. 34, pp. 621-635.

MANCHURIA (MANCHUKUO)

Manchuria includes that part of the Manchurian Plains and Uplands which is south of the Amur River and west of the *Ussuri River*—nearly one half million square miles (see page 265). The country extends through 1000 miles of latitude corresponding to that from Kansas City to Lake Winnipeg but the temperature ranges in Manchuria are greater and the rainfall is less than in the compared area in North America. Although Manchuria is now a part of China, the role that it played in the recent world conflict seems to warrant the special attention it is here accorded.

Natural Features

The climate of Manchuria is continental humid with short summers (Fig. 236). The chief factors which account for the climate are (1) the position on the eastern side of a great land mass in the latitude of Nebraska, the Dakotas and Manitoba, and (2) the monsoons which bring cold weather from the interior of Asia in winter and warm moisture-laden winds from the ocean in summer. In winter all of the streams are frozen for at least three months, and the temperatures consistently stay below zero north of Harbin. In the summer rainy season, temperatures rise to an average of 76° F. in July at Dairen and to 72° F. at Harbin. Rainfall distribution depends upon the summer monsoons, the amount gradually decreasing from south to north, Dairen having 23.0 inches, Mukden 23.5 inches, and Harbin about 18.7 inches, annually (Figs. 7 and 129). Most writers compare the climate of Manchuria to that of North Dakota, and the adjacent portion of Canada, or to that of the Province of Quebec.

The mountain and upland portions of Manchuria generally are covered with forests of pine, spruce, larch, and silver fir. The vegetation on the plains as a rule is prairie, varying from tall grasses in the south to short grasses in the north with trees appearing only along streams or in valleys (Figs. 237 and 238).

The mature mountain and upland soils are podzolic, a result of low temperature and high rainfall, whereas the soils of the plains vary from prairie soils in the south to the black and chestnut soils in the north and west, depending upon the amount of rainfall.

Cultural Features

Forty years ago the population of Manchuria totaled 14,000,000, of which 80 per cent were Chinese. Today the country's 35,000,000 people are 95 per cent Chinese. For the past 50 years, three peoples, the Japanese, the Russians, and the Chinese, have sought to own and colonize this area. Each has attempted to control the economic and political destiny of the country and this has resulted in many years of war and strife. Russia has done much to develop this ancient land of the Manchus, particularly in the north where early in the twentieth century the Chinese Eastern Railway was constructed as a link in the Trans-Siberian line. However, Manchuria was colonized mainly by the Chinese who now occupy most of the region. Recently the Japanese have been developing southern Manchuria, the South Manchurian Railway being one of their contributions.

Within the past ten years the world witnessed the ascendancy of Japan to a dominating influence in the Orient. The government and administration of Manchuria for 14 years were in the hands of Japan. The principal agency of the Japanese government was the South Manchurian Railway, which not only managed transportation facilities but also was entrusted with many financial, administrative, and semi-governmental responsibilities. The Imperial Government of Japan owned not less than 50 per cent of the capital stock of the railway and in this way maintained control. Thus, the land which once furnished emperors for the Celestial Empire of China became little more than a colony or mandate of Japan which controlled finance, communication, and exploitation of resources (Fig. 170). It is expected that Manchuria again will become part of the Republic of China.

Like the rest of the Orient, Manchuria presents a cultural landscape that is predominantly agricultural. The fertile soils, cheap and abundant land, and the extension of new lines of communication have been the chief factors in the recent development of an area which formerly was a grazing land. The railroads have made Manchuria accessible to markets and brought machinery and colonists who,

coming from the more densely populated portions of the Orient, have applied their skill in producing vast surpluses of cereals such as kaoliang, maize, millet, wheat, and barley, and also the most important of all Manchurian crops, the soybean. This plant occupies at least one quarter of all the cultivated land and furnishes the country's chief export.[1] Kaoliang, a member of the sorghum family, constitutes most of the food for the native population, whereas maize, millet, and wheat are supplementary in the diet. In recent years many fruit trees have been planted and now large orchards of pears, apples, and plums may be seen. In contrast to other regions of the Orient, farms in Manchuria are larger, living conditions are better for the average farmer, and intensive agricultural methods are not generally practiced. On nearly every farm is some livestock, the per-capita number being larger in Manchuria than in other places in the Orient.[2]



FIG. 170. CHINESE-MANCHURIAN BOYS. Winters get very cold in Manchuria and warm quilted clothing satisfies a pressing need. These boys are on the Great Wall northwest of Peiping. (Courtesy Canadian Pacific Steamships)

The exploited minerals are coal, iron ore, gold, salt, and soda. Coal, the most important, is taken from several large mines in the southern portion of the area, chief of which are the Fushun mines east of Mukden. The mines until recently were operated by the South Manchurian Railway and the coal was exported mainly to Japan for use in the iron and steel industries. The iron ore of Manchuria is low grade and much expense is involved in smelting it. For this reason, the Manchurian iron industry, even though a market is close by, faces stiff competition with far-away countries, particularly in the United States.

Modern facilities for transportation and communication have been developed in Manchuria only within the last half century and much remains to be done. Railways extend from Dairen through Mukden to Harbin, and branch lines connect with the important mines and smaller commercial centers. The main line of the Trans-Siberian Railroad, entering the Amur Valley from the west, skirts the north bank of the river to Khabarovsk, and then runs south to Vladivostok. A branch line crosses Manchuria from Chita in Siberia to Vladivostok by way of Harbin. As a rule, telegraph and telephone lines follow the railways, and the principal cities are connected by airplane service. The Liao, Sungari, Yalu, Nonni, and Amur rivers are navigable during the summer and hundreds of small river boats ply these streams. In winter, the frozen rivers are used as highways.

URBAN CENTERS. *Dairen,* occupying an indenture on the eastern coast of the *Liaotung Peninsula,* is one of the important ports of eastern Asia. Its fine ice-free harbor, modern port facilities, rail connection with the main line of the South Manchurian Railway, easy accessibility to Japan, and the support of Japanese capital have combined in the recent growth of the city. Dairen is beautiful and modern with imposing public buildings, fine

[1] Deasy, George F., "The Future of Manchurian Agriculture," *Journal of Geography,* January, 1938, Vol. 37, pp. 20-27.

[2] Stewart, John R., "The Resources of Manchuria," *Life in Asia,* McKnight and McKnight, Bloomington, Ill., 1936, pp. 237-249.

streets, apartment houses, and first-class stores. It will probably long remain one of the chief cities of the Far East.

Mukden, situated in the center of the Liao River Plain on the South Manchurian Railway less than 100 miles from the sea, is surrounded by rich agricultural land which produces large surpluses of soybeans, millet, kaoliang, and sugar beets. From the hills and uplands furs, hides, and forest products are secured. In the city several industries flourish, among which are flour-milling, soybean manufactures, paper making, and tanning. Mukden was once the capital of the Manchu Empire. Today it is composed of three parts, the old city within which are the ancient Imperial palaces, the new town (formerly a Japanese concession) laid out on a grand scale with parks and squares, and the intermediate commercial quarters

Chengteh (Jehol), a city of more than one half million people, is in mountainous southwestern Manchuria just north of the Great Wall and about 150 miles from Peiping.

Harbin, the chief city of central Manchuria, is on the Sungari River at the crossing of the Chinese Eastern and Southern Manchurian railways With a hinterland that produces crops of soybeans, wheat, millet, and kaoliang, it is indeed a thriving city Prior to 1930, Russian influence in Harbin was dominant, but after the coming of the Japanese into Manchuria the city reflected more and more the influence of the South.

Looking to the Future With vast resources of fertile land and relatively large quantities of coal and iron ore, this region should continue to serve as a good home for increasing millions of people. However, several factors must be taken into account if the region is not to become another overpopulated area of the Orient. Some limit should be placed upon immigration, planning for more adequate transportation should be continued, economical exploitation of mineral resources should be considered in order to maintain competition with more favored regions; and educational facilities for the masses should be developed so that the people may participate more effectively in their government and cooperate more satisfactorily with one another.

KOREA (CHOSEN)

Korea is a peninsula 600 miles long that extends southeastward from the mainland of Asia toward the westernmost island of Japan, Kyushu, much as the Italian Peninsula extends southward toward Sicily. Korea, moreover, is nearly as large as Italy and is in a slightly lower latitude It is a country with a long and turbulent history, alternating between independence and subjection either to China or Japan. So mountainous is the country that about five sixths of the 24,000,000 people live on one fifth of the land.

Natural Features

The zigzagging mountainous core of Korea leaves but a narrow coastal plain on the east bordering the Sea of Japan, but bordering the Yellow Sea is a considerable area of arable land Most of the country, like Japan, is mountainous, but the highest peaks are not much above 8000 feet. Unlike Japan the landscape is not volcanic in appearance.

The climate of Korea is much like that of New Jersey except for the variety brought by differences in relief

The average annual rainfall at Chemulpo on the west coast is 45.4 inches. Summer is the rainy season (July 14.5 inches). The annual variability at the same station is rather high, ranging from 25 inches (1909) to 66 inches (1922). The summers are very warm in the middle and north, and the winters are cold, but in the south proximity to the sea erases the high seasonal extremes The eastern slopes are forested to the summits but the western slopes are nearly treeless and also severely dissected by stream erosion.

Cultural Features

Korea occupies a buffer position between powerful neighbors, which accounts in part for her unhappy and turbulent history Chinese, Mongols, Russians and Japanese each have at different times encroached on Korean lands and sovereignty. By the terms of Allied agreement during World War II, the Koreans have now been freed from their thirty-five years of subjection to Japanese rule. How well they will be able to enjoy their new freedom remains to be seen, for internal strife has

always plagued the Koreans whenever the halter of the conqueror has been removed.[1]

Nearly all the Koreans are farmers (80 per cent), but centuries of intensive cultivation have so impoverished the soil that crop production is low. The fact that the 11,000,000 acres of arable land are divided into 3,000,000 farms indicates that machine labor is practically impossible, and that the simplest of tools are utilized in the farming operations. Two crops per year are grown on more than half of the farm land in the south, but in the colder north one crop only is the rule.

Rice is by far the leading crop, most of it being grown by irrigation. Formerly, more than half the rice crop was shipped to Japan, making it necessary for the Koreans to import millet for food from Manchuria. Other crops are barley, wheat, soybeans, potatoes and numerous vegetables. Cotton does well in the south. Pome fruits, especially apples and pears, are plentiful, but no citrus fruits are grown. Mulberry trees are grown in large numbers to support a widespread silk industry.

Cattle and hogs are the chief domesticated animals, the former often owned communally and used as work animals. Although gold, iron ore, and coal are present, the mining industry is unimportant. Fishing, however, occupies the attention of a large number of people and fish is a significant item in the diet.

Korea has more than three thousand miles of railroad, and nearly 20,000 miles of improved highway. About 80 per cent of Korea's foreign trade in recent years has been with Japan, and most of the remaining 20 per cent with China and Manchuria. No doubt a considerable shift in trade will occur as a result of World War II.

Cities of Korea. Korea has five cities each with more than 100,000 people, and one (Seoul) with nearly three quarters of a million. This is quite in contrast to densely populate Italy which has twenty-two cities each with more than 100,000 people.

Seoul (Keijo), the capital city of Korea, is nearly girdled by mountains. Around the city is a wall built centuries ago by the Koreans. Native industry includes the making of paper, mats and fans, and the processing of silk and tobacco. The city is about 25 miles from *Chemulpo* (Jinsen) on the Yellow Sea coast with which it is connected by rail. The chief city of the northwest is *Pyengyang* (Heijo), and in the southeast is *Taikyu*. The leading city on the east coast facing Japan is *Fusan*—the eastern terminus of the railroad from Chemulpo and Seoul.

Korean Prospects. With the return of independence to the Korean people, the problem of reorganizing their domestic economy is of first importance. For thirty-five years, the country and the people have been exploited by the Japanese. More and more the land had come under the ownership of large Japanese companies, although it is still divided into small farms. Under Japanese control about 80 per cent of the farmers were tenants, and most of them were deeply in debt. In the readjustment, there are ample chances and great opportunities for improving the status of the Korean farmer. The Koreans will need protection and help from the friendly peoples of the United Nations.

JAPAN

The former Japanese Empire included the islands of Japan Proper, Korea, Formosa, and southern *Sakhalin* (an area somewhat less than that of Texas) and the puppet state of Manchuria. The four major islands of *Honshu*, *Hokkaido*, *Kyushu*, and *Shikoku* make up more than half of the total area and constitute nearly all that is left of the formerly far-flung empire, that once included more than 2000 islands, of which the *Kurile* and the *Ryukyu* chains were the most important. The estimated population of Japan in 1940 was 105,000,000 people. Today the four main islands contain about 75,000,000 people. As an area in which the United Nations will exercise close supervision for an indefinite period, it seems desirable to give Japan considerable attention.

Natural Features

The mountains of Japan at first glance appear to rise in a jumble of irregularity. A careful study, however, will disclose two discontinuous but parallel ranges running through the main islands—one

[1] Price, Willard, "Jap Rule in the Hermit Nation," *National Geographic Magazine*, October, 1945, Vol 88, pp 429-445

near the east coast, the other near the west coast with the chief lowlands lying between the two mountain chains (see pages 265-266). In the southwest the lowland is buried under the sea (Inland Sea), providing numerous excellent harbors protected from the winds and waves of the ocean. But the continuity of the midland valley in the center of Honshu, however, is almost completely effaced by the huge volcanic piles that in general are arranged in rows at right angles to the trend of the lowland. At the end of one of these rows about 75 miles southwest of Tokyo is the famous *Fuji* (12,395 feet), the sacred mountain of the Nipponese. These volcanic piles separate the lowlands into sections more or less isolated from each other. The plains around Tokyo, Nagoya, and Osaka are the three most important ones.[1]

Any discussion of Japan would be incomplete without some reference to the terrific subsurface instability that torments the country. The high altitudes, the fractured surface, and the adjacent ocean depths furnish ideal conditions for many earthquake shocks (1500 per year) that haunt the people every day. Of course, the quakes vary much in destructiveness, the worst one in history occurring in 1923, when Yokohama and half of Tokyo were destroyed.

Among the many factors which produce a variety of climatic types in Japan are (1) the monsoons, (2) the marine influence of nearby water bodies, (3) the wide range of latitude, (4) the mountain ranges with their north-south trend, (5) ocean currents, and (6) the westerly winds. These factors explain for the most part why southern Japan (southern Honshu, Kyushu, Shikoku) has a subtropical humid climate and northern Honshu and Hokkaida have a continental humid climate—the former island having the long summer and the latter the short summer phase (Fig. 236).

Throughout the region the seasonal rhythm of temperature and rainfall depends largely upon the monsoon winds, for they blow into the continent in summer and out in winter, producing rainfall regimes on the windward and leeward slopes which differ according to the seasons of the year. Thus, the western slopes of most of the mountains are rainy in winter, while the eastern slopes are rainy in summer.

The effect of ocean currents should not be overlooked in seeking to understand the climate of the region. The *Kuro Siwo* (Japan current), a warm stream originating near the equator and flowing northward, bifurcates near Formosa, one branch of warm water bathing the east coast of Japan and the other branch the west coast. Two cold currents sweep out of the north, one from the Sea of Japan follows the continental margin and the other hugs the east coast of the Japanese islands. The results of these currents are (1) the frozen harbors in winter as far south as Vladivostok corresponding in latitude to Portland, Me. (43° 40′); (2) relatively warm coasts for Japan which are open to navigation all year, and (3) generally mild winters in southern Japan as contrasted to severe winters on the adjacent mainland.

Sakhalin and the Kurile Islands, although in the latitude of Labrador, do not have as severe climate because of greater marine exposure. The four major islands of Japan enjoy mild summers and a short, relatively mild winter because of the marine influence. However, in the northeastern part of the country (Hokkaido) deep blankets of snow often cover the ground in winter, whereas in the milder southwestern parts snow is seldom seen. Formosa has a climate much like that of southern Florida, except on the mountains where some peaks are perpetually covered with snow.

Devastating tropical typhoons often visit southern Japan. These destructive storms are similar to the hurricanes of the West Indies in that they originate in tropical latitudes and swirl northwestward and thence northeastward in a parabolic path, bringing torrential rains and terrific winds and frequently taking heavy toll in life and property.

The inblowing monsoon winds bring a maximum rainfall in late summer or early autumn—at Taihoku in the latitude of Habana, in August (11.7 inches); at Tokyo in the latitude of Norfolk, Va., in September (8.7 inches), and at Ochiai on the island of Sakhalin in the latitude of Quebec, in September (4.7 inches).[2] The dry season at each of these

[1] Von Engeln, O. D., "The Japanese Landscape," *Journal of Geography*, January, 1933, Vol. 32, pp. 41-43.

[2] Sanders, F. M., "The Climate of Japan and Formosa," *Life in Asia*, McKnight and McKnight, Bloomington, Ill., 1936, pp. 286-301.

stations comes during late autumn or winter (Fig. 129).

Complexity in climate, topography, and bedrock in the Japanese Empire has produced much diversity in natural vegetation. Coniferous forests thrive in Sakhalin and northern Hokkaido (Fig. 237). However, tundra vegetation covers most of the high mountainous sections of the area. Mixed deciduous forests begin in northern Honshu and continue southward in the mountains and foothills, but the bamboo and other monsoon vegetation appear in the lowlands of Honshu, Shikoku, and Kyushu.

Wherever mature soils have developed they are generally pedalferic, a response to forest vegetation, high humidity, and heavy rainfall. Soils on the slopes of the mountainous and hilly country are likely to be coarse textured, whereas the alluvial soils are generally silty and exceedingly fertile.

Cultural Features

The basic human activities of Japan have been much the same for hundreds of years, at least before the coming of Occidental merchants and navies. It has been fairly well established that the culture of the country today was superimposed upon an early culture imported from China.[1]

The impact of Western culture upon this region has had five outstanding effects upon the life of the people. (1) the old isolation has nearly disappeared, ships from every part of the world in times of peace anchor in the harbors of the country; (2) momentous changes occurred in the economic life of the people since the introduction of Occidental customs, methods of industry, and trade and political ideas; (3) there was a re-orientation in political power in the Orient, Japan having replaced China as the number one power in the Far East; (4) the rapid transition of isolated Oriental Japan to a modern, industrial world power is unprecedented in world history; and in addition (5) there has been an enormous increase in population. What effect the loss of the war and the Allied occupation of the country will have upon Japan remains to be seen.

Three factors of the natural environment seem to be closely associated with the distribution of population within Japan today—namely, rainfall, temperature, and topography. Wherever adequate rainfall, moderate temperatures, and relatively level plains are associated, people congregate in the largest numbers and there, too, the land is intensively utilized. In the mountain areas of the warmer and more humid portions land utilization is conditioned largely on the terracing of the slopes where availability of soil may then limit land use.

Population densities exceeding 250 persons per square mile are not uncommon on the plains of Japan. Extreme cold and mountain ruggedness render northern Hokkaido inhospitable for occupancy on the same scale as the more favored areas to the south.

The chief human activity of the people of Japan is tilling the soil, and here, as in other regions of the densely populated agricultural lands of the Orient, the emphasis is placed upon production of food crops. The number of domesticated animals is few in proportion to population when compared with some other parts of the world. The principal crops are rice, wheat, millet, beans, barley, tea, mulberry trees, and some cotton. The fertile alluvial plains along the rivers and the coastal plains in general produce cereals. In the southern half of Japan a two-crop system prevails—that is, rice is grown during the rainy season and harvested in the dry season at which time the land is sown to wheat, barley, or millet. Farther north rice culture decreases, not because rice will not mature, but because other crops produce more abundantly and are more reliable in the less humid and cooler climates.

Tea is grown in the foothills and on the lower mountain slopes of the south where the air is humid and mild temperatures prevail. The mulberry tree, so essential for silkworm culture, occupies considerable areas that are not suited to the production of cereals. On much of the land an intensive cropping system prevails which includes intertillage and the planting of more than one crop at a time, so arranged that there will be differing seasons of maturity. Not only do the fields carry more than one crop at a time, but as a rule each plant is given some fertilizer even though the soils are virgin and fertile. In the areas of crowded popu-

[1] Price, Willard, "Unknown Japan," *National Geographic Magazine*, August, 1942, Vol 82, pp 224-252

lation, there is a constant strain upon the soil to yield the maximum of human necessities. The principal cash crops are cotton, tea, silk, tobacco, and fruits (Fig. 171).

Contrary to general impressions, Japan has a relatively large forested area and, consequently,



FIG. 171. GATHERING ORANGES. Southern Japan is in the latitude of southern California. (Courtesy Japanese Government Railways)

forest industries are significant. First of all, Japanese craftmanship is associated largely with the use of wood—including such things as houses, bridges, carts, furniture, and similar products. The coniferous forests of Hokkaido and Honshu are being utilized extensively for lumber. Paper making depends upon a supply of soft woods. However, the forests are not being exploited unwisely, the Japanese government already having introduced conservation methods for utilizing the forest reserves.

The ocean surrounding Japan is one of the great fishing areas of the world. A vital portion of the Japanese food supply is harvested by thousands of fishermen (Fig. 172). The meeting of warm and of cold ocean currents in this area is much the same as that of the Labrador Current and the Gulf Stream off Newfoundland in the Atlantic Ocean. The principal types of fish obtained are salmon, herring, crabs, and numerous species of small and rare fish. The absence of animal products and meat in the diet of the people in the Far East is balanced at least in part by this almost unlimited supply of food from the sea. Prior to World War II, Japan had a large number of fishing vessels and "floating canneries" which were operating on or near the west coast of North America.

Since about 1920 many industries have been developed in Japan. Some of them depend upon local resources and raw materials and others must depend upon imports. Coal, petroleum, hydroelectricity, and human energy are the principal sources of power for manufactures. Owing to the fact that most Japanese industries are young and have had to meet strong foreign competition, government protection in the form of tariffs and subsidies has been a prominent factor in their development.

The silk industry may be considered both agricultural and industrial because many thousands of households are engaged in hand production of raw silk and also many factories produce raw silk from the cocoons. Silk is, and probably will long remain, the chief export commodity of Japan. The manufacture of nylon and similar artificial fibers is a serious threat to the silk industry of the country (Fig. 173).

The fabrication of cotton textiles is another large industry, depending for its success upon cheap labor, a large market near by, and government protection. The export of cotton textiles



FIG. 172. PORT MISUMI. One of the beauty spots on the island of Kyushu near the city of Kumamoto. (Courtesy Japanese Government Railways)

by Japan to China and other countries of the Orient is contingent upon selling methods and the low cost of the finished materials. In other words, England, the United States, and Germany have been losing markets in the Orient because the products they are selling are too expensive for Oriental con-

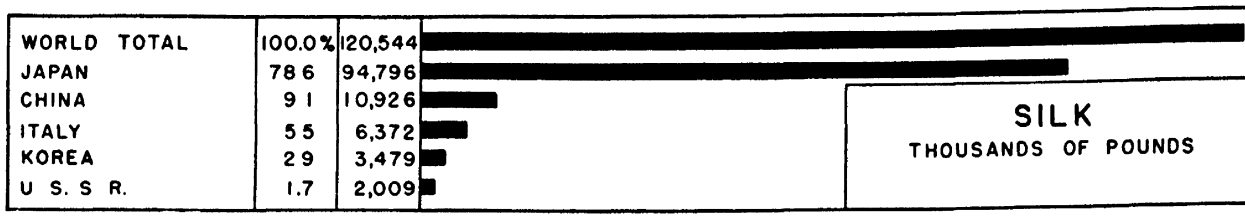


FIG. 173. WORLD'S SILK PRODUCTION. A 5-year average prior to World War II. Japan produced nearly 80 per cent of the world's supply (See also Fig 174) (From *Foreign Commerce Yearbook*)

sumption. However, Japan's market for textiles has been growing in spite of the fact that raw cotton has to be imported either from America or from India.

Iron and steel manufactures are limited because of the small reserve of iron ore and the shortage of coking coal. Preceding World War II millions of tons of iron ore and scrap iron were imported by Japan from the United States each year. It is not difficult to understand why Japan so consistently promoted the conquest and development of Manchuria when it is known that immense reserves of coal and iron ore were the stakes.

Other goods which formerly figured prominently in Japanese industry were pottery, chemicals, menthol, and a world monopoly on camphor. Thousands of small articles, manufactured for the most part by extremely low-priced hand labor, were exported each year. These articles were sold in many of the variety stores of the United States and many other countries. Most of Japan's foreign trade was with the United States, China, and India. The United States was not only the chief market for Japanese raw silk, but also the source of nearly all of Japan's raw cotton. However, China will probably continue to be the leading market for Japan's manufactured goods (Fig. 174).

Railway and steamship are the two leading types of transportation in the Japanese Empire. The central island of Japan, Honshu, has an intricate network of railroads extending from one end of the island to the other, especially on the coastal plains. All the larger cities are connected by rail. Hokkaido has several short lines. Automobile travel is still a luxury in all of the Far East.

The insular position of Japan was a contributing factor in the development of a large merchant marine and a continuance of shipping is extremely significant for the future of the country. Its position was also a factor in the development of a large air fleet by which Japan hoped to invade and conquer North America, including Alaska and the Aleutian Islands.[1] The fringe of islands near the Asiatic coast (many of them controlled by the Japanese) could have furnished a line of air bases which would have paralleled those on the Japanese coast, thereby providing a safe corridor for the operations of the Japanese navy. The extension of the ends of

[1] Duncan, Lt David D., "Okinawa, Threshold to Japan," *National Geographic Magazine*, October, 1945, Vol. 88, pp 411-428

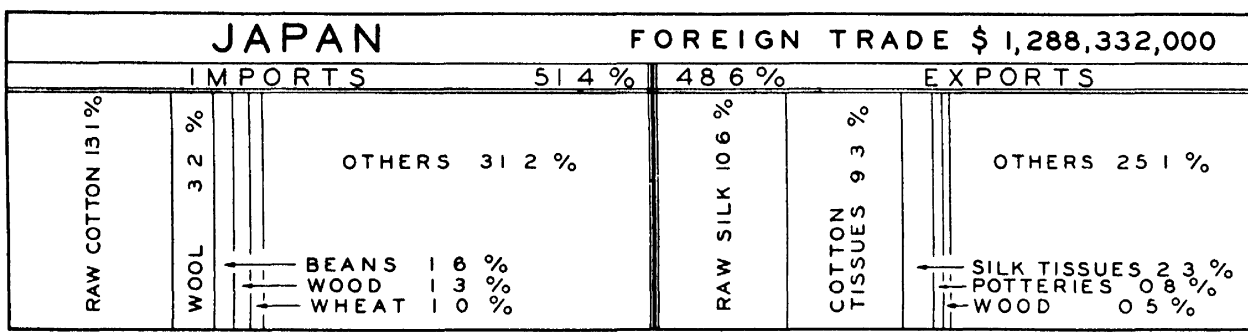


FIG. 174 JAPAN'S FOREIGN TRADE A 13-year average just preceding World War II Note a large percentage of the imports was food material (See also Figs 161 and 173) (From *Stateman's Yearbook*)

this corridor by aerial and amphibious operations until they converged on the Americas would have made invasion of the Americas relatively easy. Luckily for the Allies, however, Japanese resources and industries could not replace their airplane losses rapidly enough, and a new aeronautical geography developed by the American strategists averted this Japanese aggression. Recently a flight of three B-29's made a historic flight of 6645 miles from Hokkaido to Washington, D. C., in less than 29 hours. This is evidence that the suicide plane attacks upon American cities planned by the Japanese came perilously near to realization, and might have succeeded if the war had not been won quickly by the Allies.

It would seem that Japan's global opportunities are now problematical. The highly agricultural countries of China, India, Indo-China, and the East Indies are all in need of manufactured goods, and these areas have many of the raw materials needed by Japan. A study of Japan's global trade shows that China has been a good neighbor in this respect, but that previous to World War II the United States was first both in import and export goods (Fig. 161)

URBAN CENTERS. It was amazing to note the extent of urbanization in Italy (see page 239). It is more startling to find that Japan proper has not only the third largest city in the world (Tokyo), but in an area smaller than California are 4 cities (Tokyo, Osaka, Nagoya, and Kyoto), each with more than 1,000,000 people, 6 with more than 500,000 each (add Yokohama and Kobe), and nearly 10 with more than 100,000 people each.[1] Although many of the cities of Japan have been demolished by bombings, and two (Nagasaki and Hiroshima) almost wiped out by atomic bombs, the cities will be discussed much as they were prior to World War II. Out of the chaos wrought in Japanese cities, it is hoped that better-planned and better-constructed cities with earthquake-resistant buildings will arise.

Tokyo, capital of the Empire of Japan on the island of Honshu, and the largest city in the country, is located at the head of *Tokyo Bay* on the banks of a small river which is too shallow to accommodate ocean-going vessels. Yokohama, 18 miles nearer the sea, serves as the port city for Tokyo.

Several factors account in part for the size and significance of Tokyo in the Japanese Empire. It is the seat of the national government and contains the palace of the Emperor, it has the headquarters of the great financial institutions of the country, and, in addition, the Imperial University and the great art and museum centers of Japan are located there. The suburbs of the city furnish the site for many large factories and the residences for tens of thousands of workers. Much of the manufacturing of Japan is done in the homes, and large quantities of this type of materials may be seen for sale in the shops. In many places whole streets specialize in the sale of one small article, as some toy or a particular kind of lace. First-class railway connections from Tokyo are made with every large city on the island, the most important of which is *Yokohama* and its splendid harbor.

Osaka, *Kyoto*, and *Kobe*, also on Honshu, together form one of the world's great urban agglomerations. The sites of these cities are on the low plain stretching from *Lake Biwa* to *Osaka Bay*. Both Kobe and Osaka, lying opposite each other on the bay, are rapidly growing together. Kyoto, west and south of Lake Biwa, was formerly the capital of Japan and is connected by rail with both Osaka and Kobe, about 30 miles away. Kyoto, the site of many ancient and beautiful temples, is still the stronghold of Buddhism in Japan. Osaka, a modern industrial center, specializes in the production of cotton textiles, iron and steel products, railway equipment, and electrical machinery. Kobe, besides being a great port, is a shipbuilding center and the home of many industrial establishments The immediate hinterland of these cities is an intensively cultivated plain where agriculture reaches a peak of high production. The garden crops, fruits, and cereals find their chief markets in the great near-by urban centers.

Nagoya, on the great trunk railway of Japan 235 miles from Tokyo, is situated near the head of the shallow *Atsuta Bay* about 30 miles from its port city, *Yokkaichi*, and 94 miles from Kyoto The hinterland of Nagoya is a rich plain producing

[1] Davis, D H., "Some Aspects of Urbanization in Japan," *Life in Asia*, McKnight and McKnight, Bloomington, Ill., 1936, pp 302-317

cereals such as rice, wheat, and millet, and in addition tea, silk, and cotton. For centuries Nagoya has been the home of Japan's leading pottery works and enameled wares, these products being well known all over the world.

JAPANESE OUTLOOK. Japan is not as large as California but it supports more than ten times as many people. The problems facing Japan are rendered more complex because the region is so mountainous, less than 16 per cent of the land being arable. Although the population per square mile is less in Japan than in Britain, Belgium, or Germany, the density in relation to arable land is greater. This is shown by the fact that 43 per cent of the land is cultivated in Germany, 40 per cent in Belgium, and 24 per cent in Great Britain. Moreover, Japan is poor in coal, petroleum, and the most useful minerals. In addition to this, population is increasing rapidly, and in many countries Japanese immigrants are not welcome. The people will not be permitted again to engage in such heavy industries as are converted easily to war potentialities. Concentration on small goods for which Japan is so well-known serves a worth-while outlet for their energies. No doubt, Japan will be permitted to engage in all phases of peacetime pursuits, and raw materials for such activities will be made available.[1]

[1] Ashmead, Lt. John, "The Japs Look at the Yanks," *The Atlantic Monthly*, April, 1946, Vol. 177, pp. 86-100.

22

Lands North of the Central Eurasian Barrier

PRIMITIVE MAN must have found living conditions much less favorable north of the Central Eurasian Barrier than south of it. Not until after the beginning of the Christian era did the people of northern Europe begin to make much progress in overcoming adverse environmental conditions. Cooperative enterprise seemed to flourish better in the mild climates south of the barrier than in the more rigorous climates of the central and northern parts of the continent. Due to increased population, economic pressure, the desire for better living conditions, and improved methods in the management of natural resources in southern Eurasia, the people were impelled to extend their sphere of activity into the lands north of the barrier. On account of the more rigorous natural conditions, the mental and physical stimuli were more effective in the encouragement of human activities in the northern than in the southern parts of Eurasia.

The lands north of the Central Eurasian Barrier extend from the plains in western France to the Bering Strait. The distance is less than 7000 miles, whereas the greatest extent of the lands south of the Barrier is about 12,000 miles. This difference is due to the fact that the distance north of the Barrier is measured very near a great circle which is the shortest distance between the two extremities of the Central Barrier. Near its western terminus, the land north of the Barrier is only 300 miles wide whereas the distance is more than 2000 miles in its broadest section—that is, from the Hindu Kush Mountains to the Arctic Ocean.

There is no place where a north-south mountain range other than the low Urals, or a desert, or a water body other than rivers crosses the lands north of the Eurasian Barrier. For this reason, land travel and communication in all directions are comparatively easy. The difficulty in crossing the Central Barrier greatly retarded the early penetration of Grecian, Roman, and Oriental influences into northern Europe and Asia.

The lands north of the Central Eurasian Barrier may be separated into three divisions—namely, the *Northwest Highlands* including the old worn-down mountains of northwestern Europe, the *West Central Highlands and Associated Lowlands* which are adjacent to the western portion of the Central Barrier; and the *Interior and Northern Plains and Uplands* which extend from the Pyrenees to the Bering Strait (Fig. 136). Each of these divisions and its component parts will be described separately.

NORTHWEST HIGHLANDS

At *Hammerfest* on the northern Norwegian Coast one may see the sun at midnight for more than two months every year, and although it is nearly 300 miles north of the Arctic Circle this port never freezes—thanks to the *Icelandic low* and the *North Atlantic Drift*. Eighteen hundred miles southwest of Hammerfest in the westernmost part of France is Brest, one of the chief ports through which assistance was carried to our allies in World War I. Hammerfest and Brest, respectively, are at the northern and southern limits of the Northwest Highlands. These partially subdued highlands are a portion of the very old land of Eurasia, and are included mostly within the British Isles, Finland, Norway, Sweden, and western France (Brittany).

BRITISH ISLES AND BRITTANY. The continental shelf in the vicinity of the British Isles is more

than 500 miles wide. On this shelf are several thousand islands of which Great Britain and Ireland are the largest If the sea floor were elevated a few hundred feet, most of the British Isles would again become a part of the continent. The *Upland of Brittany,* a section of this region, is separated from the highlands of *Great Britain* and *Ireland* by a drowned lowland, the *English Channel* Other portions of the drowned lowland between the islands and the continent are occupied chiefly by the *Strait of Dover* and the *North Sea* (Fig. 175).

Brittany (*Armorican Plateau*) on the continent is an old, worn-down mountain region projecting from the mainland into the Atlantic Ocean, and is the southernmost portion of the Northwest Highlands. The distance from southern Brittany to the *Faroe Islands* is about 1000 miles, which in latitudinal extent corresponds to that from Quebec to the Hudson Strait.

The southeastern portion of Great Britain, approximately one third of the island, lies in the Central Plains of Europe where the structure and the topography resemble those of the plains of central France, but because of its separation from the continent and its close association with the rest of the island, it is included here (see Fig 136).

The British Isles and Brittany Region, small and large sections and islands alike, is more or less rugged. The rugged features are disconnected, however, in some places by water and in others by land. Great Britain is separated from Ireland by the *Irish Sea* and from Brittany by the English Channel. Ireland is like a saucer, having lowlands in the center which are nearly surrounded by low mountains.

The mountainous sections of Great Britain are divided into three parts by the *Bristol Channel* and *Severn Valley* in the south, and by the *Solway Firth* and *Tyne Valley* in the north. The *Scottish Highlands* are divided into two major parts by the *Midland Valley,* which is a rift lowland and the really rich area of the northern section. South of the Bristol Channel and Severn Valley is the rugged, southwest-projecting peninsula of *Devon* and *Cornwall,* the latter renowned through centuries for its tin mines. Between the northern and southern highlands are the *Pennine Chain,* the *Welsh Highlands,* and the *Cumbrian Mountains,* the last of which contain the well-known *Lake District.* The Cumbrian Lake District is much like the Adirondacks. All of the British Isles and Brittany have the appearance of old, worn-down mountains. There are no sharp crags or peaks, all sections having been planed off until even the highest mountains have rounded summits.

In a remarkable way the surface features reflect the underlying structure. The Scottish Highlands both north and south of the Midland Valley contain ancient crystalline rocks. The Midland Valley is a great block of sedimentary materials deposited in a rift valley between the crystalline highlands on the north and on the south.[1] This valley, which is rich in coal, supports an important iron industry, especially at and near Glasgow.

The Lake District, Welsh Mountains, the *Highland of Cornwall,* and the Uplands of Brittany are all composed of crystalline cores surrounded in part by sedimentary layers. The Pennine Chain, an eroded north-south folded ridge, exposes a crystalline core which is flanked on both east and west by sedimentary rocks which include much coal.

Scandinavian Highlands and Finnish Peneplain. Comprising an area nearly twice that of Texas, the Scandinavian Highlands and Finnish Peneplain include all of Norway, Sweden, Finland, and a northwestern portion of Russia. Two oceans (Atlantic and Arctic), three seas (*North, Baltic,* and *White*), two gulfs (*Bothnia* and *Finland*), and two lakes (*Onega* and *Ladoga*) almost encircle this great, mountainous Eurasian appendage. The lake region between the Gulf of Finland and the White Sea forms the only land boundary. A small section of the southern part of the Scandinavian peninsula lies in the Central Plains of Europe.

The slow but mighty forces of snow and ice have profoundly affected the topography in this ancient, peneplained, mountainous region. Thousands of lakes were created by the uneven deposition of glacial drift and by the weight of the glaciers, and, in addition, the rounded, level summits of many mountains and plateaus remain as evidences of glacial erasure. The mountain backbone of the Scandinavian Highland mass swings near the At-

[1] Aitchison, Alison E., "Lowland and Highland Farms in Scotland," *Journal of Geography,* December, 1931, Vol 30, pp 365-377

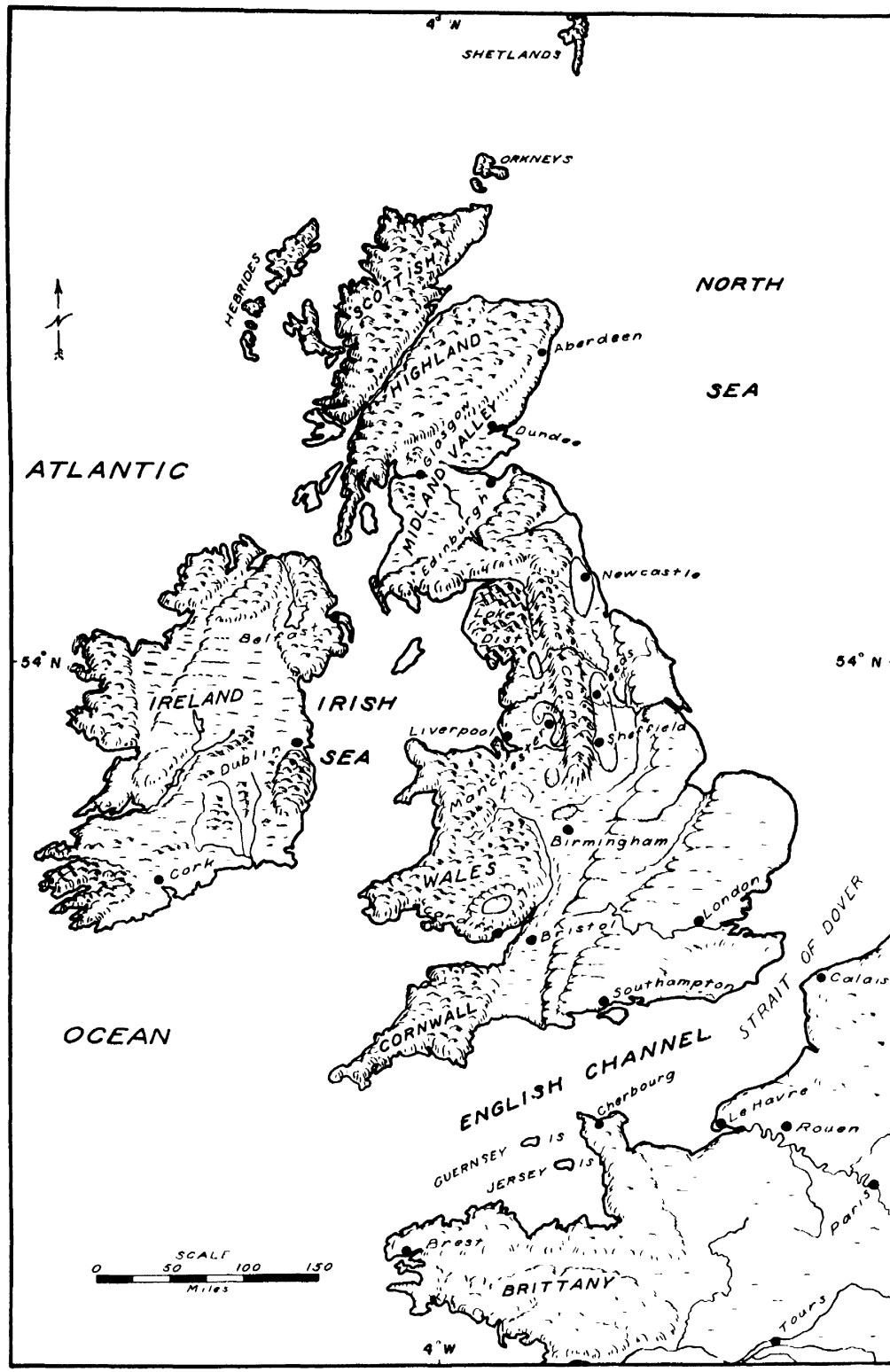


FIG 175 BRITISH ISLES The southeastern part of Great Britain is really in the Central Lowland The rugged sections of the island may be visualized from the diagrammatic sketch. The Normandy beachhead between Calais and Cherbourg is well shown on this sketch

lantic coast, and here glaciers have incised numerous, deep, beautiful fiords, whereas the Baltic slope is more gentle and the streams are longer. In the north the main mountain chain, the *Kjolen Mountains,* extends eastward in an arc from northern Norway through Sweden and thence southward into Finland where the mountain mass has been reduced to a lake-spotted peneplain. That portion of the Scandinavian Peninsula bordering the Baltic Sea is a coastal plain, made up largely of sediment brought from the ancient highlands by streams and ice. The southern end of the coastal plain encloses an old, glaciated, mountain block known as the *Smaland Plateau.* Ancient crystalline rocks form the core of this plateau, whereas on the flanks younger sedimentaries have been deposited by streams and glaciers.

COUNTRIES WITHIN THE NORTHWEST HIGHLANDS

Within the two regions of the Northwest Highlands are five countries. Two of these (*United Kingdom* and *Irish Free State*) are island countries, two (*Norway* and *Sweden*) are peninsular, and one (*Finland*) is continental.

THE UNITED KINGDOM

The United Kingdom of Great Britain and Northern Ireland includes all of the island of Great Britain and a small portion of Ireland.[1] The area is a little less than 100,000 square miles or almost equal to that of Wyoming. The population is approximately forty-eight million, about one third that of the United States.

Natural Features

The insularity of the United Kingdom no doubt has been the chief factor contributing to the trend in the development of the nation. Britain has not been successfully invaded for more than 800 years, thanks in part to the definite barrier boundary. Of course, the shallow surrounding sea has helped immeasurably in furnishing a food supply, and a training area for a large merchant marine, a powerful navy, and an efficient amphibious army.

The major land features of the United Kingdom have been described (see pages 287 and 288). The climate is cyclonic and marine. At Aberdeen, Scotland, the average annual temperature is 46° F. and at Greenwich 49.5° F. At the former station the mean annual rainfall is 30.4 inches and the dependability (60 years' record) 83 per cent; whereas at the latter station the rainfall is 24.3 inches and the dependability (88 years' record) is 77 per cent (Fig. 128). There is much more rainfall on the western coastal lands than on the eastern The high latitude and high humidity render evaporation low, so that, even though the precipitation is not high, no part of the country has a deficiency.

The mature soils are podzols. On the more level lands farming and orcharding are practiced, but on the generally rugged land, because of the cool climate and high rainfall, the raising of cattle, sheep, and goats is very important.

Tin is mined in the mountains of Cornwall, but the leading mineral product is coal, which is secured from the flanks of the mountains in *Wales* and *England.* Great Britain has much low-grade iron ore but only a part of it is secured from the highland region.

Not more than 6 per cent of the United Kingdom is still forested. In early times the forested areas were depleted largely for the smelting of ores with charcoal. Today, about two thirds of the usable land is in meadows and pastures and about one fourth is in seeded grasses and clovers Most of the permanent pastures are in Ireland and the Scottish Highlands, moors and heaths prevailing over much of the latter.

Cultural Features

The transformation of the landscape in the United Kingdom has furnished stirring episodes for legend, history, and literature for many hundreds of years, in fact reaching back into prehistoric times.

Scottish history has been one of almost continuous struggle to hold the rich Midland Valley. Dun-

[1] One should carefully discriminate among the following expressions United Kingdom (see above), Great Britain (largest island), England (only a part of Great Britain), British Empire (all British-owned and -controlled territory), and British Commonwealth (Union of British self-governing dominions)

can, a lowland king, became the chief character in the tragedy of Macbeth.[1] Irish resistance to English encroachment on their liberties supplies abundant thrills for song, story, and legend. The London Tower was built by the Norman invaders to protect the ford in the *Thames*. Places made famous by English and Scotch writers are familiar to every student of literature. James Watt, associated with the improvement of the steam engine, was a Scotchman. It would be futile to try to make a comprehensive list of items covering the historical elements of the United Kingdom.

Among the contributions of the United Kingdom to the animal industry are some of the breeds of cattle, sheep, horses, and swine so well known in our own country and in all other parts of the world. Jersey, Guernsey, Ayrshire, Hereford, Galloway, and Aberdeen Angus cattle; Lincoln, Leicester, Shropshire, and Cheviot sheep; Berkshire, Hampshire, Yorkshire, and Cheshire swine; and Clydesdale, Shire, Suffold, Cleveland Bay, and Shetland horses are familiar names in nearly every farm home in the United States. (Fig. 176).

Of the manufacturing activities, the iron and steel and associated industries are outstanding. The leading districts are the Midland (including the Sheffield and Birmingham areas), the Cumberland region, the *Scottish Lowlands*, and southern Wales. Wool, cotton, and linen textiles rank high in value. Manchester, Leeds, and Edinburgh are leading textile centers. Leather goods, pottery, and cutlery factories employ many thousands of people. The fisheries are world renowned and have provided an adequate sailors' training school for the British navy and merchant marine. The British render services to other nations by the use of their merchant marine, they ship manufactured goods to all parts of the world, and they need to import much of their food supplies. In this way, therefore, they are able to furnish a ready market for some of the surpluses of American cotton, wheat, and meat (Fig. 177).

Because of the insular location, the small size, and population density, the British early developed the shipbuilding industry; these circumstances also led to the development of a great navy and merchant marine. It became necessary to keep the sea lanes open for trade with outside possessions as well as with other nations, and this in turn led to mastery of the seas. The Axis wrought havoc with this trade in World War II, not only by cutting off trade routes through the Mediterranean Sea and the Strait of Malacca to the Far East, but by the development of air power.



FIG. 176. SHEEP IN WICKER PENS IN SOUTHERN ENGLAND. The wicker pens may be folded and moved from place to place as the needs of the sheep may require. (Courtesy Travel and Industrial Development Association)

The tremendous strength of Allied naval and air force finally overcame the Axis, but left the United States supreme in the air and in both naval and marine strength on the sea.

URBAN CENTERS OF THE UNITED KINGDOM. England, with an area a little less than that of Florida, has a population of nearly 40 million. Most of the people live and work in cities and towns which are close to each other except in the mountainous areas. During World War II frightful damage was wrought on the towns and cities of this part of the United Kingdom by German bombs.

Most of the large cities of the United Kingdom are accessible to ocean-going vessels, and are connected with each other by good railways, highways, and air lines. Among those that are inland are Sheffield, Leeds, and Birmingham. Of eleven cities with more than 400,000 population each, three

[1] Adam, Robert M., and Kenneth, John H., "Nature Conservation in Scotland and Furth of Scotland," *Scottish Geographic Magazine*, September, 1944. Vol. 60, pp. 45-50. Some marvelous pictures.

(London, Birmingham, and Glasgow) have 1,000,000 or more each and one (London) has more than 8,000,000. In the United Kingdom are 56 cities, each with more than 100,000 people. There are three large cities on the east and south coasts of England.

London had its beginning at the lowest fordable point on the Thames River and also at the head of tidewater. Naturally the site became a crossroads for routes of travel and transportation. Moreover, the Thames estuary is opposite the mouths of two important rivers on the continent, thus improving the position of the city for trade. *Greater London* is the result of the coalescence into one great urban unit of a large number of growing villages. Like New York City, the problem of transportation within the city is a critical one, solved in part by the use of subways ("tubes") London owes its greatness in large measure to the fact that it is the capital of the British Empire. It is certain to be a focal point for global aviation Although the city suffered severe devastation during World War II, it already is emerging with newly conceived plans for a finer rebuilt city for posterity.

Southampton, on the estuary of the River Test, is on the north shore of the English Channel. It is London's chief gateway to the Channel and is known best as a port of call for transatlantic passenger traffic. Fast trains and air service connect the port with all parts of the island. One of the special features of the harbor is the double tide, the first from the west, and two hours later the one from the east.

Newcastle, on the Tyne estuary eight miles from the ocean, owes its significance to the immense store of coal in the vicinity. The place was first called "Monkchester," but the name was changed when the conquering Normans built a large castle on the site.

On the estuaries of the west coast of Great Britain are several cities which derive much of their prominence from their trade with the Americas.

Liverpool, on the east bank of the Mersey estuary, three miles from the sea, lies on a continuous slope of varying gradient—very steep in some places. Commercial intercourse of the city extends to all parts of the world, but because of its fine harbor and position on the west coast of the island, trade with the Americas and Australia predominates (Fig 22). Cotton is the leading import; grain ranks second; and the third, of enormous value, is chilled and frozen meats. Lumber imports are very heavy and fruits arrive in ever-increasing quantities. Liverpool is the second largest flour-milling center in the world Most of the other industries are closely related to shipping such as oil-pressing, cottonseed cake, tanneries, the making of rope, sacks, and bags, and the products of grain processing. The near-by chemical and pottery industries are of considerable significance.

Manchester, on a plain near the west slope of the Pennine Chain 30 miles east of Liverpool, is accessible by large ocean-going vessels by way of the *Manchester Ship Canal* which, through most of its extent, follows the Mersey Valley. The site of Manchester, on glacial sands, gravels, and clays, is reflected in the thousands of houses and other build-

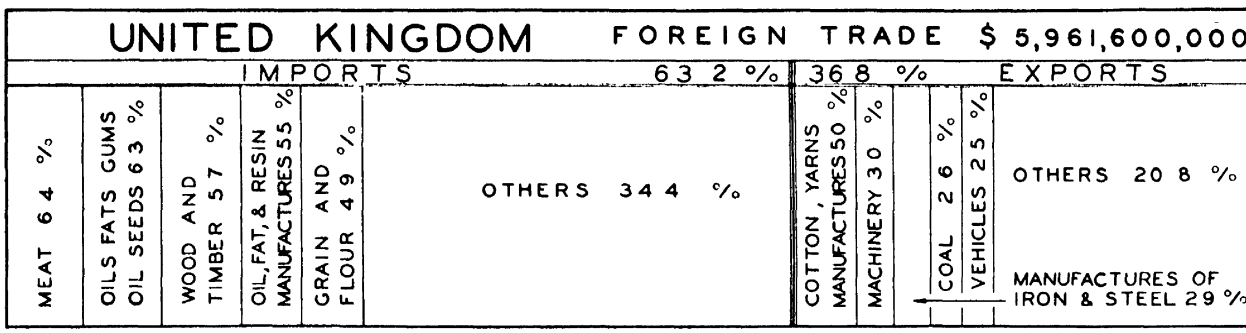


FIG. 177. UNITED KINGDOM'S FOREIGN TRADE. A 10-year pre-war average including 1938 Note the great excess of imports over exports (See also Fig 22) (From *Statesman's Yearbook*)

ings made from brick. A network of canals, railways, and highways connects Manchester with other parts of England. This is one of the greatest centers in the world for the manufacture of cotton goods. The chemical and dyeing industries are closely related to textile manufacturing. Because of the ship canal Manchester shares many of the interests that dominate the life of the people of Liverpool.

Bristol, with its nucleus in the narrow, deep valley of the *Avon,* is only eight miles from the Bristol Channel—the drowned valley of the River Severn. Harbor improvement has made the city accessible to all but the very largest ocean-going vessels. Liverpool's trade with the Americas is shared with Bristol. Petroleum and its products account for a considerable portion of the imports.

Cardiff, on the north shore of the Bristol Channel near the Welsh Highlands, is one of the leading coal-exporting cities of the world. Evidences of Roman occupation may be seen. In the ninth and tenth centuries the place was in the hands of Scandinavian raiders. Cardiff shares the same type of prosperity that characterizes Liverpool and Bristol.

Three large interior cities owe their growth largely to manufacturing activities that center on the use of iron and coal. *Birmingham,* on a plain in the midst of England's greatest coal fields, is renowned for the manufacture of hardware and articles of high value in proportion to the amount of raw material entering into their composition. Small arms, jewelry, screws, nails, pins, needles, and cutting tools are illustrative of a major interest. Although in the center of the island and on a divide, the city is only 400 feet above sea level, and its position on a plain 100 miles northwest of London makes the city a natural center for travel, transportation, and trade. Near-by *Coventry* was one of the most bombed industrial cities in central England in World War II.

One of the best known cities in the world for the manufacture of cutlery is *Sheffield,* located at the junction of several small valleys at the eastern base of the Pennine Chain. It has easy and natural communication in every direction and its prosperity is based on the manufacture of steel and allied industries, such as steel plates for war vessels and ocean liners, castings for engines and hydraulic presses, and rails, stoves and grates.

Leeds, a nodal city at the narrowest point in the Pennine Mountains, derives its importance from its halfway position between London and Scotland, and from its water and rail connections up and down the *Aire Valley* and through the highlands. The activities of the city center around the manufacture of industrial, transport, and agricultural equipment. Textile, leather, and clothing industries, too, occupy the interests of a large number of people.

Nottingham, Leicester, and *Derby* are outstanding in the manufacture of knit goods.

Four Scottish cities deserve some attention. Two of them (Glasgow and Edinburgh) are in the Midland Valley and two on the east coast north of the Firth of Forth (*Dundee* and *Aberdeen*)

Glasgow, on the *River Clyde* in the Midland Valley, spreads far onto the hills that confine the lowland. In the eighteenth century the river was fordable 12 miles below the city, but it has been deepened so that today the largest ocean-going vessels can dock in its spacious harbors Proximity to rich fields of coal and iron ore accounts for the manufacture of locomotives, steamships, marine engines, and many other products related to the iron industries. Textiles, clothing, food products, rubber goods, the smelting of lead and zinc, the making of brass and glass products and dozens of other manufacturing activities are characteristic of the interests of the people of Glasgow.

Edinburgh, occupying a group of hills and valleys facing the *Firth of Forth,* has been known for hundreds of years as an educational and book making center. The manufacture of maps and paper, bookbinding, and lithography are all related to the major interests of the people.

Of the numerous towns in Ireland only two will be discussed in this treatise, the first (Dublin) is in Eire (see page 295) and the second (Belfast) is in Northern Ireland.

Belfast, at the head of a well-sheltered estuary in northeastern Ireland, has rich flax areas and iron-ore fields in the immediate hinterland These resources together with the easily accessible coal just across the Irish Sea have combined to make Belfast one of the great shipbuilding and linen-manufacturing cities of the world.

AN APPRAISAL FOR TOMORROW. Of the 48,000,000 people (1942) in the United Kingdom before World War II, fewer than 2,000,000 were engaged in agriculture and only 25,000 in the fishing industry. Since the people cannot produce enough food to satisfy home needs, and since the vicissitudes of war always threaten food imports, the problem of increasing agricultural production is vital. The stress of war brought much idle land into productivity. It is probably true that technological unemployment does not affect the fishing industry as much as it does manufacturing and agricultural industries. More people, therefore, should be encouraged to engage in fishing as a means of making a living.[1]

The English Channel, North Sea, and Strait of Dover hinder easy and rapid transportation service between Great Britain and the continent, not only because these are water barriers but also because they are subject to frequent storms. Serious consideration has been given to the proposal of tunneling under the Strait of Dover.

The time seems rapidly approaching when British coal resources will be running low. Something must be done soon to meet the exigencies of this critical day. The use of nuclear (atomic) power may be a solution to this problem.

All of the United Kingdom is rich in antiquities and in educational, historic, and literary lore. Millions of people revel in recreation that includes such features. It would be profitable to make such resources more easily available to persons who are interested in them.

For several hundred years the British have been busy building a world-wide empire and a navy which has been in control of the sea. Naval supremacy has been lost, but the Empire stands. Shall the British strive to regain their former enviable position in world affairs?[2] Is it desirable in the evolving world situation? Can Britain hold by diplomacy what she has achieved by hard work, sagacity, and sometimes by force?[3]

[1] Jones, Rodwell, "The British Fisheries," *Economic Geography*, January, 1926, Vol 2, pp 70-85

[2] Clay, Henry, "Britain's Declining Role in World Trade," *Foreign Affairs*, April, 1946, Vol 24, pp 411-428

[3] Grattan, C Hartley, "Britain's One Way Out," *Harper's Magazine*, May, 1946, Vol. 192, pp 385-393.

IRISH FREE STATE (EIRE)

The Irish Free State is one half as large as Iowa and supports a half million more people. Both Iowa and *Eire* were glaciated, but it occurred so recently in the latter that even today there are many lakes, bogs, and moorlands which, combined with the rugged mountainous areas, leave only four fifths of the country productive.

Natural Features

In structure Ireland is a near replica of Great Britain (Fig. 175). A survey of the topography of the island discloses that the major features of the larger island converge on the smaller. *Glenmore* and the Midland Valley of Scotland have their counterparts in Ireland, and the Welsh Highland and Cornwall in Great Britain have their representatives in appropriate places in the smaller island (see page 288).

An east-west rectangular plain or depression occupies the middle of Ireland, through which flows the *Shannon,* the largest river in the British Isles. The bogs of Ireland supply large quantities of peat which is used both for fuel and for building construction (Fig. 178).

Eire has a marine climate. At Valencia on the west coast the average annual temperature is 51° F., and the range is only 16° F.—less than at any place in the marine climate of North America. The rainfall at the same station averages 56 inches, with a monthly evenness of 70 per cent and a dependability of 81 per cent (Figs. 128 and 236). The last two measures are unusually high. It is probable that the island formerly was forested, but the forests must have been destroyed long ago, for most of those of today have been planted. Nutritious grasses grow luxuriantly all over the country. The mature soils are pedalfers, belonging mostly to the podzols and the gray-brown groups.

Cultural Features

One thousand years before the beginning of the Christian era this island outpost on the west margin of Europe possessed a civilization of which Plutarch wrote, "They drew this history from remote antiquity, so that of other nations is new compared with them." Recent centuries have wit-

nessed much dissension among the Irish, and their contentions with the British are well known. Today, their political status is so nearly free from British coercion that the people of Eire chose to remain neutral in World War II.[1]

Eire is an agricultural country, but most of the farm holdings are so small that the owners or tenants find it difficult to make a living. The chief

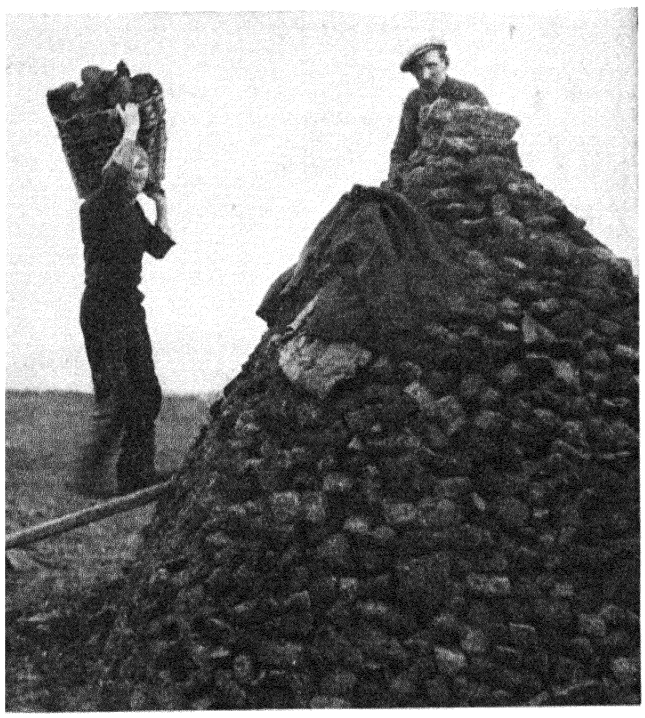


FIG. 178. STACKING PEAT. The bogs and humid climate of Ireland are ideal for the accumulation of thick layers of turf. Peat is used extensively for fuel in Ireland. (Courtesy Irish Tourist Association)

crops are vegetables (turnips, potatoes, mangels), grain (oats, wheat, barley), hay and some flax. Cattle, sheep, hogs, and poultry play a large part in the agricultural economy. The industrial pursuits center around the processing of the products of the farms. The leading imports are coal, wheat, corn, tea, and fruit, and the exports include cattle, poultry, and dairy products, bacon and hams, and malt and spirituous liquors.

CITIES AND PROBLEMS. The cities of Eire with one exception are small—a natural adjustment to the predominance of an agricultural life.

Dublin (Baile Atha Cliath), at the head of Dublin Bay midway on the east coast of Ireland, is favorably located for trade with Great Britain by way of Bristol, Liverpool, and Glasgow across the Irish Sea. Continual dredging keeps the harbor open to large ocean-going vessels. As a center of Irish resistance to English domination, Dublin has had a stormy, varied, and interesting history.

Although Eire is closer to America than is the United Kingdom, yet from an industrial and economic point of view the country faces eastward. To what extent would it be desirable for the Irish to reorient their trade relations to include more intercourse with the United States, Canada, and Latin America?

Another problem that is critical for the Irish is that of getting along with their British neighbors. Perhaps the Irish can tame or subdue the pugnatious temperaments of their leaders so more friendly relations may be realized with their former alleged oppressors.

NORWAY

Southern Norway is in the latitude of northern Labrador. The country extends 1000 miles along the border of the Atlantic and Arctic oceans, and has 12,000 miles of shoreline. More than one third of Norway is north of the Arctic Circle, the "Land of the Midnight Sun." The country almost has the isolation of an island.

Natural Features

Although Norway shares the Scandinavian Peninsula with Sweden, the land surface is more like that of Scotland, with which it formerly was connected according to geological history (see page 288). The rugged land is deeply incised by dozens of fiords on its seaward margin—the work of numerous valley glaciers flowing out of the highlands during glacial times. At the head of many of the fiords are small areas of deltaic land, about the only available space for villages, towns, and for a limited agricultural activity. The *Skerry Guard* (a fence of 150,000 islands) just off the coast of Norway provides a protected inside water passage from southern Norway to the *North Cape*.

[1] Walker, Harrison Howell, "Old Ireland, Mother of New Eire," *National Geographic Magazine*, May, 1940, Vol. 77, pp. 649-691.

Even though much of Norway is in the sub-Arctic latitude, the January temperature especially along the Atlantic coast is not much colder than that of Maryland or New Jersey. The summer days are long and mild and the winter nights are long, but not very cold. The coldest month at Bergen averages 34° F.; at Trondhjem, 41° F.; and at Tromsö, (70° north latitude) 36° F. The temperatures for the warmest month (July) at the foregoing stations are 58° F., 57° F., and 52° F., respectively. Rainfall at each of the Norwegian stations listed is abundant and quite evenly distributed through the year (Fig. 128).



Fig. 179. A Lapland Landscape. The turf dwelling and scarcity of vegetation are characteristic of life in polar climates. (Courtesy Swedish Traffic Association)

Nearly one fourth of Norway is covered with coniferous forests, 4 per cent is cultivated, and almost 75 per cent of the area is waste land consisting of rounded bare rock knobs, depressions covered with peat moss, and large areas of plateau glaciers. The waste land presents a gloomy, cheerless landscape entirely uninhabited except for a few Lapps who live a nomadic life in the far north (Fig. 179).

Cultural Features

A thousand years ago the ancestors (Vikings) of the Norwegians were bold sea robbers, ravaging the Atlantic Coast of Europe from England to the Mediterranean Sea. These skillful sailors found Iceland and Greenland, and pushed their discoveries far south on the coast of North America; all this was done 600 years before the day of Christopher Columbus. The riches of the sea and the poverty of the land have made Norway "a nursery of seamen." It is probable that the Norwegians are more homogeneous than any other people of Europe.

The long summer days in Norway enable the farmers to grow such hardy grains as oats, barley, wheat, and rye. The acreage of potatoes is relatively high, but three times as much land is used for hay as for all other cultivated crops. Cattle and sheep have a large place in the agricultural economy. Considerable transhumance is practiced between the lowland and the high summer pastures. Because of the rugged topography, poor soils, and the relatively cold climates, however, the Norwegians naturally turned to the sea to make a living.

The harvests of sea and forest furnish more than half of what the people have to sell. Cod and herring are taken in large quantities, and more than half of the whale fisheries of the world is in Nor-

wegian hands. The forest products are lumber, pulp, paper, and articles made from these products.[1]

Ten per cent of the Norwegian people are engaged in navigation and other forms of transportation—mostly services performed for people in other countries (Fig. 180). Manufacturing is continually becoming more important, but only one tenth of the country's potential water power has been developed. On the east side of the Kjolen Mountains

Oslo (Christiania), capital and chief city of Norway, is at the head of one of the largest fiords about 80 miles from the Atlantic Ocean. The harbor is deep enough to accommodate the largest vessels, but it is icebound from 3 to 4 months in the winter. Large shipbuilding yards and associated industries employ many thousands of people; and pulp mills, engineering shops, flour mills, and numerous small-goods industries supply employment for many other thousands.

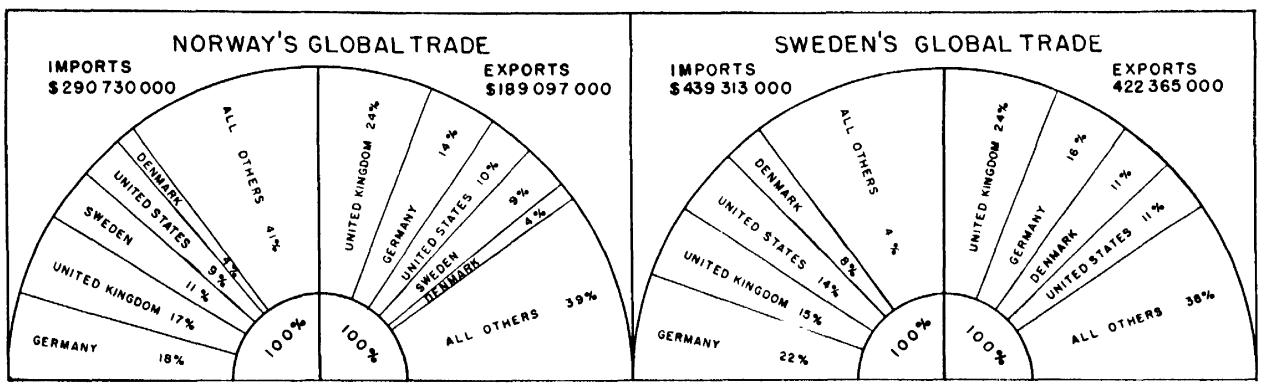


FIG. 180. GLOBAL TRADE OF NORWAY AND SWEDEN. The maritime interests of Norway are shown only in part by the graph. Fig. 182 helps one to understand the distribution of Sweden's foreign trade interests (From *Foreign Commerce Yearbook*)

are rich magnetite iron ore deposits in the *Kiruna* and *Gallivare* districts in Sweden. Because the coastal port at *Narvik* is usually free from ice in winter, much ore is shipped from Sweden to this port and then transported by boat to England, Germany, and other receiving countries In World War II, the German invasion of Norway was made partly in an attempt to prevent the movement of iron ore to England. Another objective was to control the west coast of Norway in order to guard the ocean routes to *Murmansk* on the Arctic coast and to Archangel on the White Sea.[2]

CITIES OF NORWAY. As might be expected, most of the cities of Norway are small, only two having as many as 100,000 people each.

Beautifully situated on the promontory between two fiords on the west coast of Norway is the important fishing city, *Bergen,* with an excellent harbor. The staple exports are fish and fish products. Imports include coal, grain, machinery, and food provisions. Among the industries are weaving, distilling, and the making of paper, pottery, and rope. Bergen is a center of Norway's growing tourist industry.

NORWEGIAN PROSPECTS. According to most measures Norway is a poor country in which to live, but it seems to possess the stuff of which brave, thrifty, frugal, and tolerant people are made.[3] What does the future hold for the Norse people? For one thing the sea is rich in fish, and it is certain that this resource will continue to support many people. Moreover, the training in seamanship will enable Norway to continue to man a relatively large merchant marine. The Norwegians

[1] Ekblaw, W. Elmer, "Facets of Fjord Economy A Study in Life on Sogne Fjord, Norway," *Journal of Geography,* January, 1937, Vol 36, pp 1-16.

[2] Moritzen, Julius, "Scandinavia and European Reconstruction," *Current History,* October, 1915, Vol 9, pp 304-310

[3] Oxholm, Axel H., "Country Life in Norway," *National Geographic Magazine,* April, 1939, Vol 75, pp 493-528

have large water power possibilities but not much has been developed. Thus favorable conditions for increased manufacturing and trade are available.

The mountainous terrain, the heavy winter snow, the ice on streams and lakes have helped to make Norwegians among the best skiers and skaters in the world. It is not unreasonable to expect that Norway may become a great summer and winter playground for the people of northern Europe and even of the United States. The scenery among the fiords and the midnight behavior of the summer sun are alluring to people everywhere.

SWEDEN

The population of Sweden (6,000,000) is about the same as that of Ohio, but Sweden is more than four times as large. The country is in the same latitude as Alaska, but it does not have such a diversity of climate. The mountainous backbone (Kjölen Mountains) of the Scandinavian peninsula is near the west coast with Norway on the short, steep slope and Sweden on the long, gentle, eastern slope.

Natural Features

As a part of the Scandinavian old land, Sweden belongs with Norway and Finland, but topographical conditions link the country quite definitely with Germany and Russia. Geographically, Sweden may be divided into a northern and southern part by a line from the *Gulf of Bothnia* to the *Skagerrak*. South of this line most of the country is a plain wherein the old land has been covered with clays of marine, alluvial, and lake origin. North of the line is a plateau of old ice-scoured rocks with many glacial-made lakes and much poorly drained, boggy land. The northern portion occupies 60 per cent of the country and is a rugged highland (see page 288).

The west coast of southern Sweden has a marine climate but the northern three fourths of the country is on the leeward slope of the Scandinavian mountains and has a continental climate. At Upsala, 30 miles north of Stockholm, the average annual temperature and rainfall are 41° F. and 21.2 inches, respectively. At Gothenburg the corresponding measures are 45° F. and 30.0 inches (Figs. 128 and 236). The temperature range at the former station is 32° F., at the latter 30° F., and at Haparanda at the head of the Gulf of Bothnia 48° F. Thus the south coast, with its greater salinity of ocean water and lower latitudes, seldom freezes over, whereas the Gulf of Bothnia may be frozen several months each winter.

About one half of Sweden is covered with forest—birch in the north and at higher altitudes in the south, and conifers, oak and beech in the south. The small slow-growing trees of the north do not contribute much to Sweden's wood-working industries which are based largely on raw material from the forests.

In the plains of the south the gray-brown soils are derived mostly from alluvial, lake, and marine sediment, and are the basis for intensive agricultural activity. In the north podzol and tundra soils prevail, but much of the area is boggy and the soils are abnormal.

Cultural Features

The Swedish people in their political and economic life for a long time have feared the Russians, but through trade relations in recent decades they have been closely associated with their southern neighbors, especially the Germans. In medieval days a lively trade was carried on with Constantinople through Russia, but the shift in trade routes at the close of the medieval period forced Sweden to face westward for trade outlets. The Swedish people are mainly rural. They are frugal and hard-working, with neither a great many rich nor extremely poor folk. They have one of the best consumer cooperative systems in the world.

The southern plains are the agricultural and industrial heart of the country. The leading cereal grown is oats, generally followed in order by wheat, barley, and rye. However, the hay land occupies more area than any other three crops. Potatoes are produced in large quantities, and root crops are grown especially for cattle. Among the domesticated animals, dairy cattle come first, followed by hogs, horses, and sheep. (Fig. 181).[1]

The industrial activities center around the processing of products of farm and forest. Sweden has 1700 sawmills and 1800 joinery establishments.

[1] Huntington, Ellsworth, "Farms and Villages of Sweden," *Journal of Geography*, March, 1938, Vol. 37, pp 85-90.

For a long time the making of fine steel, using charcoal instead of coke for smelting, has given Swedish artisans a world-wide renown. The best iron ore, magnetite, is abundant in northern Sweden in the Kiruna and Gällirose districts. Much iron ore is exported through Narvik, Norway, because this port is open nearly all year due to the marine climate.



FIG. 181. RURAL LANDSCAPE IN SWEDEN. This farming area located about 100 miles northwest of Stockholm is a region of numerous glacial moraines.

The mutual suspicion between France and Germany maneuvered Sweden into an embarrassing situation regarding iron ore. The Germans, who have plenty of coal, preferred to get iron ore from Sweden rather than from France. The British also used much Swedish iron ore. This situation during World War II made Swedish neutrality very difficult to maintain because both belligerents wanted Swedish iron ore, and each tried to prevent the other from getting it.

Forty per cent of the exports are iron ore and forest products.[1] This percentage is increased materially by the export of hydroelectric power to Denmark—power generated at the excellent sites in southern Sweden. Rural electrification is common and many railroads use electric power. Imports include coal, textiles, machines, non-precious metals, and chemicals. Sweden's two best customers have been the United Kingdom and Germany (Fig. 182).

The southern part of the country has fine railway and highway facilities, and a large ship canal from the Skagerrak to the Baltic Sea by way of lakes *Väner* and *Vätter* saves a long trip around the southern end of the peninsula. The Lulea-Narvik railway, like our Great Lakes waterway, serves principally in the transportation of iron ore.

[1] Anderson, Sven Axel, "Forests and Forest Activities in Sweden," *Journal of Geography*, February, 1933, Vol. 32, pp. 55-65.

CITIES OF SWEDEN. Only three cities of the country have populations exceeding 100,000, and only seven have more than 50,000. All three of the larger cities are seaports. Numerous small towns serve the rural communities.

Stockholm, capital of Sweden and largest city of the Scandinavian-Finnish region, is situated on several small islands and the mainland between a bay of the Baltic and *Lake Malar*. It appropriately has been termed the "Venice of the North." The city has a fine tideless harbor which is kept open in winter with ice breakers. The location of the city, combined with its financial and governmental functions, makes it the natural hub of distribution for the countries and cities surrounding the Gulf of Bothnia and the Baltic Sea. The manufacturing industries of Stockholm include steel, leather goods, silk, brew, and chemicals.

Malmö, on the extreme southern tip of the Swedish peninsula, is just 18 miles southeast of Copenhagen. The city, with its strategic location at the entrance to the Baltic Sea, is the principal exporting center of Sweden and is second only to Stockholm in industrial development.

Gothenburg (Goteborg), on the *River Gota* five miles from the sea, has such good railroad connections with its hinterland that it has become one of the chief ports of Sweden. The leading industrial establishments are mechanical works, sawmills, flour mills, margarine factories, and distilleries Gothenburg is the center of the Swedish shipbuilding industry.

WHAT OF THE FUTURE. The great variety of imports and large excess of imports over exports is generally an indication of the prosperity and well-being of a people. This condition in Sweden, together with the political and economic stability of the country, augur well for the future. The scenery is not grand like that of Norway, but it entices visitors to stay longer and enjoy the lakes and falls, the fishing and boating, and the multiple winter sports, such as skiing, skating, ice yachting, and tobogganing. Sweden's excellent record in keeping out of war might furnish a blueprint for some of her avaricious and pugnacious neighbors, who find themselves in a maelstrom of trouble.

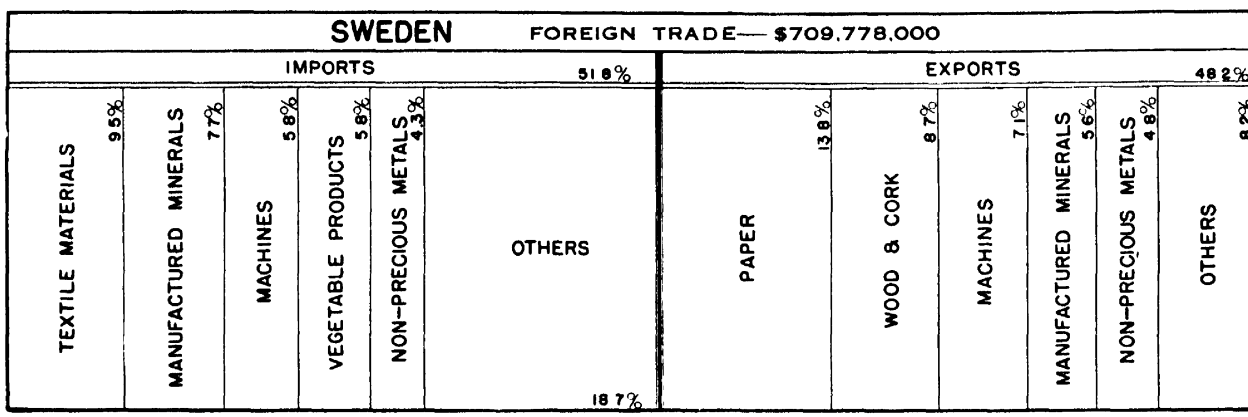


FIG. 182 SWEDEN'S FOREIGN TRADE. A 10-year pre-war average including 1936 Note the large proportion of wood and metal materials in the exports (See also Fig 180) (From *Statesman's Yearbook*)

FINLAND

The southern boundaries of Finland and of Alaska are in the same latitude from which each extends about 700 miles northward to the Arctic Ocean. The area of Finland is a little less than that of Montana, but it has six times as many people. During each year the sun shines continuously for 70 days on the north coast, and the midsummer nights are only six hours long on the south coast.[1]

Natural Features

Many millions of years ago the area which is now Finland was reduced to a peneplain, and then

[1] Fisher, Clyde, "The Nomads of Arctic Lapland," *National Geographic Magazine*, November, 1939, Vol 76, pp. 641-676

sank into the sea. After receiving some marine sediments, it emerged from the sea and was again eroded, thus uncovering some of the ancient rocks. In due time the land was engulfed in glacial ice that moved in from Scandinavia. This left the country with several large semicircular moraines, numerous radial eskers, and thousands of lakes which cover nearly one third of the country. The obstructions of ancient drainage ways by glacial debris, as happened similarly in New England, resulted in hundreds of waterfalls. Finland may be the Arctic Coast. The Finns have enjoyed political independence only during the last quarter of a century, previous to which they were under the dominance of Russia for 100 years, and of Sweden for more than 600 years.

Although only 7.5 per cent of Finland is under cultivation, agriculture is the base of the country's prosperity. Some wheat is grown in the south, rye thrives as far north as the land of the midnight sun, and oats grow even on the Arctic Coast although they do not always ripen. Potatoes and vegetables

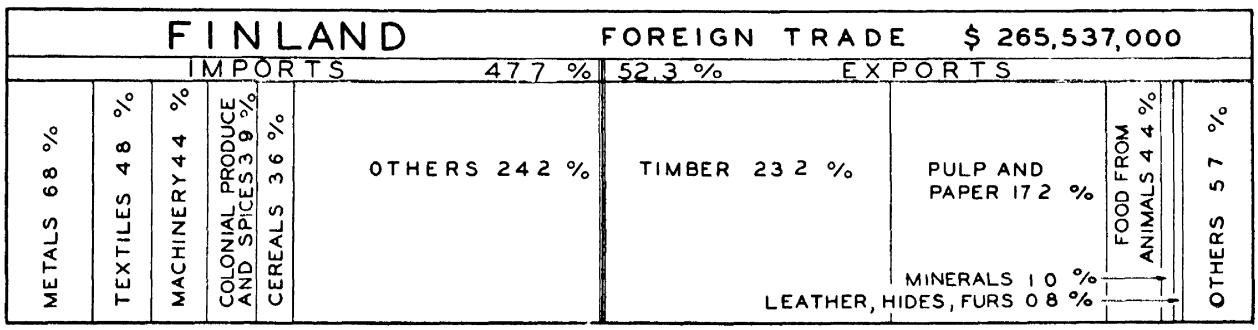


FIG. 183 FINLAND'S FOREIGN TRADE A 10-year average prior to World War II and including 1938. Note the preponderance of forest products in the exports. (From *Statesman's Yearbook*)

divided into three physical regions, namely, the *Northern Uplands*, the *Marginal Plains*, and the *Central Lakes District* (see page 288).

The high latitude and the inland position on the leeward side of the Scandinavian Highland assure Finland a severe climate. The sea on the south and west coasts is not sufficiently salty to prevent freezing during several of the winter months. Ice breakers are utilized in winter to keep the southern ports open.

Sixty per cent of the land surface of Finland is forested, about one third is marshland, peat bogs, moors, and heaths, leaving only a small percentage for cultivation. The mature soils are either of podzol or tundra type.

Cultural Features

The Finns are an ancient people, having arrived in northern Europe from Asia many hundreds of years ago. Linguistically and culturally the Finns are related to the Magyars both of whom at about the same time found their way into Europe, and to the Lapps who occupy some of the tundras along

are significant in Finland's agricultural economy. Cattle, sheep, swine, horses, and poultry thrive in large numbers.[1]

The basis of most of Finland's industries and export trade centers in her forests. The wood working and paper and pulp mills are for the most part at the inner edge of the marginal plains where the fall line and power sites are located. Some minerals are mined (nickel in the *Petsamo Region*) and stone is quarried, but only for local use.[2] Wood and wood products constitute three fourths of Finland's exports. Imports include metals and metal goods, machinery, fibers, and textiles. Her best customers are Germany, United Kingdom, Sweden, and the United States (Fig. 183). Coal is imported for metallurgical use, but wood is the chief fuel.

PEOPLE AND CITIES. Most of the Finns live near the coast or along the waterways. The significant

[1] Mead, William R., "Agriculture in Finland," *Economic Geography*, April, 1939, Vol. 15, pp. 125-134; July, 1939, Vol. 15, pp. 217-234.

[2] Kuehnelt-Leddihn, Erik R. V., "The Petsamo Region," *Geographical Review*, July, 1944, Vol. 34, pp. 405-417.

cities are ports on the coast, on rivers, or on lakes. There are nine cities in Finland, each with more than 25,000 people, and only one with over 100,000

Helsingfors (Helsinki), the capital and largest city of Finland, is in the southern part of the country on the Gulf of Finland A fine harbor which is connected by rail with a large hinterland invites ships which bring imports of coal, grain, machinery, clothing, and sugar, and take away forest and dairy products, and small manufactured goods. Helsingfors is a modern, beautiful city with wide streets, parks, and gardens, and new buildings of modern architectural design, some of which were badly damaged by bombing in World War II.

The Outlook. The Finns have done well, considering the handicaps of severe climate, meager resources, remote location, racial disadvantages, and proximity to powerful neighbors. The climate has been conducive to sturdiness, the dearth of natural resources has stimulated intellectual and spiritual resources, and not always have the Finns clashed with their neighbors as they have within the last decade. In fact, they have learned valuable lessons in thrift, economic stability, and industrial enterprise from their Swedish friends. The forests are a mighty asset, and will continue so through wise management. Only a fraction of the water-power resources have been developed, and they offer large opportunities for the expansion of manufactural activities. Finland's unfortunate adventure into totalitarianism should fortify the determination to promote the interests of her people by democratic processes Her experiment in consumer cooperation has turned out well, and is a step in the right direction.

23

Lands North of the Central Eurasian Barrier (Continued)

WEST CENTRAL HIGHLANDS AND ASSOCIATED LOWLANDS

THE WEST CENTRAL HIGHLANDS and Associated Lowlands skirt the Central Eurasian Barrier on the north from northern France to the Black Sea. Much of the area is old geologically, formed of ancient rocks much eroded, uplifted, and then worn down again. The higher portions generally are composed of hard rocks that have resisted erosion, and the lower areas, as a rule, have resulted from the more rapid wearing away of soft rocks. Valleys throughout the West Central Highlands are usually fertile and sheltered, but the higher portions are often bleak, unproductive, and ordinarily forest-covered.

This division has some of the most densely populated and intensively industrialized areas in central Europe. Here also are well-known cultural centers. Beautiful scenery in the Rhineland and other mountainous sections and numerous health resorts attract many tourists and vacationers. The principal regions are the *Rhenish Highlands*, the *German Uplands and Bohemian Plateau*, the *Carpathian-Transylvanian Highland*, and the *Hungarian Plain*.

RHENISH HIGHLANDS. The Rhenish Highlands derive unity from the *Rhine River* and its tributaries which drain most of the area. (See Fig. 184.) In the center of the region is a strategic crossing of two routes of transportation and travel—namely, the *Rhine Valley* (north-south) and the *Lorraine Gateway* (east-west)

The principal physiographic features of the Rhenish Highlands are in the north, (1) the *Ardennes Mountains* and (2) the *Slate Mountains;* in the middle, (3) the *Odenwald* and the *Lorraine Depression*, in the south, (4) the *Vosges Mountains* and the *Black Forest* (Schwarzwald), and (5) the *Middle Rhine Lowland*, a detrital-filled rift valley mostly between the Vosges Mountains and the Black Forest. From the rift valley northward the Rhine flows through a narrow gorge in the Slate Mountains.

The Rhine, with its headwaters in the Alps and its numerous small tributaries, forms the principal drainage system of the region. The most remarkable physical feature of the entire area is the rift valley. It was formed in several sequential steps: (1) lateral east-west pressure caused the Vosges-Black Forest dome, (2) lateral east-west tension caused the dome to split at the crest, making a deep depression with precipitous walls; and (3) deposition of debris for thousands of years so that it now partially fills the rift valley. In the valley a series of terraces on each side of the river rises to the forested, vine-clad foothills of the Vosges Mountains and the Black Forest.[1]

Northward from these two mountain masses is the Lorraine Gateway connecting the central lowland of Germany and the *Paris Basin*—a route through which millions of people have surged for hundreds of years, sometimes following peaceful

[1] Mutton, Alice F. A., "The Black Forest: Its Human Geography," *Economic Geography*, April, 1938, Vol. 14, pp. 131-153.

pursuits of trade, but too often bent on each other's destruction.

The Rhenish Highlands in the north consist of the Ardennes, chiefly in Belgium, and the Slate Mountains in Germany. Into the latter the Rhine

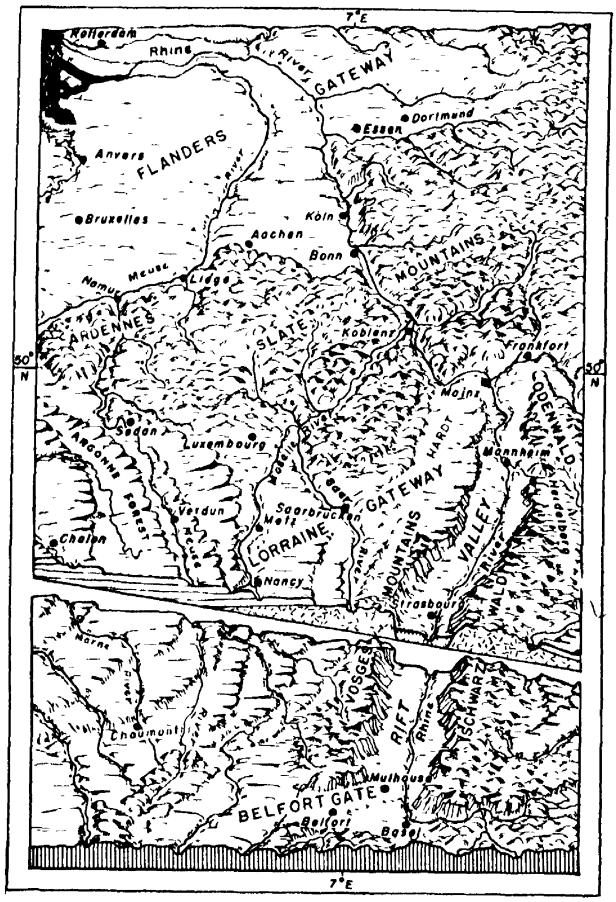


FIG. 184. RHENISH HIGHLANDS Note the gorge through the Slate Mountains and the structure of the rift valley as shown in the vertical section Three important gateways are sketched here also Some of the names have not been anglicized.

River has incised a narrow gorge, which in places has precipitous slopes. The German lyric poet, Heine, has popularized one of these steep precipices in his poem, *Die Lorelei.* The falls and rapids in the gorge formerly were a serious handicap to river transportation, but the construction of locks, canals, and other channel improvements has made the Rhine one of the great inland waterways of Europe.

The core of the highland areas of the region is, for the most part, ancient crystalline rocks. However, the flanks of the highlands are underlain by sedimentary strata which extend outward in all directions. The Ardennes and the Slate mountains present an almost flat-topped skyline, but centuries of stream erosion have carved numerous valleys into the ancient rocks, giving the area a dissected plateau appearance.

Along the northern sedimentary flanks of the Ardennes and the Slate mountains are some of the world's richest coal beds. Another important deposit of coal, although not so extensive, is in the *Saar Basin* on the southern flanks of the Ardennes. Iron ore deposits are abundant in Luxembourg and in western Lorraine; and north of Mulhouse in the rift valley are valuable deposits of potash. Throughout the area stones such as marble, slate, limestone, sandstone, and schists are used for building purposes. The lead, zinc, copper, silver, and gold ores have been nearly depleted because of the many years of exploitation. A large part of the Rhenish Highlands is in Germany (see pages 320-325).

GERMAN UPLANDS AND BOHEMIAN PLATEAU. The German Uplands and the Bohemian Plateau, lying east of the Rhenish Highlands and north of the Alps, form an area about the size of Nevada and are nearly rectangular in form. The region extends to the Central Plains on the north and eastward to the *Moravian Gateway.* Most of the region is in Germany and Czechoslovakia (see pages 307, 308, and 322). Although considerable topographic diversity exists in this region, the natural boundaries are quite definite and lend sufficient unity to the area for the purposes of this discussion (Fig. 185).

Most of the area lies at an altitude of more than 1000 feet. Stream erosion has continued so long that the land is well drained and now great rolling expanses covered with pastures, green forests, or neatly cultivated plots dominate the landscape. This type of topography with moderate to gentle relief is prevalent in the south and is typical of the areas between the mountain ranges. The mountains, in general, are forested and, through centuries of associating forests with the mountains, some of the mountains are called forests. For example, the *Bohemian Forest* means the Bohemian Mountains; and the same is true of the *Thuringian*

Forest and the *Black Forest* (see page 303). Some of the other mountain ranges having the rounded, forested summits are the *Harz*, the *Ore*, the *Sudetes*, and the Oden Forest. Most of the mountain ranges of the area are less than 3000 feet high. The Bohemian Basin and the Bohemian Plateau lie within a U-shaped formation of ancient, mountain blocks —namely, the Sudetes, Ore Mountains, and the Bohemian Forest. The region is drained by four principal river systems: (1) the *Rhine*, (2) the *Weser*, (3) the *Elbe*, and (4) the *Danube*. Tributaries of each of the larger rivers, radiating in every direction, have incised many mature valleys into the area. Centuries of exploitation account for the almost complete removal of the scanty supplies of minerals in a region where there never was much mineral wealth. However, three minerals are still found in considerable quantities—coal, potash, and iron ore. By far the richest deposit of coal is in the *Silesian* fields which lie at the eastern end of the Sudetes, partially in the plains and partially on the mountain slopes. Some coal is found in the Sudetes, and deposits of lignite, not nearly so valuable, exist in considerable quantities in the northern part of the region. The principal iron ore deposits are in the *Bohemian Basin*, but there are smaller deposits in the Sudetes, the Harz, and the Ore mountains. On the flanks of the Harz Mountains, especially the area just east of them, is one of the world's principal deposits of potash. At one time the Ore Mountains had gold, silver, lead, and zinc, but most of these metals have been mined and the mountains have now lost their commercial importance.

CARPATHIAN-TRANSYLVANIA HIGHLAND. The Carpathian-Transylvanian Highland rises in a great mass just east of the Moravian Gateway (Fig. 186). From this gateway the Carpathians swing eastward and southward 500 miles where they turn sharply to the west under the name of the *Transylvanian Alps* and terminate at the *Iron Gate* of the Danube. Lying within the great curve of the Carpathian and the Transylvanian Alps is the *Transylvanian Basin* and the *Bihor Massif* (old land). The physiographic unity of the region is nearly perfect for both ends are skirted by natural gateways, and all other sides are bordered by plains.

Although not nearly so high as the Alps of Switzerland, the Carpathian-Transylvanian area is a rugged, lofty mountain system with numerous glacial incisions, occasional matterhorns, and numerous perennial snow-clad crests. Crystalline rocks are exposed in the higher mountains, but on the flanks are sandstones and limestones which have been subjected to much faulting and folding. The Transylvanian Basin, an area of moderate relief lying within the crescent, is broken into a number of basins by low wooded hills. The crests of the hills

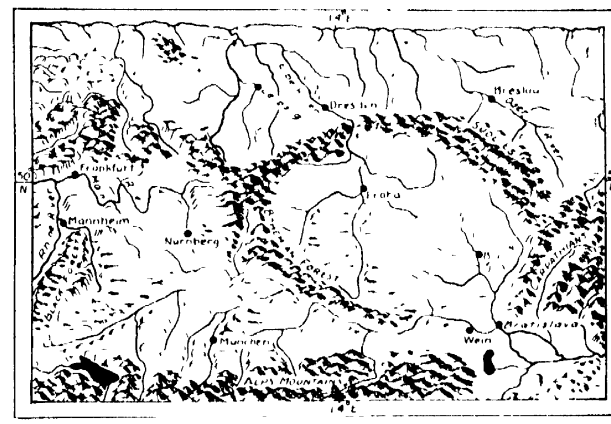


FIG. 185. GERMAN UPLANDS AND BOHEMIAN PLATEAU. Note the Rhine on the west and the Carpathians on the east. Bohemia, the land of the Czechs, is surrounded by mountains. The alps are on the southern margin. Not all of the names have been anglicized.

have not only been worn down by erosion, but the bases have been buried by detrital material. The Bihor Massif, lying to the west of the Transylvanian Basin, is an ancient mountain block that resisted the forces of erosion while the surrounding areas were being reduced. The Danube River dominates the drainage of the region. Nearly all of the many streams which rise on the south or the west side of the mountains eventually enter the Danube. The small area on the east and north slopes drains mostly into the *Vistula*, the *Prut*, and the *Dniester* rivers. In the southern foothills of the Transylvanian Alps are deposits of petroleum, iron ore, coal, some copper, gold, and silver, whereas in the Carpathians, the only mineral of much consequence is salt.

HUNGARIAN PLAIN. The Hungarian Plain is a great depression, entirely enclosed by highlands. The north and east encirclement is formed by the

continuous arc of the Carpathians and the Transylvanian Alps, and the Alpine Highland forms the natural boundary to the south and west In the northeast part the *Bakony Forest,* an extension of the Alps, connects with the Carpathians of Slovakia ward near Vienna to Budapest and thence directly south, uniting with several large tributaries, among which are the *Sava,* the *Drava,* and the *Tisa* (Tisza in Hungary). Flowing by way of Belgrade eastward, the Danube breaks through the Iron Gate into the

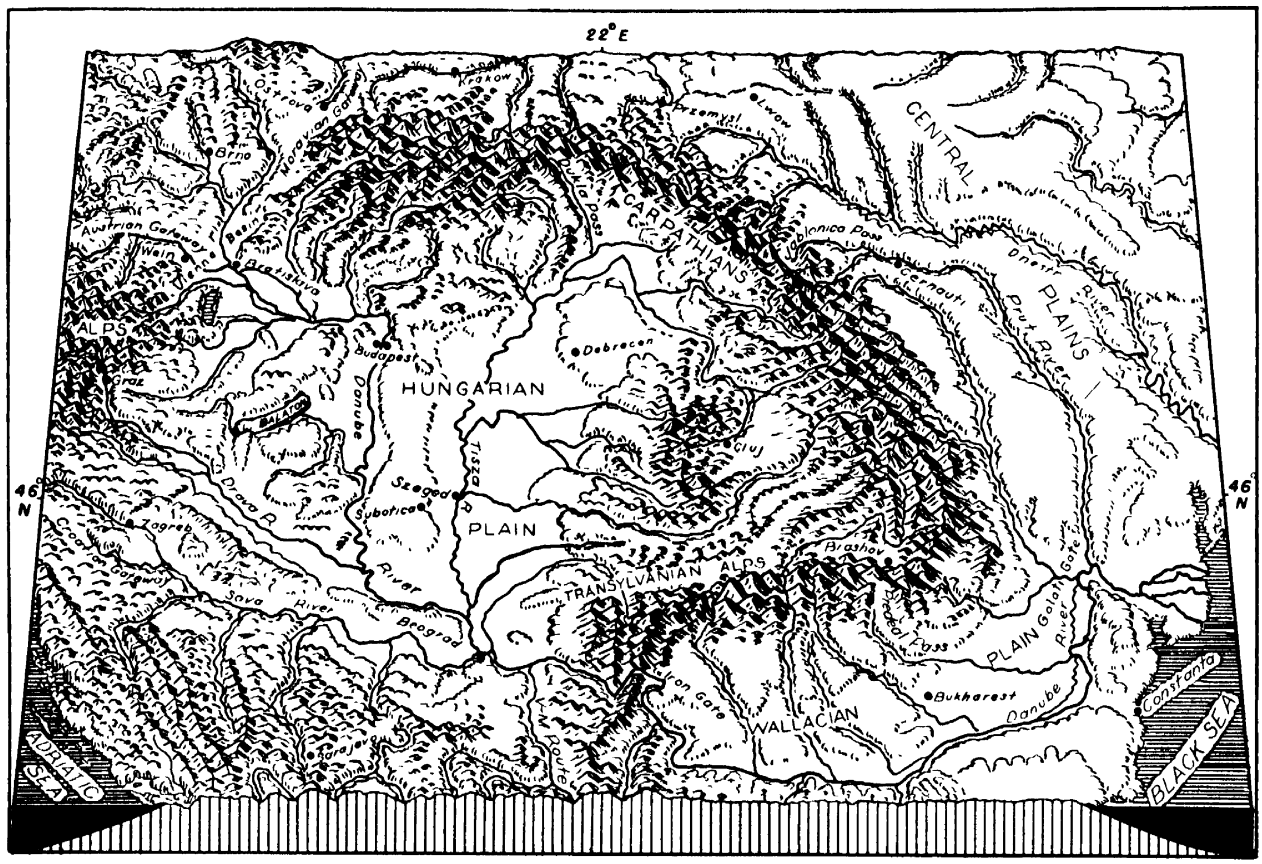


FIG 186. CARPATHIAN MOUNTAINS AND PLAINS OF HUNGARY. Note the six gateways and passes through the mountains surrounding the Hungarian Plain Some of the names have not been anglicized

to divide the Hungarian Plain into two parts, but for purposes of this discussion little attention will be given to this feature.

Monotonously flat and level, this plain covers an area about as large as Colorado. Nearly everywhere altitudes are less than 500 feet, and in many places drainage is so ineffective that salt basins are formed during the dry season. For centuries mountain streams have entered the basin to deposit their debris and build the alluvial plain.

Entering the region near Vienna, the Danube, flowing through the Bakony Forest, nearly bisects the Hungarian Plain. In its course it swings east- Walachian Plain and then flows across Romania, entering the Black Sea east of the *Galati Gap.*

COUNTRIES OF THE WEST CENTRAL HIGHLANDS AND ASSOCIATED LOWLANDS

Several of the countries of Europe are wholly or partly within the bounds of the Central Highlands of western Eurasia The major interests of two of these, France and Germany, seem to be closely connected with the Central Plains of Europe but four have their roots sunk deeply in the Central Highlands and Associated Lowlands.

CZECHOSLOVAKIA

Czechoslovakia is an illustration of a severely elongated country. It has low mountains on the north, through which are numerous easy gateways and beyond which previous to World War II were densely populated, aggressive nations (Germany and Poland). Much of the south boundary is open plains country with aggrieved peoples just over the border (Austria, Hungary, and Romania).

In addition to being wasp shaped, it is the most centrally located country of Europe and it does not have easy access to an ocean highway. As if to multiply its handicaps, Czechoslovakia is a Slavic wedge driven hundreds of miles westward between non-Slavic peoples, and a large percentage of its boundary runs through territory occupied by foreign language elements.

Natural Features

Western Czechoslovakia, otherwise known as *Bohemia,* is nearly surrounded by old forest-clad mountains. On the north are the *Ore Mountains* (Erzgebirge), the *Giant Mountains* (Riesengebirge), and the Sudetes. On the west and south are the Bohemian Forest and the *Moravian Heights.* The interior of Bohemia is a north-sloping plateau drained mostly by the *Elbe River* and its tributaries. This section of the country is highly industrialized, and has much good land for farming, especially in the valleys of the Elbe system of rivers (see pages 304 and 305).

The section east of Bohemia is the rich plains area of Moravia which, extending northward, becomes a part of the Moravian Gateway. The headwaters of the Vistula and the Oder and of the Moravia are in the vicinity of this gateway.

About two fifths of the country, *Slovakia* and *Ruthenia,* lie on the south slope of the Carpathian Mountains, extending into the Hungarian Plain, and bordering the Danube River for at least 100 miles. Most of this portion of Czechoslovakia is quite deeply dissected by streams, making it a pastoral country, with the best farm lands adjacent to the Danube.

The latitude of Czechoslovakia, corresponding to that of northern Minnesota, its altitude, and its continental interior position insure a continental climate. Rainfall in the highlands is plentiful (30 to 40 inches annually), but on the plateau and lowlands it is much less (15 to 20 inches). The Elbe is usually closed by ice two or three months each year.

Cultural Features

Czechoslovakia is not as large as Iowa, but it has six times as many people. For 400 years preceding World War I, the Czechs were under the domination of Austrian rulers. Preceding 1526, they had been an independent people. The republic, created in 1918, lasted only 20 years, but when the German aggression was crushed, liberty was restored to the country. The attempts of the Austrians through hundreds of years to Germanize the Czechs seemed only to intensify their desires for unity and autonomy. Before the country was taken over by Nazi Germany, about 65 per cent of the people were Slavic, more than 20 per cent were Germans, and over 5 per cent were Hungarians, the latter two being very aggressive minorities. In spite of complaints of minority groups, the country made greater progress toward prosperity during its brief interim period of nationality than any of the other larger nations in Europe. One of the notable features of progress during this period was the division of large estates into small family-size farms.

There is a marked contrast between the interests and activities of the people in western and eastern Czechoslovakia, because the west has considerable mineral deposits and the better agricultural lands. In the valleys of the Elbe and its affluents sugar beets are grown so generally that large quantities of sugar are exported. Only in Germany is sugar beet culture practiced more assiduously. However, the western part of the country is so highly industrialized that less than half of the people are agriculturalists, whereas in the Carpathian foothills more than two thirds of the people follow pastoral or farming enterprises.

The chief industrial activities in Bohemia include the processing of agricultural products (sugar, flour, and beer); the making of textiles, glass, porcelain, and leather goods; and the manufacture and fabrication of steel and iron goods, machinery, and until recently instruments and munitions of war.

Especially valuable in promoting the metallurgical industries is the fine grade of coking coal, mined in the vicinity of the Moravian Gateway.[1] The upper Silesian coal field, located at the junction of Czechoslovakia, Poland, and Germany, is a locality that exemplifies well how nations struggle for mineral wealth. Germany, through a plebiscite, lost part of the area at the close of World War I. One of the Nazis' early acts of aggression was the seizure of all of this Silesian coal and mineral area.

Since forests cover one third of the country, timber and timber-consuming industries support a large number of people. Great quantities of the softer woods are used in making paper and paper pulp, much is utilized in the construction of buildings and furniture, and much wood is used for fuel, especially in the forested sections.

The problem of internal transportation is not so critical as that of reaching world markets outside Europe. The mountain rim, however, is not a serious barrier, for more than sixty railways cross the country's boundary. Navigable waters lead both to the North Sea via the Elbe River and to the Black Sea via the Danube.

In a populous country so highly industrialized and yet so nearly self-supporting in food materials, it is not to be expected that only a few items would monopolize either the imports or exports. Among Czechoslovakia's imports are fibers (cotton, wool, jute, and flax); hides, skins, and leathers; ferrous and nonferrous metals; and petroleum and oil seeds. Exports cover such articles as sugar, textiles, and knitted goods; manufactured metal and glass wares; and, previous to World War II, arms, explosives, and other instruments of war. The global distribution of the country's trade includes many nations, the near-by neighbors absorbing most of it.

Cities of Czechoslovakia. One city of Czechoslovakia, Prague, has nearly 1,000,000 people; five have more than 100,000 each; about forty have more than 20,000 each; and all are located in an area smaller than Iowa

Prague (Praha), capital of Czechoslovakia, is near the center of the Bohemian Basin on the slopes of hills which skirt both sides of the *Vltava* (Moldau), a tributary of the Elbe. The natural routes opening into the hinterland are formed by three of the tributary streams of the Elbe which converge near the city. Prague has been the commercial, cultural, and political hub of Bohemia for a long time. A good railroad connects the city with the Moravian Gateway and thence extends both north into Poland and south into Hungary. Barge service on the Elbe River connects the city with the ocean by way of Hamburg.

Brunn (Brno), in the Moravian basin at the edge of the uplands, is renowned for its manufacture of woolen textiles. *Pilsen* (Plzeň), 50 miles northwest of Prague, is noted for the brewing industry and the making of war goods. *Pressburg* (Bratislava), in the southern part of the country, is the chief outlet for the river-borne commerce on the Danube from the extensive hinterland in southern Slovakia. The *Elbe-Danube canal* when completed should add to the commercial significance of the city.

The Outlook. With the spirit of retaliation running high in Europe, several problems in the life of the people of Czechoslovakia have critical aspects.[2] The majority groups need to strive for an integration of economic and political interests among all. Trade interests that include countries beyond the ocean must be adequately satisfied, and amicable commercial relations with adjacent countries should be cultivated assiduously Slovakia and Ruthenia have facilities for hydroelectric development and the industrialization of this part of the country might be encouraged with resulting higher standards of living for all.

AUSTRIA

Eastern Austria is at the crossroads of Europe. The main north-south route runs from the Adriatic Sea through the Croatian, Carpathian, and Moravian gateways to the *Baltic Plains* (Fig. 132). The main east-west route follows the Danube from southern Germany through the Austrian and Carpathian gateways to southeastern Europe. Vienna is the chief city serving this crossroads site. Although the boundary of Austria is very irregular, the eastern

[1] Pattie, John, "Czechoslovaks, Yankees of Europe," *National Geographic Magazine*, August, 1938, Vol 74, pp 178-225

[2] Waln, Nora, "I Saw Czechoslovakia," *The Atlantic Monthly*, February, 1936, Vol 176, pp. 60-68

part of the country is nearly circular, and the rest is a long, alpine panhandle reaching westward to Switzerland.

The country today is a mere shadow of its former great size and influence in world affairs. Austria, a country more mountainous than Switzerland and a little larger than Maine, has nearly seven million people with an average density of more than 200 per square mile. To be sure, one third of the people are concentrated in the great city of Vienna.

Natural Features

All of Austria, except a few square miles in the extreme west, is in the drainage basin of the Danube. The country embraces parts of three regions—namely, the Alpine Highland, the German Uplands and the Bohemian Plateau, and the Hungarian Plain (see pages 211, 304, and 305).

The eastern Alps constitute the largest section of the country. Just north of the mountain divide is a long, east-west trench drained by three rivers, the *Inn*, *Salzach* and *Enns*. This trench, running more than 300 miles through the center of the country, is the main route from Vienna to the cities of the Swiss plateau. At several places along the trench, subsidiary and cross routes lead south over the Alps to Italy or to the *Alpine Foreland* on the north.[1]

The upland and plateau section of Austria includes the southern edges of the German Uplands and the Bohemian Plateau. Although the relief of this section is considerable, it is not too rugged for agriculture. The Danube bisects the upland and plateau portion of Austria and provides the leading east-west gateway through central Europe.

The *Vienna Basin* in the eastern part of the country and not as large as Delaware is the smallest of the plains along the Danube, and occupies the depression where the Alps, the Carpathians, and the Bohemian Plateau nearly meet. This basin is a cosmopolitan area, for it was here that the "Cross" met the "Crescent," and the Christian met the Hun. Today it is the meeting place of Germans, Czechs, Yugoslavs, Italians, and travelers from many parts of the world.

[1] "This Was Austria," *National Geographic Magazine*, July, 1945, Vol. 88, pp 71-86

The climate of Austria is alpine and continental. The precipitation in the high Alps in many places is more than 100 inches, but in the deep Alpine valleys it is much less (Innsbruck, 30.9 inches). The rainfall in the Vienna Basin is low (Vienna, 24.6 inches), the temperature for the coldest month (January) is 29° F., and for the warmest month (July) 66° F.

Cultural Features

For hundreds of years the Hapsburgs were the most powerful ruling family in the world. Their power centered in the Vienna Basin, the crossroads of central Europe. The dismemberment of the Dual Empire (Austria-Hungary) in 1918, left the care of a big "White Elephant," Vienna, to the little Republic of Austria. If it were not for the big city, its traditions, and the attitude of its previously favored classes, Austria would be in a much better position from an economic point of view than Switzerland. In comparison to Switzerland, it is better suited to agricultural production, has iron ore, timber, some coal, and an abundance of undeveloped water power. Excellent advantages for trade are provided by the Danube and its tributaries, and by the intricate network of railroads; the scenic attractions can scarcely be surpassed; and the minority language groups are too small to create a critical problem.[2]

The Austrian Alps section in the west is a tourist country. The well-known Brenner Pass is just a few miles south of Innsbruck. The valleys of the Inn, the Salzach, and the Enns are dotted with pretty villages and small farms. Dairying as a transhumance activity is followed diligently in much of the country. Water power is utilized to run textile mills, and embroidered goods are made in the homes.

In eastern Austria the mountains have lost their Alpine character, and are so low that half of the land is forested, mostly by deciduous trees. Here 40 per cent of the land is used for crops and pasture. In addition, this part of Austria is rich in iron ore, and lead and zinc ores are mined. This is not only the metallurgical section of the country,

[2] Kuehnelt-Leddihn, Erik R. V., "Where Three Countries Meet: The Region of Nauders," *Geographical Review*, April, 1945, Vol. 35, pp 239-256.

but textile industries and the manufacture of paper are important.

The uplands area south of the Danube is a rolling country of grass-covered hills and of ridges of fossiliferous rocks. This section is an agricultural country with more than half the land in farms and pastures. The swiftly flowing streams provide power for a significant manufacturing industry. The Bohemian Plateau occupies nearly two thirds of the area in Austria north of the Danube, but the lower land to the east is a rich, farming country, the vine receiving special attention.

The Vienna Basin is used especially for the production of truck and fruit crops; and the growing of grain also receives much attention. Southeast of Vienna beyond the Carpathian Gate is a rich level tract on which cereal crops and cattle are grown by a mixed population of Hungarians, Croats, and Austrians.

Although Austria is landlocked, it is favorably located for foreign trade, but the immense city within its borders, built to serve a great empire, completely disorganizes the country's trade relations. Austria continually buys more than it sells, which tends inevitably toward bankruptcy. The manufactured goods which the people have to sell do not bring enough money to pay for the food and raw materials which they need to buy. It is probable that the boundaries of Austria will not be changed much if any from their prewar position.

Cities of Austria. *Vienna* (Wien), the lovely old city of the Danube, once the center of world politics and intrigue, and formerly the gay and romantic capital of the Austrian Empire and home of the Hapsburgs, has been a mecca for artists, musicians, medical students, and writers for a long time. This famous city at the intersection of the principal trade routes of central Europe is on the right bank of the famous Danube at the eastern foot of the *Wienerwald Mountains*. The explanation of Vienna's size and former grandeur rests upon its position with regard to trade, and the fact that it was the great political center of middle Europe for nearly ten centuries.

During the empire days Vienna was the entrepot and principal industrial city of the entire eastern and central Europe. Here developed a group of industries such as bookbinding, fine leather goods, jewelry, silk weaving, millinery, and clothing, all of which catered to the aristocratic people of the capital. Heavy manufactures such as iron and steel also receive some attention.

With the disruption of the Dual Empire in 1918, Vienna lost most of its hinterland, and the ensuing depression accounted for a slow decline of the city in nearly all of its once prominent aspects. It was one of the large European cities that was not so badly damaged by aerial warfare as were some in World War II.

Graz, favored by its position near coal and iron ore in the eastern edge of the Alps, is a prosperous manufacturing center, specializing in woolen and metallurgical goods.

Innsbruck, a crossroads city in the Alps, benefits both by its position in the valley route from Vienna to Switzerland, and its transalpine route from Munich to Venice by way of the Brenner Pass.

HUNGARY

Hungary is on the whole a semicircular country, in the same latitude as North Dakota but not quite as large. In this relatively small area live 13,000,000 people, nearly all of them depending on agriculture for a living, although 40 per cent of them live in cities of 10,000 or more persons. Previous to World War II, Hungary occupied most of the northern part of the Hungarian Plain, although Czechoslovakia and Romania encompass much of the plain adjoining the Carpathian Highlands (see page 305).

Natural Features

The Bakony Forest, just north of *Lake Balaton* (Fig. 186), extended to include the highlands northeast of Budapest, divides the Hungarian Plain into two sections—a small western plain (*Little Alfold*), and a large eastern plain (*Great Alfold*). The elevated land that separates them is composed of the stumps of old highlands that projected above the surface of the ancient sea that once occupied the lowlands. The smaller plain is rolling and well drained, having good soil, ample rainfall, and numerous small forested areas. By contrast the larger plain is severely flat, having much poorly drained land and moderate rainfall, formerly being covered

with luxuriant grasses. Only in the Bakony section can forests be found now, and here the broad-leaved deciduous trees such as elm, maple, oak, and beech grow.

The Danube River, flowing directly south from the Czechoslovak border, divides the country into almost equal parts and drains the western part, while a large tributary (Tisza) of the Danube with its affluents drains the eastern part of Hungary, but joins the master stream in Yugoslavia

The climate of Hungary is continental—marginal between the humid and the semiarid phases (Figs. 128 and 236). The median annual rainfall is about 25 inches (25.3 inches at Budapest). Droughts frequently are severe, the moisture requirement of crops continually pressing close to the supply. In all parts of the basin, however, the maximum precipitation falls during the growing season and the climatic conditions, on the whole, are comparable to those of eastern Kansas and Oklahoma in the United States.

The loessal and alluvial mantle, the relatively low rainfall, and the grassland vegetation have combined to develop rich pedocalic soils which, as is usually true of pedocals, lack only moisture to become exceedingly productive The chernozem belt which begins in this region extends for thousands of miles through the plains of the lower Danube far into the Soviet Union

Cultural Features

Rich in the traditions of a glorious past which includes centuries of warfare against the incoming hordes of invaders from the south and east, a sturdy, proud race of people has developed in the Hungarian Plain For centuries this plain was the home of Europe's most skilled horsemen.

However, the plains people, after many decades of seminomadic living, came to be a part of the Dual Monarchy in 1867 The ensuing years have witnessed marked developments in agriculture and increased activity in industry and commerce.[1]

Whether on large or small holdings, the chief activity of the people is farming Cultivated areas produce wheat, corn, rye, barley, tobacco, hemp, sugar beets, vegetables, and fruits, such as peaches, grapes, and apples. Wheat is by far the leading cereal and corn is second in importance. In the more arid portions of the plains the grazing of cattle and sheep is the chief industry. Although declining in importance, the breeding of fine horses is still a noteworthy activity. Those who travel through Hungary marvel at the number of horse-drawn carriages and the large number of horses used for draft purposes

Compared with the industrial portions of Europe this region has had little development of manufactures. However, in the larger cities are distilleries, textile mills, grain mills, breweries, tobacco-processing plants, and in many of the smaller villages and towns household industries are still prominent, wherein handmade articles such as laces and rugs are made.

The famous Oriental Express, unexcelled in continental rail transportation, passes through Hungary Before World War I, Germany built the Berlin-to-Baghdad Railway, extending it through Hungary, thus servicing a chain of cities, such as Vienna, Pressburg, Budapest, Belgrade, and Sofia before it left the European continent at Constantinople. The gateways through the surrounding highland are important avenues of trade for Hungary.

Hungary, like Czechoslovakia, is entirely land locked, and suffers the handicap of having to go through the territory of unfriendly neighbors to reach world markets[2] Foreign trade amounts to about thirty dollars per capita, the exports consisting mostly of raw or processed foodstuffs, and the imports being fibers, textiles, wood, and wood products, chemicals, fuels, and metal goods. Trade is chiefly with European neighbors

URBAN CENTERS. Only three cities in Hungary have more than 100,000 people each, and yet there are thirteen with more than 50,000 each. Through the countryside are hundreds of picturesque villages from which the peasants go each morning to work in their near-by fields and to which they return at eventide. Many of the larger towns, such

[1] Wanklyn, Harriet, "The Role of Peasant Hungary in Europe," *Geographical Journal*, January, 1941, Vol 97, pp 18-35.

[2] Renner, George T., *Global Geography*, Thomas Y Crowell Company, New York, 1944, "Southeastern Europe —A Study in Geographic Disunity," Chapter 31 (Joseph S. Roucek)

as *Debreczen* (118,000) and *Szeged* (135,000) really are collections of several villages, including not only the village sites but much open farm land lying between. For example, Debreczen is spread over nearly 400 square miles, whereas many a compact town with a corresponding population occupies a site only 5 per cent as large.

Budapest, capital of Hungary and one of Europe's most interesting and colorful cities, is on the Danube near the foothills of the Bakony Forest. It is, in fact, the gateway city between the upper and the lower sections of the Hungarian Plain. Two cities, *Pest* on the west bank, and *Buda* on the east bank of the river, have combined to form this dual city. Pest, the older part, is the center of government and culture, whereas Buda is the modern and commercial part of the city.

It was here that the agricultural peasants of the plain in ancient days met and traded with the miners and lumbermen of the highlands. The manufacturing in the city includes principally the processing of products from farm and forest. Budapest ranks close to Minneapolis in the United States in the manufacture of flour. The city was severely damaged by the Russians in World War II.

HUNGARIAN PROSPECTS. At one time the entire Hungarian Plain was a part of the Dual Monarchy, but after World War I boundaries drawn through the plains enlarged the new country of Yugoslavia and materially increased the size of Romania at Hungary's expense. Since the end of World War I, Hungary's principal aspiration has been to regain her old boundaries, and this has caused endless disputes, much misery, and continual enmity between Hungary and her neighbors. Since Hungary cast her lot with the Axis powers in the recent global conflict, it is not probable that her aspirations will soon be realized. There should be some way in which the people of these countries could settle their boundary problems so that the fullest development of all could be insured, and the rights of minorities to economic and social progress be fully recognized.

ROMANIA

If compactness of area were the chief factor in national unity, then Romania would be fortunate, indeed, since the country is nearly circular in form. The application of the principle of compactness, however, is nearly nullified in the case of Romania by several conditions among which are the dearth of barrier boundaries, arrangement of land forms, lack of language and ethnic unity, and the attitude of neighboring countries.

Previous to World War II, Romania was as large as Arizona, but whether or not her boundaries will be retained cannot be stated with certainty. Although much of the country is mountainous and more agricultural than any other country in central Europe, it supports 180 people per square mile, four times as many as agricultural Iowa.

Sections of several physiographic regions are included with Romania—the Hungarian Plain in the west (see pages 305 and 306), the Walachian Plain (a subdivision of the Central Plains of Europe) in the east and south (see pages 315 and 316), and the Carpathian-Transylvanian Highland through the center (see page 305).

Natural Features

The Carpathians in Romania are much lower than they are farther north and have several densely populated basins and numerous easily crossed passes. Streams flow in all directions from the mountains in the central part of the country, and for this reason the people in the west have closer ties with the Hungarians than they do with their compatriots in the Walachian Plain. East and south of the mountains is a long, semicircular piedmont built up by the dozens of streams flowing out of the highland, thus pushing the Danube well to the south side of the Walachian Plain. This foreland area varies in width, and throughout its length from the Danube to the Polish border is trenched by swiftly flowing streams.

The climate of Romania is continental in the north and interior but has characteristics of the subtropical on the Black Sea coast. In the east conditions trend toward semiaridity, but in the remainder of the country the rainfall is distributed in concentric belts Braşov, situated in a valley of the Transylvania Basin, receives 27.6 inches of rainfall annually, but the surrounding mountains may get 50 or more inches. However, the outer slopes of the highlands receive progressively less

precipitation at lower and lower levels, until on the plains the annual amount is 20 to 30 inches. At Bucharest on the Walachian Plain the median annual rainfall according to a 66-year record is 23.1 inches, and the dependability is only 58 per cent (Figs. 128 and 236). This almost duplicates rainfall conditions at North Platte, Nebr.

The highlands and the piedmont foothills, for the most part are forested with conifers on the upper slopes and broad-leaved deciduous forests of beech and oak at lower levels. Most of the plains and uplands of the northeastern part of the country were formerly steppes. Chernozem and chestnut soils prevail in the drier sections of Romania, but in the agricultural highlands gray-brown soils predominate (Fig. 237 and 238).

Cultural Features

The rich plain of the lower Danube, lying between the Black Sea and the Carpathian-Transylvanian Highland, has been a route of travel, migration, and contention for hundreds of years. Romans, Goths, Slavs, Huns, and Turks have commingled, fought, and amalgamated in this region, evidence of which may be found in the language and customs of the Romanian today.

That portion of Romania lying west of and within the high Carpathian bend is *Transylvania*. This is a picturesque country of rounded hills, broad alluvial valleys and basins which become lower from east to west, but are punctuated on the western margin by an old, crystalline plateau, the Bihor Massif (Fig. 187).[1] Although the steeper slopes of Transylvania are forested mostly by broad-leaved deciduous trees, only about 40 per cent of the land is cultivated and large areas are in pastures, supporting millions of cattle, sheep, and hogs. This is economically and culturally the most stable part of the country, the valleys supporting many small Romanian hamlets and villages, and the larger agglomerations being composed mostly of Germans and Hungarians. The western margin of Transylvania is in the Hungarian Plain, an area of fertile, loess soils which produces the best yields of wheat and corn in the whole country.

The rolling piedmont, east and south of the mountains, is densely populated by small landholders who follow diversified agriculture and in this section pastures, meadows, cultivated fields, orchards, and vineyards abound. On the piedmont north of Bucharest are the *Ploesti* oil fields, second only to the Russian fields in European production. It was on the petroleum of the Ploesti fields that Germany leaned so heavily for her blitzkrieg tactics which were so successful during the early part of World War II. The American bombing in this area interfered seriously with the German supply of motive power.



FIG. 187. A SUMMER RESORT. The rugged Carpathians furnish a retreat in summer from the uncomfortable heat of the adjacent plains. (Courtesy Royal Romanian Legation)

The broad, flat, featureless plains east and south of the piedmont are the semiarid Romanian steppes, which for many centuries resounded to the tread of hordes of nomadic horsemen. On these steppes between the Carpathians and the sharp bend in the Danube River is the well-known 50-mile wide Galati Gap. Not until the nineteenth century did the sedentary Romanian of the plateau venture to occupy these dry steppes. Today this is an area *par excellence* for the growing of cereals, corn being favored by the peasant, and wheat by the landlords on the large estates. Other crops and animals other than horses receive scant attention inasmuch as 80 to 90 per cent of the land is devoted to grain-growing.

There is a small transdanubian area bordering the Black Sea and known as the *Dobruja*, the northern part of which is an old crystalline massif and the southern part a dusty limestone plateau covered with loess and grass. The northern Dobruja for a long time has been a paradise for the hunter and fisherman.

[1] Roucek, Joseph S., "Mineral Resources of Roumania," *Journal of Geography*, May, 1933, Vol. 32, pp. 191-199.

Romania is not adequately supplied with railroads, and the ones in use today are poorly coordinated. This is due to the fact that the lines were constructed to serve the specific needs of separate countries, parts of which are now incorporated into Romania. Navigation on the Danube has its handicaps, because the river flow fluctuates widely. Its banks are low and swampy, it freezes in winter, the rapids in the Iron Gate are dangerous, and the delta is swampy with shifting channels. Many of the smaller rivers in the highlands are used for floating logs.

The foreign trade of Romania is oriented toward central and northern Europe. The chief imports, as might be expected since the country is predominantly agricultural, are cotton and wool fibers, textiles, metal goods and machinery, automobiles, and chemicals. Exports consist of wheat, corn and barley, cattle and hogs, wood and wood products, and petroleum and its processed forms. Romania's near neighbors, Czechoslovakia, Germany, Italy, France, and the United Kingdom, are its best clients.

Cities of Romania. The cities, towns, and villages of Romania have many rural residents because the people in the agricultural areas live mostly in small agglomerations instead of on isolated farmsteads as in the United States. As a rule they travel back and forth to their farms daily, or they may "camp" for a few days and return home for supplies, especially during the growing season.

Romania has one city (Bucharest) with more than 500,000, four in the 100,000-200,000 group, and sixteen with more than 50,000, quite a record for a country the size of Arizona and almost entirely agricultural. Nearly all of the villages, towns, and cities, even to the capital, are interested almost wholly in serving agricultural interests.

Bucharest (Bucuresti), capital and chief cultural center of Romania, is on the Walachian Plain just north of the Danube River. An important transit trade of lumber, petroleum, and agricultural products has been responsible, in the main, for the commercial development of the city. The chief industries are petroleum refining, brewing, distilling, the manufacture of machinery, textiles, and numerous small goods. *Constanta*, on the Black Sea coast, serves as the port for Bucharest and a good railroad, one of the main commercial lines of the nation, has been built between the two cities.

Cernăuti, on the banks of the Prut River which flows along the east flank of the Carpathians, is the principal trading center for northern Romania, and specializes in the handling of timber, cattle, and other agricultural produce. On the headwaters of one of the tributaries of the Tisza River in the fertile Transylvanian Basin is *Cluj*, a commercial trade center. Its manufactures consist of textiles, paper, pottery, sugar, and brewery products. *Braşov*, sometimes called *Kronstadt* because it is a German city, is in the Transylvanian Basin. A rich hinterland supplies the city with agricultural products; and manufactured articles such as textiles, machinery, and small goods are purchased. Near by are petroleum refineries, and associated with the mining of iron ore and copper are foundries which work these metals. The city is served by railroad from Bucharest through a pass in the Transylvanian Alps.

Romanian Outlook. Romania is a densely populated country, devoted almost wholly to farming. Much of the country has low, erratic rainfall. Farming on a large scale on the Walachian Plain with modern machinery may be successful under low rainfall conditions. However, since many of the large estates in Romania have been broken up into small peasant-sized farms, the small operator cannot succeed with the primitive methods which he is almost compelled to follow. This is a situation which calls for reconsideration and thoughtful planning.

In 1939, the oil wells of Romania were owned mostly by foreign companies. One wonders under the circumstances to what extent the Romanians themselves are bartering away their irreplaceable resources. Of course, Allied bombing saved some of the petroleum by keeping it in mother earth.

A period of adjustment following World War II is certain to be embarrassing. Romania will probably lose considerable territory, some will certainly go to Soviet Russia and some may go to Hungary. However, her highland and piedmont nucleus is likely to be kept intact, and around this core of thrifty small farm owners an economy of well-being may be constructed.

24

Lands North of the Central Eurasian Barrier (Continued)

INTERIOR AND NORTHERN PLAINS AND UPLANDS

THE GREAT PLAIN north of the Central Eurasian Barrier extends about 5000 miles northeastward from the Atlantic coast of France and terminates at the Arctic coast near the Bering Strait. From the Hindu Kush on the south to the Arctic Ocean is a distance of 2000 miles. On the whole this division of Eurasia includes approximately one third of the continent. A submerged portion of the area is the continental shelf on the west margin of Europe. The upland section lies east of the Yenisei (Enisei) River and extends north of the Central Eurasian Barrier to the Arctic coast. Formerly most of the plains section was probably a part of the sea floor, and for this reason it is underlain chiefly by rocks of sedimentary origin. Throughout its great extent the generally level characteristics of the land are scarcely broken except by the *Ural Mountains*. Many large rivers drain this extensive plain and uplands, among which are the Elbe, *Vistula*, *Volga*, *Ob*, *Yenisei*, and *Lena*. Several rivers, such as the Volga, Ural, and Oxus, flow into landlocked seas, but most of the drainage is into some ocean.

Because of the great latitudinal ranges and varying distances from oceans and bordering highlands, the resulting climate in this immense area is complex. Rainfall and temperature regimes differ widely and require careful study to gain an adequate understanding. Two climatic divisions are represented—namely, the cyclonic and the polar. However, there are transition zones between these major divisions, each of which will receive an appropriate discussion.

Several major vegetation belts can be discerned, among them are the tundra, the mixed deciduous forest, the coniferous belt, and the vast steppes, and deserts.

The Interior and Northern Plains and Uplands may be separated into four large regions—namely, the *Central Plains*, the *Turanian Plain*, the *Siberian Plain*, and the *Siberian Uplands*. The first of these is in Europe and will be discussed in this chapter, and the other three are in Asia and will be treated in the next chapter.

CENTRAL PLAINS OF EUROPE. The chief features of the Central Plains are their unbroken continuity and general levelness. The Central Plains extend from the Pyrenees in a great arc north of the West Central Highlands of Europe, to spread fan-like from the *White Sea* to the Black Sea and eastward to the Ural Mountains and the Caspian Sea. In southeastern Europe the Walachian Plain, which extends southward between the Black Sea and the Transylvanian Alps, is a part of the Central Plains. All or parts of several European countries are included within this region. Southern Sweden, the Danish Islands, and southeastern England are considered parts of the region, because, although separated by shallow seas, they are similar in structure, bedrock, and topography.

The topography is flat to rolling with altitudes in most places averaging less than 500 feet. How-

ever, in the *Valdai Hills* in central Russia, the land reaches an average altitude of 500 to 1000 feet. Some of the outstanding physiographic features of the Central Plains are: (1) the *Paris Basin*, a large cuesta-ringed saucer-like area with Paris near the center, (2) the *Flanders Lowlands*, comprising the lowlands between the Ardennes and the North Sea and composed, for the most part, of deep deposits of marine clays and sands, (3) the *German-Polish Lowlands*, which present many evidences of glaciation such as moraines, drumlins, and a great outwash plain of sands and clays, and (4) the vast Russian Plain extending from the White Sea to the Black and *Caspian* seas. On the east the Ural Mountains separate the Central Plains from the Siberian Plain.

The drainage of the Central Plains is divided between the rivers that flow westward to the Atlantic Ocean and northward to the Arctic Ocean, and those that empty into inland seas. There are more than twenty important rivers among which, from west to east, are the *Seine, Rhine, Elbe, Oder, Vistula, Ural, Dnieper, Danube,* and *Volga.* The rivers are typical of plains drainage systems, having slow, sluggish waters which deposit much silt and make braided channels. Large deltas have formed at the mouths of nearly all the rivers.

Four chief types of mantle materials are found in the Central Plains—namely, (1) the residual type, which has developed from the sedimentary bedrock, (2) the glacial drift, extending north of the 52nd parallel from the mouth of the Rhine to middle Russia; (3) the great loess belt, occupying the area from the Netherlands to central Russia; and (4) especially noteworthy, the river deposits on the North Sea coast, including the deltas of the Rhine, the *Ems*, the Weser, and the Elbe. Here thousands of square miles of rich land have been reclaimed from the sea—land which now supports millions of people. Alluvium is also of major importance in the flood plains and terraces of the large rivers. In some areas, such as the lowlands of Flanders, the parent materials of the soils and subsoils are extremely deep and no bedrock is exposed, but in the glaciated portion of northern Russia, for example, glaciers have left only a thin coat of drift over the bedrock.

COUNTRIES OF THE INTERIOR AND NORTHERN PLAINS AND UPLANDS

International boundaries on densely populated plains, as a rule, are unsatisfactory. This is especially true in the Central Plains of Europe where boundaries between countries for hundreds of years have bristled with fortifications and the paraphernalia of war. Difficulties multiply rapidly when the aspirations of some of the countries turn to the acquisition of territory, rather than to continued internal improvement. It cannot be forecast at present where the boundaries of some of the plains countries of Europe will be when the final allocations are made. It may be assumed, however, that the geographic background and human activities will not be so greatly changed by postwar settlements as to render obsolete at once the geographic appraisals that are made today. At least seven countries (*France, Germany, Denmark, Netherlands, Belgium, Poland,* and the *Soviet Union*) are certain to exist partly or wholly within the Interior and Northern Plains and Uplands of Eurasia following the postwar settlement. Of these seven, all but the Soviet Union will be discussed in this chapter.

FRANCE

Although Julius Caesar wrote before the beginning of the Christian era that all Gaul (France of today) was divided into three parts, there has been much unity among the people of the area ever since the day of that illustrious dictator. This is not to say that serious internal conflicts have not raged at times, but when danger threatened from without usually Frenchmen have united to repel the aggressor. France has the good fortune to border on two large water bodies, namely, the Mediterranean facing the Orient, and the Atlantic facing the West. A small portion of her coastline is north of the Strait of Dover bordering the North Sea. The country, with an area somewhat greater than that of Washington and Oregon, contains forty million people, or about 190 persons per square mile.

Natural Features

France has the advantage of a great deal of barrier boundary, although the country includes or

extends into at least six physiographic regions. The Pyrenees on the south are shared with Spain (see page 211); the Alps on the east, with Italy and Switzerland (see page 211); the Rhenish Highlands on the east with Germany and Belgium (see page 303); and the Central Plains with numerous countries on the north and east. Brittany, a part of the Northwest Highlands (see page 287), and the Central Plateau (see page 211) are wholly within France.

For diversity of structure, of topography, and of climate, France surpasses any other area of similar size in Eurasia. This diversity ranges from the young, rugged Alps and Pyrenees in the south to the very old mountain remnants of the Ardennes in the north, from the ancient block of the Central Plateau to the recent deltaic deposits of the Rhone and Garonne; from the glaciers of the Alps and Pyrenees to the subtropical clime of the south and the equable marine climate of the north and west.

The numerous gateways into and out of France, together with corresponding strategic routes through the country, have directed the course of events more than a casual glance might indicate. Five of the major routes are the Rhone-Saone, the Carcassonne, the Lorraine, the Belfort, and the Flanders gateways. Each of these has great historic as well as present-day significance. It is interesting to note how many of the major and minor routes lead toward the Paris Basin, the political and cultural center of the country.

The climates of France are well represented by the records at Marseille on the Mediterranean coast, at Bordeaux on the Atlantic Coast, at Clermont-Ferrand on the Central Plateau, and at Paris in the Paris Basin (Figs. 128 and 236). The mean annual rainfall at each of these stations is 21.5 inches, 33.4 inches, 21.8 inches, and 22.6 inches, respectively; and the corresponding mean annual temperatures are 57° F., 54° F., 50° F., and 50° F. The evenness of rainfall at Marseille is 63 per cent and at Paris 83 per cent, while the dependability is 63 per cent for the former and 75 per cent for the latter. These differences are to be expected when comparing the records of subtropical dry summer climates at Marseille with the marine type at Paris.

The mature soils of France are mostly pedalfers with the gray-browns in the plains and plateau sections and the red and yellow soils along the Mediterranean coast.

Cultural Features

The French have always viewed the open plains boundary in the north (Flanders Gateway) and the low route from the Paris Basin to the Rhine Valley (Lorraine Gateway) with apprehension, because just beyond these gateways lives their implacable foe, the Germans. Time and again these routes have resounded to marching feet and to the clash of arms. The most recent conflict occurred in 1940 and only lately has been stilled. During times of peace these gateways serve the useful purposes of trade, transportation and the exchange of goodwill.

Intensive farming prevails in all parts of the country. The diversity of industrial and commercial activities is such that if necessary France can produce enough goods to satisfy nearly all the needs of her people. On the Mediterranean seaboard and in the Rhone-Saone valleys the subtropical climate is conductive to the growth of grapes, olives, and mulberry trees for the production of silkworms. The coal from the Central Plateau and the hydroelectric power from alpine streams combine to make this section a hive of industry. The Paris-Lyon-Mediterranean Railroad following this corridor carries more traffic than any other railroad in France.

The Central Plateau is a region of low productivity and relatively few people. The valleys of the streams flowing out of the plateau not only have some good soil but provide roadways into and through the interior. The region in the main is a sheep and cattle country, but meager crops of rye and barley are grown.

The uplands of Brittany and the hill country of *Normandy* are primarily stock-growing areas with cattle, horses, and hogs predominating. Dairying and poultry farming receive some attention. Orcharding, especially the producing and processing of apples, is a profitable enterprise.[1] The rugged land and the deeply indented coast together with the shallow adjacent ocean have induced

[1] Kemp, Harold S., "Brittany The Backward Child of a Stern Environment," *Journal of Geography*, September, 1930, Vol 29, pp 223-240

many Britons to turn to the sea for a living. Except for household industries very little manufacturing is done. It was on the coast of Normandy that the mighty Allied American and British armies gained their first beachhead for the invasion of western Europe in June, 1944.

Only a small portion of the Rhenish Highlands extends into France, but the coal and the iron ore from the south flank of these highlands account in large measure in making this the chief manufacturing section of the country. Most of the woolen and cotton mills, and nearly all of the heavy metallurgical works of France are located in the north.

The Central Plain in France is composed of two major features—the *Basin of Aquitaine* in the southwest and the Paris Basin in the north. These basins are connected by the low gateway of *Poitou*. The former area is essentially agricultural—the products of the vine (wines and brandies) having a world-wide renown. Wheat, corn, tobacco, and fruit are also grown. A large coastal sand-dune region (*The Landes*) occurs south of the Garonne, an area of planted forests, now producing lumber, resin, and naval stores.[1]

The Paris Basin ("Isle de France") with its great city is the heart of France. The center of the basin is rimmed by several concentric outward-facing escarpments or cuestas, the gentle slopes of which are toward the center (Fig. 184). Before the advent of highly mechanized warfare, this series of escarpments served as a protection for the capital city. In general, the basin is a good farming area, producing bountifully of wheat, grapes, sugar beets, tobacco, garden products, and fruit. Manufacturing is associated with agricultural products—grapes, wheat, and beets—except for the textiles industries in the north near the coal-mining districts. Paris is the leading city in the fabrication of luxury articles, but these are mostly small goods noted for their artistic finish and for the large amount of skilled labor involved.

Before the coming of railways, France had developed a valuable system of waterways. Today Paris is connected with all the main rivers of the country and with the Rhine by canals. Five canals converge from the headwaters of streams in northern France toward the Rhone-Saone waterway. The network of canals in the northern part of the country is intricate and most used. Moreover, Paris is the center of a complicated railway net that extends in all directions both within France and with her neighbors on the continent.

France's overseas possessions include *French Indo-China, Algeria, French Guiana, Madagascar,* and some islands in the Pacific, with an all-inclusive total of nearly five million square miles. This area is twenty-two times the area of the homeland and contains one and one half times as many people. Such an empire with which to trade has helped to make France one of the powerful and influential countries of the world (Fig. 188).

FRENCH CITIES. France has seventeen cities each with over 100,000 people, and three with more than one half million (Fig. 138).

Paris, the capital and one of the world's best known cities containing nearly three million people, is located in a broad basin on the River Seine. The city has witnessed nearly every vicissitude of war, of culture, and of power. Since the time of the Romans, it has been a political center, and with the rise of France to international importance in the fourteenth century, the city became, and has persistently remained, one of the principal seats of Western finance, and international politics have attracted people to Paris for a long period of time.[2] Beautiful, sweeping boulevards, classic architecture, famous monuments, and countless promenades and parks add to the allure of Paris. The concentric boulevards occupy the sites of the ancient walls that at various times surrounded the city. Paris has access to the ocean through two ports, *Le Havre* and *Rouen,* at the mouth of the Seine. All railroads seem to converge in the city because of its position in the Paris Basin. The nearness to London, Amsterdam, Rotterdam, and other cities of western Europe has contributed materially to its growth and importance. All forms of transportation and communication are available in all directions from Paris to either the Mediterranean

[1] Blanchard, W. O., "The Landes: Reclaimed Waste Lands of France," *Economic Geography,* April, 1926, Vol. 2, pp. 249-255

[2] Crone, G. R., "The Site and Growth of Paris," *Geographical Journal,* July, 1941, Vol. 98, pp. 35-47

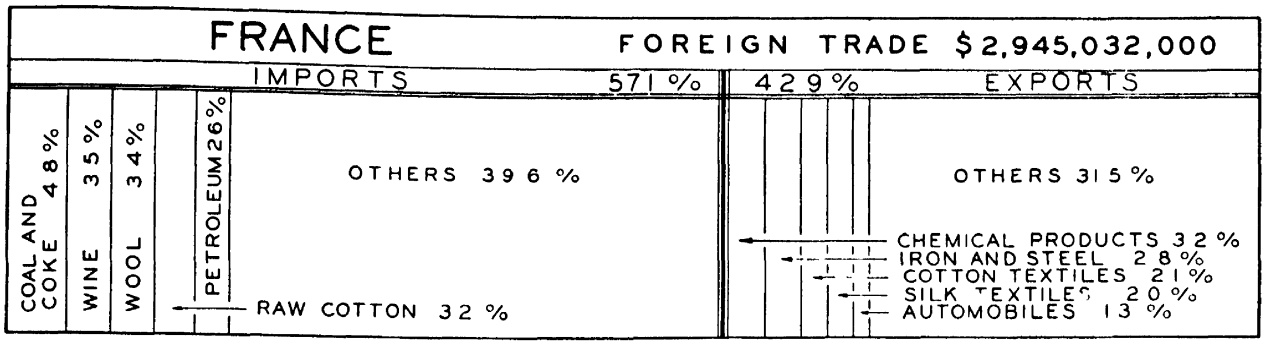


FIG. 188. FRANCE'S FOREIGN TRADE. A 14-year average immediately prior to World War II. France seemed to be buying more goods than she was selling. (See also Fig. 189.) (From *Statesman's Yearbook*)

cities, the New World, or to the interior of Europe. Fortunately Paris escaped the devastation suffered in World War II by several European capitals.

Marseille, at the western extremity of the Alpine Highland and on the north shore of the Mediterranean, is the chief seaport of France (Fig. 189). The importance of the city arises from the fact that it is the *entrepôt* for nearly all of the French trade with the *Levant*,[1] Africa, and the Far East. Marseille is one of the oldest European cities. Founded by the Greeks in 600 B.C., it became successively during the ensuing centuries a trade center for the Phoenicians, Carthaginians, and the Romans. Today, the city is the center of a flourishing tourist trade, has a thriving commerce, and has considerable industrial development. Marseille is the southern terminus of the great European north-south waterway, the Rhine-Rhone system, and the Paris-Lyon-Mediterranean Railway.

Lyon, near the middle of the Rhone-Saone Corridor at the junction of two rivers, is the business center of the European silk industry. The coal from the plateau and the abundance of available water power have contributed much toward making Lyon the third city in size in France. It is on the main line of travel and transportation from northwest Europe to the Mediterranean.

Bordeaux, a seaport on the west side of the Garonne River in southwestern France, has been a flourishing port since Roman times. Many wide quays, warehouses, factories, and mansions dot the plains landscape. Not only is the city the fourth in size in France but also it is fourth among French ports (Fig. 7). Among the exports are resin, wine, wood hoops, turpentine, fruits, and vegetables, and imports include timber, grain, machinery, and

[1] Eastern Mediterranean

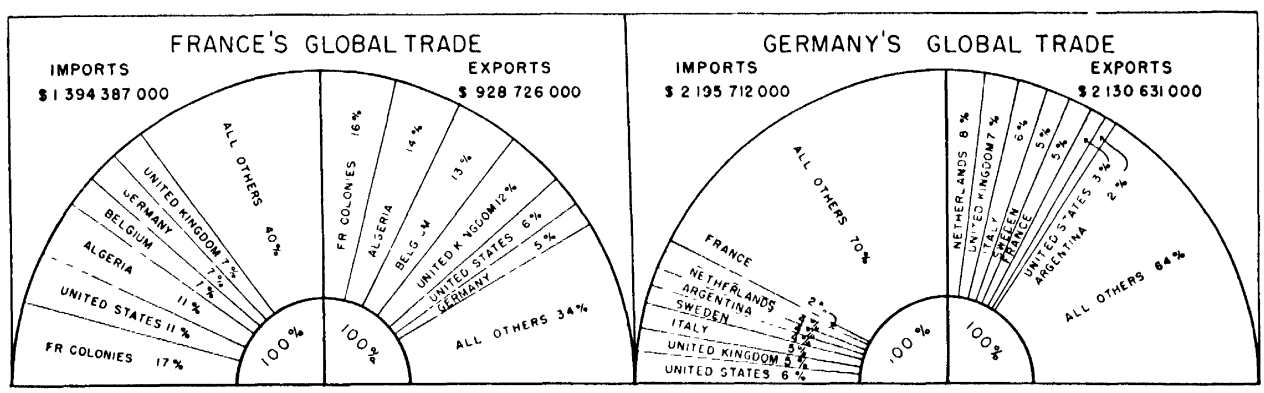


FIG. 189. GLOBAL TRADE OF FRANCE AND GERMANY. The foreign trade interests of France and Germany, similar to those of the United States and the United Kingdom (Fig. 22), are widely distributed. No one country enjoys more than 6 per cent of Germany's import trade, and none more than 8 per cent of her exports. (See also Fig. 188.) (From *Foreign Commerce Yearbook*)

chemicals. Industries center around flour milling, wine making, sugar refining, canning, distilling, and fish processing.

Nice, situated on the narrow coastal highway at the foot of the Maritime Alps from southern France into Italy, is a renowned winter resort similar in climate and attractiveness to southern California. It is the largest city in what is known as the *French Riviera.* Not far from Nice is another outstanding resort city, *Cannes.* Near by also is the renowned playground village of *Monte Carlo* in the little principality of Monaco

On a large bend in the Garonne River is *Toulouse* in the Carcassonne Gateway at the southern edge of the Central Plateau. Its history antedates the Christian era, evidences of which may be seen in the accumulation of ruins on the site of the old city. It is an important commercial and industrial center.

Nantes and *Brest* are the only cities of considerable size in Brittany. The former, on the tidal estuary of the Loire where the river sends out several distributaries, is accessible to large ocean-going vessels. Nantes is a very old city, having been a great commercial center under Roman domination in the early centuries of the Christian era. Industries today include the processing of sugar, rice, petroleum, fibers, and wheat; the canning of vegetables, fruits, and fish; and the manufacture of soaps, rubber, and metal goods as well as the building of ships. Brest, on a landlocked bay at the western extremity of Brittany, began as a fishing settlement and even today this industry dominates the thoughts of the people. Some of the slopes on which the city is built are so steep that ascent by stairs is necessary.

Strasbourg, situated at the junction of two small streams two miles west of the Rhine, holds a strategic military position because it guards an important entrance to the Rhine rift valley. For centuries Strasbourg has been a fortified town. Commercial connections are made with both France and Germany by railroad, and since the city is on the Rhine it has the advantage of the Rotterdam-Marseille water route.

Clermont-Ferrand, at the entrance to the picturesque volcanic heart of the Central Plateau, is noted for the processing of grains and the manufacture of rubber goods, especially tires. At the beginning of the Christian era, a Gallic city occupied the site which later became a center of Roman authority. *Belfort* owes its significance to its strategic location in the gateway between the Rhine Valley and the Rhone-Saone Corridor.

In the western edge of the plateau *Limoges* is noted especially for its high-grade porcelain. This industry had its beginning in medieval times and depends on the excellent kaolin clays in the vicinity.

Looking to the Future. Although France possesses a great deal of political and social unity, the diversity of climate, of soil, of topography, and of natural resources is considerable. This diversity, too, is an asset, since the grains of the north can be exchanged for the fruits of the south, early vegetables of the Mediterranean coast supply the north without the need of greenhouses, and the riches of forests and mines furnish an abundant supply of raw materials for factories on adjacent plains. But recurring difficulties with her neighbors indicate that France should help devise an economy of international relations that would correspond with the internal trade adjustments that have developed so favorably. This will require new patterns of diplomacy that ought to be well within the genius of French statesmen.

GERMANY

The devotion of Germany to modern science made of her a great nation. Scientific agriculture, especially in the introduction of commercial fertilizers, made naturally poor land produce bountifully. Mechanical and chemical science brought a wealth of industry and production second only to the corresponding development in our own country. This development seems the more remarkable when it is remembered that Germany did not become a unified country until after the War between the States in the United States—only three quarters of a century ago. This great material progress was halted for a dozen years by World War I, but by the end of the third decade of the present century, the country had regained most of her former enviable position. The world depression and unfavorable

trade conditions, however, hastened another catastrophic war

Natural Features

Germany is not so well situated with reference to barrier boundaries as is France, Spain, or Italy. She has always looked toward Russia, beyond her open eastern boundary, with misgivings; and toward France, her traditional foe on the other side of the Flanders and Lorraine gateways, with fear. About one half of the country is in the Central Plains of Europe, the other half occupying portions of the Rhenish Highlands, German Uplands and Bohemian Plateau, and the Alpine Highland (Figs. 136, 184, and 185).

The fact that Germany occupies portions of these complex regions suggests that the country must have a great diversity of topography, of resources, and of human activities. This, too, might lead one to conclude that certain less favored areas might be thinly populated. On the contrary, such is not necessarily the case; for Berlin, formerly the largest city on the continent, is in the center of a broad, unfertile plain, without minerals or coal, with a climate that is not too hospitable, and without easy access to the sea.

The climatic data indicate that the seasonal range of temperature does not vary greatly from one part of Germany to another, and that the rainfall is quite adequate, even, and dependable (Fig. 128). It is discernible, however, that there is a transition from the marine in the west to near continental in the east and south.

Germany at one time was practically all forested. Today much of the forest has been turned to cultivated land, but most of the rugged areas are still forest covered. So universally true is this that many of the mountains are known as forests.

The mature soils are mostly pedalfers, belonging chiefly to the gray-brown group (Figs. 237 and 238). Much of the soil of the plains is glacial in origin, either in the form of drift or outwash plains, and as a rule is coarse in texture and generally low in fertility. This is true especially of the Luneburg heath south of Hamburg. However, there are some good loess lands just north of the Harz Mountains, and an area of rich glacial till in the extreme west, north of the Rhenish Highlands.

Cultural Features

For hundreds of years after the flowering and decay of the Roman and Greek nations, the German tribes north of the Alps were living in numerous, hostile, mutually suspicious, but sovereign groups Some lived in large groups and some in small ones, each depending almost wholly upon the adequacy of the occupied area to support them. Among the peoples of northwest Europe, the Germans were the last to be unified. In the latter half of the nineteenth century twenty-six independent units were welded into the German Empire During the last two decades the number of constituent states not only was reduced but limited also was the amount of self-government permitted to them.

The several physiographic regions into which Germany extends, each in its own way, makes a notable contribution to the economic welfare of the people. This is especially true of the Rhenish Highlands, the Central Plains, and the German Uplands

Rhenish Highlands Before the advent of the modern industrial era in Europe most of the Rhenish Highlands, except for the commercial towns, was a land of agriculture and of peasants[1] The growing of cereals, fruits, grapes, the grazing of cattle, and forestry were the chief occupations (Fig 190) Today this part of Germany still produces abundantly of these necessities but not nearly enough to satisfy the needs of the great industrial area into which it has developed during the last several decades. By far the major interests today center on the mining of coal and iron ore and the manufacture of iron and steel goods. There are three notable coal-mining districts—namely, the *Saar Basin* on the southern margin of the highland (now in France), the *Sambre-Meuse* field on the north slope of the Ardennes mostly in Belgium, and the *Ruhr Valley* on the north slope of the highland. Iron ore is mined in considerable quantities in the Rhenish Highlands, but much is imported from Sweden and France[2]

It is not possible to list all the manufacturing industries that were promoted in this section of

[1] Chater, Melville, "Rediscovering the Rhine," *National Geographic Magazine*, July, 1925, Vol 48, pp 1-48

[2] Brandt, Karl, "The Fuel Crisis in Europe," *Foreign Affairs*, January, 1946, Vol 24, pp 337-340

Germany before the allied air assault. The intensity of occupancy meant specialization, not only in iron and steel goods but in many associated industries, some of them being parasitic. The urbanization of the western and northern margin of the Rhenish Highlands is phenomenal. On the

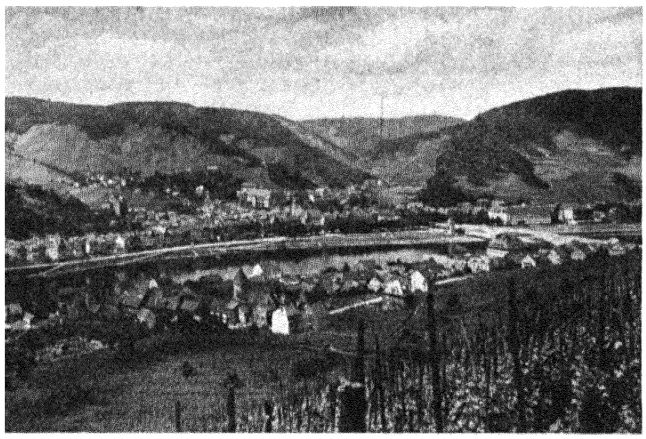


FIG. 190. CULTIVATED SLOPES ALONG THE MOSELLE IN GERMANY. The source of the Moselle is in France. At the close of World War I, American troops followed the Moselle to Coblenz. (Courtesy German Railroads Information Office)

northern edge are more than a dozen large industrial cities, some of them actually coalescing, so completely is the area occupied. Among these cities are Cologne, *Dusseldorf, Essen, Dortmund, Duisburg-Hamborn*, and *Wuppertal*, each with more than four hundred thousand inhabitants before the allied bombing. All of these cities were closely knit by rail, by canal, and by motor roads.

Transportation in the Rhenish Highlands converges on the Rhine and its tributaries. Railroads follow the tributary valleys to the Rhine, which, itself, has railroads along both banks. Much tonnage goes by water. The master stream, although beset by rapids and shoals, has been made navigable by means of canals and locks, and it has been connected by barge canals with the Rhone, the Seine, and the Danube.[1]

GERMAN UPLANDS. For centuries farming has been the chief occupation in the German Uplands (Fig. 191). Today diversified and intensive agriculture is practiced where conditions are favorable. The chief crops are rye, barley, sugar beets, potatoes, orchard crops such as apples and peaches, and berries. A wide variety of vegetables is grown. For a long time forest conservation has been the rule, and continued utilization has not materially reduced the supply of products, such as lumber for furniture manufacture and wood carving, wood pulp for paper, and wood for fuel.

Associated with the forested mountains are the grazing of cattle and sheep and recreation. Manufacturing industries of the German Uplands are highly developed and many specialized ones are outstanding, such as porcelain and glassware at Dresden, books at Leipzig, textiles at *Chemnitz*, toys at Nuremberg, and malt liquors at Munich. Transportation within this part of Germany is well developed with good connections to all parts of Germany and to surrounding countries by rail, highway, airplane, and by canal and river boats.

CENTRAL PLAINS. The topography of the Central Plain in Germany is gently undulating and glacial in its origin. Concentric arcs of alternating moraines and glacial valleys are plainly in evidence. The shortest moraine forms an arc from *Danzig* to *Lübeck*, and south of this moraine and parallel to it is an old glacial valley. As many as four or five moraines and valleys corresponding to the fore-

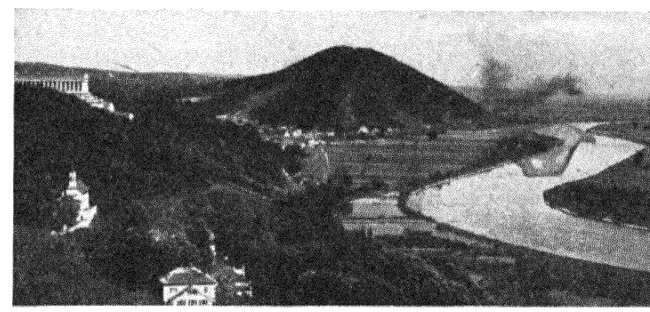


FIG. 191. THE WALHALLA. Germany's Hall of Fame on the Danube River about 75 miles north of Munich. Note the even skyline of the Upland. (Courtesy German Railroads Information Office)

going pattern occupy the plains as far south as the German Uplands and Rhenish Highlands. Today the larger streams, the Elbe, the Oder, and the Vistula, cut across these moraines and valleys rather than flow parallel to them.[2] The geological history

[1] Eisen, Edna E., "The Structure of Rhine Traffic," *Economic Geography*, July, 1934, Vol. 10, pp. 254-267.

[2] Crone, G. R., "Inland Waterways of Germany," *Geographical Journal*, April, 1939, Vol. 93, pp. 333-339.

of these formations is an interesting but complex story and cannot be followed here. Suffice it to say that the much more recently glacial-invaded northern section is dotted with lakes, whereas the areas of more ancient invasions in the south are practically without lakes.

Pasture, hay, and forage crops predominate in the Baltic coastal zone in which dairy and beef cattle are grown. The plains section of Germany is primarily a farming country, although soils vary markedly in crop-producing capacity. On the plains in the extreme west, 60 per cent of the farmers' income is from livestock. Mixed farming is the rule through the rest of the plains section. Rye, potatoes, oats, and livestock command major attention. Much of the manufacturing is associated with the products of the farms, such as the processing of meat, potatoes, beets, and grain.

Although Germany has no colonies with which to trade, the diversity of interests essential to trade relations is enhanced by the fact that the western part of the country is preeminently an industrial area, whereas the eastern and northern parts are largely agricultural These specialized interests have encouraged the building of numerous east-west routes of trade and transportation—canals, highways, railroads, and airways.

Cities of Germany. Previous to World War II Germany had at least two cities, each with more than a million people, and another forty cities each with one-hundred thousand or more. Since it would be difficult to describe German cities as they are today in their bombed and badly wrecked condition, the present discussion will consider them as they were before World War II (Fig 138).

Berlin, the capital of Germany, is situated in the center of the north German plains on the banks of a small stream, the Spree, and is surrounded by low marshes, lakes, and forests. The establishment of Berlin as the capital and chief center of the Empire accounted for its size and importance. Canal connections are made both with the Oder and the Elbe, and railroads converge upon it in much the same manner as they do at Paris. Berlin's ports are Hamburg and *Stettin*. While Berlin was a larger city than Paris, it is not nearly so old because Germany did not rise to world power until the nineteenth century. However, since the empire days beginning in 1870, Berlin had a tremendous growth in international importance and in politics, business, and industry. It was a beautiful city with government buildings, educational and art centers; and its famous "Unter den Linden" boulevard (now only a ghost of its former grandeur) is known throughout the world. The industries of Berlin were associated with iron and steel, clothing, printing, dyeing, electrical apparatus, musical instruments, brewing, and the processing of agricultural raw materials as well as the manufacture of many luxury goods. It is impossible to tell at present what the future of Berlin will be under the joint occupancy of the Allied Nations.[1]

Hamburg, on the Elbe 60 miles from the sea, is the chief port of the country. Its location on the great inland trade route of Germany gives it a vast hinterland which reaches to the Bohemian Basin and includes many of the important cities of the interior such as Dresden, Prague, and Berlin. Since the largest ships cannot dock at the Hamburg harbor, a small harbor, *Cuxhaven*, was established near the coast Tributary to Hamburg are the principal steamship lines of the world which bring tourists, tropical products, foodstuffs, and raw materials and take away the products of a rich industrial hinterland

Cologne (Koln), a focal point about 20 miles from the lower end of the Rhine gorge and an old city founded by the Romans, occupies a great semicircle of land on the left bank of the river From the near-by incised highlands are roads from nearly all directions which converge at the city. The location of Cologne on the great Rhine water route accounts in part for its prewar prosperity and progress. At one time Cologne was a prominent member of the old Hanseatic League Until recently it was a leading wholesale distributing center, and the manufacture of sugar, chocolate, tobacco, and cigars gives sufficient evidence of this city's former connection with tropical and subtropical lands. The most famous manufactured article was a perfume, eau de Cologne

Frankfurt (Frankfort-on-Main), a historic city dating from the twelfth century, is on the right

[1] Waln, Nora, "Children in Germany," *The Atlantic Monthly*, December, 1945, Vol 176, pp 52-54

bank of the *River Main* just 24 miles above the Main-Rhine confluence. Frankfurt is the place where the old emperors were crowned. Goethe lived here for a time, and the famous Rothschild family, renowned in annals of European finance, had its beginning in this city. Old fortifications dating from medieval times still exist. It was within the old walls and the guild hall that the medieval merchants traded with the surrounding towns and uplands to the north, east, and south. The principal industries before World War II included printing and publishing, brewing, and type foundries; and the manufacture of machinery, rubber goods, chemical goods, electrical technical apparatus, and metal wares.

Dresden, situated on the banks of the Elbe near the exit of the river from the Bohemian Basin, has been a point of attack for centuries in nearly every war in central Europe. The Elbe River connects Dresden with the port of Hamburg, and a fine system of railroads extends in all directions from the city. The commercial importance of Dresden resulted from the numerous types of goods which were manufactured, such as porcelain, pianos, paper, photographic instruments, books, and beer.

Leipzig, prior to World War II, was known throughout the civilized world as a great publishing center and was famous for its two great fairs, one in the spring and one in the autumn. The chief articles of trade at the fairs were furs, leather, wool, glassware, and cloth.[1] Leipzig, on the periphery of the Central Plains lowlands and the German Uplands, has connections with both. This city ranked among the highest in the world in book selling and in publishing, about one thousand establishments being engaged in this business. It also had printing machine manufactures, type foundries, and other industries related to publishing.

Munich (Munchen), on the German Uplands and the most important midway city between Strasbourg and Vienna, is on the bank of the Isar about 25 miles north of the Alpine foothills. It is the center of a network of railways connecting directly with Strasbourg, Paris, Cologne, Leipzig, Berlin, Vienna, and with Innsbruck for Italy via the Brenner Pass. The city long has been celebrated for its artistic handicrafts such as bronze founding, glass staining, silversmithing, wood carving, and the manufacturing of optical instruments; and it also has been one of the leading art and musical centers in Germany.

Nuremberg (Nurnberg), on a sandy plain on the banks of the *Pegnitz River* about 100 miles nearly due north of Munich, is on the *Ludwig Canal* which connects the Main and the Danube rivers. A historic past, which includes famous Germans of both medieval and modern times, combined with early German art, attracted tourists from many nations of the world. The old walls, now crumbling, the famous old homes of aristocrats and patricians, and the ancient torture chambers, together with the narrow crooked streets made Nuremberg an attractive old city. However, modern business buildings and fourteen bridges across the river were evidences that the modern era was erasing the old. Great wealth came to the city from its intermediary trade between north Germany and Italy during the empire days. Nuremberg in prewar days was well known for the manufacture of electrical apparatus, motors, toys, fancy metal wares, wood products, and especially articles carved from ivory.

Mulhouse, at the southern end of the Rhine graben, is connected with the Rhone-Rhine canal system. Just southwest of Mulhouse is the Belfort Gateway, and to the southeast several railroads lead into Switzerland by the way of Basel and Zurich. The Belfort Gateway continues eastward to Basel in Switzerland and thence between the Jura and the Black Forest to *Lake Constance* and the Alpine Foreland. Mulhouse was a manufacturing city producing textiles, chemicals, and machinery It has good transportation facilities by river, canal, and rail.

Mannheim is another strategic military city located in the lowland at the Neckar-Rhine confluence. Mannheim had the advantage of trade from the Rhine to the interior via the Neckar valley, and it, too, had the advantage of the Rhone-Rhine water route.

GERMANY'S PROSPECTS. Most of the soils of Germany are inferior. In the plains of the north the soils consist of coarse glacial materials; in the Rhenish Highlands they are shallow as a rule because of the rugged terrain; and in the central and

[1] Van Cleef, Eugene, "The Leipsig Trade Fairs," *Journal of Geography,* September, 1937, Vol 36, pp 205-212

southern uplands the mature soils are largely residual and thin. However, with German untiring effort in the development of commercial fertilizers and introduction of crop rotation, the country was nearly self-supporting in food necessities. A lack of tropical colonies has been a handicap, but not so great as might first appear, for there was always the possibilities of trade with other countries. To this type of adjustment the Germans were not well-disposed, preferring to proclaim to the world that they were severely hedged in and must have more room. Two world wars grew in part out of this state of the German mind.[1] A readjusted point of view in international relations is the most critical problem of the German people today. For several years German industrial, economic, and political activities will be closely supervised by four of the Allied Nations—Russia occupying the eastern part, United States the southern, France the southwestern, and the British the northwestern. The rigorous limits placed on the German people because of their recent aggressions is bound to require some distressing reorientation in modes of living and thinking.[2]

LOW COUNTRIES OF THE NORTH SEA COAST

Altogether the three kingdoms of Denmark, Netherlands, and Belgium are just as large as Kentucky. However, before World War II each possessed more than three quarters of a million square miles of overseas territory—a total area more than three fourths as large as the United States. It is true, of course, that Greenland and Iceland, belonging to Denmark, are not very valuable assets. On the other hand, the Belgian Congo and the Netherlands Indies not only have high potential value but the riches of tropical products and petroleum of the latter are very great indeed. More may be learned about these colonial possessions from the discussions in other parts of this book. The strategic location of these three countries athwart the North Sea trade routes, and at the same time their gateway position among powerful neighbors have been a great advantage in times of peace but decidedly unfavorable when their neighbors fall out. Much trade in transit between the continent and overseas countries passes through Belgium and the Netherlands, since they are on the seaward side of a great industrialized area. Many commodities imported into these two countries are re-exported without further processing. All of the *Low Countries* are within the Central Plains (see pages 315 and 316).

The climate of the Low countries is cyclonic marine, the small variations being due chiefly to differences in latitude (about 100 miles) and distance to the open ocean. Temperatures at Copenhagen are about 2° F. lower, month by month, than they are at Brussels. Although the rainfall at each station is quite evenly distributed through the year, the annual totals differ by about 10 inches, the former receiving about 20 inches and the latter about 30 inches (Fig. 128). However, none of these countries is subject to damaging droughts, and in none is irrigation required.[3]

DENMARK

Two of the routes from the North Sea to the Baltic through Denmark are waterways, the so-called *Little Belt* and *Great Belt*. These water passages lie between the mainland (*Jutland*) and the large island components of the kingdom (Fyn and Seeland). The third route (The Sound) is between Sweden and the large island, *Seeland* (Sjaelland). Denmark, not including Greenland, has more people than Indiana but in area it is not half as large. (See Greenland, page 118.)

Natural Features

The concentric arcs of alternating moraines and glacial valleys of northern Germany extend into Denmark, and determine largely the terrain of the country. This may account for the fact that Jutland is unique among the peninsulas of the world, in that it is one among the few that project northward. The east part of the mainland is mostly a terminal moraine and the west is a sandy, outwash

[1] Henry, Thomas R., "War's Wake in the Rhineland," *National Geographic Magazine*, July, 1945, Vol 88, pp 1-32.

[2] Byers, Carey, "Future Strength of Germany," *Harper's Magazine*, December, 1944, Vol 190, pp 48-57

[3] Crone, G. R., "Notes on the Agriculture of the Low Countries," *Geographical Journal*, November-December, 1942, Vol 100, pp 235-244

plain (see page 322). The islands likewise are terminal moraines, but the outwash valleys are under the two submerged Belts. The western part of the Jutland peninsula consists mostly of sandy moors and wastelands which have been partly reclaimed by forestry. The remainder of the mainland and most of the islands have much good soil which is carefully cultivated.[1]

Cultural Features

The early inhabitants of the Danish area were probably fishermen, who, when they started farming, moved inland where the soils were better. Today most of the people live in the eastern part of the country, including the islands, where the land, due to careful management, is highly productive. Rich meadows and good yields of oats, barley, wheat, beets, and root crops are grown. Since the country has no coal, no minerals, and no water power, the attention of the people has been directed to producing the most that is possible from the land. They have done this by growing green crops, such as hay, forage, roots, legumes, etc., and by importing concentrated feeds for their animals —namely, cattle, hogs, and poultry. The restricted resources, the dense population, the competition in the world's grain markets, and the protective tariff barriers to the exchange of goods between countries were some of the factors that impelled the Danes to specialize in high-class animal products—butter, cheese, eggs, and bacon. In these commodities the Danes enjoy world-wide renown. Much of the credit for their large measure of success is due to their numerous cooperative societies, both consumer and producer types.[2]

Because of the large amount of poor soil, forestry is important. Manufacturing enterprises center especially in the processing of agricultural products, including imported grains. The foreign trade of Denmark includes a wide range of items. Among the imports are food and feeds, fibers and textiles, metals and machinery, fuels, chemicals, fertilizers, and hydroelectric power. Exports include mostly cattle, hogs, processed meats, and animal products (butter, cheese, eggs, etc.). More than three fourths of the global trade of the country is limited to the United Kingdom, Germany, Norway, and Sweden (Fig. 192). The trade relations of Denmark were not permanently injured by the German aggression.[3]

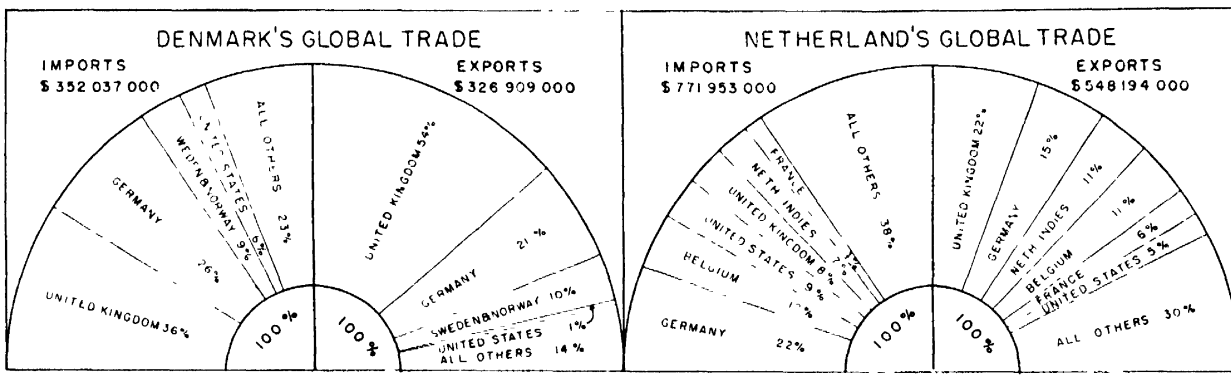


Fig. 192 Global Trade of Denmark and Netherlands. All but 23 per cent of the import trade and 14 per cent of the export trade of Denmark is with four countries—a dangerous situation when powerful neighbors fall out. Netherland's foreign trade interests are widely distributed. (From *Foreign Commerce Yearbook*)

Cities of Denmark. Denmark has numerous small towns and cities, but only one (Copenhagen) has more than 100,000 people. Nearly one fourth of the people live in the capital city.

[1] Sutherland, Mason, "Bornholm—Denmark in a Nutshell," *National Geographic Magazine*, February, 1945, Vol 87, pp 239-256.

[2] Bergsmark, Daniel R., "Agriculture in Denmark, A Land of Specialized Farming and Cooperation," *Journal of Geography*, April, 1938, Vol 37, pp 129-142.

[3] Moritzen, Julius, "Denmark's Frontier and Minority Problem," *Current History*, January, 1936, Vol 10, pp 43-47.

Copenhagen (Kobenhavn), although on an island in the extreme eastern part of the country, is nevertheless the railway, shipping, financial, governmental, and educational center of Denmark. For hundreds of years it was the guardian of the Baltic-North Sea gateway, and it well deserved the name, *Merchant's Harbor*. The problem of railway transportation is solved by the use of large ferryboats which carry the trains back and forth across the narrow strips of water. Copenhagen is a near million city, only one other city (Aarhus) in Denmark having over 100,000 people.

THE NETHERLANDS

The little country of the Netherlands, one third as large as Ohio, supports a thriving population of nearly 9,000,000, more than 600 persons per square mile. This is explained in part by the fact that the overseas territory under its control is sixty times that of the homeland, and has 50,000,000 people (see pages 407-411). Moreover, most of the overseas lands are tropical, yielding highly valuable products which the Dutch undertake to distribute to a waiting world.

Natural Features

It may be no idle remark when a Dutchman says he was born below sea level; thousands of the Dutch were. If the dikes and protecting dunes were removed, the ocean would inundate about 40 per cent of the land. Truly, the Netherlands is a delta country, built up from ocean-bottom by sands, gravels, and clays which were carried from the watersheds of the Rhine, the *Scheldt*, and their tributaries.

The surface features of the Netherlands may be discussed in three divisions—namely the dunes, the lowlands or polders, and the uplands. Along the entire coast is a fringe of sand dunes protecting the country from the ravages of the sea. Four waterways from the lowlands through the dunes to the sea are the channels of the Rhine and the Scheldt rivers, and two canals. The dune barrier along the northern two fifths of the coast has been breached by the sea into a string of sandy islands known as the *West Frisian Islands*.

The lands lying east of the dunes, occupying about two fifths of the country, are threaded in every direction by dikes and canals. The farm land which is at subsea level is drained by continuous pumping into the canals which carry the water to the rivers or to the ocean. Of course, most of the homes and villages are on the dikes. The water in the canals moves very slowly, is usually discolored, covered with duckweed, and often gives off unsavory odors. One must not look for limpid, sparkling waters in the polders of Holland. In the lowlands the soils are peaty and clayey, and the land is used chiefly as pasture.

The uplands in the east are above sea level and occupy more than one half of the country. The glacial ridges lend a rolling aspect to the terrain, a considerable contrast to the flat polder and delta lands. Some of the uplands are too sandy for farming, and here the purple heath in summer with the green forest background of oak, beech, and pine is a sight that delights the tourist.

Cultural Features

It is said that there was more land in Holland a thousand years ago than now. It is recorded that in the twelfth, thirteenth, and fourteenth centuries the fury of the sea broke through the west wall of protecting dunes and inundated areas that had previously been fresh water lakes. At any rate, the Dutch seem to have the sea under control today; but their hold must be precarious, for if some of their delta land should slump only a few feet disaster would certainly overtake them.

The German blitzkrieg advanced so suddenly and so rapidly in May, 1940, that the Dutch did not have time to stop the invasion by flooding their country. By November, 1944, however, during the Nazi retreat the Germans opened the dikes and flooded nearly 20 per cent of the Netherlands in their attempt to halt the Allied advance. It will probably require several years to drain the flooded areas and again get them into production.[1]

The interests and activities of the Dutch center around agriculture, if not directly in the production of crops and animals, then in industrial or commercial pursuits closely related to the land.

[1] Whittlesey, Derwent, "Occupance in the Lowest Rhineland," *Journal of Geography*, February, 1930, Vol. 29, pp 41-53.

The grazing and hay lands are usually too wet for farming. Crops include rye, barley, wheat, oats, potatoes, and root plants. Considerable concentrates for animal feed are imported. Sugar beets are grown in large quantities and enough sugar is produced so that some is exported. The Dutch have world renown for the quality and abundance of their dairy products.

The fishing industry has always been important in Holland, not only for the fish secured, but for the school of seamanship that the industry provided. The management of the great empire of islands has required a large merchant fleet and an adequate supporting navy.

Holland secures some coal from the Franco-Belgian-Ruhr seams that cross the southeastern corner, but the country has no other minerals and no hydroelectric power. However, manufacturing industries are highly important and include the making of cheese, butter, condensed milk, and sugar from agricultural raw materials; the fabrication of textiles from imported cotton, wool, and linen fibers, the cutting of diamonds; and the manufacturing of jewelry.

The foreign trade of the Netherlands amounted to more than $150 per capita in 1938. The exchange includes a host of items, many of which are imported, processed, and then exported (Fig. 7). The chief imports are food and feeds, fibers, coal, machinery, wood and wood products, and chemicals. Exports include meats, animal products, fresh vegetables, textile goods, vegetable oils, machinery, and diamonds. Among Holland's best clients in trade are the United Kingdom, Germany, Belgium, France, and the United States (Fig. 192).

Cities of the Netherlands. The Netherlands has fifty cities with more than 20,000 people, seven with more than 100,000 people and two previous to World War II with over 500,000. Only four will be discussed here. It is certain that the damage caused by bombing of the Dutch cities will soon be repaired and that they will emerge as better-planned communities.

Amsterdam, on the southwest shore of the *Zuider Zee*, is a historic commercial center built on a giant sandbar near the coast. It has an artificial harbor and a canal across a peninsula to the ocean. However, since the ships in modern times have become larger and require deeper harbors than they formerly did, Amsterdam has relinquished much of its trade to Rotterdam. Long known as a center of culture, finance, and skilled workmen, Amsterdam continues to attract tourists, trade, and industry because of its long leadership.

Rotterdam, at the mouth of the Rhine, has a hinterland which extends to the great industrial district of Germany. It is the principal entrepot for great quantities of goods which the cities in its hinterland use. The Rhine River and associated canals account for much of the growth and importance of Rotterdam.

The Hague ('s Gravenhage) is the site of the royal residence, the meeting place of the Dutch parliament, and one of the capitals. It is comparable to Washington as a center of wealth and a home of dignitaries, and enjoys international renown because it is in a buffer country and is the seat of the *Court of International Justice*.

Utrecht is an educational and railway center, having direct connections west with Rotterdam and Amsterdam, and north and east with *Groningen* and *Arnhem*.

Looking to the Future. The Netherlands is a little country delicately balanced in a precarious situation. It is difficult to keep imports balanced with exports, for it has to be done largely by services rendered.[1] Small shifts in the attitude of neighboring countries seriously affect domestic economy. For example, food and raw material for manufacture must be imported, and fresh vegetables and animal products are exported. Tariff changes could easily upset a balance that has required years to attain. The stripping of the country, during World War II, of its animals is a serious handicap, since previously enjoyed markets depending on cattle and swine may never be regained. The country will need help in rehabilitation.

BELGIUM

When the ancient lowland between Great Britain and the continent sank into the sea it left modern Belgium in a dubious situation. With the width of

[1] Bolles, Blair, "Should We Mind Holland's Business?," *Harper's Magazine*, June, 1945, Vol 90, pp 606-615

the Central Plains between the highland and the ocean constricted to barely 50 miles, the people in the broad plains adjacent were certain to meet in this gateway for trade, for conference, and perchance for war. Nearly half of Belgium's 11,373 square miles (an area equal to that of Connecticut) is in the Flanders Gateway, and the land is not only densely populated but intensively cultivated and highly industrialized.

Natural Features

The terrain of Belgium may be divided into three east-west sections, each of which may be further subdivided (see pages 303 and 315). The northern section is a westward extension of three belts in Holland—namely, the coastal dunes, the polders, and the sandy zone The dune section has no breaches in it, so Belgium must find access to the ocean highway from Antwerp, the chief Belgian port, through Holland by way of the Scheldt River. It has been the Dutch foreign policy to discourage commerce over this stream, so that it would be diverted through their own ports, Rotterdam and Amsterdam. The sandy zone probably represents the southern limits of glacial outwash

The middle belt across the country is a loamy, loess upland, extending southward to the *Sambre* and *Meuse* rivers. The terrain is rolling, the soil is rich, and the drainage is mostly northward to the Scheldt and its tributaries. At the southern edge of the middle Belgian upland is the deep broad valley of the Sambre and Meuse rivers. This valley is the shortest and best roadway from the German plains to the Paris Basin, and generally is the section of Belgium to first feel the impact of invading armies. It is in this valley, too, where the rivers have uncovered the underlying coal beds on which Belgium has relied in developing the rich industrial district across the central part of the country.

In the southeast one third of the country—that is, south of the Sambre-Meuse rivers—are the Ardennes Mountains. This highland is an elevated, dissected peneplain, not much over 2000 feet in altitude, and is a southwestward extension of the Slate Mountains in Germany. For hundreds of years this region has produced zinc, lead, and iron ore, and in ancient days was the seat of the most intensive metallurgical industry in northwest Europe. The lower slopes of the Ardennes and the Ardennes foreland are partly under cultivation, but at higher levels forest and moorlands prevail. The Ardennes highland receives twice as much rainfall as the adjacent lowlands, and the winters are cold with considerable snow and much fog.

Cultural Features

As if to aggravate a gateway situation already fraught with danger, the Belgian people, for the most part, are made up of two language and ethnic groups—the *Walloons* in the southern half of the country, 40 per cent of whom speak French; and the *Flemings* in the north, 43 per cent of whom speak German. The remainder of the people are bilingual. In general, the Walloons are interested in mining and industrial enterprises, and the Flemings in agricultural pursuits. The buffer position of Belgium is further emphasized by the many well-known military events associated with the vicinity Among them are the battles of *Waterloo* and *Sedan* in the nineteenth century, the bitter struggles in both World Wars in the first half of the twentieth century, and the battles of Ramillies, Oudenarde, and Jemappes in the eighteenth century

All sections of Belgium support one or more phases of agricultural enterprises. The polders and sandy lands are better suited to grazing than to tillage; and here on the pastures and hay lands fine horses and cattle are raised. The loess belt is adapted to the production of high yields of wheat, oats, barley, root crops, beets, and orchard fruits. The highlands are used chiefly for pasture and forestry at the higher altitudes, but farming becomes increasingly important on the northern slopes and on the foreland. The farms in Belgium are small, entirely too small for efficient cultivation and management. One of the critical problems is that of consolidation of the little cultivated plots into farms large enough for the use of modern farm machines.

But after all, more of the people of Belgium are engaged in industrial than in agricultural pursuits.[1] The easily mined coal and minerals have nearly been exhausted, but both are available in neigh-

[1] Chandler, Douglas, "Belgium—Europe in Miniature," *National Geographic Magazine*, April, 1938, Vol. 73, pp 397-450

boring countries, iron ores in *Luxembourg* and France and coal in Germany. However, many of the essential minerals and metals, such as petroleum, copper, manganese, and fertilizer, must come from overseas sources. Not all of the industrial enterprises are concerned with metals and machines, for the processing of agricultural products, the weaving of textiles, and the manufacture of brick and porcelain goods have a very large place in Belgian industrial economy.

Even with such intensive utilization of the land

Brussels (Bruxelles), capital of Belgium, although located in the interior is connected by canal with the Scheldt and the ocean. The importance of the city arises from its political leadership and its industrial and financial activities. Its position in the Flanders Gateway has given it strategic importance for trade in times of peace and for violence in times of war.

Ghent (Gand) has a ship canal connecting with the Scheldt, and is a textile-manufacturing center, especially of linens.

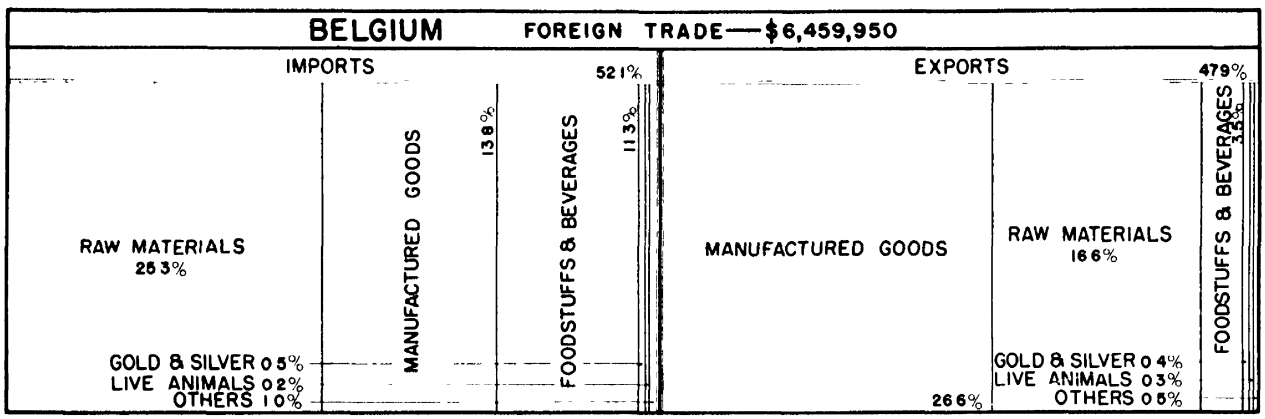


Fig. 193 Belgium's Foreign Trade. A 10-year average preceding World War II. The percentage of raw materials imported just about equals the manufactured goods exported. (From *Statesman's Yearbook*)

Belgium needs to import large quantities of food for her people, feed for animals, and raw materials for manufacture (Fig. 193). Exports consist mostly of manufactured goods, iron, steel, textiles, coal, coke, and machinery. The global trade of Belgium is chiefly with neighboring countries (France, Germany, United Kingdom, and the Netherlands), and with the United States and the Belgian Congo (see pages 379 to 382).

Cities of Belgium. Belgium is a highly industrialized country with an average of 700 or more people per square mile. In it are many towns and cities, twenty-eight of which have more than 25,000 people, four with over 100,000, and one (Antwerp) with nearly a million (Fig. 138).

The leading seaport of Belgium, *Antwerp* (Anvers), is on the banks of the Scheldt River just above the mouth. Its hinterland extends into Germany, France, and Switzerland, and at times it almost rivals other great ports of the world in the quantity of its shipping.

Liége, the east entrance to the Sambre-Meuse valley, is outstanding in metallurgical industries.

POLAND

The Vistula River is more Polish than the Rhine is German. As the Rhine flows through Dutch territory to reach the North Sea, so the Vistula flows to the Baltic through lands formerly held by the Germans. Poland is primarily a plains country, twice as large as Nebraska, and contains thirty times as many people. South Poland is in the latitude of Winnipeg, and its north-south and east-west extents are each about 500 miles. It rivals Romania in compactness of area, and 70 to 75 per cent of the people are Roman Catholics and speak the Polish language. The new German-Polish frontier will probably fall in the vicinity of the Oder River, 50 or more miles west of the prewar boundary.

Natural Features

Poland is mostly in the Central Plains with the southern boundary extending to the crest of the Carpathian Mountains (see page 305). The entire country at one time or another was glaciated, but the recent ice invasion covered only the northwestern section about as far south as Warsaw and in this area glacial hills and lakes characterize much of the terrain. The remainder of the country south of the middle has been subject to post-glacial erosion so long that the soils have become mature and most of the lakes have been obliterated. In the southern two fifths of Poland, even into the Carpathian foothills, most of the ancient glacial drift has been covered by a rich mantle of loess. The east central part of the country, the portion drained by the *Pripet River* and its tributaries, is a flat, marshy area—low in value and thinly populated.[1] The *Dniester*, *Prut*, and Pripet rivers flow from southeastern Poland into the Black Sea, but the remainder of the country is in the drainage basin of the Baltic Sea.

The climate of Poland is continental humid with the length of the growing season decreasing eastward and northward. Although the average annual rainfall is not high (Warsaw, 22.3 inches), most of it comes in the summer (15 inches from May to September, inclusive), and in this latitude (52° north) evaporation is low, thus lending high efficiency to the amount received (Figs. 128 and 236). Seldom does Poland suffer severe droughts, and, therefore, the food supply for the densely populated area is quite secure.

Originally nearly all of Poland was forested mostly with hardwoods such as oak, beech, and maple; but today only one fifth of the country is tree covered, the remainder having been cleared and turned into agricultural land. The remaining forests are mostly the conifers, located in the Carpathians and in the sandy drift in the north.

Cultural Features

Both the Poles and the Czechs have lived in a frontier zone of bitter and sanguinary conflict for many hundreds of years. During its greatest expansion Poland stretched from the Baltic to the Black Sea. Dissension among themselves, however, and the growing power of their neighbors, resulted in the dismemberment of the country in the latter part of the eighteenth century. Sections of Poland remained under the control of Russia, Germany, and Austria for about 150 years, when at the close of World War I the Poles were given a new birth of freedom. Access to the North Sea was granted through the *Polish Corridor* to the port of *Gdynia*. But freedom was fugitive. The Polish Republic lasted until 1939 when it was destroyed by the German juggernaut. The lines on which new boundaries will be drawn are fairly well settled, Poland losing some territory in the east to the Soviet Union, and gaining some in the west at the expense of Germany. On the whole the total area will not be altered much.

In that part of Poland, south and west of the *Bug* and Vistula rivers, the land is used intensively, about 90 per cent of the arable area being devoted to crop-growing. The population density is more than 200 per square mile in this section. The yields of wheat, barley, potatoes, rye, and oats are high, not only because of the excellent soil, but also because of superior farm management—the result in part of lessons learned by close proximity to the highly efficient methods of their German neighbors. Not only is this a good farming area, but it is also the most industrialized section of the country.

The best part of the rich upper Silesian coal and iron district is in southwestern Poland, but a smaller section lies in adjacent parts of Czechoslovakia. This area on the continent has been second in the iron industry only to the Ruhr District in western Germany.[2] The north slope and foothills of the Carpathian Mountains are rich in water power and petroleum which contribute to manufacturing interests in the southern part of the country. South and west of Warsaw are numerous manufacturing towns and cities specializing in the processing of agricultural products, including brewing, flour milling, meat packing, and leather making; and in this area the weaving of textiles from cotton,

[1] The Russians propose the Curzon Line (about 150 miles west of the prewar frontier) as the new Polish-Soviet boundary. This would place eastern Poland almost entirely in the drainage basin of the Vistula.

[2] Hartshorne, Richard, "The Upper Silesian Industrial District," *Geographical Review*, July, 1934, Vol. 24, pp. 54-80.

wool, linen and jute requires many skilled workers. The western and southern parts of Poland are densely populated, and industrially are much like western Europe, but the area north and east of the Vistula and Bug rivers is thinly settled and backward, both in agricultural methods and in industry. In this section of the country less than one half of the land is under cultivation, and the percentage engaged in industry is very low. The processing of wood into lumber, pulp, and paper is the most important industrial activity.[1]

194). Germany, the United Kingdom, and the United States have been Poland's best customers.

Cities of Poland. Poland has 11 cities of more than 100,000 people, only one of which is east of the Vistula and Bug rivers. Before World War II two cities had over a half million people each, and one (Warsaw) had more than a million. It is probable that the destroyed sections of Polish cities will soon be reconstructed.

Warsaw (Warszawa), the capital and chief urban center of Poland, is situated on the banks of the

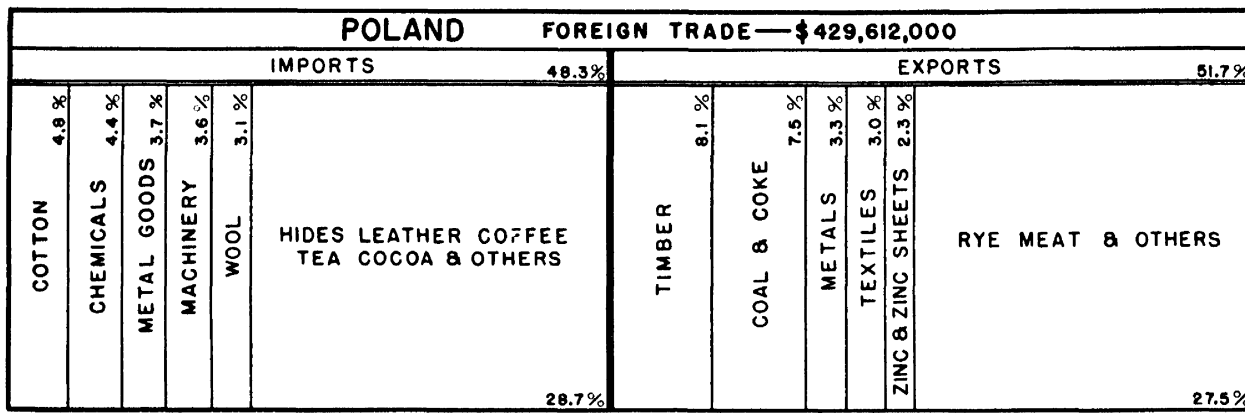


Fig. 194. Poland's Foreign Trade. A 10-year average prior to World War II. Although an important producer of beet sugar and potatoes, the export of these commodities seems negligible. (See also Fig. 198.) (From *Statesman's Yearbook*)

Transportation facilities, both by water and rail, in western Poland (formerly a part of Germany) are quite good, but in the remainder of the country means are inadequate, becoming progressively poorer eastward. Most of the country needs improvement in highways, railways, waterways, and airways.

The foreign trade of Poland in 1938 was only $13 per capita, whereas that of Hungary was $30.15 and of Finland, $95.10. Of course, the country has a high population density with few resources to sell except the labor added in the manufacturing of goods. Poland has keen competition in the world markets for the kinds of goods she has to sell. The leading exports of the country are animal products, wood, and wood products, metal goods, and coal. Imports include fibers, machinery, and gold (Fig.

[1] Durand, Loyal, Jr., "Baronowice, A Landed Estate in Polish Silesia," *Journal of Geography*, November, 1937, Vol. 36, pp. 289-299.

Vistula about 200 miles south of Danzig and approximately 300 miles east of Berlin. For centuries this great city has been the focal point of attack by armies in the northeastern plains of Europe. It was probably as completely devastated by bombing as was Berlin.

The fact that it has been the capital of Poland since World War I, and that it has had considerable commercial and industrial development, accounts for the importance of the city. Steel and iron goods such as locomotives and machinery have been the dominant manufactures, although the processing of agricultural products and the making of small and varied goods were important. Examples of the latter are: beet sugar, footwear, millinery, hosiery, gloves, and house decorations.

Lodz, second city in size, 70 miles southeast of Warsaw, has been the textile center of the country. Raw cotton, wool, hemp, and jute are brought by the thousands of tons, and the manufactured goods

are used at home and sold to neighboring countries. *Lemberg* (Lwów), in the southeast near the Carpathians, is interested chiefly in minerals, petroleum, and forest products.

THE POLISH OUTLOOK. The arguments for a Polish corridor to the Baltic through former German territory were always of doubtful geographic validity, especially since such a corridor severed and isolated a segment from the German homeland. Since the Soviet Union has annexed *German East Prussia*, the old Polish corridor has been eliminated, and the old problem of a divided Germany no longer exists. But new difficulties will no doubt arise in this connection. The transitional nature of Poland's situation between Germans and Slavs has created trouble for hundreds of years. Linguistic boundaries between them and their neighbors, isolation, and tariff barriers have been tried only with indifferent or detrimental effects. Real cooperation has not yet had a trial. The railways constructed to serve the diverse interests of the three nations of which the Polish republic was made up, lack standardization and coordination. Poland needs help in building highways, railways, and waterways—a rehabilitation enterprise that is a challenge to the United Nations.

25

Lands North of the Central Eurasian Barrier (Concluded)

INTERIOR AND NORTHERN PLAINS AND UPLANDS (Continued)

UNION OF SOVIET SOCIALIST REPUBLICS (U.S.S.R.)

THE UNION OF SOVIET SOCIALIST Republics (Soviet Union) occupies more than one seventh of the land surface of the earth (8,176,054 square miles)—two and one half times as large as Brazil. Unlike the British Empire whose territory is scattered all over the world, the lands of the Soviet Union are all in one block. It extends nearly half way around the earth on the Arctic Circle, and the distance from Odessa to Vladivostok is nearly 5000 miles When it is noon in Soviet Latvia, it is 11:00 P.M. at East Cape (Bering Strait).

The Soviet Union is composed of sixteen so-called republics, the largest of which (Soviet Russia) includes three fourths of the total area (6,375,000 square miles), and the smallest (Armenia) is only a little larger than Vermont. In the Soviet Union live nearly 200,000,000 peoples, three fourths of whom are in Soviet Europe[1]

The high latitude position of most of the country on the poleward side of both the largest continent and the world's greatest mountains are decisive factors in control of the climate, natural vegetation, and soils. All phases of the cyclonic continental climates are represented, in the far north the polar littoral is in control, and along the Black Sea a bit of the subtropical dry summer climate is present.

Several large physiographic regions are wholly or partly within the Soviet Union—namely, (1) the Central Plains, (2) the Turanian Plains, (3) the Siberian Plains, and (4) the Siberian Upland. The first of these is in Europe, and will be discussed under *Soviet Europe;* and the other three will be considered as regional divisions of *Soviet Asia.*

SOVIET EUROPE (RUSSIA)

Soviet Europe is that part of the Soviet Union usually designated as Russia. It extends from the Arctic Ocean to the Black Sea, and from the Carpathian Mountains and Baltic Sea on the west to the Ural Mountains and Caspian Sea on the east. It occupies almost half of Europe (46%), and has 125,000,000 people. Among the several Soviet states either in Europe or closely associated are *Ukraine, White Russia (Byelorussian), Moldavia, Lithuania, Latvia, Estonia,* three in Transcaucasia (*Azerbaijan, Georgia,* and *Armenia*), and a number of the autonomous areas within the huge *Russian Soviet.*

Natural Features

Russia for the most part is an almost featureless plain (see pages 315 and 316)—the broad eastern section of the Central Plains of Europe. At one time the country was glaciated eastward almost to the Ural Mountains and as far south as Kharkov. Lakes

[1] Harris, Chauncy D., "Ethnic Groups in the Cities of the Soviet Union," *Geographical Review,* July, 1945, Vol 35, pp 466-473

occur only in the recently glaciated northwest. With the exception of a bit of the Finnish Peneplain, a small granite ridge just north of the *Sea of Azov*, and the *Timan Mountains* in the far north, the country is underlain mostly by nearly horizontal sedimentary rocks.

The differences in climate, vegetation, and soils from north to south in Russia justify dividing the country in several east-west regions (Figs. 236, 237, and 238). The land in the vicinity of the Arctic Circle is a tundra country. The vegetation consists mostly of mosses, lichens, and scattered grasses, and supports a scant population of nomadic Lapps and Samoyeds. At Archangel (Arkhangelsk) the average annual temperature is 32° F., and the annual precipitation is 17 inches (Fig. 128). The taiga forest (coniferous) extends southward from the tundra to about as far as Leningrad or 60° north latitude. This section, too, is sparsely populated and lumbering and hunting are the chief activities of the people today.

South of the taiga is the belt of deciduous broad-leaved forests—beech, ash, oak, maple, etc.—intermixed with conifers in the northern margin (Fig. 195). Much of this section has been cleared of trees, and the land is used for growing crops. The climate at Moscow is much like that at Duluth, except at the latter station both the temperature range and the annual rainfall are a little greater.

The fourth section is the prairie or chernozem belt lying in southwest Russia. This is the well-known Ukraine or *Black Earth* country, deriving its name from the rich, deep, black soil. Originally this was a grassland similar to the prairies of Illinois, Iowa, and eastern Nebraska, and today it is an excellent farming section growing immense crops of grain, especially wheat.

East of the Black Earth country the land becomes progressively drier. This is a short-grass steppe area with chestnut soils, a land where crop yields are low and farming at the best is precarious. The grazing of cattle and sheep is the safest use of the steppe land. Eastward from the steppes rainfall decreases (6.6 inches, average annual at Astrakhan) to near desert conditions.

The *Crimean Peninsula* and the lowland between the Black Sea and the *Caucasus Mountains* have subtropical climate, similar to that of southern California.[1]

The only mountains of Soviet Europe are on the eastern and southern margins, the Urals and the Caucasus, respectively. The former are a low, north-south range, not rugged, well forested, thinly populated, easily crossed, and in the south they are rich in minerals (gold and platinum). The Caucasus are loftier than the Alps, contain some glaciers, are a true barrier to transportation, and the flanks are very rich in petroleum. This "black gold" lured the Germans to disaster in World War

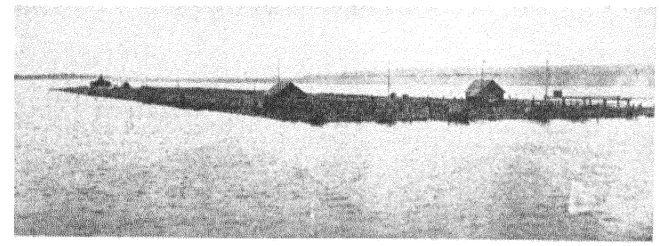


FIG. 195. A RAFT OF LUMBER ON THE VOLGA. The "rafters" live in the cabins on the rafts. The destination of the lumber is Stalingrad or Astrachan. (Courtesy W. Elmer Ekblaw)

II. Russia has some of the greatest oil reserves in the world. The principal production comes from the rocks on both the north and south flanks of the Caucasus Mountains in the vicinity of *Maikop*, *Grozny*, and *Baku;* and also from the flanks of salt domes in the *Emba River* basin northeast of the Caspian Sea.

Cultural Features

The evolution of the Russian people and their culture is a long and very complex story. But the bonds that were compounded on the plains of eastern Europe through many centuries of association have given a homogeneity and solidarity to the Russians entirely alien to the other half of Europe.

Nizhnii-Novgorod was founded in the northern forest on the upper Volga as a riparian settlement in the fifth century of the Christian era. Moscow, the center of the early Muscovite Kingdom, was also a forest settlement built around a wooden stockade (now the Kremlin) in about the year 1000.

[1] Gilmore, Eddy, "Crimea Reborn," *National Geographic Magazine*, April, 1945, Vol. 87, pp. 487-512.

In contrast to the "Forest Folk" of the north, the "Field Folk" founded a settlement in the great grasslands on the present site of Kiev in the fifth century (Fig. 196). Predatory, warlike neighbors from the west encroached upon the territory and then and there these plains people learned certain military lessons they never have forgotten. When the "Field Folk" applied their newly learned martial techniques to their Byzantian neighbors on the south, they learned Christianity from the Orthodox Church—another lesson they have not forgotten.



FIG. 196. STRAW-THATCHED LOG HOUSE. In a small village south of Moscow. The houses surround a central open area, and are connected by high wattle fences. (Courtesy W. Elmer Ekblaw)

Both of these experiences added to the culture of the plains people. However, it was not long (300 or 400 years) after the experience with their western and southern neighbors that the nomadic horsemen stormed out of the Kirghiz Steppe through the wide gateway between the Ural Mountains and the Caspian Sea to cast a blight on the fair Russian lands—for nothing was learned from these invaders comparable to what had been acquired from the Nordics and the Byzantians. However, eventually amalgamation took place to such an extent that the Russians Slavs today represent a unity not surpassed, perhaps, by any other European peoples.[1]

Under the Czarist regime in Russia preceding the political and social revolution in 1917, most of the land was held in large estates. Much of it was owned by the nobility, and the farm laborers were bound to the land as serfs, a condition worse but comparable to that of the peons in Mexico three or four decades ago. Today nearly all agricultural enterprises in the Soviet Union are promoted by the state on two types of farms, the *collective farms* (Kolkhoz) and the *state farms* (Sovkhoz). More than 90 per cent of the peasant families are united on 250,000 collective farms of about 1228 acres each. Before collectivization most of these lands were held by small individual owners who were dispossessed by force but only after violent resistance—many thousands paying with their lives for their opposition. The peasants live in villages surrounded by the collectively owned farms, each family going out in the morning to work on the land and returning to the village in the evening. The collective farms, as a rule, have modernized equipment (tractors, combines, etc.). The state purchases or requisitions the surplus products. Among the important crops in Soviet Europe are wheat, barley, rye, flax, oil seeds, sugar beets, and potatoes (Fig. 197). Of the other type, the state farms, there are about 1000 containing an average of 6676 acres. Many of these have been carved from large estates, church-owned lands, or property of the nobility, and others have been constructed on marginal lands that previously were little used. The same crops are grown as on the collectives, and on both types of farms scientific practices are enforced.[2]

Lumbering and furs are the major interests in the northern forested regions of Russia. Along the *Dvina* and its tributaries logs are cut, floated, and rafted down the river to Archangel where there are a number of large sawmills. From there the products are shipped in great quantities to western Europe, especially to the United Kingdom. The area along the upper Volga and its tributaries from the Polish border to the middle Urals, formerly a great deciduous forest, has been partly deforested and in the clearings, barley, rye, oats, flax, and hemp are grown on the rather poor podzolic soils; good crops of cabbage, root crops, and potatoes also are produced (Fig. 198). The rearing of cattle and hogs is receiving increased attention. In this section, land transportation is not well developed, so

[1] Dean, Vera Micheles, "Russia and Her Neighbors in Europe," *The Atlantic Monthly*, March, 1946, Vol. 177, pp. 68-74.

[2] Earle, F. M., "Mechanization of Agriculture in the USSR," *Economic Geography*, July, 1931, Vol. 7, pp. 297-307.

the streams and lakes are used for transport facilities, and the forest resources are processed and shipped by the limited rail facilities to countries in central and western Europe.

The revolutionary transformation of Russia in the last three decades from a land of agricultural serfdom to a highly mechanized agricultural economy is no more marvelous than the extraordinary progress and speed in industrial metamorphosis. The *Dneprostroy Dam* furnishes light and power to supply the homes and factories of 16,000,000 people in the vicinity of the lower Don basin. Although the dam was destroyed at the approach of the German invasion, repairs will soon put the project back into operation. The great quantities of petroleum found just north of the Caucasus Mountains have provided the power to mechanize Russian agriculture and industry. When the covetous Nazis extended their lines too far in their reach for these oil fields, they were decisively defeated by the Russians at *Stalingrad*, thus turning the tide of World War II.

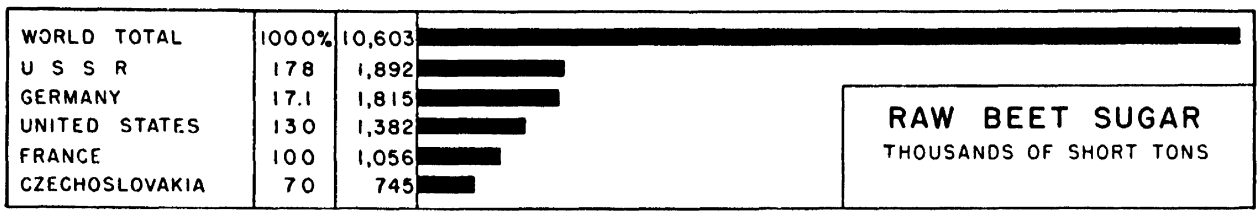


FIG. 197 WORLD'S RAW BEET SUGAR PRODUCTION. A 5-year average prior to World War II. United States is third in the order of production. (From *Foreign Commerce Yearbook*)

Since the Russian Revolution, industrial output has increased tenfold. In the United States, England, Germany and France, the change has been 1.2, 1.1, 1.3, and 0.9, respectively. Of course, the country paid a terrific price in hardship to effect these agricultural and industrial changes. The amazing loyalty of the people to the undertaking has eventuated in a unity and an efficiency that contributed immeasurably in subduing the Nazi tyranny. Coal, petroleum, and water power have each received their share of attention in the process of industrialization. The relative proximity of an abundance of coking coal in the *Donetz Basin* and the rich beds of iron and manganese ores at *Krivoi Rog* and *Nikopol* in southern Ukraine provide a favorable situation approximating that of the Ruhr District in Germany or the Great Lakes District in the United States.

Through time immemorial the rivers of Russia have been the major routes of travel and transportation. Although the Volga flows into a landlocked sea, its headwaters, by way of several of its tributaries, are connected by canals with rivers flowing to the Baltic Sea. Petroleum is the most important commodity shipped on the Volga.[1] In winter when the streams are frozen, they are used extensively for sled and sleigh as well as for motor and vehicular transportation. At present the total mileage of operating waterways in the Soviet Union approximately equals the railway mileage, but the

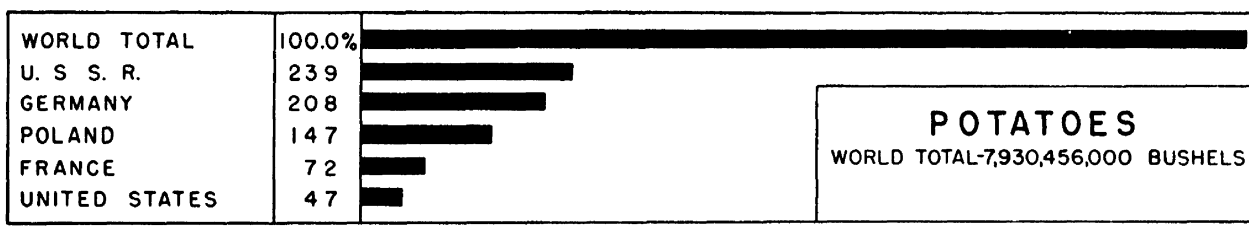


FIG. 198 WORLD'S POTATO PRODUCTION. A 5-year average preceding World War II. United States is fifth in this list. (From *Foreign Commerce Yearbook*)

[1] See, M. Melvina, "Voyaging Down the Volga," *Journal of Geography*, November, 1939, Vol. 38, pp. 297-304.

railway tonnage is sixteen times that of the waterways. That part of Soviet Europe west of the Volga and south of Leningrad is well supplied with rail transportation. Trunk lines extend to Murmansk and Archangel on the Arctic coast, and southward to Odessa and Rostov on the Black Sea. Running eastward into Soviet Asia are the *Trans-Siberian Railway* to Vladivostok and the *Trans-Turkestan* lines. The *Trans-Iranian Railway*, connecting the Caspian Sea with the Persian Gulf, was completed in 1938.[1] Before World War II the Soviets held many of the height, weight, and distance records in air transportation, as well as the largest freight service. This is a natural development in an area so vast in which surface transportation facilities are so meager and in which the major rivers, flowing into the Arctic Ocean, offer no opportunities for world trade. It will not be surprising if the Soviets outstrip the rest of the world in aviational developments during postwar years. The Caspian and *Aral* seas, and lakes *Baikal* and *Balkhash* are landlocked, and the Black and Baltic outlets are controlled by foreign powers Hence, the densely populated portion of the Soviet Union (Russia) does not have satisfactory access to the outside world.

There are a few trunk-line highways, but an adequate network of good roads has yet to be constructed. Although the per capita ownership of passenger automobiles is very low, trucks carried about one half of the total freight before World War II

Russia's experiment in social and economic reform during the 1920's and 1930's greatly reduced its trade with other countries. Few Russians left the country, and only a limited number of foreigners were permitted to cross its borders While they were working out their two 5-year plans the Russians were not much interested in the rest of the world, except in securing complex machinery and tools. At the same time most of the other countries, especially the United States, were fearful that the Soviet experiment might spread, causing a world-wide economic and political upheaval. The foreign trade per capita for the whole Soviet Union in 1938 was only $2 20. During the interwar years the chief imports were machinery, oil-well equipment, complete factories, cotton, aluminum, and copper. Exports included forest products, furs, manganese, some wheat, and petroleum. Germany, the United Kingdom, the United States and China were the recipients of most of Russia's prewar trade.

[1] Wohl, Paul, "Transport in the Development of Soviet Policy," *Foreign Affairs*, April, 1946, Vol 24, pp 466-483.

The Baltic Soviets (Lithuania, Latvia, and Estonia)

The three Baltic Soviets (formerly the Baltic States) for hundreds of years have served as buffers between powerful neighbors to the east and west. This transitional location is not altogether unlike that of Belgium and the Netherlands between two powerful but mutually suspicious neighbors, Germany and France.

In topography, *Estonia* with its denuded glacial landscape resembles Finland, whereas *Latvia* and *Lithuania* are more like glaciated northern Germany. Many lakes, tortuous streams, and numerous marshes and peat bogs are characteristic surface features. Formerly the whole area was forested with pine, fir, birch, alder, and oak; but four fifths of the land has been cleared and is now devoted almost exclusively to agriculture.

Formerly the land was in large estates usually owned by foreign aristocracy, and the work was done by tenants. During the recent period of independence the estates were broken up, and free-holding peasants were established on the land This resulted in much improvement in human welfare. Since the three countries have been incorporated as independent units in the Soviet Republic (July, 1940), collectivization in the use of the land may be undertaken

The people of the three Baltic Soviets differ in language, religion, and attitude toward their neighbors. The Estonians, more than 90 per cent Finns, are Lutherans, and feel themselves superior to the Letts but not better than the Finns. The Letts, 10 per cent Russian with an intermingling of a few Germans and Poles, are mostly Protestant; they think they are superior to the Lithuanians who are of Aryan stock, belong to the Roman Catholic Church, and perhaps are the most backward of the Baltic Soviet peoples.

Cities of Soviet Europe. There are nine cities in Russia with more than 500,000 people each, and two (Moscow and Leningrad) with more than three

million each. Several of these cities deserve special attention.[1]

Moscow (Moskva) is the center of Russia's trade, industry, and culture. The historic *Kremlin* houses the capital and administrative officials of the nation. Although Moscow is an inland city, rail connections are good with almost every portion of Russia, and nearly 800 factories contribute to the industrial greatness of the modern city. The important products of the factories are metal goods, textiles, foodstuffs, precision instruments, boots and shoes, and many small goods.

Leningrad (Petrograd), located at the head of the Gulf of Finland, is the second largest city of Russia. The site is on a group of low islands with marshy ground which requires the driving of piles to support buildings of considerable size. The city was built by Peter the Great in the seventeenth century and was called St. Petersburg; but during World War I the name was changed to Petrograd, and, in 1924, with the full emergence to power of the communists in Russia, the city was renamed Leningrad in honor of the great communist leader of Russia. One of the problems of the city is the ice-bound harbor in winter. Nevertheless, considerable commerce and industry have developed, making Leningrad the principal seaport of northern Russia. Direct connections by rail are made from Leningrad through Moscow to the interior; this greatly enlarges its hinterland.

Odessa, picturesquely situated on a plateau 150 feet above sea level on the northwestern shore of the Black Sea, is the chief southern seaport of Russia. Three rivers enter the Black Sea near the port, the Dniester, the Bug, and the Dnieper (Dnepr) Navigation is possible all year at Odessa which makes it a valuable port. However, the prosperity of Odessa is threatened when the Bosporus-Dardanelles Gateway is closed by war. The most important exports are cattle, grain, linseed, sugar, wool, and timber. The imports are general machinery, coal, iron ore, cotton, coffee, and tea. In the main, Odessa is a city dependent upon a vast agricultural hinterland, its destiny, therefore, rests upon foreign commerce and the productivity of the surrounding region.

Kiev, perched on a high bluff on the west side of the Dnieper, overlooks the quietly flowing stream as it meanders through its broad flood plain. Kiev is one of Russia's great wheat markets and lumber-distributing centers. For hundreds of years the beet sugar industry has been important here, and the manufacture of textiles and railway equipment occupies the attention of many people.

Kharkov is so near the Donetz coal and the Krivoi Rog iron ore that it has become a leading iron- and steel-making city. The manufacture of farm machinery is one of its special lines of work, but the processing of agricultural products also holds a high place Home industries still are important in Kharkov and vicinity. *Magnitogorsk* in the southern Ural Mountains is one of the leading steel-manufacturing cities of the country, ranking close to the great steel-making city of Gary, Ind.[2] *Gorki* (Nizhni-Novgorod), at the junction of the *Oka* and Volga, is best known because of the annual commercial fairs that have been held there through hundreds of years Today it is a great river port with modern drydocks for the hundreds of steamers that ply the rivers of central Russia. The manufacture of automobiles is one of its large industries. *Dnepropetrovsk*, like Kharkov, profits from proximity to coal and iron ore, and in addition it is only a short distance from the hydropower from the giant Dnieprostroy (Dnieper) Dam.

Rostov, at the mouth of the *Don*, profits from its nearness to the coal and iron ore of Ukraine, the petroleum of the Caucasus, the railway terminal facilities, and the fishing industry in the Sea of Azov. *Baku*, at the east end of the Caucasus Mountains, is a Caspian seaport. Its major interest is petroleum Refineries are numerous, pipe lines both north and south of the Caucasus carry petroleum and its products to the Black Sea port of *Batum* and to the Russian interior, tankers ply the Caspian Sea, the Volga and Ural rivers, and deliver petroleum to the east ports of the Caspian for use in the Turanian Plains and beyond.

Tiflis, the capital of the Transcaucasian units of the Soviet Union, is a trade center of considerable importance. Its site is enclosed by the precipitous

[1] Harris, Chauncy D., "The Cities of the Soviet Union," *Geographical Review*, January, 1945, Vol 35, pp 107-121

[2] Scott, John, "'Magnetic City,' Core of Valiant Russia's Industrial Might," *National Geographic Magazine*, May, 1943, Vol 83 pp 525-556

valley walls of the *Kura River* just below the point where it emerges from the mountains. Tiflis is on the main railway from Baku on the Caspian to Batum on the Black Sea; this affords markets for the manufactures of bricks, tobacco, soap, leather goods, lumber, and furniture.

THE FUTURE IN SOVIET EUROPE. Many of the problems of Soviet Europe are inseparable from those of the whole Union. However, Russia in Europe is the motherland of the Soviet Union and as such furnishes most of the initiative, patterns of thought, and creative enterprise for industrial and economic development. The isolated position of the Soviet Union is postulated on land and water transportation, but with the rapid development of the skyways the picture as a whole takes on a new orientation.[1] Thousands of young Russian aviators during World War II ferried war planes from the United States, especially from Alaska, to the battlefronts in Europe. Stratosphere flying in polar lands is more satisfactory than it is in middle and low latitudes All of the subpolar lands may profit immeasurably by developments in aviation (Fig. 6).

No country other than the United States has such a wide range of resources. With Russia's rejuvenation, her break with tradition, her experimental attitude toward political and economic relations, the stage may well be set for a leap forward—a movement that may evolve into new patterns of thought and action of which the older complacent peoples of the world seem incapable. The world looks with wonder at what has been accomplished in Russia in just a short time by the socialization of agriculture and industry. It may well be that socialization in Russia has gone too far, just as rugged individualism in America may have become mostly outmoded. Perchance we and the Soviets may learn some good lessons from each other.

SOVIET ASIA

Soviet Asia extends from the Caspian Sea to the Bering Sea, and from the Hindu Kush Mountains (35° north latitude) to the *Taimyr Peninsula* (77° north latitude). Although this encompasses more than three fourths of the Soviet realm, it contains only one fourth of the people. Several factors account for the low density of population—some sections are dry, some are very mountainous, some are extremely cold, much of the area is relatively new and has not been developed and much has not even been explored (see page 287).

Of the sixteen republics in the Soviet Union, eight are in Asia; and also, of the nineteen autonomous states in the large Russian Soviet, several are in Asia. A greater diversity of languages, of human activities and interests, and of human aspirations than appear in the Soviet mosaic can scarcely be imagined. Yet the Soviet political design assumes that in this heterogenous union of states, each with limited sovereignty, the people can work and live together happily and profitably in the promotion, not only of the general welfare, but also of individual well-being.

Two names that are generally associated with Soviet Asia are Siberia and Russian Turkestan, but for purposes of this survey three large physiographic regions will be recognized, namely, the *Turanian Plain*, the *Siberian Plain*, and the *Siberian Uplands*. In an area so vast, a detailed study would call for several more subdivisions, the number depending on the objectives and nature of the inquiry.

Turanian Plain

The Turanian Plain extends eastward from the Caspian Sea to Lake Balkhash, more than 1000 miles, and northward about an equal distance from the Hindu Kush Mountains The northern portion is known as the Kirghiz Steppe The Turanian Plain is nearly one half as large as the United States, and near the center is the great landlocked Aral Sea—salty and almost as large as Lake Superior.

NATURAL FEATURES. Most of the Turanian Plain is nearly flat, lying far below the level of the mountains on the south and east (Fig. 199). Much of the area has an altitude less than 500 feet, and parts near the Caspian Sea are below sea level. The plain is one of interior drainage, the larger streams rising in the mountains to the south and east and flowing into landlocked bodies of water such as the Aral and the Caspian seas. In many cases, the streams never reach the sea, for their waters sink into the

[1] "The Geography of Post-war Air Routes," *Geographical Journal*, March, 1944, Vol 103, pp 89-100

sands of the desert or are used for irrigation. The principal rivers of the region are the *Syr Darya*[1] and the *Oxus* (*Amu Darya*), both of which have played important roles in the drama of history.

The loose mantle materials of the plain are underlain chiefly by sedimentary rocks and contain only small mineral wealth when compared with some other parts of inner Eurasia. Salt in abundance, some poor grade coal, and a little petroleum are produced.

The Turanian Plain is buttressed on the south and east by the lofty Hindu Kush Mountain wall, which effectively isolates it from rain-bearing winds. In summer, aridity prevails because the monsoons do not penetrate to the western interior of Asia. In winter the high pressures of the continental interior are responsible for chilling blasts that sweep over the region and result in low winter precipitation. Merv, located in the south central portion of the region, has an average annual rainfall of 7.5 inches; while Tashkent, near the mountains on the east, receives 14.6 inches. The growing season varies from 160 days in the north to 240 days in the south. The climate, therefore, is continental dry having the semiarid phase in the north and arid in the south (Fig. 129). Over large areas of the region aridity and extremes of temperature have produced desert vegetation consisting of shrubs and short grasses, but in most places grasslands prevail. Pedocalic soils such as gray desert soils and, where rainfall is adequate, chestnut soils have evolved. The chestnut zone is confined mainly to the northern portion of the region where it merges with the extensive chernozem belt of central Asia (Figs. 236, 237, and 238).

CULTURAL FEATURES. Throughout the nineteenth century Russia expended considerable effort in establishing a semblance of order among the many nomadic tribes which, for centuries, have occupied this dry region. It was not an easy task, for the nomads were skillful horsemen and noted for rapid and elusive movements across great areas. It is believed that the mobility of nomadic life provided the necessary training for the Mongol hordes that swept out of western Asia time after time into eastern and central Europe. At any rate, by the turn of the twentieth century, Russia was in control of the arid and semiarid plains that stretched from the boundaries of Muscovy (Ancient Russia) to Afghanistan and Persia in the south and to China on the east. Today the entire region is a part of Soviet Asia and includes several so-called autonomous republics among which are *Uzbek*, *Tadzkik*, *Kirghiz*, and *Kazak*. Each of these republics is partly self-governing and sends representatives to the central governing body at Moscow.[2]

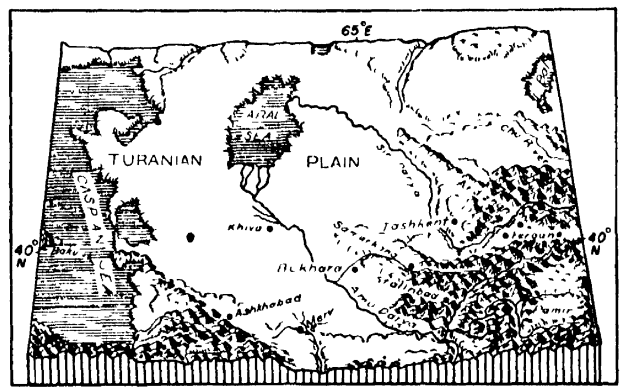


FIG. 199 TURANIAN PLAIN. Although extremely arid this is Russia's great cotton-producing area. Ancient routes to India and China passed through this region.

The Turanian Plain includes one of the great pastoral regions of the world. Among the environmental conditions in the north which favor the pastoral mode of human occupancy are (1) vast areas of land which cannot support permanent settlement, (2) relatively sparse population which for centuries has practiced pastoral nomadism, and (3) sufficient differences in altitude to give alternating season of grass growth to two portions of the region. The nomads utilize the grassland plains in winter but, when the scorching dusty winds of summer arrive, they migrate to the highlands where grasses await their wandering herds. The chief animals used in nomadism are horses, sheep, cattle, and goats, and, when the tribes move, all of their possessions are taken along, because their needs are simple, the main essentials being a tent, cooking utensils, and a few clothes.

[1] Darya means river or watercourse

[2] Tulaikov, N. M., "Agriculture in the Dry Regions of the USSR," *Economic Geography*, January, 1930, Vol. 6, pp. 51-80.

Another type of human adjustment made to arid lands is irrigation. In this respect portions of the Turanian Plain are among the world's greatest irrigated oases. Along the two main streams, the Syr



FIG. 200. COTTON PICKERS. Russian women working on a collective farm in the vicinity of Bukhara. Each can pick as much as 250 pounds per day. (See also Fig. 14.) (Courtesy U.S.S.R. Embassy)

Darya and the Oxus, are vast irrigation projects. Some are crude, having been used for centuries, but others are of modern Russian construction. This region is Russia's principal source of cotton, which is by far the dominant crop (Fig. 200). Other crops grown are tobacco, rice, fruits, and some grains. Irrigation and oases agriculture account for several large cities in the region—namely, Khiva, Merv, Tashkent, Samarkand, *Fergana,* Bukhara, and *Andizhan.* The *Plain of Fergana* is an outstanding example of oases agriculture as it is one of the chief cotton-growing areas of the world (Fig. 201).

The camel caravan was the chief means of communication and travel in the region prior to the twentieth century, but since 1900, there has been a considerable increase in railroad mileage. By 1930 the chief cities of the plains were linked by rail with the Trans-Siberian Railway on the north, connections being made with Moscow in the northwest and Novo-Sibirsk in the northeast. The importance of this development cannot be overestimated because the cotton-producing area has become dependent for foodstuffs brought in from the grain fields of southern Russia and the great chernozem belt far to the northward. Accessibility to foodstuffs has accelerated and stimulated the specialization of parts of this region in the culture of cotton.

CITIES IN AND ABOUT THE TURANIAN PLAIN. On the whole urban settlement has shunned the desert and the steppe, except where irrigation is possible. Consequently the large cities are associated either with natural oases or are located near some stream. Some of the smaller cities are *Khiva, Merv,* and *Stalinabad.* Only three cities will receive special attention.

Tashkent, surrounded by irrigated land which produces abundant crops of cotton, tobacco, and fruits, is the most important city of Soviet Asia. It is the principal trade center of the Turanian Plain and specializes in silk, cotton, leather, skins, and other agricultural products. The city is on an an-

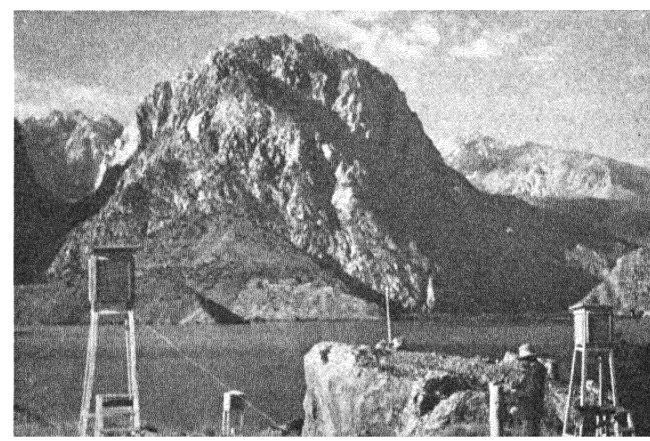


FIG. 201. MOUNTAIN WEATHER STATION. This station is in the highlands east of Stalinabad. Irrigation water for the collective farms along the Amu Darya comes from these mountains. (Courtesy U.S.S.R. Embassy)

cient caravan route to China, and is now situated on the main railways of the region with connections to Moscow and the Far East, and it still commands much of the trade with east-central Asia.

The old city, formerly surrounded by a wall dating back at least to the seventh century, is practically in ruins. The new city is modern in most aspects. Because of earthquake hazards, the buildings are low and nearly hidden by the profusion of vegetation—especially poplar, willow, and fruit trees.

Samarkand, ancient trade center of Turkestan, is situated about 200 miles southwest of Tashkent. A tributary of the Oxus furnishes irrigation for the near-by land which produces cotton, corn, wheat, fruits, and silkworms. Samarkand was at the crossroads of south-central Asia for a long time, and it was here that caravans met the railroads of the west. Since Russian rule was instituted the ancient city has undergone a slow modernization, but there still remain vestiges of ancient Asiatic architecture. The mud houses of the old city form a marked contrast to the modern red-roofed structures.

Bukhara, an agricultural marketing center, is situated on the *Zarafshan River,* a tributary of the Oxus. An immense diversion canal, beginning near Samarkand 200 miles away, carries irrigation and domestic water supplies to Bukhara and vicinity. It is a colorful city with picturesque shops, bazaars, and an old wall, doubtless built in ancient days to protect the city from the incursions of fierce nomads from the steppes. Some of the products which reach markets far from Bukhara are black lambskins (caracul), hand-made rugs, and excellent pottery. Outside of the city is the typical irrigated agricultural scene where the farmers depend upon such crops as cotton, fruits, grains, and tobacco, and above all upon the life-giving water from the mountains to the east.

The Future of the Region. In the Turanian Plain are found several environmental conditions which foster the development of cotton growing. However, the fertile soils, abundant irrigation facilities, and good railroad connections are the dominant factors. There is always danger in narrow agricultural specialization and it may not be safe to quit growing sufficient food for local needs and thus to depend upon other regions for supplies.

The people, generally speaking, are a mixture of many traditionally independent groups among which are Hindus, Mohammedans, and Jews with Tartars and Russians intermingled. It is a difficult task to assimilate these tribes of people who, for so many centuries, have been unhampered by political organization of the Russian type. It will require the best of Russian political maneuvering to insure peace and security to a region with such diverse interests and characteristics.

Siberian Plain

The Siberian Plain extends eastward from the Ural Mountains almost to the Bering Strait, a distance of nearly 4000 miles. In the west the plain is wide, extending more than 1500 miles southward from the Arctic Ocean. In the east all of the plain is north of the Arctic Circle. The vastness and remoteness of this plain have greatly retarded scientific exploration, and consequently many portions have never been seen nor described by the geographer.

Natural Features. In general the region slopes from the highlands of central Asia to the Arctic Ocean. Altitudes are usually less than 500 feet, but here and there remnants of ancient uplands still rise above the general altitude of the plain. Three mammoth river systems, the Lena, the Yenisei, and the Ob, drain most of the Siberian Plain. With the exception of the Missouri-Mississippi, each of the main streams is longer than any river in North America and each possesses large tributaries. The significance of these rivers in the future development of the region is problematical.

Relatively flat lying sedimentary rocks underlie most of the plain, but explorations in the south have disclosed that ancient crystalline rocks are exposed, and generally at about the same altitudes as the plain itself.

The extent of the mineral resources of the Siberian Plain has been the subject of considerable conjecture and speculation by many writers and specialists, but present explorations and known deposits limit the minerals largely to coal, iron ore, gold, and fossilized ivory. The best coal deposits are in the *Kuznetsk* Basin 150 miles southeast of Tomsk along the *Tom River,* and in the *Karaganda field* in the Kirghiz Steppe. Iron ore in abundance and other strategic metals are found near the southern Urals.

Three climatic types are represented in the Siberian Plain. The southern portion is in the latitude of Southern Canada and has a climate similar

to that of southern Saskatchewan and Manitoba—namely, the continental humid type with short summer (Fig. 236). As one travels northward the winters become increasingly longer and more severe, characteristic of the continental subpolar climate which extends northward to the Arctic Circle. Still farther northward bordering the Arctic Ocean for nearly 3000 miles is the polar littoral climate. The chief factors contributing to the cold climates are: (1) the location of the region in the interior of the greatest land mass in the world; (2) the position of the area in high latitudes which places much of the region within the Arctic Circle, thus giving it short summers and relatively low insolation even at the time of the summer solstice.

No part of the region receives more than 20 inches of rain per year, most portions receiving nearer 10 inches. Even though the Siberian Plain receives less rainfall than some of the arid and semiarid areas farther south, the evaporation is less, consequently the relatively low rainfall supports great coniferous forests where the soil is not frozen all year. Tomsk, in the southern part of the region, receives about 20 inches annually; whereas Omsk, farther west, receives only 11 inches; and Verkhoyansk, in the far northeast in the Siberian Upland, receives less than 5 inches annually Nearly all of the region has temperatures below zero throughout the winter but summer temperatures may reach as high as 68° F. with the exception of the polar portion (Fig. 129).

The extremely cold climate of northern Siberia has resulted in immature soils which in many places are frozen to a depth of several feet during the whole year. In summer the snows melt and the soils thaw to some extent, and thus vast swamps are created as a result of imperfect drainage of the frozen water-soaked soil. The dominant type of vegetation of the polar section is the tundra, consisting of mosses, lichens, and short-lived plants (Figs. 237 and 238). South of the tundra is one of the world's great coniferous forests, known as the *taiga*. Most common among the trees are spruce, larch, pine, and Siberian fir, which grow well in the podzolic soils. In the extreme southern portion of the region, increased rainfall, longer summers, and consequent greater insolation, and more evaporation, have contributed to the development of a great chernozem soil belt with attendant grasslands. In this section trees as a rule do not survive because of the low rainfall. However, the black earth (chernozem) belt which extends eastward almost to Lake Baikal in the Siberian Upland is by far the choicest land in the whole of central Asia and probably can support a population comparable to that of the chernozem belt of North America or southern Russia.

Cultural Features. For centuries the civilized world considered the vast Siberian Plain as an impregnable and uninhabitable wilderness of snow, ice, and forest—the ultimate pattern of isolation. About the time that Lewis and Clark were exploring western North America the Russians were beginning their explorations of the Siberian Plain. In 1829, thirty years after his important journey into tropical South America, Humboldt was exploring in this area. The over-crowded peoples of western Russia found an opening into the Siberian Plain with the advent of rail transportation. Previous to the modern migration, the Czars of Russia utilized Siberia as a place of exile for political offenders. It was assumed that the most dreaded punishment that could be visited upon anyone was banishment into the isolation of Siberia, because usually it meant leaving the civilized world, never to return.

Three principal adjustments have been made in the Siberian Plain, and each of them is limited principally by climatic, vegetational, or soil factors, or a combination of these.

1. In the tundra a very sparse widely scattered population derives subsistence by hunting and fishing, and from herds of reindeer that graze on the short grasses and mosses. These animals not only are beasts of burden but serve as food and even furnish milk. When the animals die, their hides are made into clothing and the bones are used for making tools such as needles, knives, and spears. The native animals of the cold Siberian Plain develop a fine, thick fur, and the trapping of fur-bearing animals such as ermine, fox, wolf, bear, beaver, squirrel, and marten has furnished a means of barter for many of the inhabitants of the region for a long time Furs thus secured are traded each spring for goods from the civilized world. Some of the furs find their way to the world's greatest

fur markets in Leipzig, Moscow, and Amsterdam, where, during the fairs, they again change hands to be redistributed far and wide over the world. Some coal and minerals are formed along the lower Yenisei which hold considerable promise for the future.

2. In the coniferous forest belt south of the tundra, the chief activity is lumbering, but only a small portion of the forest belt is utilized because means of transportation of heavy lumber have not yet penetrated into much of the region, and the large streams flow into the frozen Arctic. Generally, lumbering is confined to the southern edge of the forests and to the river valleys.

3. The chernozem belt supports most of the people in the southern part of the Siberian Plain where fine crops of wheat, rye, barley, oats, and vegetables are grown. Associated with the natural grasslands, a dairy industry of considerable importance has developed, and some of the surplus products such as cheese and butter find markets in western Europe. Other factors besides soils which account for the utilization of this black earth belt are: adequate rainfall for cereal crops, a growing season long enough to encourage agriculture, and level land over which the Trans-Siberian Railway and numerous spur lines have been built between Moscow and Vladivostok. The gentle relief has also encouraged the use of large-scale, modern farm equipment. On account of these factors and the overpopulation in the west, the Soviet Union has planned for a more intensive utilization of this black earth belt, inasmuch as the land doubtless can support many more people.[1]

In 1902 the Trans-Siberian Railway was completed and became the principal means of transportation through the Siberian Plain. The railway traverses the black earth belt, and it is in this belt that the large urban centers have developed. The agricultural commodities of the region are shipped either west to Moscow, south to Russian Turkestan, or east to Vladivostok and China. In addition to the great trunk line small spurs have been built to accommodate mines in southern Siberia and to isolated cities in the region, but on the whole, railroads are poor, and efficient means of transportation on any considerable scale have yet to be developed. It is important to note, however, that connections are made with points in other regions such as industrial Moscow and the cotton-growing Turanian Plain.

URBAN CENTERS OF THE SIBERIAN PLAIN. Few of the cities are more than agricultural depots serving a rather limited hinterland, and only four will receive special attention.

Omsk, situated on the Trans-Siberian Railway at the confluence of the *Irtysh* and the *Om* rivers, is the principal trade center of the Siberian Plain. Omsk is called by many the "Capital of the Steppes." In some respects it has the appearance of a frontier town, especially the older portions of the city, but modern developments are constantly being made. Municipal electricity, water, and bus service have been installed and stone buildings are being constructed. Omsk is not only a center for the export of meat, butter, hides, and skins, but it also has recently developed some manufactures such as the making of machinery, clothing, and the processing of agricultural products through milling, meat packing, and brewing.

Tomsk, an older town than Omsk, is situated on the Tom River, a small tributary of the Ob. The discovery of gold in 1824 had considerable effect upon its rapid growth but today the city is important for other reasons, among which are (1) its situation on a railway spur 56 miles from the Trans-Siberian Railway; (2) its educational facilities with a university, preparatory schools, and its museums; and (3) its two outstanding activities, commerce and the tanning of leather.

Novo-Sibirsk, located where the Trans-Siberian Railway crosses the navigable Ob River, is one of the leading urban centers of the Siberian Plain. Not only is it important as a distributing center for agricultural machinery and other manufactured goods, but it is also engaged in the processing of such materials as wheat, dairy products, lumber, clay, and iron ore. From Novo-Sibirsk a railroad leads to prominent mining districts in the foothills and mountains on the southern and eastern margins of the Siberian Plain.

Barnaul, on the Ob, is at the center of the Altai mining district, especially the minerals and coal of the Kuznetsk area. In addition to the mining inter-

[1] Baievsky, Boris, "Siberia—the Storehouse of the Future," *Economic Geography*, April, 1927, Vol. 3, pp. 167-192.

ests of the city, it is in the center of a rich agricultural territory in which bee-keeping is a notable specialization. Many of the leading citizens are descendants of former Russian exiles.

THE FUTURE OF THE SIBERIAN PLAIN. The Siberian Plain is a vast region with enormous resources of land and forests, but the utter vastness has been one of the principal problems of the people. The streams flow toward the frozen Arctic and therefore are of little value in trade (Fig. 202).

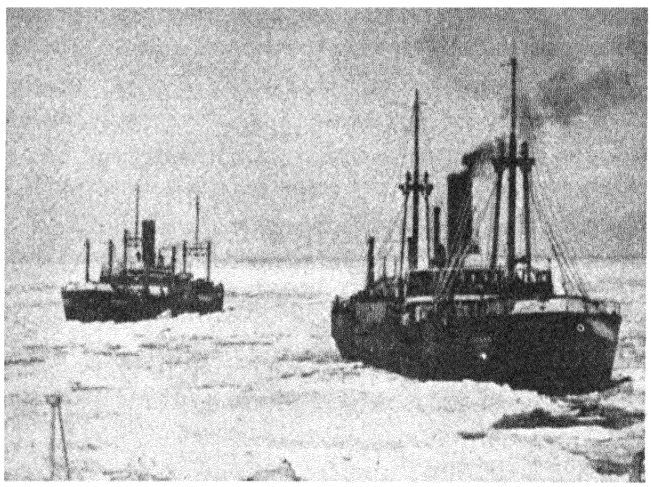


FIG. 202. ICEBREAKERS IN THE ARCTIC. These boats are following an icebreaker near the mouth of the Yenesei River. (Courtesy U.S.S.R. Embassy)

Transportation both within the region and to points outside will have to be improved before much wider utilization can take place. Air travel and transportation may contribute much in this connection. It is doubtful if the tundra will ever furnish subsistence for many people; therefore, the forests and the black earth belt offer the best opportunities for more complete occupancy in the future. In all probability it will be many years before the shortage of coniferous lumber in other parts of the world will make it profitable to exploit this great natural stand of timber. However, it is a vast reserve to which other regions may look in the future after the forests have been depleted. The warmer portions of the Siberian Plain have a promising future, but the cold northern section offers little for the immediate future, unless great riches in minerals are discovered. As development proceeds will the natural resources of Siberia be exploited any more wisely than ours have been under private control?

Siberian Uplands

The Siberian Uplands lies south and east of the Siberian Plain and constitutes the transition zone from the rugged Central Eurasian Barrier on the south to the low Arctic plains in the north. From east to west the Siberian Upland extends from the Yenisei River to the Bering Strait. Much of this immense area has not been explored, and geographers must depend upon a meager amount of data gleaned from fragmentary descriptions and inadequate maps.

NATURAL FEATURES. The Uplands of Siberia on the whole exceeds 1000 feet in altitude, but there are several broad river basins which have been carved into the upland and then partially refilled by alluvial deposits. The broad, mighty Lena River and its tributaries constitute the principal drainage system of the region. Three tributaries of the Yenisei, the *Upper,* the *Middle,* and the *Lower Tunguskas,* drain the western portion of the upland.

The Siberian Uplands should not be thought of as a single monotonous plateau, but rather as a series of plateaus at different altitudes interrupted by great mountain ridges such as the *Verkhoyansk Ridge* and *Cherski Mountains* just east of the Lena River, and by dozens of smaller ridges traversing the region. From north to south the topography becomes continuously more rugged until great barrier mountains, such as the *Altai,* the *Sayan,* and the *Stanovoi* mountains, stand in bold relief outlined against the southern horizon.

During the winter months the great high pressure area of Eurasia centers over this region, and winds blow out in all directions from the vicinity of Lake Baikal. The inblowing summer winds, so-called summer monsoon, contain very little moisture after passing the great mountain and desert barriers to the south and east. The westerly winds of summer also have lost much of their moisture before they reach the Siberian Uplands. As a consequence, the rainfall over most of this vast area averages less than 20 inches (Fig. 129). As a result of its high latitude, the summer is short—generally less than three months. A long, cold winter occurs during the low sun period, at which time temperatures

drop below zero and remain there for weeks at a time. All streams are frozen in winter, even Lake Baikal to the south, in the latitude of England. The average January temperature at *Verkhoyansk* in this region is 59° F. below zero.

Because of the polar climate in the north, tongues of tundra protrude southward into the region where they merge into the coniferous forests. With the exception of the tundra section, the mature soils are podzolic.

CULTURAL FEATURES. For centuries the Siberian Upland Region has remained sparsely settled, and in many places, totally unoccupied by man. In the advancement of human settlement this cold, forbidding region has contributed little to man's needs—that is, little in proportion to the needed expenditure of energy and capital. Consequently, the area is, and probably long will be, sparsely populated by fur-seeking hunters (Fig. 203) and small agricultural and pastoral groups along the streams. The Trans-Siberian Railway, skirting the southwestern corner, gave a start to a few settlements near the railroad. However, the settled portion of the region is small indeed when compared with the immense unoccupied area.

Hardy cereals, such as rye, oats, and barley, are grown in small isolated clearings along the Lena River during the short growing season. Some lumbering is associated with the coniferous forests, but this is limited mainly to areas near the railroad or near the far eastern border of the region. Fine furs, such as fox, bear, ermine, squirrel, marten, and mink, are secured in considerable abundance.

URBAN CENTERS IN THE SIBERIAN UPLANDS. The urban centers of the Siberian Upland are small, isolated villages, located chiefly along the great streams of the region. Most of the small centers are lacking in adequate communication and transportation facilities, and are open to trade only in summer when the rivers are not frozen. These sequestered settlements become icebound and snowbound during the long Siberian winter.

Krasnoyarsk, located near the southwestern margin, is the single large city of the region. The site is on the left bank of the Yenisei at its confluence with a smaller tributary. This 300-year-old city has had a precarious existence, for centuries having been subjected to attacks by nomadic tribes such as the Tartars and the Kirghiz. However, when gold was discovered near by, and when the Trans-Siberian Railway was built, the city began to grow, and with the protection of the Russian government it has now become one of the important cities of Asiatic Russia.

A gold refinery and manufactures such as machinery, porcelain, leather goods, and brewing ac-



FIG. 203. SIBERIAN FURS. Northern Siberia like northern Canada contributes extensively to the fur markets of the world. This hunter has some choice pelts. (Courtesy U.S.S.R. Embassy)

count in part for its size and importance. Connections are made with Vladivostok and with Moscow by rail, and this gives the city a distinct advantage over most other cities of the Siberian Upland. It must be kept in mind that Krasnoyarsk is a peripheral city, situated on the edge of the region and not in the interior, and that this has had a considerable influence upon its growth and significance.

Yakutsk, in the Lena River valley only 300 miles from the Arctic Circle, ranks second in size among the cities of the Siberian Uplands, but its appearance is far from modern. It was, and still is, a prison camp for Russians and remains a frontier town. It is the largest urban center of the Lena valley and therefore has a spacious, but sparsely populated hinterland which serves much of the Siberian Upland. Three other cities of Soviet Asia, although south of the Central Barrier, deserve some attention.

Vladivostok, the Pacific terminus of the 5500-mile Trans-Siberian Railway, is the leading Soviet port on the Pacific coast, having large drydocks, shipbuilding yards, and good harbor facilities. Shipping increased greatly during World War II, although hampered by proximity to Japan. The harbor is kept open in winter by icebreakers *Khabarovsk,* located where the Trans-Siberian Railway spans the Amur River, is the upstream terminus of a railway from *Komsomolsk*—the new steel-making and ship-building city of the *Soviet Far East.*

LOOKING TO THE FUTURE. The one great known resource of the Siberian Uplands is the coniferous forest. Furs provide another principal product, but agricultural land is limited. The mineral resources of the region are not yet known. In the light of limited resources and great distances, the materials that this region can best contribute to man's needs are still problematical.

In the future doubtless a large market will be found for the lumber of the Siberian Uplands, particularly since China, with its great demands for lumber, is practically denuded, and Japan may need softwoods to an increasing extent. To meet this demand the eastern portion of the region probably could accommodate more people. However, the area will have to wait for a more settled state of affairs to evolve in China, and also for the improvement of communication and transportation. The age of aviation may offer much in the development of the Siberian Uplands. The forests of Siberia are a great potential resource, capable of supplying millions of people with lumber for many decades. It is in this light that the value of the immense open spaces of Siberia is revealed most clearly. Until conditions are ready for exploitation, the Siberian Uplands is likely to remain one of the isolated and sparsely settled areas of the world.

Part Four

AFRICA

Introduction

ALTHOUGH AFRICA supported one of the most ancient civilizations of the world, yet for many centuries the natural conditions of climate, topography, vegetation, native animals, and hostile native peoples combined to retard explorations into the interior. The pyramids, the tombs of the Pharaohs, and many other monuments along the *Nile River* testify to the antiquity of Egyptian occupancy. Ruins along the Mediterranean coast give evidences of Phoenician settlements long before the beginning of the Christian era.[1] Late in the fifteenth century the Portuguese navigator, Diaz, rounded the *Cape of Good Hope*, but not until the latter part of the nineteenth century did white men penetrate the great and forbidding African interior.

Africa is attached to the huge Eurasian land mass by the *Isthmus of Suez* and is separated from it by the narrow *Strait of Gibraltar* and the Mediterranean and Red seas. The combined area of these two great land masses covers one sixth of the earth's surface and encompasses about two thirds of all the land surface. During and since World War II, Africa has become a more significant factor in world affairs because of its great variety of natural resources. The Air Age is making it more accessible. Dakar is only 8500 air miles from Shanghai, and the Cape of Good Hope is 7400 air miles from North Cape on the Arctic Coast. North Africa played a major role in World War II.

SURFACE CONFIGURATION

Africa is less complex than any of the other continents in surface configuration and structure. Relatively well-established plateaus and tablelands have resisted both tensional and compressional stresses, except for the series of great rift valleys and the folds of the *Atlas* and *Drakensberg* mountains. On the whole Africa is a gigantic crustal block elevated in general from one thousand to several thousand feet above sea level. Near the margin of the continent the highlands as a rule are rimmed by escarpments. Coastal plains of varying widths usually occur between the escarpments and the sea.

The relief of the continent provides conditions favorable for numerous basins, some having outlets to the sea, some of the more arid ones having interior drainage, and others being entirely without drainage (Fig. 204). Two large areas without surface drainage are the *West Saharan* and the *North Kalahari* basins; two with interior drainage are the *East African* and the *Lake Chad* basins, and two with drainage to the ocean are the *White Nile* and the *Congo* basins.

The basins, as a rule, are surrounded by ridges or swells in the land surface, some of which are mountains. The chief highlands of Africa are the Atlas Mountains, the Drakensberg Mountains, the *Ethiopian* (Abyssinian) *Highlands*, and the *East African Highlands*.

One of the remarkable topographic features of the world is the series of immense rift valleys of eastern Africa extending from the *Lebanon Mountains* at the eastern end of the Mediterranean Sea southward nearly 4000 miles to the *Zambezi River* in South Africa. The compressional and tensional stresses in the earth's surface were so great that immense fissures hundreds of feet deep and hundreds of miles long were opened. These fissures, called rift valleys, occur in many places in

[1] Wicker, Cyrus French, "Eastward from Gibraltar," *National Geographic Magazine*, January, 1943, Vol. 83, pp. 115-142.

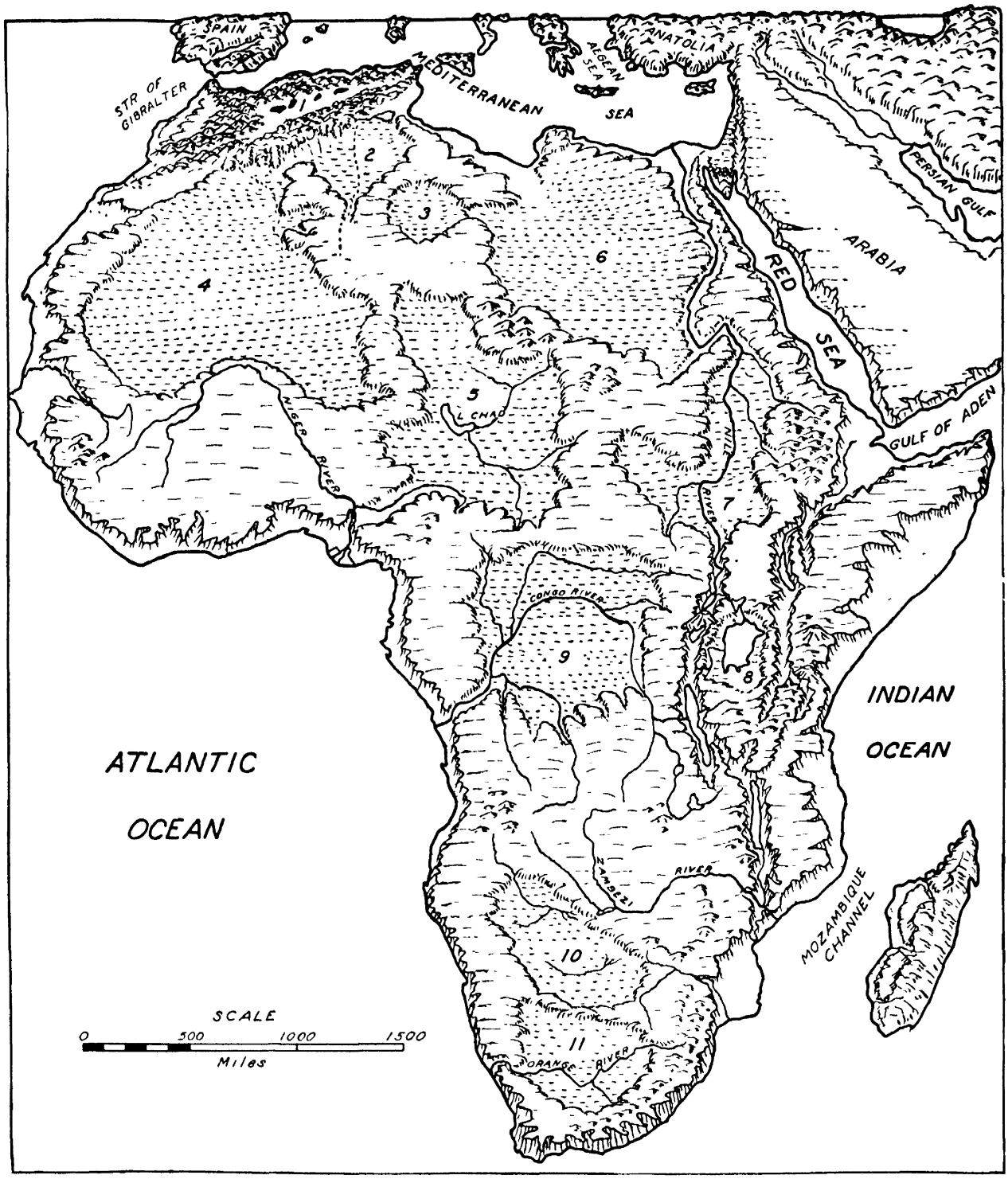


FIG. 204 CONFIGURATION OF AFRICA The sketch is designed to emphasize the basin, ridge, and plateau features of the continent The following basins are recognized here (1) Shotts Plateau, (2) Igharghar Basin, (3) Fezzan Basin, (4) West Saharan Basin, (5) Lake Chad Basin, (6) Libyan Basin, (7) White Nile Basin, (8) East African Basin, (9) Congo Basin, and (10 and 11) Kalahari Basins.

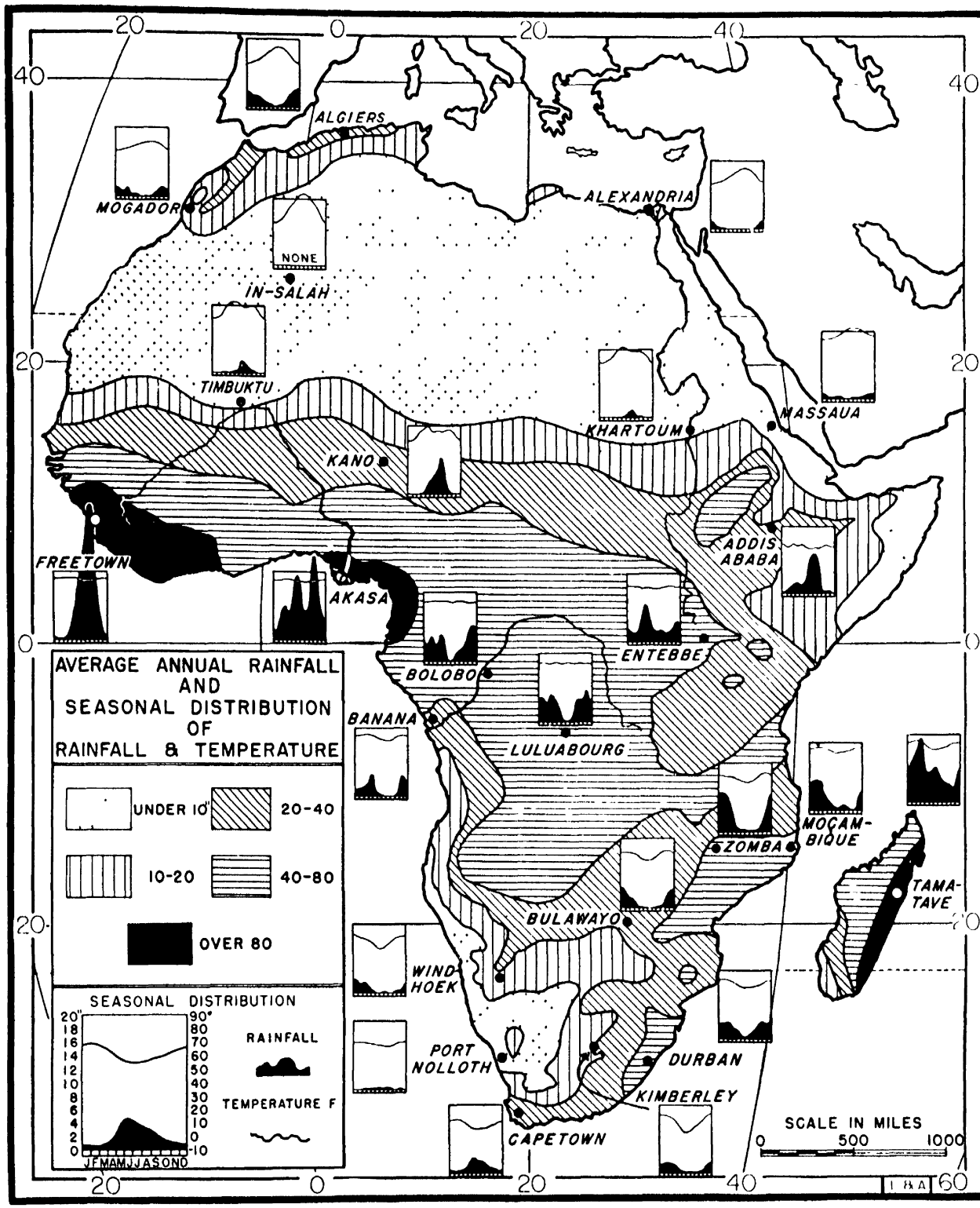


FIG. 205 MEAN ANNUAL RAINFALL AND MONTHLY DISTRIBUTION OF TEMPERATURE AND RAINFALL The Capetown graph is enlarged to assist in the interpretation of the graph of other stations.

the world, but nowhere else on so grand a scale as in east Africa. One might well wonder whether or not Africa eventually will be severed in twain along the general line of the rift valleys.[1]

The four largest rivers of Africa—namely, the *Congo*, Nile, *Niger*, and Zambezi—receive their major supply of water from the equatorial rain belt (Fig. 205). The seasons of flood waters of these rivers follow the rhythmic north-south migration of the sun's vertical rays. Each of the great rivers has numerous waterfalls, most of which are near the margins of the continent where the streams descend from the plateau levels in the interior to the level of the plains near the coast. The chief difficulties in exploring the African interior were and still are the obstruction to navigation by falls and cataracts in the large rivers.[2] Within the 600 miles of the middle course of the Nile six great cataracts or falls hinder navigation. The *Victoria Falls* in the Zambezi are even greater than Niagara Falls. The Congo crosses and recrosses the equator before it descends by a succession of falls from the elevated Congo Basin to the coastal plain. The source of the Niger is within 200 miles of the Atlantic Coast but it flows nearly 1000 miles northeast toward the interior before executing a right angle turn and flowing another 1000 miles southeast to the *Gulf of Guinea*.

[1] Lobeck, Armin K., "Physiographic Diagram of Africa," The Geographical Press, Columbia University, New York, 1946

[2] Filby, A. F., "A New Trans-African Route," *Geographical Journal*, May, 1939, Vol. 93, pp. 419-424.

PHYSIOGRAPHIC DIVISIONS AND REGIONS OF AFRICA

The larger features of the Americas and Eurasia are easily discerned and, hence, the separation of these continents into major divisions is a relatively simple task. The general uniformity in surface configuration of Africa and the diversity of opinion as to what constitute major divisions in the continent justify in part the present somewhat arbitrary classification. The divisions hereby adopted depend on three readily distinguishable features—namely, (1) the general north-south line of the great rift valleys, (2) the immense bight in the western coast (Gulf of Guinea), and (3) the east-west land ridge just north of the Congo Basin extending eastward from the Gulf of Guinea to the rift valleys. For purposes of the present exigency, therefore, the following divisional and regional arrangement has been proposed (see Fig. 204 and also Fig. 206, the designation numbers of the latter of which refer to the following outline).

A. NORTHERN HIGHLANDS AND ASSOCIATED BASINS
   1. Atlas Mountains and Associated Features
   2. Sudan-Saharan Tablelands and Associated Basins
   3. Lower Nile Valley and Its Margins
B. EASTERN HIGHLANDS AND ALLIED FEATURES
   1. Ethiopian Highland
   2. Eastern Plateaus, Mountains, and Plains
   3. Madagascar
C. SOUTHERN HIGHLANDS AND BASINS
   1. Congo Basin and Its Margins
   2. South African Highlands and Basins

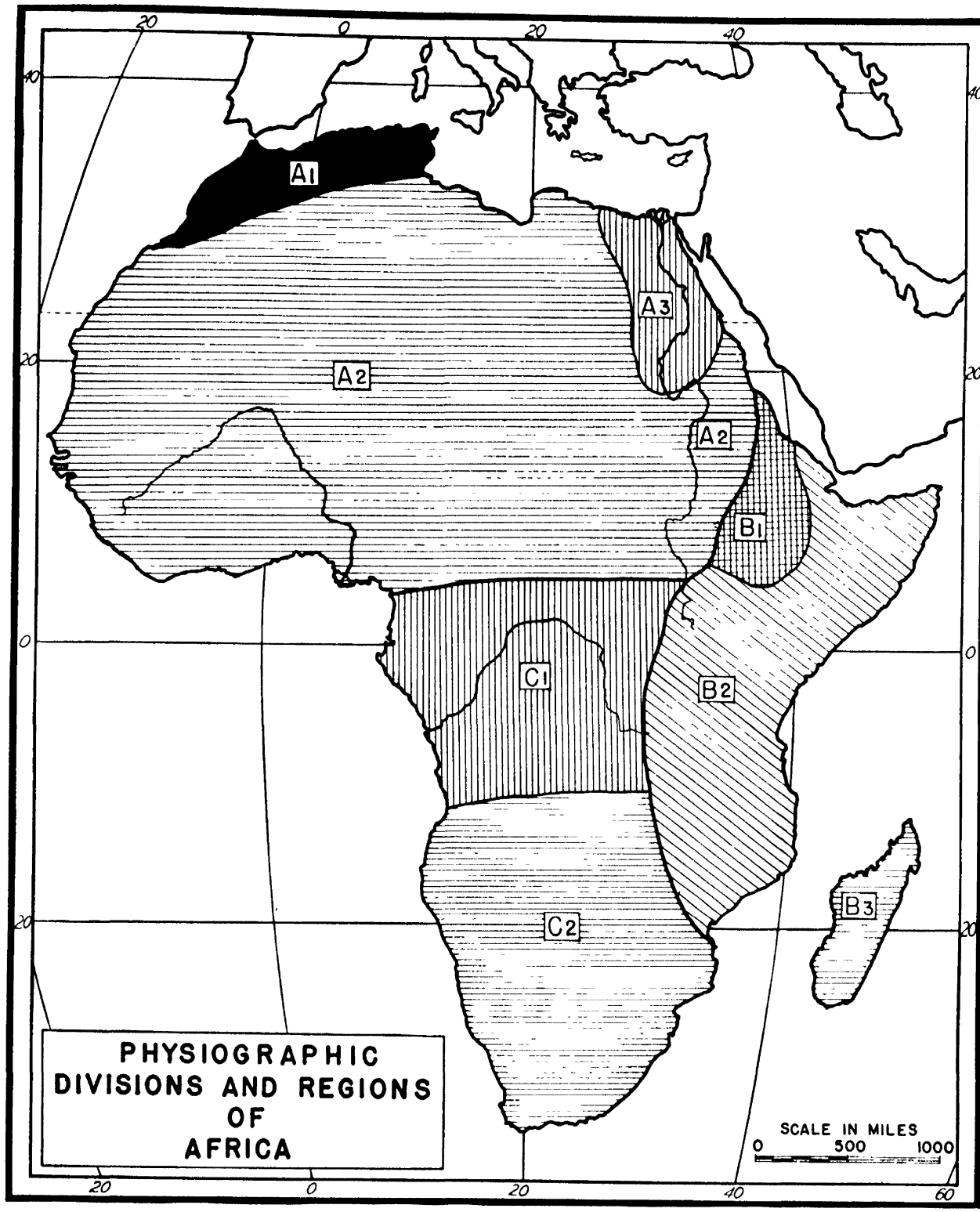


FIG. 206. PHYSIOGRAPHIC DIVISIONS AND REGIONS OF AFRICA This classification is admittedly arbitrary, but nevertheless it is relatively simple. See names of regions on the next preceding page

26

The Northern Highlands and Associated Basins

THE NORTHERN HIGHLANDS AND Associated Basins of Africa are entirely north of the equator and west of the Red Sea and the rift valleys. In latitude the division extends from 5° north latitude to the Mediterranean Sea, almost 32°. Beginning in the south this division of Africa is affected by all of the tropical climates, ranging from the rainy to the dry, while bordering the Mediterranean Sea, the dry subtropical and the subtropical dry summer types are represented (Fig. 236). With the exception of the Atlas Mountains, the topography, vegetation, soils, and human activities in this immense area are in a large measure a response to climatic factors.[1]

This large division includes approximately one half of the continent, and within the area are many features of absorbing interest, such as the *Sahara,* the greatest desert of the world; the *Nile Valley,* the most renowned of all oases; the immense basins, some with interior drainage; and the only folded mountains of the continent, the Atlas Mountains (Fig. 204) The uniqueness of this part of the world is evidenced by contrasts from some of the most intensively cultivated lands in the Nile Valley to some of the most desolate.

The features mentioned in the foregoing paragraphs are included within three regions, each of which possesses considerable unity. These regions are: (1) The *Atlas Mountains and Associated Features,* (2) The *Sudan-Saharan Tablelands and Associated Basins,* and (3) The *Lower Nile Valley and Its Margins.*

[1] Ballert, A G , and George M C , "Notes on the Climate of the Coastal Fringe of North Africa," *Journal of Geography,* March, 1944, Vol 43, pp 97-107

ATLAS MOUNTAINS AND ASSOCIATED FEATURES

The ancient Arab geographers named the Atlas Mountains area the *Island in the West* (*Jesirat-el-Maghreb*), because of the comparative isolation of the region between the sea on the north and west and the Sahara Desert on the south.

The axis of the Atlas Mountains extends about 1500 miles in a northeast-southwest direction. In the east the mountains sink beneath the Mediterranean and reappear as Sicily, and in the west the *Canary Islands* are remnants of the submerged Atlas. The area ranges from 200 to 300 miles in width and is somewhat larger than the combined area of Washington, Oregon, and California.

Natural Features

The Atlas Mountain Region of Africa differs in many ways from the remainder of the continent. The folded mountains constitute the only departure from the crust-block structure, and the climate, vegetation, and culture are more akin to southern Europe than to the remainder of the continent.

The major land forms of the region parallel the Mediterranean coast (Fig. 207). In the west-central part are the *High Atlas Mountains,* in many places 10,000 or more feet in altitude. Southwest of the High Atlas are the *Anti-Atlas,* and farther eastward bordering the Sahara Desert are the *Saharan Atlas.*

An important depression extends the full length of the region. In the west it lies just south of the Anti-Atlas, occupying the valley of the intermittent stream, *Wadi Draa,* and borders the desert. Eastward the depression connects with the *Plateau of*

Shotts—a high basin lying between the Saharan Atlas on the south and the *Tell Atlas* on the north. Farther eastward the depression dips into the sea in the *Gulf of Tunis*.

The Plateau of Shotts is an area of inland drainage similar to the Great Basin of the United States. During the rainy season many shallow lakes are formed, but in the dry season the lakes evaporate and leave numerous salt-encrusted flats.

Several useful minerals are found in abundance. Phosphate rock for chemical fertilizer is abundant in Tunisia, Morocco, and Algeria. Iron ore, especially hematite, easily holds first place among the metallic ores. Lead and zinc ores, usually in close association, are mined in the eastern part of the region, and some antimony, copper, and manganese also are produced.

The climate of the Atlas region on the whole is

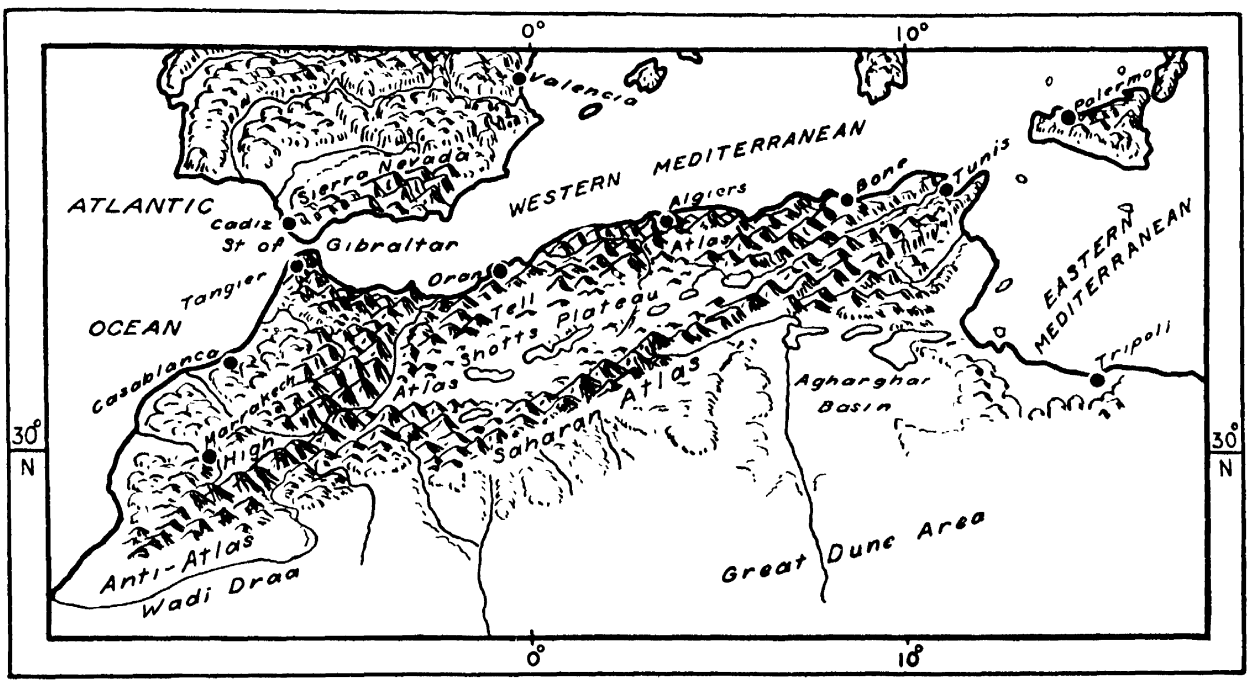


FIG. 207 ATLAS REGION This area of folded mountains is structurally related to the Sierra Nevada Mountains of Spain and the Apennines of Italy The region has a subtropical climate with a dry summer

The *Rif Range* in Africa and the Sierra Nevada in Spain form two great arcs separated by the Strait of Gibraltar. Between the High Atlas and the ocean is the *Moroccan Plateau*, a large expanse of country across which flow several permanent streams with broad basins well adapted to agricultural occupancy. These streams receive much of their supply of water from mountain snows. Although the Rif and Tell mountains are close to the sea in most places, there are several highly productive valleys and massifs associated with these ranges. In several instances eastward-extending ranges of the Tell Atlas project into the sea, creating bold headlands Back of these headlands are a number of protected gulfs and bays affording some fairly good harbors.

subtropical with dry summers Differences in altitude and in the trend of major topographic features cause many variations in both temperature and precipitation. On the Atlantic border from Tangier southward to Mogador about 500 miles, rainfall decreases from 32 inches to 13 inches (Fig. 205). On the Mediterranean coast at Bouzareak near Algiers, the median annual rainfall is 26 7 inches. Twenty-five per cent of the time this place gets 33.2 inches or more and 75 per cent of the time 23 1 inches or more. The driest month (August) receives 0 2 inches and the wettest (January) 5 0 inches.

The Plateau of Shotts receives from 8 to 15 inches, depending upon the altitude and exposure

and therefore has a subtropical dry climate (Fig. 236). The Saharan Atlas Mountains form the climatic divide between the tropical and subtropical climates. The north flank receives a little rain but the Sahara Desert begins on the south slope.

At many places on the High Atlas the annual precipitation probably reaches 50 or 60 inches, and since a considerable portion of this comes in the form of snow, much of the stored water from the mountains is used in summer for irrigation in the valleys and on the plains at lower levels.

Considerable variation in native vegetation exists as a result of the variety in land forms and rainfall. It is probable that large areas of land which were formerly forest-covered have been cut or even burned by the pastoral Arabs in order to provide more grazing land. The trees are similar to those of Spain. Cork oaks are common and pine and cedar trees grow luxuriantly at higher altitudes (Fig 237). The Moroccan and Shotts plateaus are steppes, and farther equatorward the lower lands support only desert bush and scrub

The mature soils of the Atlas region are mostly pedocals, due to the low rainfall However, where rainfall is more abundant pedalfers occur. The chestnut and the gray-brown soils are predominant, the former occupying the more arid portions and the latter the humid section.

Cultural Features

Hannibal's army against Rome, progressing slowly as it did along the *Barbary Coast* in 219 B.C., with 100,000 foot soldiers and three dozen war elephants, was a mild episode as contrasted with the lightning descent of the armada of the Allied Nations into the same area on November 8, 1942. How conditions have changed in 2165 years!

From the time of its colonization and the founding of Carthage by the Phoenicians, this region has "felt the heel" of one conquering army after another. Carthage fell to the young, vigorous Roman Empire, and in Africa the Roman Empire in turn gave way to the rise of Mohammedanism With the decay of the Ottoman Empire during the nineteenth century, several European nations attempted to bring this region into their schemes of empire. France, having easy access to North Africa, and having developed a fine overseas army, brought the region under control within the last 100 years. There is an oldness in the fields, in the cities, and in the towns of the region, and when one remembers that here dwelt the hardy, seafaring Carthaginians long before north Europeans could read or write, then one can appreciate the glories of the thousands of yesterdays in the Atlas region.

Through all the millennia in the Atlas region man has faced the same landscape, and it is notable that this was never a region of famine; the herds, the mines, and the soils yielded steadily through the centuries, providing grain and other supplies in peace and war It was at the west end of the Atlas Region that the German-Italian armies were cornered by the Allied forces in World War II and driven into the sea or made to surrender.

The contrasts in topography, soils, climate, and native vegetation together with the age-long association of the people with the soil account in part for the dominance and variation of agricultural pursuits in the Atlas Region. On the Atlantic slope the coastal plains receive considerable rainfall in winter and subtropical fruits such as olives, figs, grapes, and oranges thrive and yield abundantly. Wheat, barley, and beans grow well. On the Moroccan Plateau sheep and cattle are numerous but crops need to be irrigated. The mountains are covered with forests of cedar and cork oak, both of which are exploited. In the Saharan oases dates, wheat, barley, and eggs are produced for local consumption and for export (Fig. 208).

The coastal strip between the sea and the Tell Atlas is an area where irrigation is essential for crop production. The crops are similar to those on the Atlantic slope. The best farms are owned and operated by Europeans, whereas on the uplands and plateaus semi-nomadic people follow their herds of cattle, sheep, and goats in quest for pasture. Transhumance is practiced to a considerable extent on the desert border and the development of artesian wells is adding numerous oases to the agriculturally productive lands on the margin of the region.

The last 100 years have opened the Atlas region to penetration, infiltration, and exploitation by Europeans. It is only in recent years that foreign trade has encouraged the growth of cities along the

coast. The leading ports are on the shore of the Mediterranean.

The Barbary States

From a governmental point of view the Atlas Mountain Region is included for the most part within three political units—*Morocco*, *Algeria*, and *Tunisia*, each subject to outside control. For a long time these have been known as the *Barbary States*.[1]

MOROCCO. The Sultan of Morocco claims authority over the western half of the Atlas Mountain Region—an area a little greater than that of France However, the country lies within three zones of influence. The Spanish zone, which borders the Mediterranean Sea for some 200 miles, occupies less than 10 per cent of the total area. The Tangier zone (international), guardian to the Strait of Gibraltar and containing less than 1 per cent of Morocco, has an autonomous government subject to certain limitations imposed by interested European powers. The French zone, including more than 90 per cent of Morocco, borders the Atlantic Ocean for 700 miles and the Sahara Desert for at least as great a distance. Four cities in Morocco deserve some attention.

Casablanca (White House), the chief port on the Atlantic Coast, has had a very rapid growth in recent decades although it does not have a good natural port. Its growth is due largely to the construction of good breakwaters and the export of phosphate. The hinterland, in addition to phosphates, produces sheep, cattle, wheat, and dates. The landing of American troops at Casablanca in October, 1942, and the conference there of the president of the United States and the British prime minister in January, 1943, illustrate the important role of the city in recent stirring events.

Tangier, 35 miles southwest of the Strait of Gibraltar and since 1923 an international city, nestles between two promontories at the head of a spacious bay. It is a picturesque sight, decked with white Moorish houses and the citadel at the highest point, as it rises on the slope from the sea. The city and adjacent territory was internationalized because no one nation could be trusted with a place so strategically located with reference to the gateway at Gibraltar.

Marrakech, in a fertile valley nearly 100 miles from the ocean at the southern edge of the Moroccan plateau, was organized chiefly as a protection against Saharan and Atlas tribesmen, and to guard the gateways through the High Atlas Today it is becoming quite a resort center *Fez*, located in a valley at the north edge of the Moroccan plateau, is known as the "Mecca of the West" because of the veneration in which it is held by the Moslems of this part of Africa.

ALGERIA Algeria is about one fourth as large as the United States Less than 20 per cent of it is in the Atlas Mountain Region, the remainder being in the Sudan-Saharan Tablelands and Associated Basins. The country is under the jurisdiction of France although it is not a colony in the usual sense of the term.

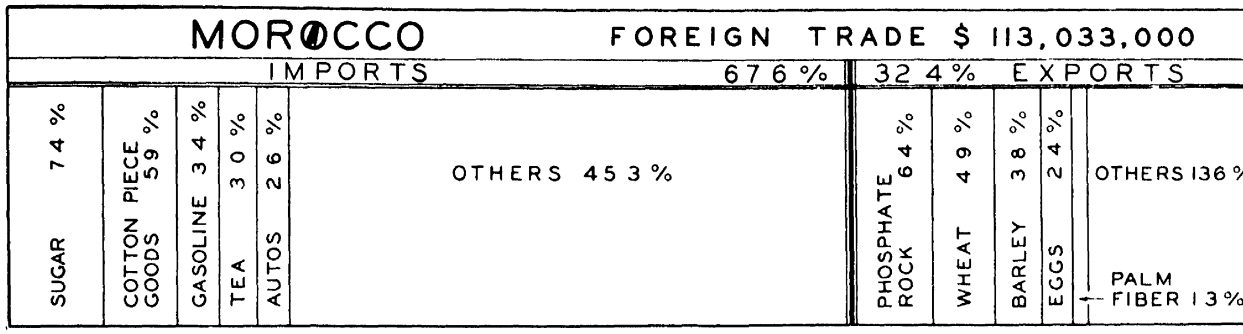


FIG. 208 MOROCCO'S FOREIGN TRADE An 11-year average prior to World War II Note the preponderance of imports over exports About 20 per cent of the exports is phosphate rock and approximately 11 per cent of the imports is sugar. (From *Statesman's Yearbook*)

[1] Gregory, J W, "Africa," Rand McNally and Company, Chicago, 1928, Chapter 7

Algeria may be divided into three agricultural belts. The northern coastal belt has a subtropical dry summer climate where cork oak and rice growing are the leading pursuits; the high basin belt between the Tell and the Saharan Atlas mountains produces most of the cereal crops and large numbers of livestock; and the desert-oasis belt, besides growing subsistence crops of grains, vegetables, and fruits, produces great quantities of dates for trade.[1]

About one fifth of the population of Algeria is urban, concentrated chiefly in the coastal cities. Several of these places had some exciting experiences during the allied invasion of North Africa.

Algiers (Alger), sheltered back of a promontory of the Tell Atlas on the west shore of the *Bay of Algiers*, is the largest city in the Atlas Region. The rich verdure of the mountains back of the dazzling white buildings of the city is a beautiful sight when viewed from the sea. Formerly Algiers was a leading port and a commercial city but its preeminence in this respect has been lost largely because of its poor harbor.

Tunisia. Only about one third of Tunisia is in the Atlas Region, the remainder being in the coastal plains and the northern Sahara. In area and population the country is approximately equal to North Carolina. For thousands of years, Tunisia has been so important in the growing of grain that it early became known as the "Granary of Europe." But olives, grapes, and livestock receive much attention today on the coastal lands, and date palms are grown in the southern oases.

As a rule, the cities of North Africa are divided into two distinct parts, the native quarters and the European section. The cities in the north and central parts of Tunisia generally obtain their water supply from the mountains, some of the aqueducts dating back to Carthaginian days.

Tunis, on the inner margin of the swampy *Gulf of Tunis,* is connected with navigable water by a canal 6 miles long. Its location was a protection against Christian invaders who might approach the Moslem settlement by sea. Only a few miles away on a promontory was the ancient city of *Carthage.* Tunis is well located for trade with its hinterland, which includes the rich valleys of the eastern Tell, the *Medjerda Valley*, and the plateaus and oases to the southward.

Two other Mediterranean cities are *Oran* and *Bône.* The former with a fertile soil and iron-producing hinterland has an excellent harbor and good connections with rich interior oases. The latter, the third port of the Atlas region, derives its chief importance as an export center for iron ore and phosphates. Other small cities that Americans have heard much about recently because of World War II are *Gabès* and *Sfax* on the south coast, *Sousse* farther north, and the harbor town of *Bizerte* on the north coast.

Looking to the Future. The Atlas region, although possessing several rich deposits of minerals, many thousands of square miles of fertile land, and several flourishing cities, is nevertheless not independent politically or economically. The principal trade of the region is controlled by European states, and when war breaks out on the European continent, the people of the Atlas region are affected by it in several ways: (1) they may have to furnish troops; (2) they may have their trade restricted by blockades in the Mediterranean, and (3) they may have a change in government, depending upon the victor in the European wars. Even during times of peace, the flow of their products is directed by other governments. The outcome, at present, is problematical.

Although this situation faces practically all peoples of colonial status, it seems that the people of the Atlas region are more capable and have more ability to organize trade, government, and local affairs than those of the tropics. Finding the best method of obtaining greater economic security and political freedom is a challenge to these people and their imperialistic neighbors.

SUDAN-SAHARAN TABLELANDS AND ASSOCIATED BASINS

The Sudan-Saharan Tablelands and Associated Basins occupy an area larger than that of the United States. From the Atlantic lowlands on the west to the Nile Valley is as far as the distance from New York to Los Angeles, and it is farther from the *Gulf of Guinea* to the Mediterranean Sea than

[1] Ackerman, Edward A., "An Algerian Oasis Community," *Economic Geography*, July, 1936, Vol. 12, pp. 250-258.

it is from Canada to Brownsville, Tex. The area includes chiefly those parts of Africa known as the Sahara and the Sudan (Fig. 204). Although the contrasts in altitude and relief are not great, the diversity in topography, climate, vegetation, people, and industries is considerable.

Natural Features

Altitudes in the north African tablelands in general vary from 500 feet to 3000 feet, although some of the plateau and mountainous sections are 5000 feet or even higher. The region as a whole averages about 1500 feet above sea level. The land forms in the Sahara are due principally to torrential water erosion, sharp alternations in temperature, and redistribution of eroded materials by wind action. Three types of scenery prevail in the Sahara. The *erg* desert is characterized chiefly by drifting sand dunes—the concept generally held of the whole area.[1] The *reg* desert is strewn with a mantle of gravel, rocks, and boulders. The *hammada* desert presents large areas of bedrock practically swept bare of any mantle material. Over much of the great desert are evidences of former streams. Today many intermittent streams flow from the more moist highlands into the desert and are lost by evaporation, percolation, and irrigation.[2]

Equatorward from the Sahara is the Sudan, stretching in an east-west direction 3000 miles. The bedrock and structure are similar to those of the Sahara, but the mantle rock is covered by vegetation—short grasses in the north gradually changing to more luxuriant types, including the tropical rain forests just north of the Gulf of Guinea.

This immense tableland is made up almost wholly of numerous large, shallow, upland basins, separated by long, low ridges often hundreds of miles wide. Some of these basins are areas of inland drainage and some have no drainage at all. Of the former, the *Lake Chad Basin* near the center of the region is a good example. The West Saharan depression is a representative of the latter. The immense *White Nile Basin* drains to the Mediterranean and in northeast Africa the *Libyan Basin* is without drainage to the sea. In addition to the four large basins just mentioned there are a number of smaller ones among which may be mentioned the *Fezzan* and *Igharghar* basins in the northern part of the continent (Fig. 209).

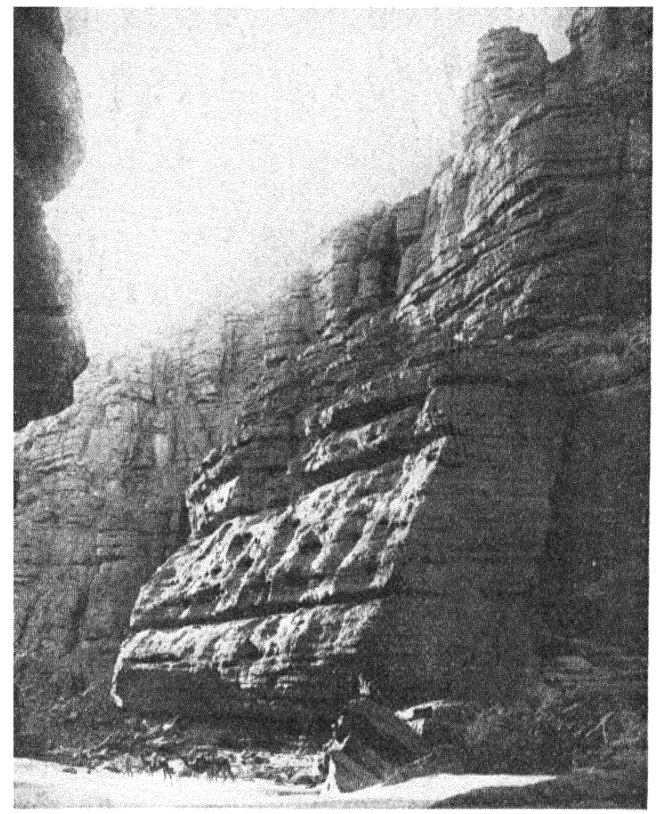


FIG. 209. CANYON IN THE SANDSTONES IN THE AHAGGAR MOUNTAINS. These mountains are in the center of the Sahara on the Tropic of Capricorn, 1000 miles south of Algiers. A camel caravan may be seen in the canyon. (Courtesy American Geographical Society)

Three mountain ranges deck the ridge between the Libyan and Chad basins, the chief one being the *Tibesti Mountains*, some peaks of which are more than 10,000 feet in altitude.

The great east-west ridge in the vicinity of 10° north latitude lies chiefly between the West Saharan, Lake Chad, and White Nile basins on the north, and the *Congo Basin* and the Gulf coast on the south. One of the large rivers of Africa, the Niger, throughout most of its course flows on this ridge. Other parts of this almost continuous ridge

[1] Capot-Rey, R., "Dry and Humid Morphology in the Western Erg," *Geographical Review*, July, 1945, Vol. 35, pp. 391-407.

[2] James, Preston E., "The Shari Plain," *Journal of Geography*, November, 1930, Vol. 29, pp. 319-330.

drain into the Nile and Congo rivers, and into Lake Chad.

The great expanse of land with low relief in northern Africa furnishes the best place in the world to observe the gradual transition of tropical climates from the exceedingly rainy to the extremely arid (Fig. 236). Parts of the southern margin of the area have tropical rainy climate. Poleward the tropical rainy gives way in succession to the tropical wet and dry, and the tropical dry, including both the semiarid and arid phases, and then to the subtropical types. This succession of climates is a response in large measure to low relief, low latitude, and the migration of the planetary belts of winds and calms.

At Calabar, near the mouth of the Niger in the tropical rainy section, according to a 28-year record the median annual rainfall is 124 inches. Twenty-five per cent of the time Calabar gets 140 inches or more and 75 per cent of the time, 105 inches or more. The rainiest month at this station is August (19.8 inches) and the driest, January (1.7 inches) (Fig. 205).

Khartoum (Anglo-Egyptian Sudan), at the desert margin on the Nile, according to a 32-year record has a median annual rainfall of 5 inches. Twenty-five per cent of the time this station gets 8.2 inches or more, and 75 per cent of the time 3.7 inches or more. The rainiest month is August (2.6 inches), and six months (November, December, January, February, March, and April) each average exactly zero. Most of the Sahara Desert receives less rainfall than does Khartoum.

Mongalla on the upper White Nile receives an average annual rainfall of 37 inches, the distribution of which through the year is similar to that of Omaha, Nebr. Bismarckburg, north of the Ivory Coast on the southern edge of the tableland on the *Black Volta River* at an elevation of 2329 feet, has an annual rainfall of 55 inches. This place has two seasons of maxima and two of minima—June (7 inches) and September (11 inches) are the two rainiest months.

The varying conditions of climates represented in the Sudan-Saharan Tablelands insure a considerable range in types of mature soils (Fig. 238). In the southern edge where the rainfall is heavy and vegetation luxuriant are the pedalfers. Lateritic soils occur in the lower Niger drainage basin. Adjacent to the laterites, both east and west, are considerable areas of prairie soils. Poleward from these soils as the climate becomes progressively drier the pedocals, including the black, chestnut, and gray soils, emerge as the prevailing types. Each of the pedocals crosses the continent as a broad east-west band. The black belt is good for farming, the chestnut belt for pasturage, and the gray belt for nomadic grazing and for oasis agriculture.

The low state of human society in most of this large region is chiefly responsible for the lack of mineral exploitation. Some beds of tin, iron, lead, and other ores are worked crudely by the natives in parts of the Sudan.

Types of vegetation and animals follow the belted arrangement of climates and soils. Tropical forests in the south give way in the poleward margin successively to woodland savannas, open grasslands, short grassland, drought resistant shrubs, and finally to desert vegetation (Fig. 237).

Arboreal animals dominate the tropical rain forest and crocodiles are plentiful in the streams. The elephant, lion, leopard, rhinoceros, hippopotamus, zebra, and various kinds of antelope and wild cattle find their homes in the savannas and lands of the shorter grasses. The semiarid desert margin furnishes sustenance to the giraffe, and numerous varieties of fleet-footed antelope and gazelles.

Cultural Features

Although trading has been carried on for centuries by camel caravans with the people of the Sudan and the Sahara, little was known of the interior until the nineteenth century. For untold ages traders have gone from the north into the Sahara and Sudan seeking dates, hides, other desert products and slaves. This trade was increased vastly during the height of the Ottoman Empire when the Arabs, riding their "ships of the desert," established some of the principal caravan routes and interior trading stations.[1]

Among the explorers who trekked inland to discover scientific secrets, none is better known than

[1] Taylor, Griffith, "Sea to Sahara Settlement Zones in Eastern Algeria," *Geographical Review*, April, 1939, Vol 29, pp 177-195

Mungo Park, the intrepid Scottish explorer who traveled in west Africa seeking the source of the Niger. The British government sent out other men to map the vast region, and one of these, Denham, traveled south across the Sahara to Lake Chad. Heinrich Barth, a daring German in the employ of the English, traveled extensively in the desert interior and returned with valuable journals and charts.

On the western coast of North Africa, where much more is known of its early history, traders named various parts after the tropical products they found there, for example: the *Gold Coast,* the *Ivory Coast,* the *Grain Coast* (Sierra Leone and Liberia), and the *Slave Coast.*

Immense stretches of the north African tableland are so arid and so destitute of usable natural resources, that much of the area is seldom if ever seen by human eyes. Other portions are covered with rich grasslands that provide sustenance for innumerable animals and a livelihood for millions of people.

Near the northern and the southern margins as well as in the interior of the Sahara are numerous oases which furnish subsistence for a considerable number of the sedentary populations. The products of the fields in the oases are dates, olives, wheat, barley, cotton, and tobacco; and of the gardens, melons, oranges, almonds, and pomegranates.

In addition to the oasis dwellers, there are two other groups of inhabitants—the nomadic herders and the traders. The former move from place to place in search of forage for their animals—the sheep, goat, horse, and camel. They have some animals to trade and also a variety of hand-made articles constructed from animal products, such as rugs and tents. The traders conduct caravan expeditions from the oases to the marginal lands both north and south, acting as middlemen between the oasis dwellers and the outside world.

In the Sudan, which occupies the southern portion of the region, conditions of climate and soil are favorable for grazing and farming.[1] The natives who occupy central and western Sudan know little of stock breeding or of scientific agriculture. Methods of soil and crop management are crude, but subsistence crops of a considerable variety are grown, the most important of which are millet, wheat, maize, peanuts, manioc, and cotton. Of the domesticated animals, sheep, goats, horses, asses, and camels are numerous and these graze on the savannas. In the vast Nigerian section of the Sudan with its millions of black natives, there are only a few hundred white men (Fig. 210).



FIG. 210. MIXED FARMING. These Sudanese farmers use humped cattle for draft animals. The natives have made progress in farm practices in recent years under the tutelage of the French. (Courtesy American Geographical Society)

The eastern Sudan, known generally as *Anglo-Egyptian Sudan,* has been accessible to white men by way of the Nile Valley from time immemorial. The activities of the people are similar to those of the people farther westward, but on the whole trade with the outside world is more accessible. Gum arabic, a product of the acacia tree used in making mucilage, is the chief export. Along the streams cotton and durra (a cereal) are the leading crops. Camels and cattle are grown in great numbers on the savanna plains. Most of the animals and crops are grown for subsistence purposes.

In the Lake Chad depression are numerous oases which derive water for irrigation from inflowing streams and from artesian wells. Agriculture, however, is almost wholly on a subsistence basis largely because of great distances to markets and the lack of adequate transportation facilities.

Political Divisions

Much of the governmental and economic control over the peoples of the Sudan-Saharan lands is in

[1] Renner, George T., "Geographic Regions of the Sudan," *Economic Geography,* April, 1926, Vol. 2, pp. 256-274.

the hands of five European countries. Only *Liberia*, occupying less than 2 per cent of the area, is independent.

French Possessions. By far the largest part of the Sahara and more than half of the Sudan is territory under French control. This includes *French West Africa*, most of *French Equatorial Africa* and Algeria, and several lesser areas (*Cameroons, Dahomey, Togoland, Ivory Coast, Senegal*, etc.) In climate and productivity these lands range from tropical rain forest to the driest of deserts. There are hundreds of native villages in French Africa, but no large cities.

Timbuktu (Tombouctou), an ancient city nine miles north of the great north bend of the Niger in French West Africa, is a peripheral center between the Sudan and the Sahara (Fig. 211). The city communicates with the Niger by a channel of intermittent flow—full in the wet season and empty in the dry season. Timbuktu, the meeting place of camel and canoe, has caravan communication northward through the Sahara.[1] The normal population of the city is about 6000, but from March to June near the end of the dry season, the influx of traders swells the population to 25,000. Aridity accounts for the spiny trees and poor grass that cover the sand dunes in the vicinity. During World War II, *Dakar*, one of the nearest points in Africa to South America, played an important part in the strategic calculations of both the Axis powers and the Allied nations.

British Possessions. In the Sudan-Saharan part of Africa, the British control more than a million square miles. From the border of Uganda, the Nile River winds northward nearly 2000 miles through Anglo-Egyptian Sudan (970,000 square miles) before entering Egypt. Bordering the Gulf of Guinea is the territory of *Nigeria* (much larger than Texas) with its tropical forests in the south and savannas in the north. Smaller but valuable possessions are Gold Coast, *Sierra Leone*, and *Gambia*, each bordering the Atlantic Ocean.[2] In British Africa are numerous native villages and several cities that deserve some attention although they are far between and relatively small.

Khartoum (Anglo-Egyptian Sudan), a desert city 400 miles west from the Red Sea and 1300 miles south from Cairo, has a picturesque location on the left bank of the *Blue Nile* just above its junction with the *White Nile*.

Omdurman (Anglo-Egyptian Sudan), on the west bank of the White Nile opposite Khartoum, is a city of mud huts and sun-dried brick. Its streets are a network of narrow lanes except for two or three long, wide streets running parallel to the river. Omdurman is the headquarters for native traders of much of the eastern Sudan. The camel market is an outstanding feature of the city.

Wadi Halfa (Anglo-Egyptian Sudan), at the second cataract of the Nile in the latitude of Habana, is at the northern terminus of the Sudan railway and the southern terminus of steamboat service on the Nile to Assuan (Aswân) where connections are made with the Egyptian railway.

El Obeid (Anglo-Egyptian Sudan), at the foot of the northern edge of the *Kordofan Plateau*, is the southern terminus of the Sudan Government Railway. Its trade includes gum arabic, ivory, cattle, and ostrich feathers.

Port Sudan (Anglo-Egyptian Sudan), 700 miles southeast of Suez on the west shore of the Red Sea, has for its hinterland the *Middle Nile Valley*.

Kano (Nigeria), about 500 miles northeast of the delta of the Niger on an open plain, is the leading commercial city of west-central Sudan.[3] Kano and *Zaria* are connected by rail with *Lagos* on the Guinea coast. Kano, with its houses of clay and surrounded by a protective wall, is a great market for camels, horses, asses, goats, and cattle, and an important center for weaving, dyeing, and the making of embroidered cloth and cotton goods from native-grown fiber. *Accra* and *Sekondi* are the chief ports on the Gold Coast. In Sierra Leone, *Freetown* is the coastal terminus of a railroad to the interior.

Italian Possessions. *Libya* borders the Mediterranean Sea for a thousand miles.[4] Under the rain of

[1] Boulton, Laura C., "Timbuktu and Beyond," *National Geographic Magazine*, May, 1941, Vol 79, pp 631-670

[2] Inman, Joseph S., "The Gold Coast Colony," *Scottish Geographic Magazine*, October, 1943, Vol 59, pp 55-59

[3] Whittlesey, Derwent, "Kano A Sudanese Metropolis," *Geographical Review*, April, 1937, Vol 27, pp 177-199

[4] Hornby, A J W, "Northern Tripolitania A Dry Mediterranean Coastal Region," *Economic Geography*, October 1945, Vol 36, pp 270-290

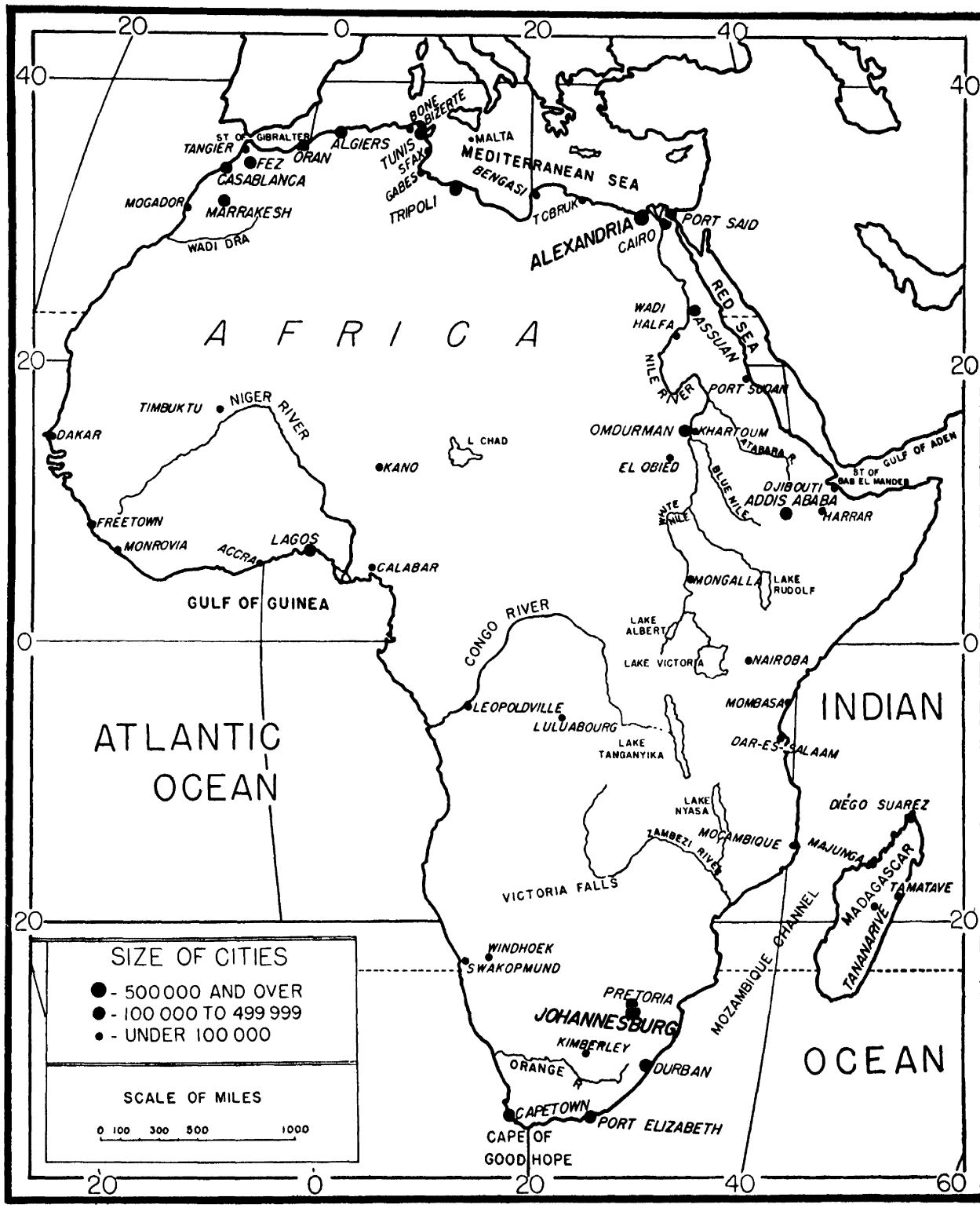


FIG. 211. CITIES OF AFRICA. Contrast the density of large urban centers in Africa with that of the United States, South America, and Europe (Figs. 15, 99, 138 and 145)

British bombs and other projectiles from land, sea, and air in 1942, it must have seemed much farther to the retreating Germans and Italians. This Italian territory reaches into the interior some 600 miles and has an area of more than 400,000 square miles.[1] *Tripoli* is the largest city, although several other places gained considerable publicity during World War II, for example, *Tobruk, Bengasi,* and *Misurata.*

Spanish Territory. Although *Rio de Oro* extends for more than 700 miles along the west African coast, it is of little value to Spain because of its extreme aridity. The mountainous *Canary* Islands off the coast of Rio de Oro are a valuable Spanish possession, furnishing a fine resort for those who would escape the rigorous winters of cold lands.

Portuguese Territory. *Portuguese Guinea* and the adjacent *Cape Verde Islands* together are about half as large as Maine. The Cape Verde Islands make an excellent coaling station for steamers plying between Europe and South America.

Republic of Liberia. This English-speaking Negro republic, nearly as large as Louisiana, was founded in 1847 through the combined efforts of several American philanthropic societies as a refuge for freed American slaves.[2] Their government is modeled on that of the United States. Although the population is about 1,500,000, only 5 per cent are civilized, and governmental control is in the hands of a much smaller percentage. *Monrovia,* the capital, is a small town of 10,000 inhabitants and the other towns are even smaller.

Future of the Region. The vast Sudan-Saharan Tablelands and Associated Basins Region is one wherein the limits of human settlement are set mainly by two mighty geographic forces: isolation and aridity. Thinking in terms of the future, would it be feasible to build railways into the region to connect the trade centers with the coast? Or would it be better to supplant the slow, ancient caravan trade with motor roads?[3] There are limits to the productive capacity of the region, and it will, in all probability, long remain sparsely populated. However, good motor roads, one of which is being constructed, might accomplish two objectives: (1) that of increasing tours into the region where anthropological interest is rapidly growing; and (2) that of bringing to the people better communication and transportation systems, which should furnish great benefits by enlarging trade and associations with the civilized world. Transportation by air may be another solution for the isolated areas if they have sufficient economic attraction.

[1] Bagnold, Brigadier R. A., "Early Days of the Long Range Desert Group," *Geographical Journal,* January-February, 1945, Vol 105, pp 30-46

[2] de Lynden, Baron R. A., "Liberia," *Scottish Geographic Magazine,* December, 1942, Vol 58, pp 89-95

LOWER NILE VALLEY AND ITS MARGINS

The Nile River is associated with some of the most ancient recorded history. At about the time the Chaldeans were building their civilization in the Mesopotamian Valley, the Egyptian Pharaohs were constructing the pyramids on the banks of the Nile. It is recorded that when famine struck the Jewish people in Palestine, great numbers of them migrated to the rich oasis along the Nile (Fig. 155). The fruitfulness of the region has not been exhausted, for today the Nile Valley supports more than twice as many people as it did in 1882.

Natural Features

The Nile River is more than 4000 miles long and in the lower half of its course it flows through the world's greatest desert. Agricultural land in the delta and flood plain extends about 800 miles from the sea and from this place the narrow riparian corridor toward the interior was an ancient, and today is a modern, route to the domain of the African Negro.

From the edge of the equatorial plateau, the Nile flows placidly through most of its 3000-mile course to the sea. This section may be divided into three parts. The upper 900 miles, most of which is through the broad White Nile Basin, has less than 4 inches fall per mile and is navigable. The middle section of about 1200 miles has an average

[3] Johnston, Pfc. Charles W., "Conformation of Non-Irrigated Desert Occupance to Transport Patterns," *Journal of Geography,* November, 1944, Vol 43, pp. 313-316

fall of 8 inches per mile, but most of this descent is acquired at the five cataracts that interrupt its otherwise placid flow. The lower 700 miles has a nearly uniform gradient of 4.5 inches per mile and is navigable throughout the entire distance (Fig. 212).

Northward for 250 miles from the second cataract, the Nile flows over a sandstone bed except where it crosses crystalline rock at the first cataract. The valley in this section is deep and narrow and for the most part less than two miles wide. Continuing northward through a distance of more than 400 miles the river has cut a level-floored groove into a limestone plateau in places as deep as 1500 feet. Through this rich alluvial trench—a fertile oasis from 10 to 14 miles wide hemmed in by a blistering desert—humanity has surged for untold generations. The limestone walls that enclose the valley become lower and lower downstream until at Cairo they become almost imperceptible as they diverge to enclose the triangular deltaic lowland.

The delta land, also "a gift of the Nile," is a low monotonous plain extending 155 miles on the seaward front from Alexandria to Port Said, and 100 miles from the Mediterranean to Cairo where the distributaries diverge to flow to the sea over the rich alluvium, most of which has been transported by the great river from tropical origins.

The sources of the Nile are south of the equator, and its delta is in the same latitude as New Orleans. For this reason, each of the phases of both tropical and subtropical climates might be expected somewhere along the river's course. Of the several representatives of these climates, only the subtropical humid is missing (Figs. 205 and 236).

Lake Victoria, almost as large as Lake Superior and nearly 4000 feet above sea level, is on the equator at the headwaters of the Nile. During the northern summer the upper half of the drainage basin is drenched with equatorial rains. Thus, the north-south migrations of the equatorial belt of low pressure account in large measure for the rhythmic fluctuations in the amount of water carried by the Nile River.

From its junction with the *Atbara River* to the sea, a distance of 1700 miles, not a single tributary of any consequence flows into the Nile. For this

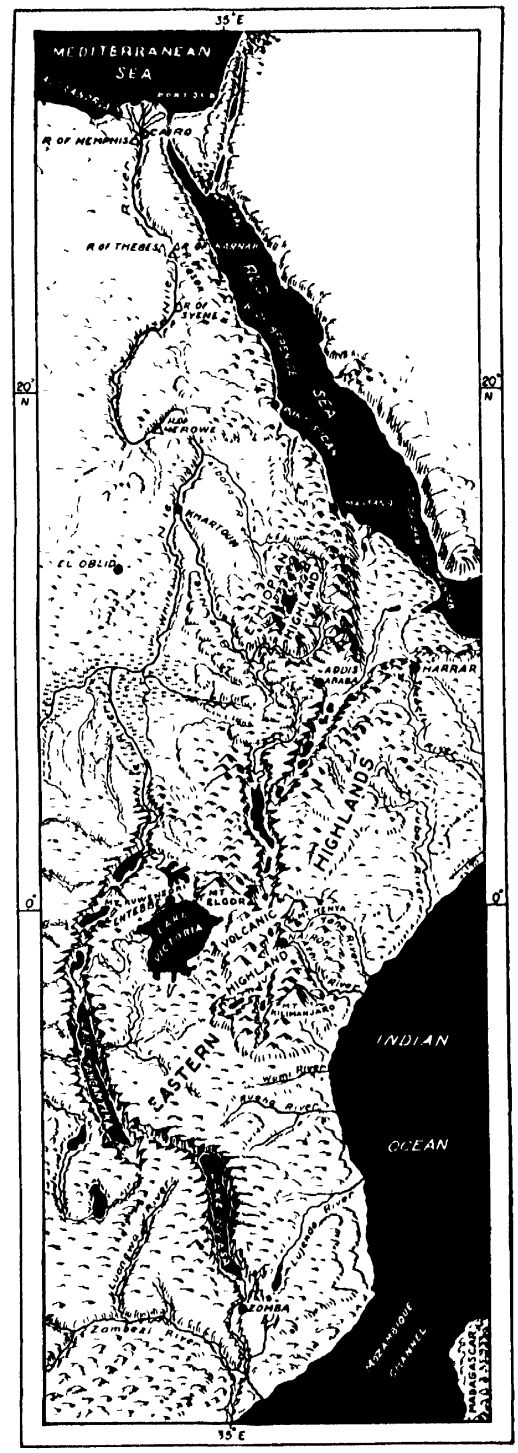


FIG. 212. EAST AFRICA. The remarkable feature in this sketch is the series of rift valleys beginning with the Jordan Valley (Fig. 1) and continuing southward to the Zambezi River—more than 3500 miles. The great volcanic peaks near the equator testify also to the structural stresses involved.

reason and because of evaporation, seepage, and irrigation, the volume of the river from the Atbara to the sea progressively decreases. At the low stage, all the water of the lower Nile is used for irrigation and none is discharged into the Mediterranean. It is not inconceivable that all of the flood waters of the Nile might be impounded, and that at a date not far distant none of the waters of the great river may reach the sea. The great dam at Assuan is a harbinger of even more diversion of the waters of the Nile. The small winter rainfall in the lower course of the Nile has no effect on its volume.

In the areas of inundation the soils of the Nile alluvial plain are being renewed annually by sedimentation and as a rule are very fertile. In irrigated areas above the flood level, fertilizer must be applied regularly in order to maintain soil fertility.

As might be expected, limestones, sandstones, and granites which exist in abundance along the Nile have been used extensively from time immemorial for construction purposes. The great pyramids bear testimony to this fact.

Cultural Features

Most of the Nile alluvial plain is watered year after year with unfailing regularity by the floods that not only soak the land but continually renew the soil by the annual deposition of fine silt. Thus conditions through the centuries have been favorable for a simple but efficient agriculture. Egypt is in a latitude low enough to be free from frost, and lying mostly in the northeast trade winds, it is near enough to the Mediterranean Sea to be free relatively from the burning heat of the tropical deserts. Although the people have not been entirely self-sustaining, additional income has been obtained from foreign trade through easy water routes available to Europe and the Near East and along the Nile—the land corridor to the treasures and slaves of the Sudan and of equatorial Africa.

It is not known how early organized government was developed in the Nile Valley. Historical records show the founding of Memphis a few miles above the delta by the Egyptian King Menes about 3500 B.C. Peace at home and a large measure of safety from foes on the outside permitted the Egyptians to devote all their attention to the promotion of arts and industries. The poverty of trees made them great builders in stone. Some of the quarries were located far up the Nile and the stones were brought downstream on barges.

Floods annually obliterated many of the boundaries of farm tracts. This necessitated the development of an accurate system of land survey, elements of which we use today.

Legend has it that about 600 B.C. one of the Pharaohs was the first to send a fleet of ships around Africa more than 2000 years before the voyage of Vasco da Gama.

These were only a few of the achievements of the Egyptian people. Most nations of the world have had some patterns by which to measure their progress, but the people of the Nile were among the earliest to have a civilized, well-organized state, and therefore had to construct their own patterns. Only the Chinese seem to have developed the arts and sciences earlier than the Egyptians, and it is quite certain that these two cultures grew up independent of each other.

In a region where no minerals are found and where, because of extreme aridity, plants will grow only where irrigation is practiced, human occupancy is conditioned almost wholly on the growing of crops. Since remotest times the delta and the alluvial plain of the Nile have been cultivated. A more intensive agricultural use of land can hardly be conceived.[1] The pressure of population on the land is amazing. Part of the flood plain supports as many as 1500 people per square mile by agriculture alone. In the last 80 years the population has more than trebled, and yet there is little if any prospect of increasing the cultivated area by more than a small percentage, even though all the flood waters of the Nile are impounded and used for irrigation.

Normally the agricultural year is divided into three parts: the summer, the winter, and the "Nile" or flood period from June to October. After the "Nile," the flood subsides and on the land winter crops of wheat, barley, beans, peas, and clover are grown, the clover especially for nitrogen-fixing purposes and for forage. By harvest time the previously flooded land has become dry, parched, and full of

[1] Mather, D. C. M., "A Journal Through the Qattara Depression," *Geographical Journal*, April, 1944, Vol. 103, pp. 152-160.

cracks. In this condition it lies fallow until the next "Nile" period.

Much land above flood levels is irrigated. For this purpose the river and its tributaries are dammed at convenient places for the storage of flood waters. By the use of canals, water is led to cultivated areas and is applied to crops as needed without complete submergence, as practiced by the basin method. Thus in summer crops are grown that can take full advantage of unclouded skies and high temperature. These conditions are favorable for the growing of cotton, corn, rice, sugar cane, and the date palm (Fig. 213)

With water from floods in winter and irrigation in summer, garden crops may be grown in the Nile Valley during the entire year As in ancient times, the area today is almost exclusively agricultural.

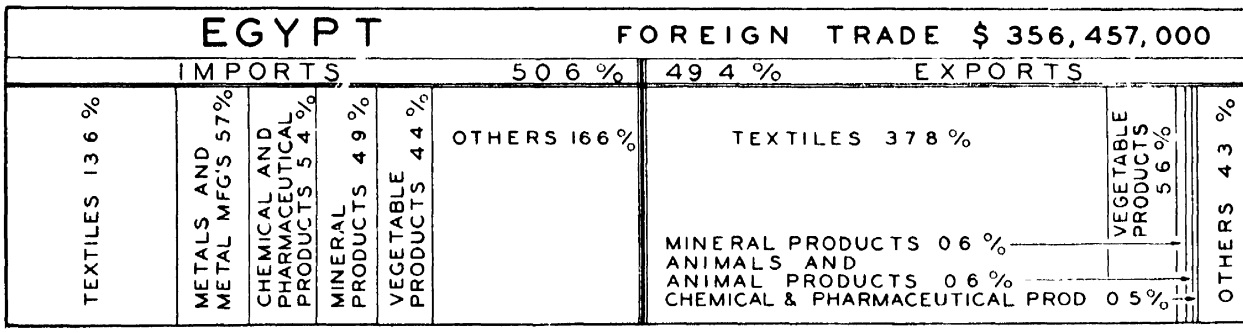


FIG 213 EGYPT'S FOREIGN TRADE An 8-year average prior to World War II About three-fourths of the exports are textiles (From *Statesman's Yearbook*)

Egypt

Egypt probably is more nearly square than any other country in the world, and it is five times as large as Nebraska. Water forms the northern and most of the eastern boundaries, and deserts border it both on the south and west. Of the whole immense area less than 4 per cent is occupied, and most of cultivated acreage is in the Nile Valley and on the delta. The Egypt of today is as truly a creation of a great river (the Nile) as was the Egypt of 5000 years ago—the Egypt of the Pharaohs, the *Sphinx,* and the *Pyramids* [1]

It is estimated that more than 60 per cent of the people are engaged in agriculture. Egypt has only one important commercial crop (cotton), the others being grown chiefly for subsistence Nearly all manufactured goods needed for local use are imported. The upper portion of the delta is well supplied with railways, and an important railroad ascends the Nile Valley as far as Assuan. Of course, the river itself always has been and still is the main artery of transportation

CITIES OF EGYPT. On the whole, the Nile Valley region does not possess the requisite resources for the support of many large cities. Only three have more than 100,000 population.

Cairo, at the head of the delta about 140 miles from the sea, is the largest city in Africa The place where the narrow valley emerges into the broad delta flats has been a natural focus for the convergence of caravan routes for hundreds, yes, thousands, of years. Although caravan trade has declined, the convergence here of river, rail, and air transportation in recent years has again accentuated the strategic location of the city.

Alexandria, 25 miles west of the Rosetta mouth of the Nile and just outside the range of the silt-depositing river, was founded by Alexander the Great in 332 B.C. In early times the city was protected from Mediterranean storms by the island of Pharos which more recently has been linked to the mainland by an isthmus of silt Just preceding the beginning of the Christian era, Alexandria was the greatest center of learning in the western world. This city is one of the great Mediterranean ports.

Port Said, 30 miles southeast of the *Damietta* mouth of the Nile and at the north entrance to the

[1] Hayes, William C., "Daily Life in Ancient Egypt," *National Geographic Magazine,* October, 1941, Vol 70, pp 419-515

Suez Canal, is an important entrepot and coaling station.

In all the immense territory drained by the Nile River, with the exception of those previously described, there are no large cities. However, dozens of small cities and towns are located on the delta and also along the banks of the great river for 2500 miles.

FUTURE INTERESTS. The antiquity of Nile civilization together with the ancient monuments in the region is an ever-attractive lure for tourists. Surely the people of the area can profit by improving accommodations for visitors from every part of the world. This means the construction of airports, highways, and improved hotel services.[1]

[1] Sandford, K. S., "Problems of the Nile Valley," *Geographical Review,* January, 1936, Vol. 26, pp. 67-76.

The proximity to the Suez Canal and the possibilities of a *Cape-to-Cairo Railroad* place Egypt in a strategic position to take advantage of the immense trade that passes that way. Means should be found to use this advantage to the fullest.

The increasing population calls for better ways of making a living. The lack of minerals for manufacturing indicates that agriculture must be developed to the fullest. The flood waters of the Nile can be stored for purposes of irrigation and power, thus adding to possibilities for industrialization and increased well-being.

The Nile is one of the greatest rivers of the world, and it should be improved for navigation so as to give cheap transportation into equatorial and tropical east Africa.

27

Eastern Highlands and Allied Features

THE EASTERN HIGHLANDS AND ALlied Features of Africa extend from the middle of the Red Sea southward to the Zambezi River, a distance of 2500 miles, and from the Indian Ocean westward to include the Ethiopian Highland in the north and the great rift valleys farther south. This section of the continent for convenience may be divided into three regions —namely, the *Ethiopian Highland; Eastern Plateaus, Mountains, and Plains;* and *Madagascar.* The Eastern Highlands and Allied Features of Africa are rich in physiographic, climatic, and biotic features (Fig 206).

ETHIOPIAN HIGHLAND

The Ethiopian Highland (Abyssinian Plateau), in the latitude of the Panama Canal and somewhat smaller than Texas, through many centuries has remained in lofty isolation. This is the only region in the eastern division of Africa with any considerable portion west of the great rift valleys The natural boundaries of the region make it the most clearly defined physiographic unit of the continent.

Natural Features

The eastern boundary of most of the Ethiopian Highland is an escarpment—the western wall of the rift valleys. In the south and west, the stream-cut margins of the highland descend gradually. The region as a whole is so high and rugged that it has been called the "Switzerland of Africa." [1]

Most of the Ethiopian Highland has a crystalline foundation covered with volcanic lavas. The whole region is a plateau more than 5000 feet in altitude, above which rise a number of giant snow-clad peaks, some to more than 14,000 feet above sea level (Ras Dashan, 14,980 feet and Mt. Kollo, 14,107 feet). The escarpment on the eastern edge is quite abrupt and in some places 7000 feet in altitude (Fig. 212). The region in general slopes westward. The large streams have their sources near the eastern margin and flow westward across the plateau to the Nile. The northern portion of the highland is deeply dissected by westward-flowing streams, but the southern portion has large comparatively level interstream areas, surmounted by numerous flat-topped buttes. Some of the narrow, deep depressions are branches of the great rift valleys which cut through the southern edge of the highland. These depressions are occupied not only by rivers but also by some deep lakes.

The Ethiopian Highland is so near the equator that the temperature range is low. At Addis Ababa the temperature is 64° F. for the warmest month (March) and 57° F. for the coolest month (July) (Fig 205). The cool season coincides with the rainy season—June to September. However, the altitude is so great that temperatures are never high. The climate belongs to the tropical wet and dry type, the period of greatest rainfall following closely the high sun period, July and August each receiving more than 11 inches (Fig. 236) The dry season runs from October to January inclusive, Addis Ababa receiving less than one inch each month. The average annual precipitation at this station is 47 inches.

The summer rains usually make raging torrents of the highland streams, whereas during the dry season of the year many of the stream sources are

[1] Gregory, J. W., *Africa*, Rand McNally and Company, Chicago, 1928, Chapter 13

waterless. The flooding of the Nile River in Egypt comes from June to October, thus synchronizing with the rainy season in the Ethiopian Highland.

The wide-spread lava rocks of the highland have weathered into rich soil. Because of the rugged topography most of the soils are youthful, but where they are mature, they belong to the red and yellow type (Fig. 238). Mineral wealth is not to be expected in a region of volcanic lavas. However, where the streams have cut into underlying sedimentary and crystalline rocks some iron, copper, and other ores are found.

The vertical zonation of vegetation corresponds to that of southern Mexico and Central America. Forests of tropical varieties occur in the lower, more moist section (Fig. 237). At successively higher elevations bamboo, deciduous forests, grasslands, and finally alpine flora are found.

Cultural Features

The population of the Ethiopian Highland is estimated at 7,000,000, nearly all of whom follow agricultural pursuits which for thousands of years have been carried on in a primitive manner. It is not probable that the brief Italian occupancy modified the situation very much.

The history of Ethiopia dates back farther than that of any other part of Africa except Egypt. The land was known to the early Greeks. The people are chiefly an admixture of Arabians, Jews, and Negroes. Bible students are well acquainted with the visit of the Queen of Sheba, an Ethiopian woman, to King Solomon at Jerusalem. Because of the ruggedness of the country, the people, until recently, have been able to maintain their isolation and independence. Unusual customs provide some strange and outlandish tales as told by visitors to the region during the eighteenth century. The "Strange Adventures of Baron Munchausen" is a good example. In 1896 Italy suffered an ignominious defeat in a war with the Ethiopians. In 1936 the region was conquered and overrun by the armies of Italy but 1941 again witnessed the "Lion of Judah" (Haile Selassie, emperor) on his throne.

The nearness of the Ethiopian Highland to the equator insures narrow ranges of temperature for all portions of the region, although the average temperatures vary from those of the warm tropical at the lower levels to those of temperate and alpine climates at greater altitudes. At altitudes up to 5000 feet, coffee, bananas, and rubber trees thrive. The healthiest and most habitable sections are at altitudes from 5000 to 8000 feet. At these levels tropical hardwoods and bamboo thrive, and such fruits as oranges, figs, apricots, and grapes are produced in abundance. Also at this altitude cereals do well, pastures are luxuriant, and cattle and sheep are numerous.

At altitudes from 8000 to 13,000 most trees disappear and open grasslands gradually merge into alpine flora. Some cereals are grown as high as 12,000 feet above sea level.

Practically all agricultural crops are for subsistence only. Exportable products such as coffee, beeswax, ivory, gum arabic, tragacanth, frankincense, and myrrh, result chiefly from a gathering industry. Small local and primitive industries are numerous. Metal, cloth, pottery, and processed agricultural goods are the chief manufactured products.

The region is rich in potential water power, but at present little has been developed. Transportation is in a primitive state, the ox-wagon being a common means of conveyance. Mules and camels are used over most of the area. One railway, 396 miles long, connects Addis Ababa to *Djibouti* on the *Gulf of Aden*. Roads extend in several directions from the highland—westward connecting with steamboats on the Nile, northward to the Red Sea, southward to the *Juba River* and the Indian Ocean, and eastward to *Berbera* on the Gulf of Aden. Most of the roads are mere trails. There are about 1000 miles of improved roads, less than 100 of which are hard surfaced.

Ethiopia (Abyssinia)

Ethiopia, about half of which is in the Ethiopian Highland, has maintained political independence through thousands of years. The aggressive highlanders have pushed their boundaries eastward onto the low plateau country, but have not been able to annex any seacoast. Ethiopia, therefore, is a landlocked country. The highlands support a population of relatively high density (about 50 per

square mile), but the arid plateau section is sparsely settled.[1]

CITIES OF ETHIOPIA. The towns of Ethiopia are not compactly built but in reality are groups of associated villages (Fig. 211). Only three have more than 25,000 people. The largest, *Addis Ababa*, near the eastern margin of the highland, is sheltered in a cultivated forest of eucalyptus trees. The city gets its water supply from tributaries of the Awash—a river that is lost in the desert east of the highland. Addis Ababa lacks sanitary methods of sewage disposal and modern water and lighting arrangements. However, it does enjoy telephones and an irregular mail service. Although near the equator the temperature of the city, due to its altitude of 8000 feet, is almost that of perennial spring.

Harar, on the mountain ridge extending eastward from the main highland toward the Gulf of Aden, is 5000 feet above sea level and enclosed by a lofty stone wall pierced by five gates and surmounted by 24 watchtowers. The roads approaching the city are made of rough, unhewn stone. Streets are narrow, dirty, and unpaved. The houses, flat-topped and Oriental in appearance, are built of undressed stone and dried mud. Harar has no rail connections.

Diredawa is the halfway point on the railroad from Djibouti in French Somaliland on the Gulf of Aden to Addis Ababa. Tributary to this city is Harar, 35 miles southeast.

LOOKING AHEAD. The people of Ethiopia have made but little progress in hundreds of years, yet some areas in low latitudes, with no better natural conditions, such as southern Brazil, the highlands of Venezuela, and Mexico, are forging ahead. Tropical, subtropical, and middle latitude crops can be grown. The great *Suez Gateway* is near by, the area ought to attract tourists, the potential water power is immense, the climate is favorable and an escape from primitive ways ought not to be difficult.

EASTERN PLATEAUS, MOUNTAINS, AND PLAINS

The Eastern Plateaus, Mountains, and Plains Region comprises that part of Africa from the Indian Ocean on the east to and including the great rift valleys on the west. It extends from the Red Sea, the Ethiopian Highland and the Gulf of Aden on the north to the Zambezi River on the south, where the great rift features of Africa disappear. This division of Africa includes the great rift valleys, the volcanic highlands, the Victoria basin, the encompassing plateaus, and the coastal plains (Fig. 212).

Natural Features

The interior of this region has been known to civilized man for less than a century, but the colossal forces of nature, working through millions of years, have created a landscape which is marvelous to behold. Here the ancient plateau of Africa was buckled into ridges thousands of miles long, and then the ridges were split into enormous gashes known as the rift valleys. Imposing volcanic peaks reach to such heights that they remain snow-crowned under an equatorial sun. Rivers, originating in the tropical rain forests, rush over the marginal ramparts of the plateau and create some of the most awe-inspiring waterfalls of the earth (Fig. 214). A wonderland of natural beauty is formed by the combination of these features with several great lakes, some more than 300 miles long, which occupy the lower depressions in the rift valleys. Among the important rift lakes are *Lake Rudolf*, *Lake Tanganyika*, *Lake Nyasa*, and *Lake Victoria*.[2]

Four of the great snow-capped volcanic peaks are *Mt. Kilimanjaro* (19,324 feet), *Mt. Kenya* (17,-044 feet), *Mt. Elgon* (14,140 feet), and *Mt. Ruwenzori* (16,798 feet). The first three are associated with the volcanic highlands, but the last rises from the depths of a section of the rift valleys.

Skirting the highlands on the east is a narrow coastal plain which extends southward from Italian Somaliland through British East Africa into Mozambique. Most of this coastal plain is less than 100 miles in width and less than 1000 feet in altitude.

Drainage is away from the region in all directions—the headwaters of the White Nile extend into the area; the Congo and its tributaries drain the western slope; the Zambezi and its affluents

[1] Buchanan, Captain Angus, "Some Impressions of Abyssinia," *Scottish Geographic Magazine*, April, 1943, Vol 59, pp 24-27

[2] Dixey, F., "The Nyasa-Shire Rift," *Geographical Journal*, January, 1938, Vol 91, pp 51-56.

drain the surface waters in the south; and numerous streams descend from the plateau on the east to the coastal plain and thence into the Indian Ocean.

The bedrock is chiefly sedimentary, except in the volcanic highland where immense areas of sedimentaries are overlain by layers of lava.

No part of the region is outside the tropics, and the equator crosses the northern section (Fig. 236).



FIG. 214. THE ZAMBEZI GORGE. The mist on the left margin is near Victoria Falls where the waters of the river drop into a rift valley—one of the series that is shown in Fig. 212. These falls are about 700 miles from the ocean. (Courtesy Canadian Pacific Steamships)

For this reason temperature ranges are low and the weather is always warm. However, because of variations in altitude, the highlands are not as warm as the lowlands. Nearly everywhere, except at high altitudes, mean annual temperatures are above 80° F.; and during the high sun periods, the interior may average 90° F. Variations in rainfall in different parts of the area furnish conditions favorable for all types of tropical climates ranging from the rainy to the arid, together with modifications that are associated with changes in altitudes (Fig. 205). At Moçambique, on the coast, the mean annual rainfall is 39.3 inches; and Dar-es-Salaam, also on the coast, receives 45.3 inches. In the plateau areas the precipitation is from 20 to 40 inches, but in the mountainous parts it is 60 inches or more. Italian Somaliland is chiefly a desert and much of the coastal areas receive less than 10 inches.

The natural vegetation varies from burning deserts in the arid eastern horn of the continent to hot rain forests on the Zanzibar coast, but the major part of the region has a grass or open woodland cover (Fig. 237).[1] Over most of the area are found herds of the grass-eating animals and the carnivorous species which prey upon them.

Little detailed soil mapping has been done in this region. By inference, however, soil experts have constructed a tentative map of mature soils based largely on climate, vegetation, and land forms (Fig. 238). Along the coast and in the interior where rainfall is heavy, laterites are found, on the plateaus the red and yellow soils predominate, and in the region of Italian Somaliland the chernozems, the chestnut, and the gray soils occur in succession from the borders of southern Ethiopia to the coast.

Cultural Features

Vasco da Gama was the first western European to visit this part of Africa. Nearly everyone is familiar with his epochal journey around the *Cape of Good Hope* and into the Indian Ocean. He traveled north along the east coast of Africa to the vicinity of the equator, from whence, taking advantage of the southwest monsoon winds, he sailed northeast to India. It is known, however, that Arab and Greek mariners and traders were familiar with the southeast coast of Africa before da Gama's time and that it was an Arabian mariner who piloted da Gama from Africa to India.

Even though the coast of the region had been known for several thousand years, it was not until the middle of the nineteenth century that the interior of this region was explored by white men who brought back stories of great waterfalls and majestic mountains shrouded in mists and covered with snow. The Portuguese were the first to acquire territory in the East African Highlands by conquest over the natives. Small trading posts were established and forts were built—the ruins of which may be seen today. Simple barter and exchange

[1] Wayland, E. J., "Desert Versus Forest in East Africa," *Geographical Journal*, November, 1940, Vol. 96, pp. 329-341.

were carried on with the natives who brought ivory, tropical fruits, and timber from the interior to the trading posts. Thus, until relatively recent times, this coast was the land of the missionary, itinerant trader, sailor, and adventurer.

East Africa as a whole is sparsely populated, some sections having not many more than five people per square mile. However, in the vicinity of Lake Victoria are areas with as many as 100 persons per square mile. Within the past half century there has been a considerable influx of whites, particularly into the high, cooler interior. Railroads have been constructed connecting Dar-es-Salaam (Tanganyika) and Mombasa (Kenya) on the coast with Lake Tanganyika and Lake Victoria, respectively. Native and European subsistence and commercial crops are grown in the region.[1]

On the plantations which utilize native labor are produced all native subsistence plants and the larger share of the export commercial crops. Some of the plantations specialize in one or two commercial products, whereas others follow a rotation system in accordance with the market and with soil-conserving practices. It must be pointed out, however, that the European plantation in East Africa does not approach the productivity and efficiency of the plantations of the East Indies.

Among the native subsistence crops are maize, millet, rice, bananas, manioc, sweet potatoes, beans, peas, ground nuts, melons, wheat, sugar cane, fruits, and vegetables; and in the interior some cattle, sheep, and swine are raised. The natives also produce some commercial crops such as rubber, tobacco, tea, coffee, coconuts, cotton, oil palm, and sisal, but these are usually under the control of European plantation owners. Most of the coconuts are produced along the coast, and the other commercial crops are grown in the interior.

Political Divisions

The East African Highlands and Associated Features, other than Ethiopia, are under the control of four European peoples—namely, the British, the French, the Italians, and the Portuguese. The area, including Ethiopia, is more than half that of the United States.

British Territory. Belonging to the British are *Kenya Colony* (225,000 square miles), bordering Anglo-Egyptian Sudan and Ethiopia, and extending eastward to the Indian Ocean; *Zanzibar* (1000 square miles), two islands just off the east coast; *British Somaliland* (68,000 square miles), bordering the Gulf of Aden; *Nyasaland* (38,000 square miles), lying just east of Lake Nyasa; and *Tanganyika Territory* (364,000 square miles), a mandated area formerly belonging to Germany and extending eastward from Lake Tanganyika to the Indian Ocean.[2] Although Kenya, Tanganyika, and Nyasaland are near the equator the altitude is such that the climate is not excessively warm and much of the area has as high potential value for agriculture as has the plateau of Mexico or of southern Brazil.[3]

Portuguese East Africa. *Mozambique*, or *Portuguese East Africa* (300,000 square miles), on the east coast of the continent opposite Madagascar, corresponds in latitude and coastal exposure to that of the east coast of Brazil from Recife to Santos. This is a valuable possession, and, although not highly productive now, its potentialities are large indeed.

Italian and French Possessions. *French Somaliland*, *Italian Somaliland*, and *Eritrea* (Italian) are all of doubtful value because of extreme aridity. The latter two are under United Nations trusteeship at present. The three areas together with British Somaliland effectively bar Ethiopia from direct access to the ocean highway. One of the advantages of each of the areas is the fact that it is adjacent to the *Mediterranean-Red Sea Gateway* (Suez Canal).

Cities of East Africa. In all this vast region there are only six cities with populations greater than 18,000 (Fig. 211). *Mombasa* (Kenya), *Dar-es-Salaam* (Tanganyika), *Moçambique* (Portuguese East Africa), *Zanzibar* (Zanzibar Island), and *Lourenco Marques* (Mozambique) are all located on the coast and serve as commercial marts, seaports,

[1] Popplewell, G. D., and Harcus, T. E., "Notes on the Geography of the Tunduru District of Tanganyika Territory," *Geographical Journal*, January, 1938, Vol. 91, pp. 31-43.

[2] Tullman, Bridget M., "A Scotswoman in Somaliland," *Scottish Geographic Magazine*, March, 1942, Vol. 58, pp. 6-9.

[3] Marston, Jay, "Uganda, Land of Something New," *National Geographic Magazine*, January, 1937, Vol. 71, pp 109-130

and administrative centers of the region. *Nairobi* (Kenya) is a beautiful modern town in the interior situated in the highlands east of Lake Victoria. In each of these towns may be found the native bazaars, the government administrative centers, and the chief business houses. Here, too, live the traders, the business men, and the missionaries.

Problems and Future of the Region. The Eastern Highlands of Africa are an example of white dominance in the tropics with the attendant utilization of native labor. The region furnishes many tropical products such as coconuts, cacao, rubber, sisal, and tobacco, but it produces these goods in limited amounts in comparison with other similar regions. The standard of living for most of the native population is very low and amounts, in general, to bare existence and in some cases to practical servitude. It seems that white administration and exploitation of resources and people have not materially benefited the natives. Since the time of the Portuguese entry into the region the native population, if employed by the whites, has suffered virtual enslavement.

In an environment which has so many possibilities it ought to be possible to advance the well-being of the natives by showing them how to use the land to better advantage, to promote public education, and to improve the conditions of health. Would not the European overseers find it profitable to promote the development of the natives, rather than to exploit them and their land so much in the interests of the European corporations which they represent. The native cultures possess certain admirable features which modern science and technology might serve in promoting a unique civilization in the tropics.

MADAGASCAR

"La Grande Ile," as it is called by the French, lies approximately 250 miles off the eastern coast of Africa. Except for a small section of the island, Madagascar is north of the Tropic of Capricorn. With an area of 228,700 square miles it is about twice the size of the British Isles or three times the area of Minnesota. Madagascar is about 1000 miles long, while its greatest width, in the latitude of Tamatave, is approximately 350 miles. The population of nearly 4,000,000 consists mainly of native tribes.

Natural Features

The similarity of the bedrock of Madagascar to that of the Deccan Plateau of India and the continental core of Africa has led most geologists to agree that the island was once a part of the ancient continent in which India and Africa were united.[1]

The mountainous backbone of the island lies near the eastern margin and consists of ancient crystalline rocks interspersed with volcanic necks and old cinder cones (Fig. 212). The eastern half of the island has an average altitude above 5000 feet, the highest parts being more than 9000 feet, whereas the western half is much lower. The western half is underlain by sedimentary rocks which were laid down when the sea advanced over the old continental platform. The eastern margin of the highland is more or less precipitous, the rivers flowing to the sea through new gorges and gullies. The descent to the sea on the western side is made more gradual by a series of broad steppes and plains which, however, are frequently diversified by ridges and valleys. On the western coast are broad plains and coral reefs while the coastal plain on the east is narrow, averaging only a few miles in width. Rivers which flow eastward carry water continuously but those flowing westward may be intermittent during the dry season.

Several minerals are associated with the crystalline bedrock on the east; they include iron ore, alluvial gold, graphite, and mica. Graphite is the most important commercial mineral. Bauxite is found in the areas of weathered crystalline rocks and small coal basins are known to exist.

Madagascar lies entirely within the region of tropical climates, but has marked differences in temperature and rainfall. The climate of the east coast is tropical rainy because, during all of the year, the highlands lie across the path of the southeast trades (Fig. 236). The orographic rainfall, therefore, is considerable. At Tamatave on the windward coast the average annual rainfall is 115.5 inches; whereas on the uplands, Tananarive (Antananarivo) gets 54 inches annually. Altitude plays

[1] Geologists call this ancient continent "Gondwanaland."

an important role in temperature distribution. Tamatave, at an altitude of 16 feet, has an annual mean temperature of 74.5°, and Tananarive at 4593 feet has 62.1° (Fig. 205).

The western portion of the island receives most of its rainfall in summer (high sun period), because during most of the year the trade winds descending the western slope are drying winds and it is only in summer that the equatorial low pressure belt, shifting southward, brings a long, rainy season to the northwest and a short, rainy season to the southwest section of the island. The western half as a rule receives much less rain than the eastern half of the island, the northern tip receiving less than 40 inches, and the southern tip less than 20 inches. As a consequence of the climate the vegetation consists of (1) the tropical rain forest in the eastern half; (2) woodland with savanna grasses in the high plateau; (3) tall grasses in the northwest; and (4) xerophytic plants consisting of scrubs and scattered grasses in the southwest (Fig. 237).

Where mature soils have developed three areas may be recognized: (1) the red and yellow soils on the high plateaus; (2) the lateritic on the eastern slopes and coastal plain; (3) and the chernozem and gray soils in the more arid southwest and west.

Cultural Features

Although the Europeans had known of the existence of the island of Madagascar since 1500 when the Portuguese discovered it, no settlements were made until the middle of the seventeenth century when the Dutch and French established slave-trading posts on the southeast shores. The history of the island for the next 200 years is one of inter-tribal warfare and kidnapping of natives for slaves.[1] The European slave traders instigated most of the warfare by encouraging certain tribes to capture slaves in other tribes. However, in the middle and latter half of the nineteenth century slavery disappeared in most parts of the world, English and French missionaries settled on the island, and trade in tropical products began to develop between Madagascar and western Europe. During the last decades of the nineteenth century, the French, basing their claim to Madagascar upon an old grant by Cardinal Richlieu, invaded the region and established a protectorate. Since that time France has been in control and has attempted, through enlightened colonial policy, to establish trade and communications, and to improve the social and economic levels of the natives. Native leaders control local conditions but they are responsible to the French governor.

Madagascar is another tropical region in which the white man is dominant, although the native economy is important both in the production of commercial and subsistence crops. About two per cent of Madagascar is devoted to agriculture, the remainder being mountains, desert, or waste land. It is to be noted, however, that the European estates have not developed on a large scale and that the natives still own the land. There are about 20,000 Europeans on the island. More than two thirds of the people live on the eastern half of the island.

Rice is by far the most important crop, being grown chiefly for subsistence, although some is exported. This crop is grown on the eastern slopes where rainfall is abundant and dams can be built. The next crop in importance is manioc or cassava, which also contributes to the subsistence and commercial economy of the region. Corn was introduced about 20 years ago and is rapidly growing in favor. The other commercial crops are sugar cane, coffee, cotton, and cacao. The animal industries produce hides, skins, wool, and some canned meats for export.

In the development of transportation the French have preferred to build motor roads rather than railroads because the region is small and the hauls as a rule are short with many stops.

Urban Centers. In general, the urban centers of Madagascar are associated with the coast and serve as ports of entry (Fig. 211). *Andevorante, Tamatave, Diégo-Suarez,* and *Majunga* are good examples of these coastal agglomerations. All have good harbors, and all have motor roads reaching into the hinterlands so that the produce of the interior can be marketed.

[1] Almasy, Paul, "Madagascar Mystery Island," *National Geographic Magazine,* June, 1942, Vol 81, pp 797-830.

[2] Chapman, Olive Murray, "A Journey Among Primitive Tribes in Madagascar," *Scottish Geographic Magazine,* January 1944, Vol 59, pp 87-92.

Tananarive is the metropolis and capital of the region. Its location on the plateau at nearly 5000 feet altitude is evidence that the old rulers of Madagascar preferred a site that was relatively cool. The city is on a long ridge overlooking broad, beautiful, green fields of rice and grain. In parts of the city the slopes are so steep that the building of steps is necessary. One of the interesting sights of Tananarive is the wooden palace, built on the crown of the ridge, which was once occupied by kings and queens. The native homes generally are built of wood or brush, and the French buildings, churches, and homes as a rule are constructed of brick.

LOOKING TO THE FUTURE. One half of Madagascar has the disadvantage of aridity, and the other half has abundant rainfall. Perhaps more of the land could be irrigated, thus enlarging the amount available for agriculture. There are large areas of land, too, that can be cleared and utilized for crops. Other possibilities for increasing the economic and social well being of the people are: (1) encouraging tourist trade, (2) removing trade barriers, (3) increasing the desires of the natives for the conveniences of civilized life, and (4) installing conservation practices in order to protect the natural resources.

28

Southern Highlands and Basins

THE SOUTHERN HIGHLANDS AND Basins of Africa extend from the Atlantic Ocean eastward to the rift valleys and the Indian Ocean, and from the Cape of Good Hope northward across the equator to the northern margin of the Congo watershed, including an area greater than that of the United States (Figs. 204 and 206). The division embraces all phases of both tropical and subtropical climates, and immense stretches of equatorial rain forests as well as correspondingly large savannas, grasslands, and deserts.

CONGO BASIN AND ITS MARGINS

The Congo Basin occupies the heart of Africa west of the rift valleys. Its limits are the uplands and divides to the north, south, and east which enclose the Congo drainage basin On the Atlantic margin the basin narrows to a constricted neck of land between the *Cameroon Mountains* and the *Highlands of Angola.* The Congo Basin is about one half as large as the United States and comprises an area of nearly one and one half million square miles.

Natural Features

The basin of the mighty *Congo* is underlain by sedimentaries, chiefly sandstones, which are almost horizontal in structure. These younger materials which now cover the ancient continental core of Africa were deposited millions of years ago when the sea encroached upon the depressed interior of what is now the continent. With the exception of minor scarps here and there, the structure of the bedrock has had little or no effect on the relief. Rather, the relief features have resulted from the work of running water which has created the natural landscape of today, and it is the extreme levelness of the land which accounts for the poorly drained portions. The large lakes and shallow swamps are the results of abundant rainfall which produces a high water table in the porous sandstone. *Lake Leopold II* is a remnant of the great inland sea which once covered the region but is now a fresh water lake because it has drainage into the Congo River.[1]

With altitudes ranging from 1000 to 3000 feet, the Congo Basin is really a shallow depression in the great plateau of interior Africa. It cannot, therefore, be considered a lowland in the sense that the Amazon Region is. However, it does have one enormous central stream which, with several giant tributaries, eventually issues into the Atlantic; and in this respect, it is comparable to the Amazon. The great northern tributary with its system of affluents is the *Ubangi*, while to the south the streams which issue in the *Katanga* flow into the *Kasai River.* The eastern headwaters of the Congo originate on the western slopes of the highlands of the rift valleys watershed. The equator bisects this region and, therefore, alternating rainy and dry seasons occur north and south of the equator. Although southern tributaries of the Congo may be at low water levels, the northern streams are at flood stage. The central stream carries a tremendous load at all seasons—1,200,000 cubic feet per second—which is exceeded only by the mighty Amazon. In a region where streams carry such vast amounts of water most of the mantle in the low-

[1] Gregory, J W., *Africa*, Rand McNally and Company, Chicago, 1928, Chapter 18

lands is certain to be alluvial in origin. On the uplands, however, residual mantle is the rule. There are several important mineral resources in the region, such as copper, bauxite and radium; and, although located in the uplands of Katanga, they are within the drainage of the Congo system. The Belgian Congo has potential water power which is twice that of Europe.

Here, as in other equatorial areas, the tropical rainy climate prevails (Fig. 236). The equatorial belt of low pressure extends over most of this region nearly all year, and high temperatures, high humidity, and abundant rainfall are the natural consequences. The annual temperature at Luluaburg, 2000 feet above sea level, is 77° F. and the seasonal range is only 1.5° F. The annual rainfall averages from 50 to 60 inches throughout most of the region (Fig. 205). The Eastern Highlands, because they are on the windward side of the basin, reduce the rainfall considerably and annual precipitation does not approach the amounts received in the rainier portions of the Amazon Lowland. Then, too, the altitudes are higher and the temperatures are lower in the Congo Basin, especially on the peripheral portions, than they are in the Amazon Lowland.

Rainfall, temperature, and humidity are sufficient, however, to produce the luxuriant tropical rain forest such as is found in other tropical rainy regions (Fig. 237). Thousands of square miles of these verdant, natural tangles of trees and vines extend along the principal rivers. So closely packed together are the trees and so completely are their crowns interwoven that the traveler's view of the sky is almost entirely obliterated. In the lower valley of the great Congo are numerous muddy streams with stagnant shallow pools, green with duckweeds and floating leaves of lotus and lilies, and with greasy scums of algae and other plant growths. In the trees are numerous tropical birds, chattering apes, and monkeys. Thus the jungle is well-nigh impassable and travelers must follow the trails of the natives and of wild animals if they are to make progress. On the uplands, where the water table is not so high, and where temperatures are more moderate, the forests give way to the tropical savanna (Fig. 237). Here tall grasses abound and small clumps of trees are seen everywhere. This is where wild animals such as the elephant, the lion, the antelope (especially the gazelle), and the giraffe make their abode.

Practically no scientific exploratory work has been done on the soils of this vast, dark region. However, *Shantz* and *Marbut,* two American soil and plant specialists, have completed a tentative classification of the soils in the region. All the mature soils are pedalfers and most of them belong to the lateritic or to the red and yellow types.

Cultural Features

In 1484 *Diego Cam,* one of the early Portuguese navigators, crossed the equator along the west coast of Africa and proceeded southward until he saw the mouth of the Congo River. It is unlikely that Cam, or any of the intrepid Portuguese explorers who followed him, dreamed of the immense region which the Congo drained, for, aside from the establishing of small coastal trading posts, the Portuguese continued southward along the coast in the ensuing years until they had solved the problem of finding a water route to the Indies. Nearly 400 years elapsed before other white men began to explore the interior of the Congo Basin During all this time the Europeans were content to take out ivory and slaves from the coastal regions.

During the latter half of the nineteenth century two great African explorers, *Livingstone* and *Stanley,* went into the Congo region and returned with maps, charts, and journals describing what they had seen. The story of their adventures in the unknown jungles of the Congo is a thrilling episode.

Toward the end of the nineteenth century, Leopold, King of the Belgians, took a considerable interest in the Congo region. As yet no other European power had considered it desirable to open the region for trade and development, so Leopold figuratively was cultivating virgin soil. He organized a government, granted monopolies to private concerns, and fostered the development of water and railway transportation to the interior. Since that time the region has been known as the Belgian Congo and has begun to contribute tropical products and minerals to world commerce and trade.[1]

[1] Shattuck, Dr George C., "Liberia and the Belgian Congo," *Geographical Journal,* March, 1929, Vol 73, pp. 216-240

Modern Congoland presents a twofold aspect in terms of human occupancy: (1) the native, and (2) the European.

In those remote areas where the white man's influence has not been felt, the native is practicing the three H's—hunting, herding, and hoeing. If his village is along a river, then he clears a small tract for his primitive agriculture, cultivates mainly with his hoe, and hunts and fishes to procure his meat. If, on the other hand, his house is in the park savanna land then perhaps he will have some herds of either goats, cattle, or sheep. In both instances small communal villages are the rule. The banana is the bread of the tropics and several kinds are grown, some of which are cooked and some are eaten raw. Supplementing the banana and the fresh fish or meat are such crops as corn, beans, peas, and yams.[1]

European occupancy is associated chiefly with the highlands because the oppressive heat and humidity almost preclude living in the vicinity of the large streams. The trading posts, as a rule, are located mainly along the streams. In the Katanga highlands mining operations are under European supervision, the chief minerals obtained being copper, bauxite and radium uranium ores. Tropical plantation agriculture, such as is practiced in the East Indies, has not developed except on a small scale. However, commercial agriculture produces such crops as bananas, cacao, and palm oil, which are exported to European markets. Here, as in most tropical regions entered by white man, the government, the market, the transportation system, and the religion and education are controlled by the white exploiters, and the native, if important in the scheme of production, furnishes the labor.

Transportation and Urban Centers. Approximately 6000 miles of the rivers of the Congo Basin are navigable by fairly large steamers. Nevertheless, rapids and marshes along the rivers necessitate the building of railroads. Where the streams issue from the highlands onto the lowlands, rapids are created because the bedrock usually changes from hard to less resistant rocks. A railway has been built from the mouth of the Congo inland for more than 100 miles to avoid the falls on the margin of the highlands. However, the larger part of the main stream and its two tributaries, the Kasai and the Ubangi, are navigable by steamers. On the uplands some motor roads connect with the upstream limits of river-boat transportation, but the plateaus are served mostly by railroads. The mineral area of the Katanga uplands and Northern Rhodesia is connected by rail with *Lobito* (Angola), a distance of about 1300 miles, with *Beira* (Mozambique), about 1600 miles; and with Capetown (Union of South Africa), approximately 2200 miles

This is a region of low population density and urban centers are few, small, and scattered. In general, they are situated along the rivers and serve as depots for the river boats and as railheads The largest town in the region is *Leopoldville*, the capital and administrative center of the Belgian Congo The town is situated on the Congo about 250 miles from the sea and is the point where river traffic meets the railroads from the coast.

Political Divisions Several European countries own or control sections of the Congo Basin and Its Margins, but by far the largest portion (at least two thirds) belongs to Belgium (Belgian Congo). South of the *Cameroons* and bordering the Atlantic Ocean are *Spanish Guinea* (Rio Muni, 10,000 square miles), a part of *French Equatorial Africa*, and the northern half of *Angola* (Portuguese).

Future of the Congo Lands A few years ago an English statesman, speaking before a learned society, said that it was the white man's duty as well as his right to develop the economic resources of tropical Africa He stated that the task was not assumed with a selfish motive but rather in the spirit of helpfulness to the natives, and to furnish the people in temperate lands with needed products. As he saw the problem it was complicated (1) by the unfavorable climate, and (2) by the wide cultural differences between the indigenous populations and the ruling nationalities.

This statement of the situation which exists in the Congo Basin seems essentially correct for here certainly are areas where white men find it difficult to live and to work. If the Congo region is to figure prominently in the world economy in the future, then the natives should have opportunities to learn to take some responsibilities in government, busi-

[1] McBride, Ruth Q., "Keeping House on the Congo," *National Geographic Magazine*, November, 1937, Vol 72, pp 643-670.

ness, and education. To accomplish this would be quite in keeping with the objectives expressed by the English statesman.

The possibilities of this vast, almost untapped region are tremendous. One can hardly visualize the immense volume of tropical produce which it could furnish to other parts of the world and the trade and commerce which would result from the interchange of manufactured goods for these tropical foodstuffs and fibers. Can arrangements be made whereby more mutual benefits may be derived by cooperative efforts between the natives of the tropical lands and the peoples of middle latitudes? For example, during World War II numerous textiles and especially sheeting were sent into the Belgian Congo in exchange for minerals needed by the Allies.

SOUTH AFRICAN HIGHLANDS AND BASINS

The South African Highlands and Basins include nearly all of that part of the continent south of the Congo Basin. On the northern margin are the highlands of Angola and Katanga and on the east a portion of the rift valleys and the Eastern Highlands of Africa.

Flowing northward from the *Angola-Katanga* divide are some of the tributaries of the Congo, and southward are the headwaters of the Zambezi and the *Okavango* rivers, the latter flowing into the *Okavango* swamp in the interior (Fig. 204). The higher portions of the region are around the margin, which faces the sea on the west, south, and on part of the east. The region is one of the ancient sections of the earth's crust and is comparable in area to that part of the United States east of the Mississippi.

Natural Features

The foundation consists in general of very old, hard rocks, which scientists say were folded early in the earth's history and afterward were covered by thick layers of shale and sandstone, now known as the *Karroo system*.[1] The flat-topped hills and mesas of today are remnants of later intrusions of more resistant igneous rocks which were intruded between the strata of the Karroo system or spread over it and which therefore resisted strongly the erosive forces of water and wind. In the northern three fourths of the region the Karroo system has been eroded to its foundations and the ancient hard rocks are exposed. In many of the interior basins, however, detritus of sand and silt, piled in by landlocked streams, cover the old foundation. On the south evidence of volcanic action is shown by the presence of old lava beds.

It is best to think of this region as an immense, fairly level plateau with depressions of considerable size in the interior, and with a horseshoe-shaped escarpment rim to the south from which the bedrock dips from above 6000 feet in the *Drakensberg Mountains* northward toward the interior where the basins lie at altitudes higher than 2000 feet. The interior is a region of high plains, in some places flat, in others gently rolling, with here and there low, flat-topped hills rising from its surface. In general the region is saucer-shaped with the western rim lower than the southern and eastern.

There are four principal drainage basins: the *Orange*, the *Limpopo*, the *Zambezi*, and *Lake Ngami* (2930 feet) in the interior lake basin. The *Orange River*, and its chief tributary, the *Vaal*, rise on the northern slopes of the Drakensberg highland and flow west (forming a series of falls) to empty into the Atlantic. The Limpopo, the source of which also originates on the west slope of the highland, sweeps around the north end of the Drakensberg into the Indian Ocean. The Zambezi receives much of its supply of water from the tropical northern portion of the region and flows into the sea near the southern end of the rift valleys. Lake Ngami with no outlet to the ocean is supplied by numerous intermittent streams from all directions, but most of these streams are dry nearly all year and carry water only after torrential downpours.

It is easily seen why most of the mantle rock of the region is of alluvial origin. Of course, the highlands have residual materials upon them, but the bulk of the unconsolidated mantle covering the bedrock has been deposited by running water, and

[1] Halvorson, Lynn H., "The Great Karroo of South Africa," *Journal of Geography*, October, 1930, Vol 29, pp. 287-300

in the drier sections parts of both alluvial and residual materials have been reworked by wind.[1]

Nature endowed this region richly with mineral wealth. Here is located the world's largest gold mine, the world's principal source of diamonds, and one of the world's greatest copper reserves, and here also is found the only coal mined in Africa. Diamonds are recovered from the old volcanic necks which were intruded into or through the Karroo system and some also are secured from alluvial deposits. The two chief mines are at Kimberley and Pretoria. The famous Witwatersrand gold mine in the Transvaal has produced nearly eight billion dollars in gold since its discovery in 1885. This gold mine is in ancient, hard rocks, where the covering of the Karroo system has been removed by erosion. Rich copper deposits occur in the north, where the ancient rocks again appear near the surface. In the southeast, where the Karroo system is still intact, the lower members have rich coal deposits. Natal, Transvaal, and the Orange Free State are the principal producers of coal.

Several factors combine to produce diversity in climate in South Africa; among them are ocean currents, and differences in latitude and altitudes within the region. It must be remembered that the Tropic of Capricorn bisects the region and thus conditions are favorable for four wind and pressure belts—namely, the equatorial belt of low pressure, the southeast trade winds, the subtropical belt of high pressure, and in the far south the westerlies, especially in the winter. Off the west coast is a cold ocean current from the south (*Benguela Current*) which helps to account for the marginal desert of Bechuanaland; whereas in the Indian Ocean is the warm *Mozambique Current* from the north which contributes to the humidity of this coast. Because of the high altitudes the region everywhere has fairly moderate temperatures. Reference to the map of the climatic regions shows that no less than six climatic types are represented in this area, three of which are tropical and three subtropical (Fig. 236) On the west, Swakopmund receives less than 1 inch of rainfall annually; and, 150 miles in the interior, Windhoek receives 14.8 inches. Other stations which indicate the diversity to be found in the region are: Capetown, 24.8 inches, Port Elizabeth, 19.9 inches; Durban, 39.7 inches, and Kimberley, 18.2 inches (Fig. 205). The entire northern portion receives up to 40 inches due to the southward migration of the equatorial belt of low pressure in January.[2]

Diversity in climate quite naturally produces diversity in vegetation and soils. Along the west coast desert vegetation consisting chiefly of scrub and brush is found. The Zambezi basin has a cover of the savanna-forest type, while the Limpopo basin has a tropical savanna with grasses predominating. The Orange drainage area is largely a scrub woodland with thorn, mulga and mallee On the southern slope of the Drakensberg Mountains the native vegetation consists of a broad-leaved, deciduous woodland and steppes with long and short bunch grasses predominating on the northern slopes (Fig. 237).

In the north the lateritic and the red and yellow soils have developed, and these, together with the south coast red and yellow, gray-brown, and prairie soils, are the only pedalfers in the region Pedocals, such as chernozems, chestnut, and gray soils cover most of the interior (Fig. 238).

Cultural Features

In 1486 *Bartolomeu Dias*, sailing for Portugal, rounded the Cape of Good Hope. This was an historic event of great significance for it opened the way to European settlement of South Africa The Portuguese, having priority by right of discovery, were the first to establish trading posts and small colonies on the coast. About 100 years later, the Dutch settled at the Cape of Good Hope as a halfway station to the East Indies. In 1612 an English trading organization, the East India Company, became the leading power in the region, and in 1685 a fourth European force, represented by the French Huguenots, joined in the colonization of South Africa. Until the early nineteenth century the immigrants mainly were missionaries, traders, and adventurers who lived near the coast. During the Napoleonic Wars, England, with her powerful

[1] Clifford, Sir Bede, "Across the Great Makarikari Salt Lake," *Geographical Journal*, March, 1938, Vol. 91, pp 233-241

[2] Sneesby, G W, "Some Notes on the Climate of British Bechuanaland," *Scottish Geographic Magazine*, September, 1942, Vol 58, pp 71-74

navy, gained control of the region and has held it ever since. However, the latter part of the nineteenth century witnessed a rebellion in the region, by the *Boers*—the Dutch colonists—against the English, but this was squelched in 1900 and England since has held undisputed control over most of the region.

The settlement and development of the interior portions of the South African Highlands and Basins came during the latter portion of the nineteenth

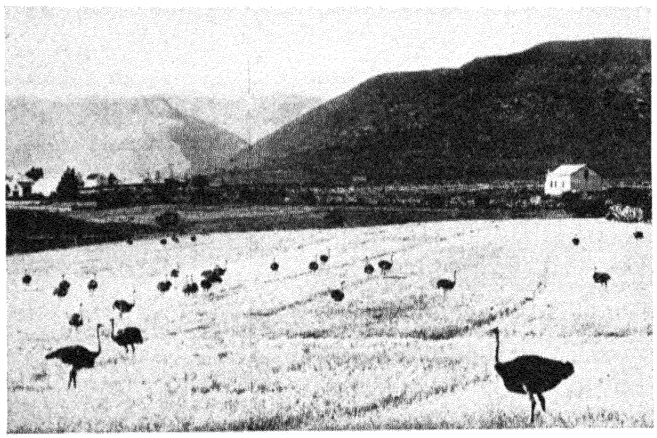


FIG. 215. AN OSTRICH FARM. This is a South African scene. Note the even skyline showing the dissected plateau nature of the country. (Courtesy Canadian Pacific Steamships)

century as it was then that the Boers migrated inland, that gold was discovered at Kimberley, and that diamonds lured thousands toward the arid and semiarid interior. The principal use of the land until the twentieth century was grazing and mining, but since then railroads have been built, and European fruits and grains have been introduced.

The economic value of land in South Africa is dependent upon two factors—namely, the amount of rainfall and the distance from the coast. As the coastal regions have the advantage in both the foregoing geographic conditions they are the most productive. For this reason they are the most valuable lands and support the most people, both European and native.

In the coastal areas the raising of fruits, grains, and sugar cane, and the grazing of cattle and sheep constitute the chief agricultural activities. Great grazing semiarid plains also are located inland. Here are vast herds of cattle and sheep, and settlements are more widely separated from one another (Fig. 215). Westward the grazing country merges with desert lands much as it does in the United States, but northward the grazing activities give way to native agriculture, and the outer limits of white settlements are reached in the desert edge of the *Kalahari* steppe. The native tribes have been pushed into the bush country where many of the natives eke out a bare subsistence with their small herds and primitive agriculture.[1]

For a long time the interior areas supplied only minerals and some animal products—but now refrigeration has made possible the shipment of fresh, chilled meats to seaports and thence to Europe.

Political Divisions

The South African Highlands and Basins are mostly under British control, the southern half of Angola (Portuguese) being the only considerable area outside the British domain.

UNION OF SOUTH AFRICA (472,550 square miles). The *Union of South Africa* (*Transvaal, Natal, Orange Free State,* and *Cape of Good Hope*) is one of the prominent members of the British Commonwealth of Nations. Although only one eighth as large as the Dominion of Canada, it contains 90 per cent as many people. However, 78 per cent of the population belong to the black race, whereas the people of Canada are nearly all white (Fig. 216).

SOUTHWEST AFRICA. *Southwest Africa* (317,700 square miles) formerly belonged to Germany but is now a mandate of the Union of South Africa. It is a very dry area and sparsely populated, producing some livestock and considerable quantities of minerals (diamonds, gold, tin, etc.).[2]

RHODESIA AND BECHUANALAND. *Northern Rhodesia* (290,000 square miles), and *Bechuanaland* (275,000 square miles) are each Negro countries (less than 2 per cent white) and each larger than Texas.[3] *Southern Rhodesia* (150,400 square miles and less than 5 per cent white) is a little smaller

[1] Tinley, J. M., "The African Native Worker," *Scottish Geographic Magazine,* January, 1944, Vol. 59, pp. 102-104.

[2] Clifford, B. E. H., "Habitability of the Kalahari," *Geographical Journal,* April, 1931, Vol. 77, pp. 355-357.

[3] Moore, W. Robert, "Rhodesia, Hobby and Hope of Cecil Rhodes," *National Geographic Magazine,* September, 1944, Vol. 86, pp. 281-306.

than California and good farming country, although primitive methods of cultivation are still practiced.

TRANSPORTATION AND URBAN CENTERS. Three types of transportation are important in this region. In the nineteenth century the English built railroads from the interior mines and towns to the coast, and finally succeeded in building a line most of the way from Capetown to Cairo. A series of short lines connect the coastal cities with the interior. The pack train and human carriers continue to be important, as well as the wagon train and the motor truck, to the more isolated portions of the region. The past ten years have witnessed the development of airline transportation between the principal cities of the region and one can now fly from Capetown to Cairo.

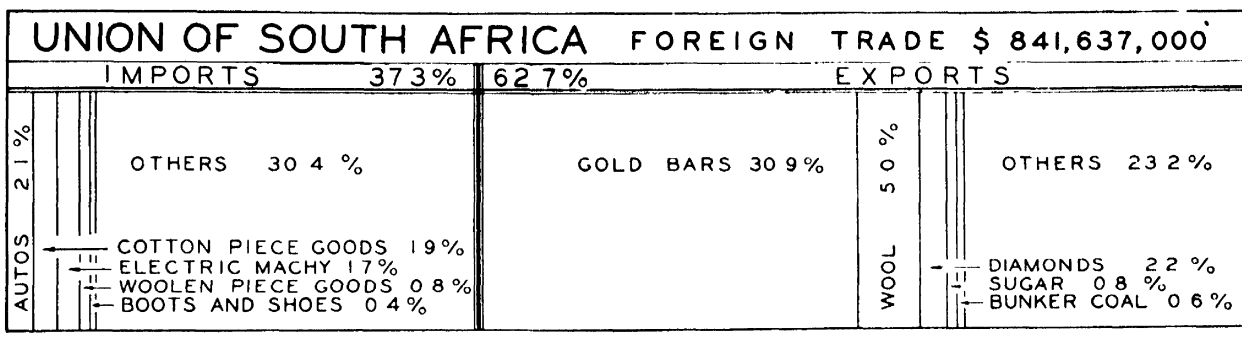


FIG. 216 FOREIGN TRADE OF THE UNION OF SOUTH AFRICA. A 10-year average just prior to World War II. Note the excess of exports over the imports, and the place of gold bars, wool, and diamonds in the export trade. (From *Statesman's Yearbook*)

It is not feasible to discuss all the cities of South Africa, but it must be remembered that, in a sparsely settled area, all urban centers even though relatively small are important in the lives of the people (Fig. 211)

Johannesburg, the largest city of South Africa, is located about 300 miles inland northwest of Durban, the principal seaport in Natal. The city owes its beginning and growth to the discovery of gold in local beds of conglomerate and sandstone in 1886. To the north of the city rises a sharp ridge which has become the favorite residential district. The entire economic pulse of Johannesburg is a response to the productivity of the famous *Witwatersrand* gold fields in the vicinity. Mining shafts, tall chimneys, and hauling apparatus dominate the landscape. In recent years such industries as flour milling, iron and steel manufacture, furniture making, and the processing of tobacco have developed, largely through the demands of an increasing population.

Capetown is beautifully situated on a strip of low ground on the southwestern shores of *Table Bay*. To the south *Table Mountain* rises as a precipitous wall, 2 miles long and more than 3500 feet high, and the city has spread up the slopes as far as the gradient will allow. Capetown is the principal passenger and mail port of South Africa and has additional importance as a port of call for vessels plying the Cape route between Europe and Australia or the Far East. Most of the South African gold and diamonds are exported from Capetown. Railroads connect Capetown with other cities along the coast and with the principal cities in the interior.

Durban, the largest urban center and chief seaport of the east coast, is built near the shores of a shallow lagoon, and is cut off from the sea by a line of ancient sand dunes. Bordering the lagoon is a picturesque, palm-lined walk called the Victoria Embankment. In the hot season, from October until January, Durban attracts many tourists from the interior. As a seaport it serves the coal fields of Natal and is a coaling station of importance to all South African trading vessels.

Pretoria is in the diamond-mining district in Transvaal about 50 miles north of Johannesburg. The world's largest diamond, the *Cullinan*, now one of the British Crown Jewels, was found at

Pretoria. Deposits of tin, mica, iron ore, platinum, and other minerals are also found in the vicinity.

Kimberley, a diamond-mining center in western Orange Free State, is in the plateau country about 500 miles northeast of Capetown. The city's water supply comes from the *Vaal River* seventeen miles away.

Port Elizabeth, on a shallow bay about midway between Durban and Capetown, is one of the principal ports of South Africa. Its hinterland produces wool, hides, hair, citrus fruits, and meat. Some of the mineral wealth of the interior reaches Port Elizabeth for export. The city has an artificial harbor which in summer is rendered unsafe sometimes when the trade winds blow strongly from the ocean.

Looking to the Future. Recent decades have witnessed a considerable infiltration of Europeans into South Africa. With the introduction of European techniques of irrigation and farming, much of the southern portion of Africa is usable for the production of subtropical fruits, vegetables, grains, and other produce. The climate in large areas is suitable to European occupancy. However, caution should be taken that the soil resources, the mineral wealth, and the interest of the natives are not exploited in short-sighted production schemes. It is possible that South Africa may continue to serve as a frontier to millions who are seeking new homes, new lands, and a fresh start, far from the turmoil and crowded areas of the Occidental world.

Capetown, Durban, and other places in South Africa will become significant links in the airways of the future especially across Antarctica and across the African continent to the Mediterranean coast. The skyway distance from Capetown to Melbourne, Australia, is 5829 miles. Numerous bases have already been established on the coastal margins of the continent and with man-made devices, the landing of planes in jungles and inaccessible areas will make possible the exploration and development of hitherto unknown regions in Africa.

Part Five

AUSTRALASIA AND ANTARCTICA

Introduction

IN THE PRECEDING PARTS of this book, each major part has dealt with a single continent. For convenience and brevity Part Five includes two large areas, Australasia and Antarctica. The former is included mostly within a rectangle extending from Sumatra to New Zealand (nearly 6000 miles), and from New Guinea (Papua) to southwest Australia (more than 2500 miles). The area thus enclosed is almost as large as the Americas, and includes within its limits the continent of

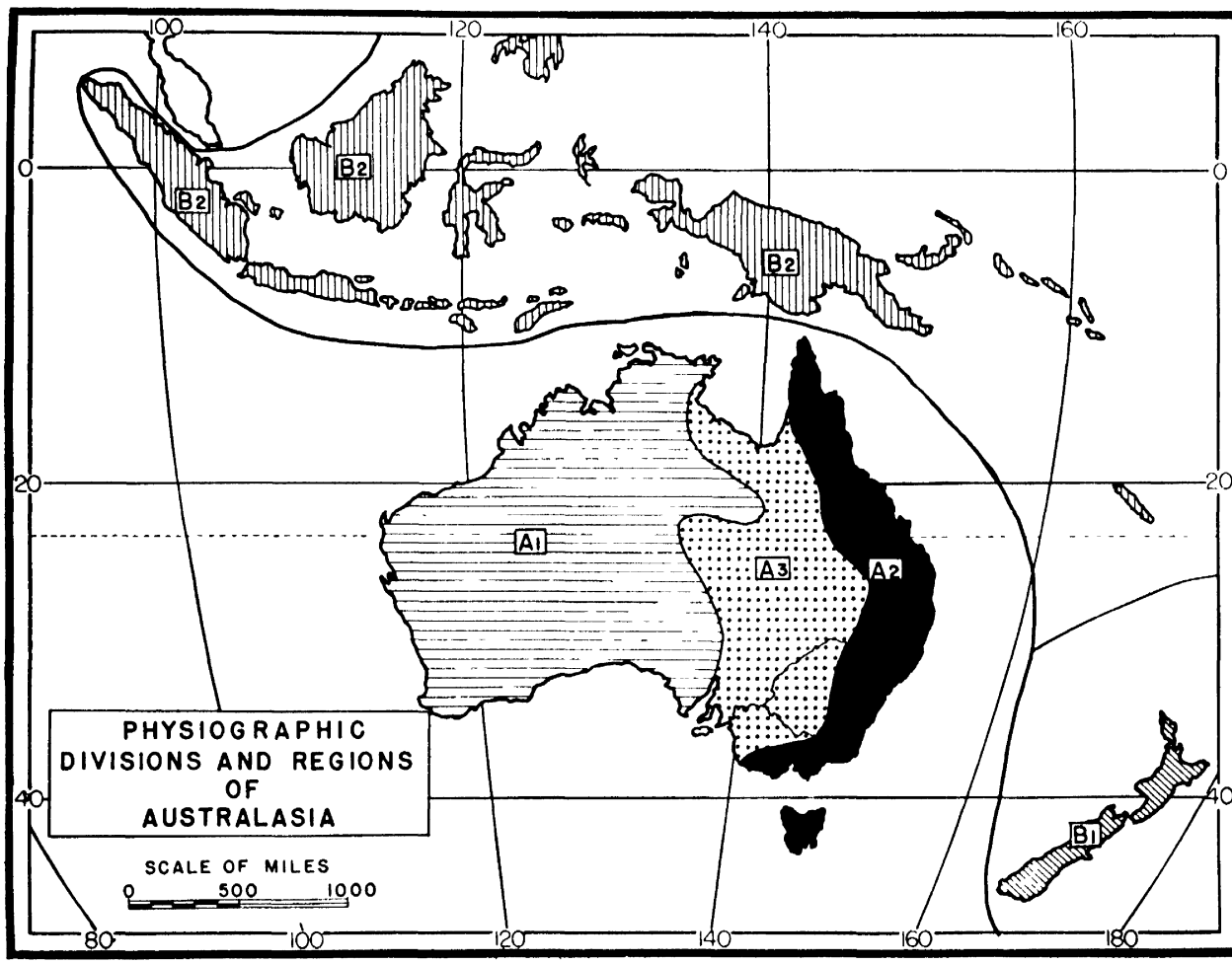


FIG. 217 PHYSIOGRAPHIC DIVISIONS AND REGIONS OF AUSTRALIA. Note the immense areas involved in this map and its location close to the equator. A1 Western Plateau, A2 Eastern Highlands and Tasmania, A3 Central Lowlands, B1 New Zealand, B2 East Indies

Australia, the East Indies, the Philippines, New Zealand, and some minor island groups; but more than *three fourths* of the rectangular area is water. Although not a portion of Australasia, Part Five is extended to include the Hawaiian Islands, the New Hebrides, and numerous other widely scattered islands and island groups.

Written records of human activities go back about 6000 years. If we represent this span of time on a clock face, allotting 500 years to each hour, we have a simple measure of historic time relationship. In these terms, then, western civilization found Australasia less than an hour ago. During this short period the activities, desires, habits, and destinies of millions of people in Australasia have become well-nigh inseparably linked with the hundreds of millions who live in Asia, North America, South America, and in other continents. Australasian products that were once considered luxuries in other parts of the world have now become necessities. The specialized tropical agriculture of this part of the world produces such commonly used necessities as rubber, cacao, coffee, tobacco, coconuts, sugar cane, quinine, spices, and many other goods.

Although Antarctica, the south polar continent, is nearly as large as South America, its remoteness, its ice barrier and glacial cover, and its lack of present economic utility seem to justify the very limited treatment accorded to it. (See Fig. 217, designation numbers of which refer to the following outline).

PHYSIOGRAPHIC DIVISIONS AND REGIONS OF AUSTRALASIA AND ANTARCTICA

A. AUSTRALIA
   1. Western Plateau
   2. Eastern Highlands and Tasmania
   3. Central Lowlands

B. PACIFIC ISLANDS
   1. New Zealand
   2. East Indies
   3. Other Islands of the Pacific (Oceania)

C. ANTARCTICA
   1. Antarctic Continent

29

Australian Continent and Commonwealth

AUSTRALIA is the unique continent. It also is the smallest and, with the exception of Antarctica, the last continent to be discovered. Although it is nearly as large as the United States, its population is about equal to that of New York City (Fig. 218). Because of its complete severance from all other bodies of land, the continent contained types of vegetation (eucalyptus), of animals (kangaroos), and of people (bushmen) that were strange to other parts of the world. These peculiar life forms were prevalent in Australia because they had developed in isolation.

Competent writers agree that the continent was known, in part at least, by the Portuguese and Arab sailors during the latter part of the fifteenth century. However, it was not until *Tasman,* the great Dutch explorer, rounded the continent and charted the south coast in 1642 that the size of Australia became known. The most important early exploration in the vicinity of Australia was achieved under the leadership of *Captain James Cook,* who, in 1778, made a careful survey of the eastern coast and discovered the economic possibilities of the continent. Since the beginning of the nineteenth century exploration and settlement have gone on at an increasing tempo.

During the early years of the nineteenth century Australia, as a crown colony of England, was utilized in several ways to help the mother country. It was used as a penal colony for a long time, the colonists consisting of those who would not pay their debts in England, those who had committed minor thieveries, and some who were imprisoned and exiled for political activities. Sheep and cattle were introduced early, and by 1850 there were approximately sixteen million sheep and two million cattle grazing on the mammoth ranges of the continent. Gold was discovered in 1851, and this was a tremendous impetus to settlement. Wheat and other cereals were introduced during the nineteenth century at about the same time that small



FIG. 218. SOME NATIVE AUSTRALIANS. The kangaroo is only one of the strange animals native to Australia. These odd creatures are marsupials—which means that the young are born so helpless that they are carried in a pouch until they are able to shift for themselves. (Courtesy New South Wales Government Printer)

mines began to produce copper, gold, and coal. By the beginning of the twentieth century Australia was contributing several of the chief articles of commerce which now find their way into market places of the world (Fig. 219).

The twentieth century has witnessed the rise of Australia to the status of a dominion in the British Empire. Manufacturing, communication, and transportation facilities have had remarkable growth. Also, great cities, modern metropolises in

every sense of the word, have arisen and have assumed their position in the world economy. The ports of Australia are connected with the great steamship lanes of the world. Thus modern facilities of transportation on the seas and in the air have overcome in large measure the former disadvantages of remoteness.[1]

During World War II, the Australian Commonwealth played an important role in freeing the territory that was overrun by the Axis aggressors. Its location near strategic gateways from the Indian Ocean to the Pacific furnished an excellent base for military, naval, and aerial operations by the United States and Great Britain. Not only this, the Australians themselves contributed largely of men and supplies in bringing the war in the Pacific to an early conclusion. The Air Age and the recent experience of many American men in Australia and the South Pacific are certain to promote good will between the peoples of the United States and Australia.

The latitude and surface configuration are responsible chiefly for the climatic, vegetational, and soil complexes. The Tropic of Capricorn bisects the continent into northern and southern halves.

Since the entire continent is occupied by one large country, the commonwealth of Australia, it will be divided into physiographic divisions for purposes of discussion as was the United States and Soviet Asia. The country falls easily into three divisions: (1) the *Western Plateau*, (2) the *Eastern Highlands and Tasmania*, and (3) the *Central Lowlands*.

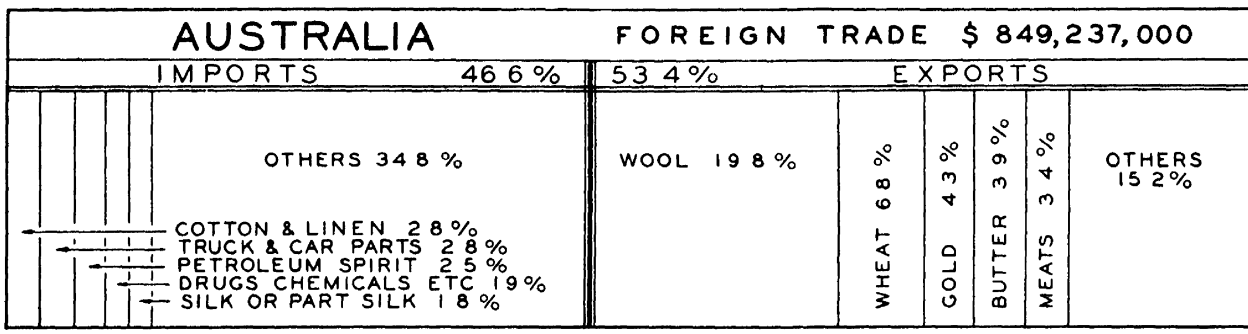


FIG. 219. AUSTRALIA'S FOREIGN TRADE. A 14-year average prior to World War II. Note the place of wool, wheat, and gold in the export trade—marks of newly exploited resources. (See also Fig. 226.) (From *Statesman's Yearbook*)

WESTERN PLATEAU

Although the Western Plateau constitutes more than half of Australia, it is by far the most sparsely populated portion of the continent. Most of the political divisions of *Northern Territory* and *Western Australia* and about one half of *South Australia* are within the region.

Natural Features

This vast, relatively flat plateau, consisting of an ancient igneous block, is thought to be a peneplain created by thousands of years of wind and water erosion. It lies at an altitude of more than 500 feet with most of the area between 500 and 2000 feet. In general the land is relatively featureless, one of the evidences of peneplanation. However, there are small highland areas among which are the *MacDonnell Ranges*, the highest peak of which is *Mt. Houghton* (4800 feet). Near the western coast are minor plateaus rising to about the same altitude as the MacDonnell Ranges.

Encircling the plateau on its seaward margins is a narrow coastal plain which varies in width from 25 to 100 miles. This marginal plain was created from sediments brought down by short streams which issue from the plateau. In the south is the large *Nullarbor* (treeless) *Plain*, consisting chiefly of coral limestone, the whole plain having been uplifted from the sea.

The occurrence of many large seasonal and dry lakes is ample evidence of poor drainage and low

[1] Terry, Michael, "From East to West Across Northern Australia," *Geographical Journal*, July, 1924, Vol 64, pp. 21-43

rainfall over the plateau. The streams are mostly intermittent, carrying water only after a rain.[1] Vast portions of the plateau are covered with dunes, and in many places rock deserts prevail. The mantle rock of the coastal plains is mostly alluvial.

In western Australia are vast areas which man cannot utilize because of climatic limitations (Fig. 220). Aridity and prolonged and terrific heat periods characterize much of the interior. For example, at Marble Bar near the northwest coast, a maximum temperature of 90° F or more has been recorded for 151 consecutive days. During the summer the subtropical high pressure belt lies over the southern half of Australia, and the desiccating summer monsoons blow northwestward across the continent. During the winter the subtropical high pressure belt migrates northward and this season, too, is dry over the plateau. Thus the average annual rainfall of the central portion of the plateau is less than 10 inches. The migration of the equatorial rain belt into northern Australia during the summer results in 50 or more inches of precipitation along the coast. At Darwin, the average annual rainfall is 61.7 inches, the maximum occurring in January which is in the southern summer. The southwestern tip of Australia is in the subtropical dry summer climate (Fig. 236). In the winter the westerlies bring considerable precipitation, but in summer the subtropical high pressure belt migrates southward and brings a pronounced dry season. Perth and Albany each receive 33 inches of rainfall annually, but 300 miles inland at Kalgoorlie, the rainfall drops to 9.2 inches annually.

The native vegetation of the interior of the Western Plateau is typically desert, consisting of bush, and sparse, hardy grasses (Fig. 237). Northward the desert merges with the steppe and thence with the savannas which consist of long grasses with occasional clumps of tropical trees. The tropical forest becomes dense on the northeast coast. Southward from the desert interior the salt bush is gradually replaced by the dwarf eucalyptus and the typical Mediterranean grasses. The southwestern tip has considerable forest of the large and giant eucalyptus.

[1] Gregory, J. W., "The Lake System of Western Australia," *Geographical Journal*, June, 1914, Vol. 43, pp. 656-664.

Most of the mature soils are classified as pedocals, the gray desert soils covering the interior, and bordering them are the chestnut soils. Due to more abundant rainfall, pedalfers predominate in the northern portion, the chief type being the red and yellow soils. The southwestern tip of the continent has some gray-brown soils (Fig. 238).

Cultural Features

The west coast of Australia was discovered by the Dutch early in the seventeenth century, but so remote and so forbidding was much of the region that no permanent settlement was made until more than two centuries later. The English eventually came into control of the continent and a settlement was established at *Albany* on the southwest coast in 1826. Little exploration was done in the interior of the Western Plateau until the latter part of the nineteenth century. Harrowing experiences punctuate the journeys of some of the early explorers. It was during the last two decades preceding the twentieth century that the gold rush in western Australia reached its climax. Not until 1917 was the east-west transcontinental railway completed. Parts of the country along this railroad are so arid that not one permanent stream is crossed for 1000 miles.

About two thirds of the Western Plateau is considered as "empty Australia" that is, the unfriendly desert interior and the more humid tropical portions in the north at present are virtually uninhabited or at the most very sparsely populated. The distribution of people in western Australia is conditioned to a large extent by rainfall and by the fact that it is a relatively young country in terms of settlement. There is too much rainfall in the north, and in the interior there is not enough, but in the southwestern corner of the continent the rainfall is sufficient to encourage human utilization and settlement. Here the chief human activities center around agriculture. Such cereal crops as wheat, barley, and oats are grown successfully. Near the coast dairying and fruit raising, especially apples, oranges, and other citrus fruit, are important; and grapes thrive farther inland where rainfall becomes less.

The chief timber resource in southwest Australia is the eucalyptus tree, the lumber of which is ex-

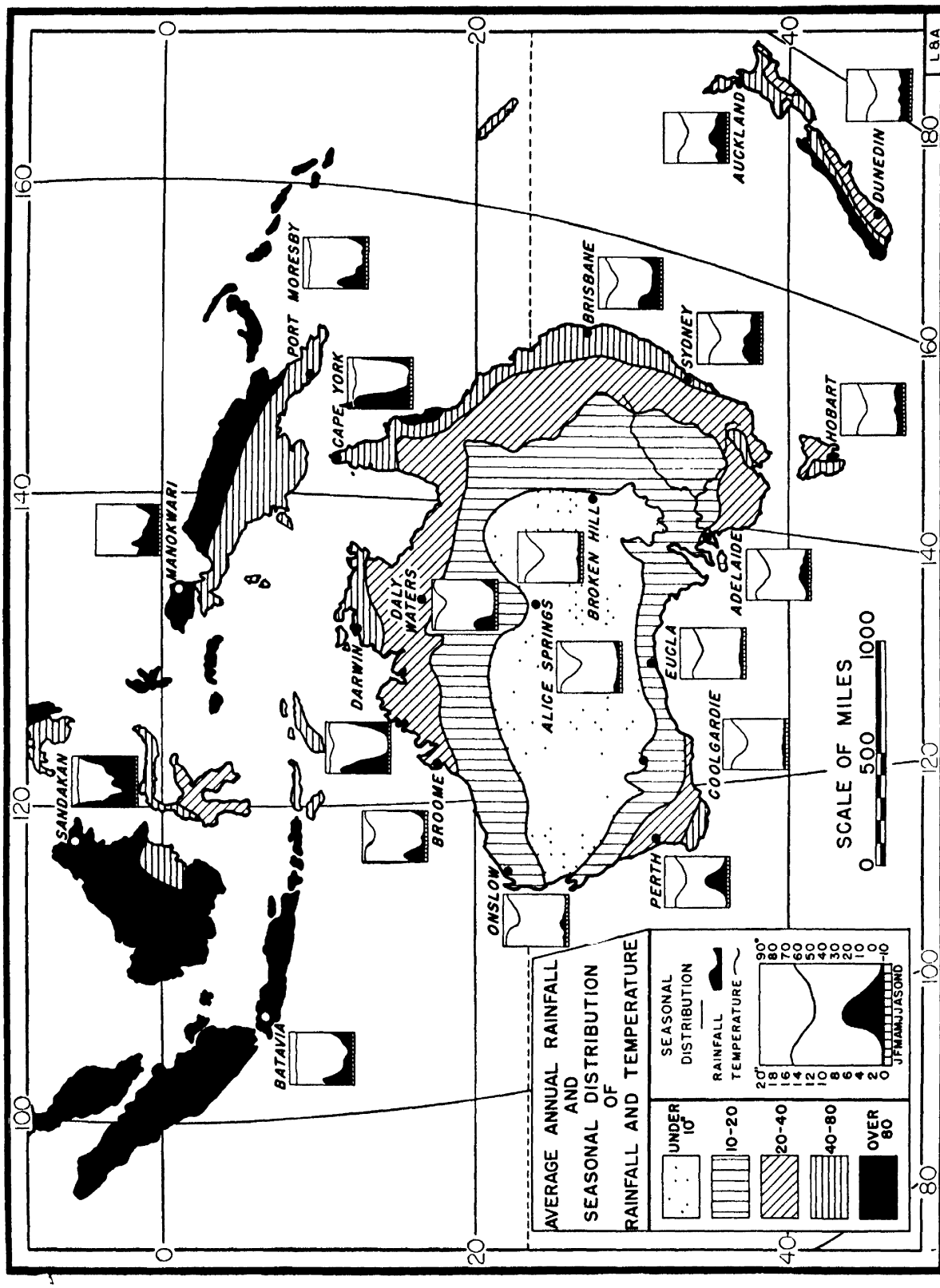


FIG. 220. MEAN ANNUAL RAINFALL AND THE MONTHLY DISTRIBUTION OF TEMPERATURE AND RAINFALL. For convenience in the interpretation of the numerous graphs, the one for Perth has been enlarged.

ported. The wheat belt is located farther inland to the northeast on the plateau above the coastal plain. This belt extends about 100 miles toward the interior and gradually merges with the pastoral belt which produces sheep and cattle. In general the 10-inch isohyet marks the landward limit of settlement.

It is well to remember that the discovery of gold and copper in western Australia was one of the stimuli to settlement. Gold mining is still of major importance in several sections. Recently the mining of copper, tin, and lead has become of considerable importance.

URBAN CENTERS. About two thirds of the population of western Australia is concentrated in a few cities and towns in the far southwest (Fig. 221). *Perth,* the largest and most important, is located on the *Swan River* about 10 miles from its mouth. Besides being the political capital of western Australia, Perth is the seaward terminus of all the railroads which enter the Western Plateau and is at the western end of the Australian transcontinental line. It is the center of banking, trade, commerce, and small-scale manufacturing on the west coast. The city is modern in every way with beautiful educational buildings, civic centers, fine streets, and parks.

Fremantle, at the mouth of the Swan River where a good natural harbor exists, is the port for Perth. It is thus the leading exit to the sea from western Australia and it is an important port-of-call for European liners. Wheat, wool, and timber are the chief exports.

LOOKING TO THE FUTURE. In summary it may be said again that much of this vast region can never be successfully utilized by man. Desert heat and aridity prohibit use of the interior; and in the north the high humidity, heavy rainfall, and high temperatures hinder settlement by white man. However, the area in the subtropical climate can support more people. After the forests are removed much agricultural land can be opened. Apples, oranges, and vineyards might cover much of the subtropical portion. Also, other cereal crops may be grown besides wheat, oats, and barley. The western coastal area will probably always be sparsely populated because of aridity. Here the pearl fishing industry near *Broome* on the northwest coast and the grazing of cattle and sheep probably will remain the chief human activities for a long time.

EASTERN HIGHLANDS AND TASMANIA

The Eastern Highlands extend from the northern tip of *Cape York* to the southern tip of Tasmania, a distance of nearly 3000 miles. In the southern portion of this region the highland dips beneath the sea at *Bass Strait* and reappears in Tasmania. The region, including the narrow coastal plain, extends inland approximately 300 miles and the area includes much of eastern *Queensland, New South Wales, Victoria,* and the *Federated Capital Territory* in which is located *Canberra,* the capital of the Commonwealth of Australia.

Natural Features

In order to understand properly the structure and topography of this important region of Australia it is necessary to recount the five major steps in the geologic history of the area. (1) During early geological times the present land area was covered by a sea and immense deposits of flat-lying sediments were laid down. (2) Later, great earth disturbances gradually lifted the region, leaving dry land upon which life could exist and swamps were created and vegetable deposits accumulated. (3) Still later the eastern portion of Australia was subjected to folding and minor faulting which produced enormous wrinkles in the earth's crust in a north-south direction. (4) Streams, working through the centuries, removed the crests of these great wrinkles and revealed the underlying structure which is now apparent. The coal beds were uncovered near Newcastle as a result of this stream erosion. The steep scarps, facing seaward, and the parallel valleys are the results of differential erosion, the more resistant layers of sedimentary rocks forming the steep scarps. (5) Later there were intrusions of igneous rock upward through the sedimentaries. Some of these intrusions formed granite mountains such as *Mt. Kosciusko.*

On the eastern margin of the region is a narrow coastal plain which consists of alluvial materials brought by streams from the mountains, and of marine sediments where the coastal plain emerged from the sea. The western slope of the highlands

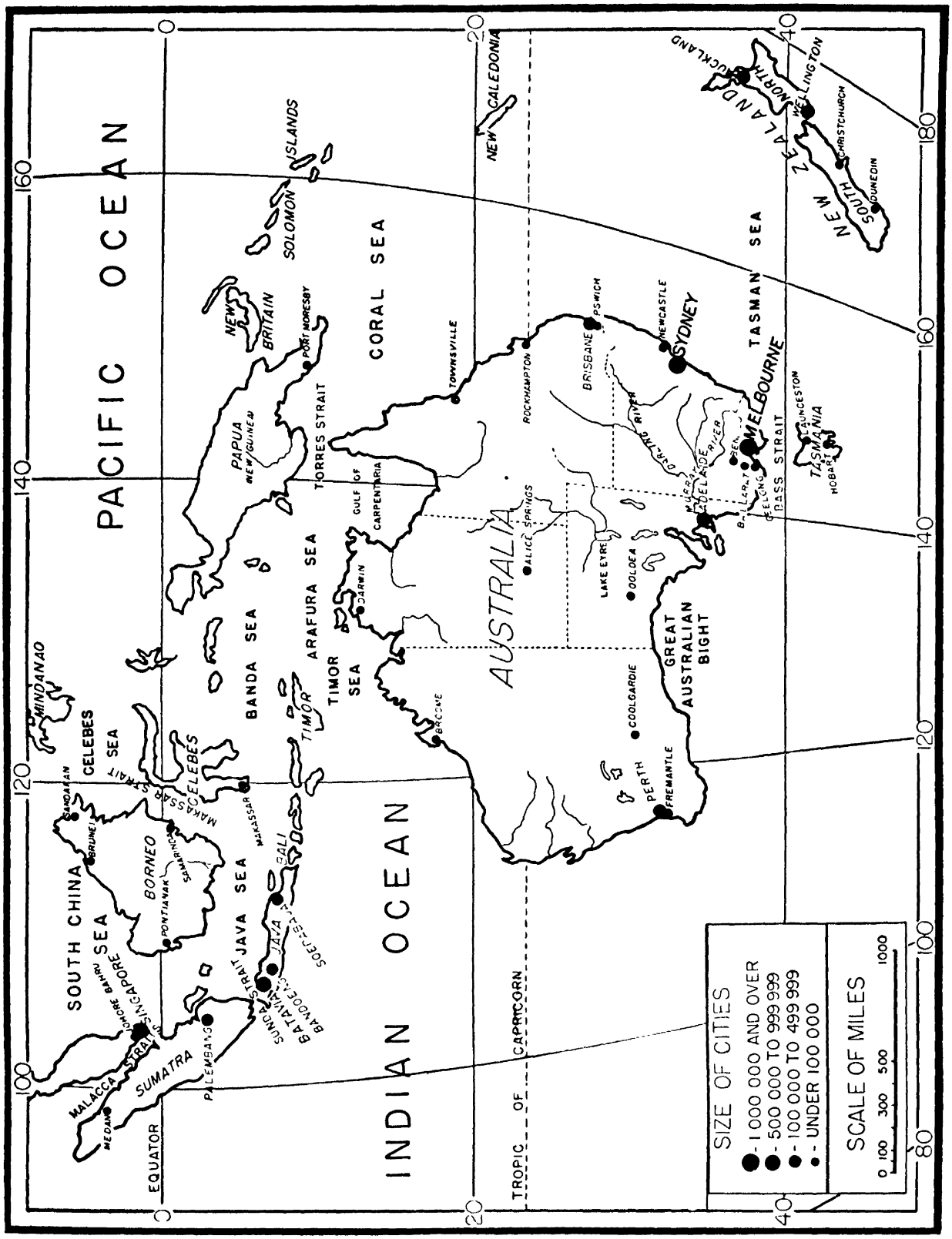


FIG 221 AUSTRALASIAN CITIES AND PLACES. Note the key and scale of miles in the lower left corner.

has a low gradient as it dips gently toward the interior of the continent. The streams on the east slope are short and swift; on the western slope they are longer and less impetuous, the *Murray-Darling* system being the most important in Australia. Hundreds of smaller streams issue from the western slopes to disappear into the sands of the dry interior.

Although all of the highland area is above 500 feet in altitude, most of it is more than 1000 feet above sea level. In altitude, the highlands may be compared to the Appalachian Highlands of North America, the highest point in Australia, Mt. Kosciusko, being only 7328 feet, which is only a little higher than Mt. Mitchell in North Carolina. The highest altitudes occur in eastern Victoria and in southern New South Wales where the highlands sometimes are called the *Australian Alps*.

The Eastern Highlands of Australia have some of the richest mineral deposits in the world. Gold has been mined throughout the region, and there are deposits of lead, zinc, tin, silver, and bismuth. An important coal field is located in New South Wales, and some rare gems such as opals and sapphires are recovered from the quartz intrusions. The crustal disturbances which created the highland, and subsequent erosion were the chief factors in the discovery and obtaining of the minerals.

Another important result of the north-south mountain building across the path of prevailing winds has been the creation of the humid east-slope climate from Cape York to Tasmania. Tasmania, in the westerlies, has a marine climate. The southeast trade winds blow over the subtropical humid section in summer and over the tropical portion in winter (Figs. 220 and 236). The northern portion is in the tropical wet and dry climate where the trades blow inland in summer, but in winter these winds parallel the coast. The distribution of rainfall from north to south may be indicated as follows: Cape York, 82.0 inches (January 23 inches); Brisbane, 47.0 inches; and Hobart in Tasmania, 23.6 inches.

The humid climates of this region have produced, in general, a forest vegetation. The most common tree is the eucalyptus which is found nearly everywhere. In the colder portion in Tasmania and in the southern tip of the continent conifers predominate, and in the highest portions of the mountains an alpine flora is found. Tropical rain forests prevail in the rainy climate of the far north (Fig. 237).

The chief mature soil groups are pedalferic. The lateritic soils are most abundant in the north, the red and yellow soils in the middle portion, and the gray-brown soils in the south and on the highlands of Tasmania. In the driest parts of Tasmania small areas of chernozems have developed (Fig. 238).

Cultural Features

Eastern Australia enjoys greater possibilities for diversity of human interests than any other part of the continent. It is here that man has found the best environment for his chief activities—agriculture, mining, forestry, manufacture, commerce, and recreation. This portion has the highest population density and here are the greatest cities, the finest transportation systems, the most productive farms and ranches, the growing manufacturing industries, and the most extensive commerce.

Pastoral agriculture includes millions of sheep and cattle. For the most part the cattle-grazing areas are located near the coast where the rainfall is sufficient to produce the best pastures. The cattle belt is limited chiefly to the coast south of the Tropic of Capricorn, the climate farther north being too warm.

The great sheep belt is farther inland where rainfall decreases to 30 inches or less (Fig. 222). More rainfall than this is likely to produce foot disease in the sheep. Still farther inland on the western slopes of the highlands at approximately the 10-inch isohyet is the great wheat belt. Wheat and oats constitute more than 80 per cent of all cereals grown in the region. In the tropical portion of the Eastern Highlands the chief agricultural product is sugar cane, and corn replaces wheat in the tropics. Queensland produces practically all of the sugar cane in Australia, the crop averaging more than a half million tons of sugar per year.

The chief mineral resource of the Eastern Highlands and Tasmania is coal. Four important deposits are being worked today: (1) a large lignite field near Melbourne supplies energy for local electric plants, (2) a valuable deposit of bituminous coal that is suitable for steam purposes is located

near Brisbane; (3) the greatest seams are in the Newcastle field where the coal is near the port and is cheaply transported by steamers; (4) coal in Tasmania is found in the center of the island, but these beds are not producing in large quantities due to the competition of the other large fields. Scattered mines produce gold, tin, zinc, lead, and bismuth, but these minerals do not approach the value of coal.

The best transportation and communication facilities are in the areas of greatest population density. In eastern Australia the railways are state

Sydney, the beautiful capital of New South Wales, and one of the largest cities of the southern hemisphere, is situated on a spacious bay where the *Hawkesbury River* empties into the sea.[1] The bay furnishes many fine harbors and is lined with wharves, quays, and warehouses. Here steamers of the European and American lines exchange manufactured goods for wool, wheat, meat, and other food products. Sydney is one of the world's great wool markets. The near-by hinterland of the city is in a basin which is connected with the central portion of the urban area by motor roads and railways.

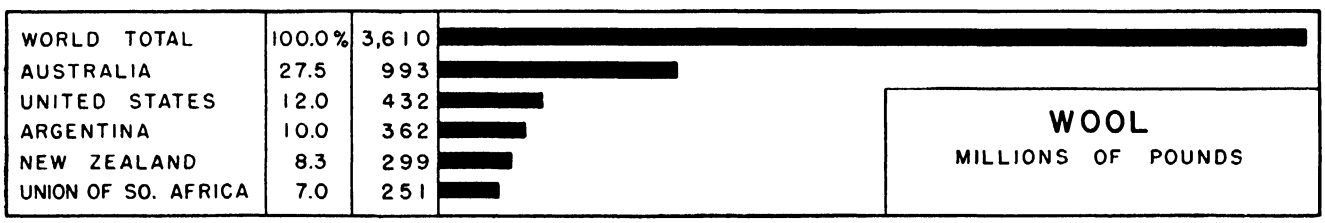


FIG. 222. WORLD'S WOOL PRODUCTION. A 5-year average prior to World War II. Australia produces more than one-fourth of the world's supply. (From *Statistical Yearbook of the League of Nations*)

owned and connect all important cities on the coastline. Many branch lines extend through highland passes to interior urban centers. Railway service now is available from Cape York southward along the coast to Brisbane, Sydney, Melbourne, Adelaide, and to Perth in Western Australia.

URBAN CENTERS. *Brisbane*, the capital and largest city of Queensland, lies astride the *Brisbane River* about 18 miles above the mouth. A fine harbor permits the entry of large ocean steamers which bring manufactured goods from Europe and remove wheat, wool, sugar, cattle, other agricultural commodities and coal which the hinterland produces. Manufacturing industries of Brisbane and its suburbs include the making of footwear, brewing and distilling, flour milling, motor building, and tanning (Fig. 221). *Ipswich*, which is near Brisbane and in the center of a coal-mining area, manufactures railway materials and has a large lumber industry. *Newcastle*, on the *Hunter River* in New South Wales, has one of the finest harbors in Australia. Rich seams of steam and coking coal which outcrop near the suburbs, furnish the chief exports of the city. The principal industries include shipbuilding and chemical, coke, fertilizer, cement, and wood-working plants.

In Sydney and its vicinity are at least 5000 factories which produce a great variety of goods, the chief ones being clothing, foodstuffs, metal wares, machinery, and railway supplies (Fig. 223). The mild, invigorating climate, the beautiful parks and centers of recreation, the civic buildings, the winding and narrow streets threading the coastal plain with a background of blue mountains in the distance, make Sydney a charming and compelling lure to the tourist trade of the world.

Melbourne, capital of Victoria and nearly as large as Sydney, is located on the banks of the *Yarra River* where it empties into the *Port Phillip Bay*. Most sea-going steamers can enter the city, but the largest ones must dock at *Port Melbourne* three miles below the city. Melbourne, first planned as the seat of the Australian Federal Government, is a city with a considerable measure of internationalism and world importance. The capital of the Dominion today is *Canberra*. The suburbs of Melbourne are as beautiful and attractive as any in the world.

The commercial importance of the city should

[1] Walker, Howell, "Sydney Faces the War Front Down Under," *National Geographic Magazine*, March, 1943, Vol 83, pp. 359-374.

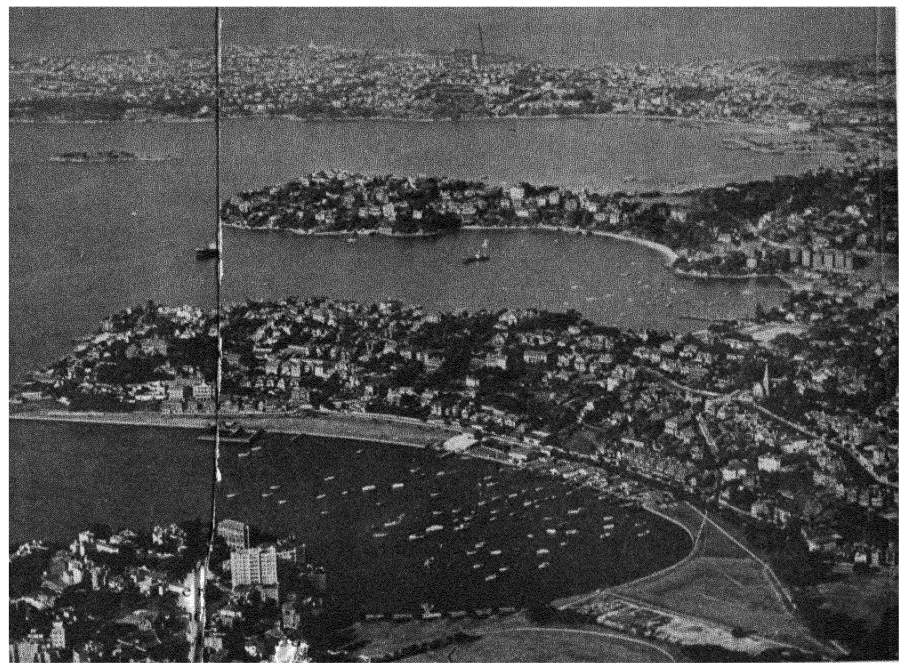


FIG. 223. SYDNEY HARBOR. Sydney is one of the *ten* cities in the Southern Hemisphere with more than a million people (Courtesy Canadian Pacific Steamships)

not be overlooked. The varied products from the hinterland are processed into leather and woolen goods, flour, foodstuffs, and refrigerated meats. In Melbourne also are some of the great banking houses, warehouses, and trade marts of the continent.

Hobart, the capital and chief urban center of Tasmania, is on the southern coast of the island on a beautiful bay at the foot of the magnificent snow-clad *Mount Wellington* (4166 feet). The harbor is easy of access, well sheltered, and deep, with wharfage for vessels of largest tonnage. The city, nearly square in pattern, links the hinterland with the sea. The interior of the island sends such products as fruit, hops, grain, timber, and wool to market in Hobart. Manufactures, while not on a large scale, are significant, and include tin, flour, dairy products, woolens, and machine goods.

Some of the other urban centers of eastern Australia and Tasmania are: *Launceston* in Tasmania, *Rockhampton* in Queensland, and *Bendigo*, *Ballarat,* and *Geelong* in Victoria.

THE FUTURE OF THE REGION. This [illegible] is [illegible] of Australia probably will long continue to [illegible] the most favorable environment in the continent for human occupancy. Blessed with a good climate, fertile soils, rich mineral deposits, and first class harbors, this region has the capacity to support additional millions of people, thus offering tempting opportunities for many from the more densely populated parts of the world (Fig. 224). Commodities produced in eastern Australia are in demand in Europe, Asia, and North America. The great markets of the world are open for such products as wheat, coal, gold, cattle, sheep, and wool. Sky travel and transportation offer opportunities for future

world contacts. The people of this region face the future with bright prospects of stability that are denied to many in other areas in the world.



FIG. 224. ROSE BAY FLYING BASE AT SYDNEY. Note the mileage by Empire Flying Boat to various distant places. (Courtesy Australian Government Trade Commission)

CENTRAL LOWLANDS

The Central Lowlands of Australia lie between the Western Plateau and the Eastern Highlands. The northern portion of the depression is occupied by the *Gulf of Carpentaria*. The region corresponds in latitude to that of the Caribbean Sea, Gulf of Mexico, and the southern United States, a distance of more than 1500 miles (Fig. 217).

Natural Features

The Central Lowlands consist of an immense plain underlain by sedimentary rocks which dip from the eastern and western highlands of the continent toward the interior. With the exception of the highland features of South Australia, the structure of the region is relatively simple. Three chief features merit description and brief explanation. (1) The *Gulf Plains* of Carpentaria are low and level, consisting of marine sediments which have emerged from the sea. (2) The *Artesian Basin* of Queensland is characterized by porous sandstones underlain and overlain by impervious beds that slope from the eastern Highlands. Water, thus collected in the sandstone in the highlands, drains underground westward where deep borings into the sandstone provide flowing wells [1] (Fig. 35). (3) The *Murray-Darling River* system rises on the western flanks of the Eastern Highlands and flows westward, draining into central south of Australia. However, many of the streams do not reach the ocean but perish in salt lakes. (4) The highland features and the great rift valley within the Central Lowlands have a complex structure and are composed mainly of sedimentary blocks that have been uplifted and subsequently faulted. From *Lake Eyre* to the *Spencer Gulf* is a depression about 500 miles in length where a long block of the surface sank, forming an enormous rift. Thermal waters have percolated through the fissures in this complex area, leaving deposits of coper, tin, zinc, gold, and other minerals.[2]

The streams reach the sea only in the Gulf Plains of the north and in the Murray River basin. The result is that the interior lakes, lacking outlets and being in a region of considerable aridity and consequent high evaporation, are usually salt. Many of the streams of the interior are intermittent, and as a rule the lakes in the dry season are but a frac-

[1] Collier, James E., "Artesian Water and Australia's Pastoral Industry," *The Scientific Monthly*, February, 1945, Vol. 60, pp. 117-129.

[2] Madigan, C. T., "Lake Eyre, South Australia," *Geographical Journal*, September, 1930, Vol. 76, pp. 215-240.

tion of the size that they appear to be on many maps.

The climate in the Central Lowlands on the whole is arid or semiarid, but in the south the subtropical dry summer climate prevails, the maximum rainfall occurring in winter when the westerlies have migrated northward. A long, dry, warm summer is ushered in when the subtropical high pressure belt shifts southward (Figs. 220 and 236). Adelaide, in the latitude of Los Angeles, receives an average annual rainfall of 20.6 inches with the maximum in June. Northward, where the subtropical high pressure belt is more constantly over the area, the climate changes to subtropical dry and the rainfall decreases to less than 10 inches. In the west-central part where tropical deserts prevail the area is almost devoid of animal and plant life. The northern portion of the lowland, because of the southward migration of the equatorial belt of low pressure, has a tropical wet and dry climate with a rainy season which increases in length northward. In Queensland the long western slopes of the Eastern Highlands and the Central Lowlands are in the rain shadow of the mountains and receive 20 to 30 inches annually, the rainfall decreasing rapidly toward the interior where near-desert conditions exist.

Mature soils as a rule are pedocalic, except around the Gulf of Carpentaria where red and yellow soils occur (Fig. 238). Long north-south strips of black and chestnut soil extend through the region, grading into gray soils on the westward margin.

Cultural Features

The history of exploration and settlement of the Central Lowlands including the *Flinders Highland* is replete with most of the thrilling experiences which pioneers meet when settling in a new, strange land. Thousands of sheep and cattle perished when settlers pushed too far inland to pastures which seemed permanent at first but later proved to be seasonal. The lack of water during the long dry season, when lake beds are dry, wrought havoc to early efforts to establish a pastoral industry in the interior of the lowlands.[1]

[1] Taylor, Griffith, "Australia," Rand McNally and Company, Chicago, 1931, Chapters 7, 10, and 13.

Today the people of the Central Lowlands, after nearly a century of experience, have adjusted their activities so that stable production from three types of agriculture is the rule and not the exception (1) In the southern humid part mixed farming is practiced in the fertile valleys and along the narrow coastal plains. Vegetables of all kinds, corn, wheat, oats, and fruits are grown in abundance. Most of the crops that thrive in Mediterranean Europe and



FIG. 225 A SALES YARD IN NEW SOUTH WALES Scenes similar to this one are plentiful on the Great Plains in Kansas, Nebraska, Colorado and Wyoming (Courtesy Canadian Pacific Steamships)

in California are grown. One of the finest grape regions in the world is located on the slopes of the Flinders Highland. (2) The great wheat belt of Australia begins farther north where rainfall decreases. The inner limit of wheat production is near the 10-inch isohyet. (3) On the gentle western slopes of the Eastern Highlands and in the *Darling Basin* where grass is too thin for cattle, vast herds of sheep give some diversity to the landscape.[2] In this section artesian wells furnish water for the flocks (Fig. 225).

The most important mining district, located in the highland portion, contains deposits of silver, zinc, and tin. Copper mining is decreasing in importance. The richest deposits of minerals are in the *Broken Hill District* about 300 miles northeast of Adelaide.

[2] Fenner, Charles, "The Murray River Basin," *Geographical Review*, January, 1934, Vol. 24, pp. 79-91.

TRANSPORTATION AND CITIES. Railroads serve the more populous sections of the Central Lowlands, but there is only one important line in the interior, this one extending north from Adelaide to *Alice Springs*. From Melbourne, Sydney, Brisbane, and other cities farther north, many short spurs extend through the Eastern Highlands and, therefore,

Darwin, on the far northern coast and in about the same latitude as Manila, is the seaward terminus of a railway that runs about 300 miles inland to *Daly Waters*. Darwin suffered several severe bombings in World War II, but the enemy in spite of his strenuous efforts was never able to land on the Australian continent.

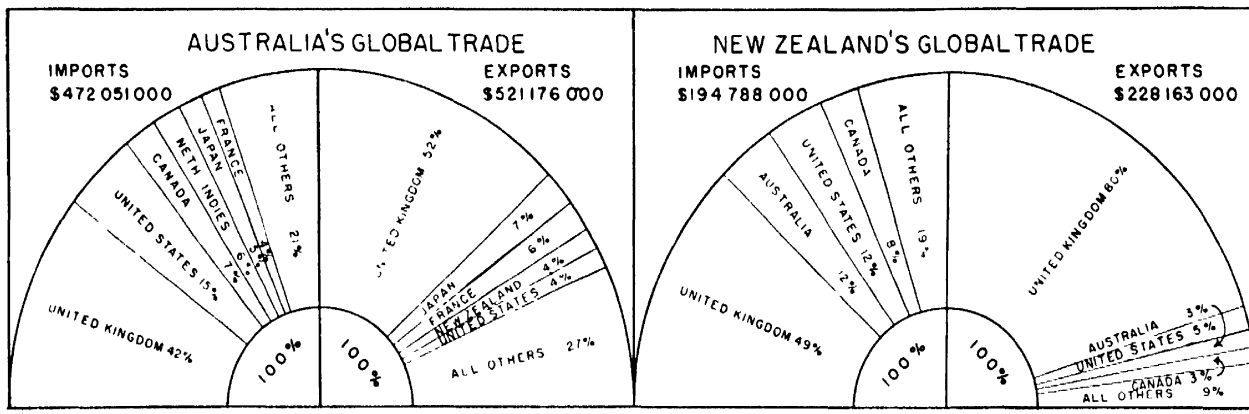


FIG. 226 GLOBAL TRADE OF AUSTRALIA AND NEW ZEALAND. Two countries have a near monopoly on the global trade of both Australia and New Zealand. Figs 219 and 228 show the narrow range of exports, and the probably wide range of imports. (From *Foreign Commerce Yearbook*)

Adelaide does not serve the entire basin to the north of it (Fig. 221).

Adelaide, the largest and most important city of the region, is situated on both sides of a river bearing the same name, and is about eight miles from the harbor, *Port Adelaide*. The city, besides being the capital of South Australia, is the fourth port of the continent, its hinterland producing wool, hides, sheep, cattle, fruit, wines, and minerals. Adelaide is also the nodal point for the great wheat belt, wheat leaving the port in tremendous quantities each year. This region also contains numerous small marketing centers which cannot be considered here (Fig. 226).

LOOKING TO THE FUTURE. Unless the unforeseen happens, it seems unlikely that the middle part of the Central Lowlands can be utilized much more effectively than they now are. However, the plains south of the Gulf of Carpentaria offer opportunities for settlement where many tropical products such as sugar cane, coffee, rubber, and rice can be produced in larger quantities. It is evident that many handicaps face white settlers on these plains. With the advent of better transportation and the wider distribution of the benefits of science, the Central Lowlands should offer colonizing opportunities to surplus populations in some of the crowded parts of the world.

30

Pacific Islands and Antarctica

THE PACIFIC OCEAN is approximately nine times as large as the continent of North America and has an area of nearly 68,000,000 square miles. One can well appreciate the explorations of Cook and Tasman in the Pacific Ocean when one realizes how vast the area is, and how slowly the old sailing vessels of the seventeenth and eighteenth centuries traveled. The minuteness of some of the islands in the great ocean made the difficulty of discovery still greater. It is for this reason that most of the discoveries were accidental, and that it is only within the past century that the Pacific and the islands in it have been mapped accurately. There are thousands of islands in this immense expanse of water, but only a few of the larger ones are inhabited and many are of no economic importance because they neither produce useful products nor furnish links in world transportation or communication. With the advent of airplane travel in the Pacific it is necessary to have fueling stations at frequent intervals across the vast ocean, and some of the islands such as *Midway* and *Guam* are useful for this purpose only.[1]

Not all of the islands in the Pacific can be mentioned here but the more important groups will be discussed briefly with emphasis on natural conditions, culture, and world relationships.[2]

DOMINION OF NEW ZEALAND

The *Dominion of New Zealand* consists of two large islands, totaling 103,000 square miles or an area approximately the size of Colorado and appropriately are named *North Island* and *South Island*. It lies about 1200 miles east of Tasmania and Australia in the South Pacific Ocean and extends through latitudes corresponding approximately to the distance from Los Angeles to Seattle.

Natural Features

The chief feature of the landscape of New Zealand is the continuous mountainous backbone which extends from north to south through the islands, broken only by *Cook Strait* which separates North Island from South Island. On South Island the mountains (*Southern Alps*) reach alpine splendor and encompass great snow fields, glacial lakes, and glaciers (Fig. 227). Numerous mountain peaks are higher than 8000 feet, among which are *Mount Cook* (12,349 feet) and *Mount Tasman* (11,817 feet). The mountains in North Island are more subdued, none of them higher than 10,000 feet. On South Island the mountain range rises near the west coast, but on North Island it skirts the eastern portion. The result is that the plains of South Island border the east coast, and the plains of North Island are on the west coast. The influence of mountains upon climate, vegetation, and agriculture deserves considerable attention.

To the student of geology and to the tourist alike New Zealand offers thrilling sights of some of the grandest phenomena in nature. On North Island are numerous hot springs and geysers equaled or surpassed in splendor only by those in Iceland and in Yellowstone National Park. Recent cracks in the earth's crust permit water to seep down to the hot rocks, the result being hot mud pools and

[1] Freeman, Otis W., "The Pacific Island World," *Journal of Geography*, January, 1945, Vol 44, pp 16-30

[2] Oliver, Douglas L., "Treasure Islands of Australasia," *National Geographic Magazine*, June, 1942, Vol 81, pp 691-722

geysers. Some of the most symmetrical volcanic cones in the world can be seen a few miles from Wellington.

The plains of New Zealand are underlain by young sedimentary rocks deposited within fairly recent geologic time. Streams originating in the glacial lakes and in the mountain snow fields are important agents of erosion and deposition and they have spread thick alluvium on the plains. However, there are also deposits of loess. The important plains regions are the *Canterbury Plains*, the *Wellington Plains*, and the *Auckland Peninsular Plains*.[1] The leading minerals of New Zealand are coal, which is mined on the west coast of South Island near Westport, and gold, secured from small placer deposits throughout much of the region.

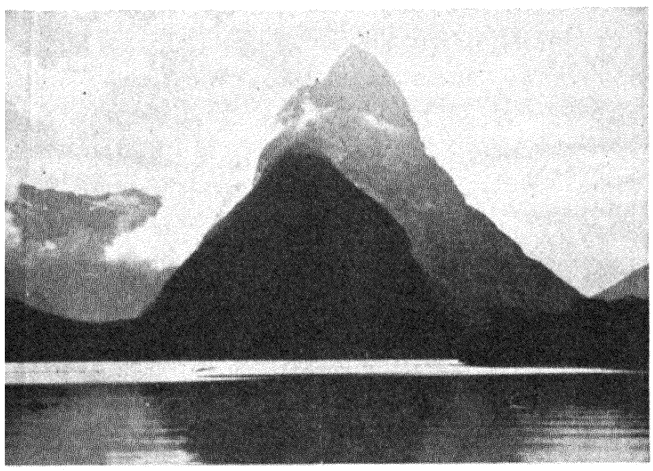


FIG. 227. MITRE PEAK AND MILFORD SOUND, NEW ZEALAND. This grand scene on the west coast of South Island would be hard to match anywhere in the world. (Courtesy Canadian Pacific Steamships)

New Zealand's climate can be attributed in general to three factors: (1) it is always in the Westerly Wind Belt; (2) it is entirely surrounded by a warm ocean; and (3) the mountains are high enough to affect rainfall because they lie athwart the prevailing winds. Mild winters and cool, delightful summers characterize this typical marine climate (Fig. 220). At Auckland the temperature rarely rises above 90° F. in summer, and the mean annual temperature is 59.4° F., the highest in the islands. The annual ranges of temperature at many stations over the region are rarely more than 20° F. Relative evenness of temperature is one of the characteristics of New Zealand. Rainfall is distributed quite evenly throughout the year. There is neither a long wet season nor a long dry season in any part of New Zealand, but the windward slopes of the highlands receive much more rainfall than the eastern slopes and plains. On South Island at Hokitika, a west coast station, the average annual rainfall exceeds 115 inches; whereas Dunedin, on the east coast of South Island, receives only 34 inches. Wellington, on Cook Strait, receives 50 inches, and Auckland on North Island receives 43.7 inches. Thus New Zealand may be classified as a humid country, corresponding to the west coast of the United States north of San Francisco (Fig. 236).

The relatively high, even rainfall combined with the equable temperatures in the middle latitudes as a rule produces an evergreen vegetation. Here is found the famous kauri pine, one of the largest and most valuable of lumber trees. Most of the kauri forests are on North Island. Other evergreens are the matai and totara. Some of the hardwoods are the beech and tawa, the latter being used in making wooden vessels. Grassland prevails on the less humid Canterbury Plains.

Cultural Features

New Zealand was discovered and named by Tasman early in the seventeenth century. During the first half of the nineteenth century the islands were important to Europeans as a sealing and whaling base, and the earliest settlers naturally were traders, sealers, whalers, missionaries, and adventurers. It was necessary to subdue the powerful and intelligent Maori tribes before permanent agricultural settlement could be made. After long wars and much carnage, the land was taken over by the European settlers, chiefly Irish, English, and Scotch. During the colonial period New Zealand was considered as too barbarous a place to which to send criminals, and thus it escaped the type of colonization that Australia had. The first permanent white settlement was made near Wellington in 1840.

Modern New Zealand is remarkably different from native New Zealand. Millions of sheep, deer, rabbits, and cattle now are grown in these islands.

[1] Cumberland, Kenneth B., "Canterbury Landscapes: A Study in New Zealand Geography," *Geographical Review*, January, 1940, Vol. 30, pp. 19-40.

Elaborate hydroelectric power establishments, irrigation works, and modern farm machinery are familiar sights on the landscape where but a short half century ago native agriculture supported only 60,000 or 70,000 people. Where forests and native grasslands have deteriorated or been destroyed English grasses have been planted. On the plains such crops as wheat, barley, oats, citrus fruits, and potatoes are grown.[1]

The more than one and one half million people of New Zealand, most of whom are British, are interested chiefly in agricultural pursuits. However, less than half of the land surface is utilized and less than four per cent is in crops. The unoccupied tracts are mainly in the interior and at the eastern and southern extremities of the islands. Sheep and cattle thrive under almost ideal conditions and, therefore, the principal agricultural products and exports are the results of pastoralism. The products of the creameries, especially butter and cheese, and the returns from the slaughtering industry, such as frozen mutton and beef, are exported in refrigerated liners to England.[2] In North Island citrus fruits such as oranges are grown and the fruits of temperate climates thrive everywhere (Fig. 228).

The principal exports of New Zealand are butter, cheese, wool, and meat. Because of distant markets, lack of mineral resources, and the youth of the Dominion, manufacturing has not developed extensively as yet. It seems more satisfactory to import manufactured goods, fuel, and other supplies in return for the easily and cheaply obtained pastoral products (Fig. 226).

Cities and Transportation. Transportation is chiefly by railroad although many of the larger urban centers are not thus connected, particularly those on the west side of the mountains. The longest tunnel in the British Empire is on South Island and goes through the Southern Alps, connecting the east and west coasts. Most of the larger cities are seaports and therefore are linked by steamship lines (Fig. 221).

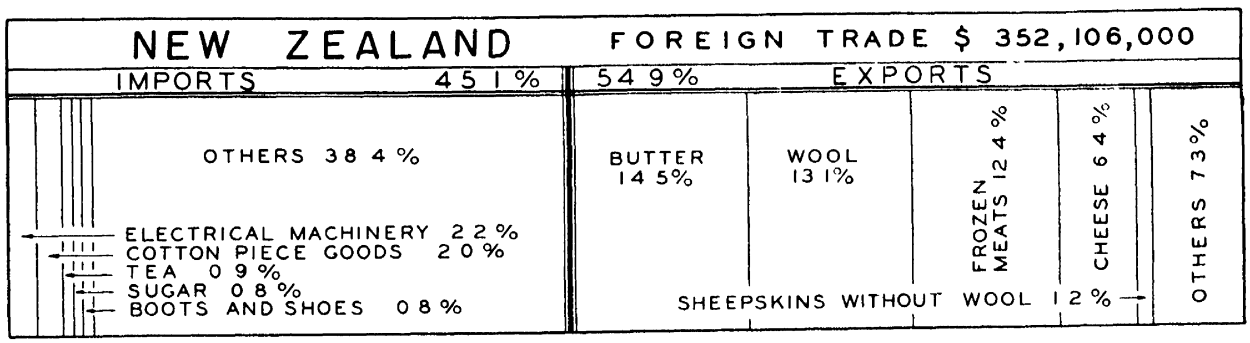


Fig. 228 New Zealand's Foreign Trade A 10-year average prior to World War II Note that the exports and imports are typical of a newly developing country Most goods entering foreign trade have to be shipped long distances (See also Fig 226) (From *Statesman's Yearbook*)

Auckland, on the east coast of North Island and the largest city of New Zealand, is situated at the head of *Hauraki Gulf*, only six miles from the *Manukau* harbor on the western coast. It is one of the thriving seaports of the South Pacific with a harbor that can accommodate the largest vessels. To the north and south of the city are extensive dairy lands. A university, an art gallery, library, and museums, together with beautiful parks and the zoo, give the city a modern appearance and all the earmarks of a twentieth-century metropolis.

Wellington, the capital of the Dominion of New Zealand, lies on the southern coast of North Island on the shore of *Port Nicholson*, the site affording a magnificent, deep harbor partly walled in by abrupt hills. The original swampy shore has been reclaimed for a considerable distance and provides the site for the principal business portion of the city. The residential suburbs extend westward over

[1] Cumberland, Kenneth B., "Contrasting Regional Morphology of Soil Erosion in New Zealand," *Geographical Review*, January, 1944, Vol 34, pp 77-95

[2] Belshaw, Horace, "Dairying Industry of New Zealand," *Economic Geography*, July, 1927, Vol 3, pp 281-296

the surrounding hills and terraces and eastward to the seaside. It was here that the first New Zealand colonists settled, but it is doubtful if one of the original colonists would recognize the site now, inasmuch as beautiful parks, a university, and great buildings occupy the area. Railway lines extend northward 300 miles to Auckland and beyond to *Kawakawa*, and 175 miles northeastward to *Napier*. Electric trams which are operated by hydroelectric power generated in the mountain ranges to the north provide transportation in the city.

Christchurch, the principal city of South Island, is on the east coast (*Pegasus Bay*), and its hinterland is the famous Canterbury Plains where most of the cereals of New Zealand are grown. The port of the city is *Lyttleton*, situated on a fine harbor 8 miles away. Railways connect Christchurch with Dunedin 200 miles southwest. Northward a railroad crosses the *Otira Pass* to *Brunner* in the Southern Alps from whence it branches to several places on the west coast. Many branch railroads extend into the plains where the products of the hinterland consist chiefly of cereals and the produce of pastoral pursuits. The distant peaks of the Southern Alps can be seen from the city (Fig. 229). *Dunedin*, 15 miles from the open sea, is at the head of the *Otago* harbor, a narrow inlet on the south-

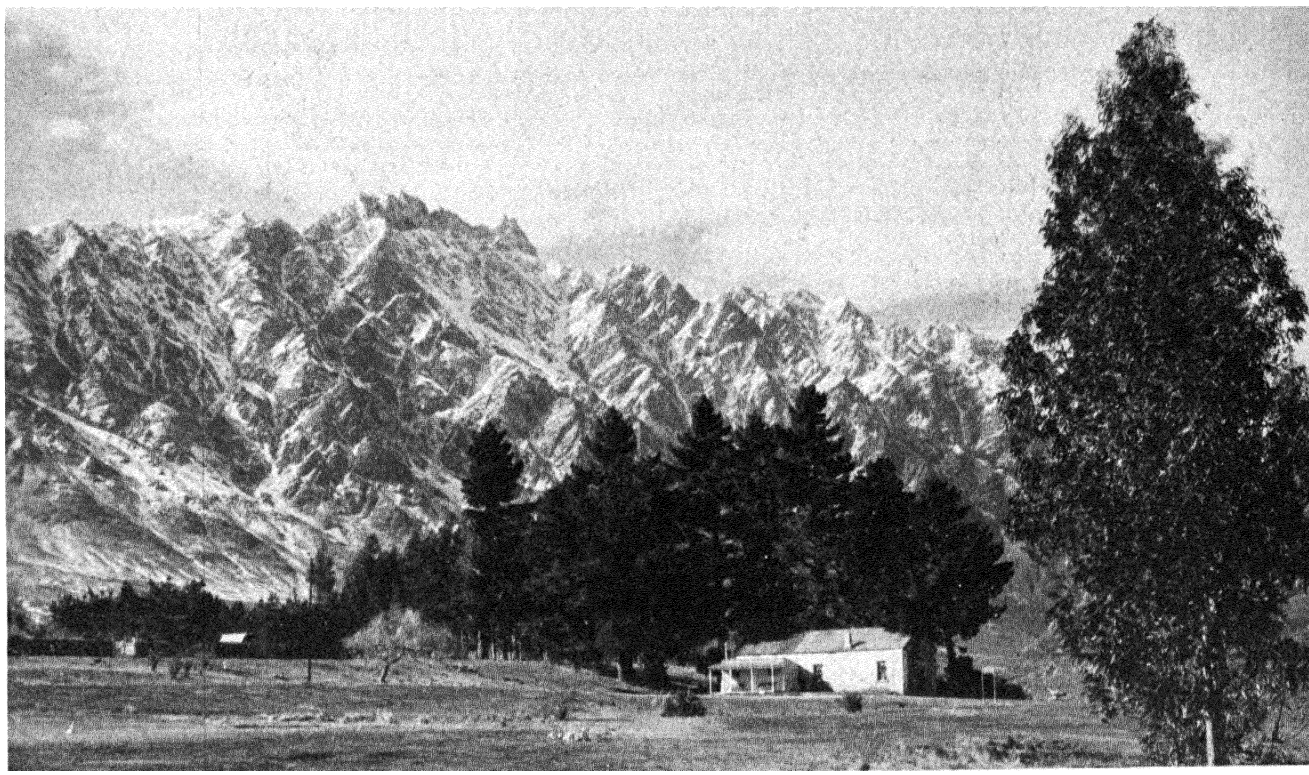


FIG. 229. THE REMARKABLES IN SOUTH ISLAND, NEW ZEALAND. These glacier-carved peaks near Lake Wakatipu are south of the equator, approximately in the latitude of Switzerland, but are not so cold because of close proximity to the ocean. (Courtesy New Zealand Government Photos)

east coast of South Island. Steep forest-clad hills rise close to the sea. The hinterland is the *Otago Plateau* which produces wool, dairy products, frozen meat, and gold.

OUTLOOK FOR THE FUTURE. New Zealand has been settled in a relatively short time and the typical haphazard adjustment of pioneer people has resulted in the rapid destruction of many natural resources. In numerous places the forests on the slopeland and hill country have been cleared with disastrous results. Soil erosion and depletion are problems facing the people. With the introduction of deer and rabbits into the region another prob-

lem was created. These animals, because they are free of natural enemies in New Zealand, have multiplied so rapidly that they threaten to use the grasslands and woodlands to the exclusion of domesticated animals.

New Zealand is a part of the British Empire, and thus is likely to feel the vicissitudes of war and depressions along with the rest of the empire. She has always been ready to take her part in times of conflict by contributing arms, men, and munitions. Thus, although usually far removed from the scene of conflict, New Zealand's economy, culture, and chief activities are affected by the activities and problems of the mother country. Future relations between the United States and New Zealand are certain to be cordial, as numerous American marines who were stationed there during World War II will testify.

EAST INDIES

The East Indies are located about 7000 miles southwest of San Francisco between the southeastern peninsulas of Asia and the northern coast of Australia. On this group of green, tropical islands are produced many of the articles which, a century ago, were considered rare luxuries to the people of the Occident, but which now are daily necessities to millions of people in North America and Europe. Whenever one opens a tin can, orders a prescription which requires quinine, purchases a package of tapioca, buys an automobile or a rubber balloon, one furnishes a market for the goods which millions of brown natives of the East Indies are gathering daily from one of the most productive lands in the world.[1]

The East Indies are arranged in the form of a mammoth triangle with the Philippines at the northern apex and the islands of Sumatra, Java, *Bali*, *Lombok*, Timor, which are known as the Sunda Islands, and New Guinea at the base. The total land area (including the Philippines) contained within this great triangle is approximately four times that of Texas, but the population of at least 70,000,000 is equal to more than half that of the United States. Most of the southern group of islands are known as the *Netherlands Indies* or the *Dutch East Indies*. Parts of several islands belong to the British. For purposes of this study, the Philippine Islands will be included under the East Indies.

In addition to the large islands of the East Indies, there are hundreds of smaller islands both in the East Indies group and scattered far and wide over the Pacific Ocean. This great island area long will be remembered as the theater of some of the bitterest conflicts in which the American army, navy, and air forces have ever been engaged. *Saipan*, *Johnston*, *Kwajalein*, *Eniwetok*, *Iwo Jima*, *Okinawa*, *Palau*, the *Solomons*, *Luzon*, and *New Guinea* are a few of the islands where the struggle was fiercest. Some of these islands are discussed under other headings (see pages 111, 113, and 114)

Several factors of similarity combine to give the region unity, chief of which are: (1) climate, (2) insularity, (3) structural relationships, (4) location in a group, and (5) the historical significance of the name, East Indies (Fig. 162) The principal islands and island groups are: *Sumatra*, *Java*, *Borneo*, *Celebes*, the *Philippines*, the *Moluccas* (*Spice Islands*), *New Guinea*, the *Bismarck Archipelago*, and *Timor* and associated islands. Many writers include the *Malay Peninsula* because of its climatic, structural, historical, and cultural similarities to the island groups.[2]

Natural Features

The substructure of the East Indies is the result of two great folds in the earth's crust. One of these folds is the southern extension of the alpine system of Eurasia which swings abruptly southward from Burma to disappear in the Bay of Bengal with only the highest peaks showing as the *Andaman* and *Nicobar* islands. Farther south this great fold appears as the mountainous backbone of Sumatra and Java. The other great fold is the circum-Pacific mountain system which extends southward from Kamchatka through the Japanese Empire and thence into the Philippines and the Moluccas. In the vicinity of the Moluccas the two great mountain systems merge and lose their separate identi-

[1] Broek, Jan O. M., "Diversity and Unity in Southeast Asia," *Geographical Review*, April, 1944, Vol 34, pp 175-195

[2] Simpich, Frederick, "Mindanao, on the Road to Tokyo," *National Geographic Magazine*, November, 1944, Vol 86, pp 539-574

ties Another feature of the structure of the East Indies deserving some attention is the large number of volcanoes. More than 40 extinct volcanoes are found in Java alone, and less than 50 years have elapsed since the small volcanic island of *Krakatoa,* near Java in the *Sunda Strait,* broke forth in a most terrific eruption. This eruption was so violent that some of the finer ash was carried by the planetary winds entirely around the earth, creating brilliant sunsets for a considerable time in Asia, Europe, and North America. The presence of recently active volcanoes and the fact that earthquakes are not uncommon bespeak the relative youthfulness of these mountainous islands.

Nearly all of the islands are dominated by mountains. Large portions of the land, however, are relatively level. The coastal plains in most cases are underlain by sedimentary rocks. The numerous rivers which are eroding and cutting down the mountains are spreading alluvial material on the lowlands and depositing it in adjacent seas. It is the constant deposition of alluvium which makes the soils so fertile in the East Indies. Particularly is this true when the alluvial materials have been weathered from recent lava deposits.

Two chief factors determine the climate of the region. The equator bisects the region, and the islands are entirely surrounded by warm, tropical oceans and seas (Fig. 236). The principal characteristics of the tropical rainy climate of this area are the continuously high temperatures, abundant rainfall nearly everywhere, and persistently low pressure and high humidity. Seasons of temperature do not exist, but significant seasons of rainfall and dry weather prevail in some areas (Fig. 220). In many places the annual rainfall exceeds 100 inches per year, but on the leeward sides of some of the mountain ranges, the shifting of the pressure and wind belts creates dry seasons where the annual rainfall may be less than 40 inches. An American soldier serving in this area wrote home "We are now in the dry season—it rains only every other day." Everywhere, temperatures have a low monthly range (usually less than 5°) and, with the exception of the higher mountains, the average annual temperature is relatively high (usually about 80° F.).

Under the influence of abundant tropical rain and heat, this region supports extensive areas of tropical rain forest. Bamboo, coconut palms, banyan trees, mangrove, and several tropical hardwoods are native to the region. Other trees such as rubber, tea, and cacao thrive as exotics.

For the most part, the soils are undifferentiated; but where studies have been made the results show that most of the mature soils are laterites or red and yellow soils. The productivity of the soil depends, in large part, upon the type of soil-forming materials from which they develop and their stage of development, the young soils being the most fertile. Many writers insist that the reason Java can support such a dense population, nearly one half that of the entire region, is because the soils are youthful and of lava origin. Those areas where soil materials have weathered from crystalline rocks, as is true in parts of Borneo, do not develop into the fertile, productive soils with the rapidity that they do in lava areas.

Cultural Features

The history of the people of the East Indies preceding the appearance of the white man is based chiefly upon tribal lore and the findings and interpretations of the archeologist. The remains of ancient temples with carved inscriptions are the chief sources of ancient or prehistoric information. It is thought that the people originally migrated from Asia, and that the religions of Asia, Hinduism, Buddhism, Mohammedanism, and Brahmanism were imported These religions are prevalent today. In some parts of the East Indies, such as New Guinea and more isolated islands, white men found the natives living in the stone age. When visitors from Europe first entered, the area was not as densely populated nor as productive of agricultural goods as it now is. The Europeans, desirous of obtaining spices, copra, rare woods, pearls, and many other tropical products, established trading posts in the islands. A system of barter was carried on for centuries, and still flourishes as the only type of trade in some of the more isolated sections (Fig. 230).

It is only within the past 50 years, however, that the East Indies, under the colonial control of the Dutch, French, English, and Portuguese, have flourished and gained a prominent place in world trade. Great corporations, with boards of directors

sitting in Amsterdam, London, Paris, and other parts of the world, determine the activities of the white overseers of plantations and estates, and of the millions of natives.[1]

The modern cultural landscape of the East Indies is predominantly an agricultural panorama. Whether the land is producing crops for native subsistence or the crops of tropical commercial agriculture, one is aware immediately of the significance of the soil in the lives of the millions of people.

Native agriculturalists generally are engaged in producing a number of subsistence crops among which are rice, corn, cassava, sweet potatoes, bananas, and other tropical fruits. These crops, combined with the harvest from sea and forest, furnish the principal sources of native sustenance.

In many parts of the East Indies the natives grow some cash crops such as rubber, coconuts, kapok, tea, abaca (Manila hemp), and bamboo along with their subsistence crops, but their production of commercial products is small in comparison with the amounts grown on the great tropical plantations.

The invasion of the East Indies by Japan cut off important supplies of rubber, tin, and petroleum from the Allies. The curtailment of rubber was nearly disastrous to the United States, the largest consumer of rubber. Mobile warfare requires immense quantities of rubber—hence, all the available supply was requisitioned by the army. By the time the war was over the manufacture of synthetic rubber was just about sufficient for army and civilian needs. One of the perplexing problems now is that of balancing our use of rubber between the natural and the synthetic supplies.

It is only in the tropics that plantation agriculture thrives at its best. It depends upon (1) a landscape which can provide subsistence crops for the laboring group; (2) an environment which can produce the commercial crops; (3) a large market; and (4) an adequate transportation system. Thus we can understand how the Europeans were able to superimpose upon the native agriculture a system which utilized the native labor during their slack season to work the commercial crops. White men furnish the capital, markets, transportation, government, and direction. The East Indies furnish the labor and the land. More than twenty-five different commercial crops are grown. Some of the important ones are: rubber, chincona (quinine), kapok, cassava (tapioca), cacao, abaca, tea, sugar cane, coffee, copra, tobacco, spices, and vanilla.

It is well to remember that each of the islands does not produce all of these crops. However, many

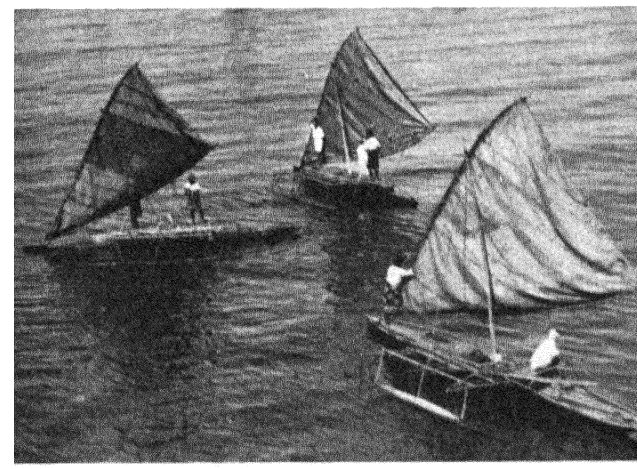


FIG. 230. OUTRIGGER BOATS. The narrow boats manned by these South Pacific natives could not be powered by a sail without the outrigger stabilizing device attached to the side. (Courtesy Cunard White Star, Limited)

of them are produced on most islands. Java is by far the most productive, for it leads the world in several of the foregoing articles.[2] Sumatra is noted for its fine cigar-wrapping tobacco; and the Philippines produce large quantities of copra and abaca, the fiber (manila) which is so useful in making high quality rope and twine.[3] Spices come from the Moluccas. Rubber is limited almost wholly to Java, Sumatra, and the Malay Peninsula. Some islands, such as Borneo, Timor, and New Guinea, are still in a rather primitive state and lack the development enjoyed in Java, Sumatra, and the Philippines.

The two chief minerals of the region are tin

[1] Hart, G. H. C., "Recent Developments in the Netherlands Indies," *Geographical Journal*, January, 1942, Vol. 99, pp. 81-102.

[2] Van Valkenburg, S., "Java, the Economic Geography of a Tropical Island," *Geographical Review*, October, 1925, Vol. 15, pp. 563-583.

[3] Haas, William H., "The American Empire," The Chicago University Press, Chicago, 1940, pp. 306-370.

and petroleum. Tin is mined on the islands of *Bangka* and *Belitong*, on the Malay Peninsula, and also in some other localities. Singapore boasts the world's largest tin smelter. Petroleum is secured in Sumatra, Java, and Borneo. Diamonds, gold, and silver occur in small amounts in Borneo and in the Philippines, and pearls are gathered from oyster beds in several places.

Manufacturing has not developed in the East Indies on any large scale. Handicrafts by the natives include weaving and basketwork, and primitive sawmills and rice mills are always in evidence. Sugar is processed in several islands, but the most important mills are in Java.

Transportation and Urban Centers. As in all island regions, transportation by water is of prime importance. Small steamers ply the straits and numerous seas in search of the tropical products which are collected at two or three main cities for re-export to the great markets of the world. Short branch railroads have been built which connect the tropical estates in the hinterlands with the cities. Travelers in the region are surprised at the large number of automobiles, especially in Java and in the Philippines, but there are only a few native owners. If the native goes on a trip, the chances are that he walks and carries his bundles.

The principal cities of the East Indies are located on the coasts, each island having one or more large urban centers which dominate the government, commerce, and trade of the island (Fig. 221). Such cities as *Medan* and *Palembang* on Sumatra; *Macassar* on Celebes, *Port Moresby* on New Guinea, *Brunei, Pontianak, Sandakan,* and *Samarinda* on Borneo, and many others are small but important in the life and trade of the East Indies. Two cities deserve special mention.

Manila, located on the estuary of *Pasig River* where it enters the beautiful *Manila Bay,* is the principal city of the Philippines. It is the capital and chief trade center of this island group and through it a large percentage of the exports, such as sugar, tobacco leaf, lumber, coconut oil, copra, and abaca, is gathered for reshipment. Manufacturing is not extensive but manila rope, wagons, furniture, coal gas, footwear, and small ships are made. Both Manila and Batavia are constantly threatened by earthquakes, due to their location on the great circum-Pacific and alpine folds. *Batavia,* a seaport on the north coast of the island of Java, besides being the administrative center of the Netherlands Indies, is the great commercial center of the region. The wide deep bay with its numerous islets on which the city is situated provides a fine harbor for even the largest ships. Railroads and highways extend into the interior of the island, hundreds of small steamers ply the adjacent seas, and over these routes to Batavia come the commercial crops and products of the vicinity for reshipment. It has been well said that Batavia is the clearing house for all the products of the archipelago. Among the products which pass through the city are rice, sugar, coffee, tobacco, petroleum, rubber, and spices.

Prospects for the Future. The destiny of the East Indies, although the area comprises but a small portion of the world's land surface and population, probably will not depend upon what the inhabitants of the region wish. The islands have attained world significance because of the valuable products which they furnish to the outside world. The East Indies are important in part because they are adjacent to the great crossroads of the South Pacific and Indian oceans, and whichever of the great industrial nations controls the vital straits of Malacca and Sunda and the powerful naval base at Singapore, probably also will control the lives of the people (Fig. 5). Aside from the world relationships involving the East Indies, there is also the plight of the native population. How shall these people be treated in the future? May they be allowed to participate in the government of their respective areas? May their standard of living be enlarged and enriched? Is it necessary and desirable that the destiny of millions of brown natives on these green tropical islands be in the hands of white colonial officers and boards of directors of alien races on the other side of the world?

The high productivity of the East Indies is apparent, and the importance of the products which issue from them is well recognized. Would it be unreasonable to suggest that every nation reaping benefits from the lands and labor of the East Indian natives strive continuously to bring to these people an ever-better standard of well-being? It certainly would not be an unreasonable price to pay for the rubber, tin, cacao, coconuts, and many other valu-

able products made available by the laborers of these tropical islands.

In 1941 the people of the East Indies were forced to transfer their allegiance from the British and Dutch governments to the Japanese aggressor. For a time the well-being of the natives hung in the balance. As for the Filipinos, the United States promised them independence in 1946. The wheel of fortune has turned so we now have fulfilled our pledge. Through several decades the lives of many millions of people in the East Indies have become adjusted to a plantation economy controlled largely by outsiders. Unless this system is maintained, satisfactory substitutes or modifications will have to be devised.

OTHER ISLANDS OF THE PACIFIC (OCEANIA)

The Pacific Ocean is studded by thousands of comparatively small islands, some lying singly but most of them occurring in groups, chains, and archipelagos. The three major agglomerations are known as *Polynesia*, *Melanesia*, and *Micronesia*. The first of these extends north and south in the mid-Pacific and include among others the *Hawaiian*, *Sporades* and *Society* islands, the second lies north and east of Australia and include the *Bismarcks*, the *Solomons*, the *Fijis*, and the *New Hebrides;* and the third extend eastward from the Philippines and embrace the *Marianas*, the *Carolines*, the *Gilberts*, and others.

TERRITORY OF HAWAII

"Crossroads of the Pacific" aptly describes the location of the Hawaiian Islands, because they are on the route of steamers plying from the Orient to the west coasts of North America and South America, and connect also with the trade of the South Pacific. The combined area of the Hawaiian Islands is a little more than 6000 square miles and includes an archipelago of many small islands and eight, larger, inhabited islands, among which are *Hawaii*, *Maui*, *Oahu*, and *Kauai* (Fig. 231). The island chain extends something over 400 miles in a northwest-southeast direction and lies mostly just within the tropics

Natural Features

Climate and soil are the two principal elements of the natural landscape responsible for the remarkable productivity and habitability of the Hawaiian Islands.[1]

The islands occupy a portion of a submarine platform in the Pacific which has been built up by the outpouring of volcanic lavas. The principal bedrock is basalt, and since it weathers easily and

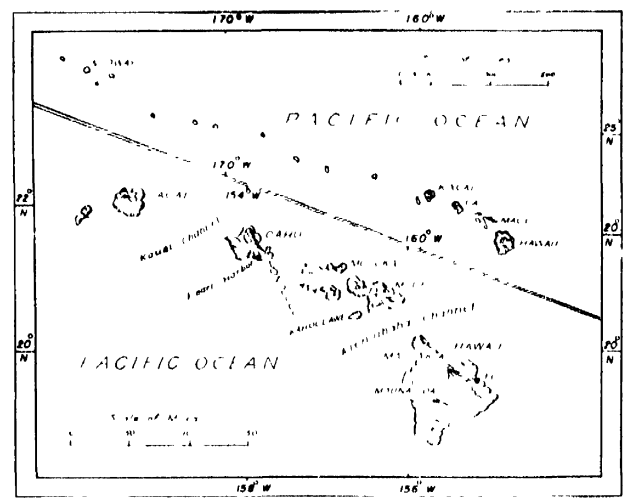


FIG. 231. THE HAWAIIAN ISLANDS. Note the larger islands are shown on two scales, and that Midway is 1500 miles from Hawaii.

rapidly, it produces rich soils for agricultural use in a short time. There are many active volcanoes, and cones of other volcanoes which have been active within fairly recent times. The famous snow-capped *Mauna Kea* (13,784 feet) and the renowned *Mauna Loa* are on the island of Hawaii. Each of the larger islands has one or more cinder cones, the lava of which produces the chief soil materials of the land.

A typical island of the group as a rule has several relief features: (1) sandy beaches, (2) coastal plains, (3) hilly lava slopes, (4) mountain summits, and (5) eroded plateau surfaces.

The climate of the Hawaiian Islands is mostly a product of the northeast trades and the insular location in a great warm ocean. Freezing or extremely high temperatures are unknown. However,

[1] Haas, William H., "The American Empire," The University of Chicago Press, Chicago, 1940, pp. 216-305.

the areal distribution of rainfall is dependent upon the trend and arrangement of the mountains, the northeast slopes being much wetter than the southwest slopes. The windward slopes may receive as much as 300 inches of rainfall per year, and the leeward slopes may have only from 10 to 20 inches (Honolulu 25.5 inches).

The mature soils are lateritic; otherwise they are undifferentiated. All of the islands formerly were covered by some kind of native vegetation, and even now forests primeval cover most of the steep slopes.

Cultural Features

Prior to their discovery by Cook in 1778 the Hawaiian Islands were inhabited by tribes that were ruled by a hereditary native family. Life was simple and placid, for there were no export crops, no banks, no great steamers bringing tourists and sightseers, and no schools or churches. The development of the islands to their present condition has covered a period of nearly 100 years.[1] At first whalers made use of them and later the famous *China Clippers* from New England stopped for sandalwood which they took to the Orient. In 1876 a treaty was made between the United States and Hawaii eliminating tariff payments on Hawaiian produce. The result was amazing. American investors immediately initiated commercial agriculture which now has become so important and profitable. The United States acquired ownership of the Hawaiian Islands in 1898.

The commercial activities of the Hawaiian Islands are dominated by agricultural products and their manufacture. Lacking any rich mineral deposits or fuel supplies, large-scale manufacturing has never developed. It can be truly said that the soil and climate of the region are the two resources of first magnitude.[2]

Sugar cane, the leading crop, responds splendidly to irrigation and to the rich lava soils. So favorable are conditions for the growing of sugar cane that even some of the mountain slopes are terraced for its production. Most of it is grown on great estates owned by large companies. The labor supply has been drawn from all parts of the world and, surprisingly, the standards of living for the laborers are higher in certain respects than in some agricultural sections of the United States. The government provides schools, places for public recreation, and good health service. Wages are not high, but as a rule they are adequate to insure stability in the working class. Much of the Hawaiian sugar cane is processed on the island and the cane sugar has free entry into the United States. The value of the yearly exports of sugar varies from 75 to 100 million dollars, depending upon demand and market conditions.

A large proportion of the world supply of pineapples is furnished by the Hawaiian Islands, grown chiefly in Oahu (Fig. 232). Small railroads and trucklines encircle the island and bring in the pineapples daily at harvesting time. The fruit is grown mostly on large estates, canned in big central canneries, and the finished product is exported, mainly to the United States. The early start, the advertising campaign, the fine natural environment, and the scientific management are the chief factors that have contributed to the success of the pineapple industry. Since pineapples thrive on poorer soils and with less rainfall than does sugar cane, the two crops are not in competition for use of the land.

Two other commercial crops of importance are bananas and coffee. Bananas are not as hardy in Hawaii, however, as they are in Central America; consequently, no large corporations have taken over the development of the banana industry. Most of the bananas are consumed locally or are shipped to the west coast of the United States where they are known as Chinese bananas. The coffee industry thrives on the fertile slope lands where soil is favorable, rainfall is adequate, and where the plants are protected from damaging winds. This industry, however, does not hold alluring prospects for the future.

The natives of Hawaii raise most of their own food; but rice, fruits, poultry, eggs, fish, and dairy products are imported. The main subsistence crops are *taro* (a root food), and such fruits as the *guava*

[1] Castle, William R., "Hawaii, Then and Now," *National Geographic Magazine*, October, 1938, Vol 74, pp 419-462.

[2] Coulter, John Wesley, "The Island of Hawaii," *Human Geography Studies: The United States*, McKnight and McKnight, Bloomington, Ill., 1935, pp 247-258. A scholarly appraisal of the beauties and possibilities of the Hawaiian Islands

and the *papaya*. Alfalfa is grown as feed for beef and dairy animals.

Manufactures are concerned mainly with food processing or with the raw materials of agriculture. Almost all household articles used daily by the natives are imported.

Tourists provide an important source of income. Mark Twain said once that the Hawaiian Islands were the "loveliest fleet of islands anchored in any ocean," and this seems to be true, for each year during normal times tourists spend several million dollars in Hawaii. With the coming of airplane travel, the tourist business is sure to be accelerated. Even now it is only two days from New York City to Honolulu.

URBAN CENTERS. *Honolulu*, on beautiful *Oahu Bay*, is the capital of the Hawaiian Islands and the most important city in the central Pacific. It has a splendid natural harbor in the basin of a coral reef which surrounds the island. Honolulu is an entrepôt for vessels plying between the United States and the Asiatic countries. Ship-repair yards, machine works, cane sugar mills, and large pineapple canneries are the principal industrial enterprises. Near Honolulu is the United States Naval Base, *Pearl Harbor*, which was bombed by the Japanese on December 7, 1941, thus hastening the United States into World War II.

HAWAIIAN PROSPECTS. The Hawaiian Islands have been known to the civilized world for only two centuries and yet they provide homes for several million people at good living standards; they send products to the far ends of the earth; they pay large amounts to the national government in taxes, and provide a restful and pleasant haven for tourists. These islands, too, are an example of what a combination of volcanic bedrock and tropical climatic conditions can do in satisfying the wants of man through agricultural produce. It is apparent, therefore, that more of the tropical islands of the world can serve just as well the needs of other millions of people.

FIJI ISLANDS

The Fijis, an important group of islands in the South Pacific in approximately the same latitude as the Hawaiians, are a part of the British Empire.

The main islands of the Fijis are of volcanic origin and have considerable areas of fertile red soils. Because they are in the belt of southeast trade



FIG. 232. A PINEAPPLE FIELD. Most of the fruits are processed in Hawaii before being shipped to outside markets. (Courtesy Canadian Pacific Steamships)

winds, the heaviest rainfall generally is on the southeastern slopes of the islands, averaging above 50 inches nearly everywhere, and the frost-free climate permits the growing of two and three crops per year. One crop, sugar cane, dominates the agriculture of the islands; as a rule it amounts to slightly more than that produced within the United

States each year.[1] One of the problems associated with cane growing has been the inadequate labor supply. It has been necessary in part to supplant the natives with laborers from India who are much sturdier and more docile than the native workers. The bulk of the cane is produced on large estates where it is processed and the sugar exported. Since the development of the sugar cane industry in Queensland, Australia, the Fiji sugar has been exported mainly to New Zealand, although some has been sent to Canada and to other parts of the British Empire. Rice and bananas are grown by the natives as subsistence crops.

Suva, the capital of the Fiji Islands and the principal port-of-call in the South Pacific, is 1100 miles from Auckland and 1500 miles from Brisbane. Its position on the diagonal route across the Pacific from Canada to Australia makes Suva one of the principal British stations in the Pacific.

SPORADIC ISLANDS AND ISLAND GROUPS

Most of the scattered islands are controlled by one of the great powers, United States, Great Britain, or France, and are important chiefly as naval bases, fueling stations, or usually for one or two products only. A number of these islands were strategic outposts in World War II. For example, *New Caledonia* belongs to France and produces a large share of the world's nickel.[2] *The Caroline, Marshall*, and *Christmas* islands are important actually or potentially as naval bases and as ports-of-call for pearlers and copra-hunters.[3] Coconuts grow wild almost everywhere in these islands, and the natives can gather copra for the white buyers who make periodic stops for cargo. The islands have been governed generally under a mandate, dominion, or dependency status, and governors or commissioners have been sent from the home country to administer governmental affairs. The allocation of control over the scattered Pacific Islands following World War II will be worked out by the Council and Assembly of the United Nations. Nearly every island that is inhabited has some church or missionary society implanted upon it, and many romantic and stirring tales have come out of the South Seas concerning the activities of the white man in that region.

In summary, it may be said that life in the South Pacific Islands is reputed to be one long holiday, and that most of the people live in primitive simplicity. The experience of American men in service in the Pacific may not bear this out in all of its implications. Most fruits and vegetables will grow without cultivation, but the islands which are important in the scheme of the world's trade quite generally have come under the scientific management of outside agencies with regard to the growing and marketing of crops.

ANTARCTICA

Antarctica, almost entirely within the Antarctic Circle, consists of a large continent and some islands which in irregular arrangement surround the *South Pole*. The rather even margin of the continent is broken by two large indentations known as the *Ross* and the *Weddell* seas (Fig. 233). Thousands of miles of the coastline have never been surveyed, but present estimates concerning the extent of the region place the area at more than 5,000,000 square miles, almost one and a half million square miles more than that of Europe.

Antarctic Exploration and Discovery. When the Portuguese rounded the Cape of Good Hope and sailed eastward into the Indian Ocean they exploded the myth that Africa, in its southern extremities, was connected with land to the south. Within a few years the southern tip of South America was passed by Magellan. Mapmakers of the sixteenth and seventeenth centuries thus knew the southern limits of two continents, but they were ignorant of the existence of a large land mass beyond the Antarctic Circle. When Europeans drew maps which showed land in the *South Polar Region*, they must have been dealing in mere fancy for previously to the last quarter of the eighteenth century there is no record that anyone had ever been in latitudes so far south.

[1] Robertson, C. J., "Fiji Sugar Industry," *Economic Geography*, October, 1931, Vol. 7, pp. 400-411.

[2] Stadtlander, Elizabeth, "New Caledonia," *Journal of Geography*, April, 1944, Vol. 43, pp. 145-152.

[3] Moore, W. Robert, "Our New Military Wards, The Marshalls," *National Geographic Magazine*, September, 1945, Vol. 88, pp. 325-360.

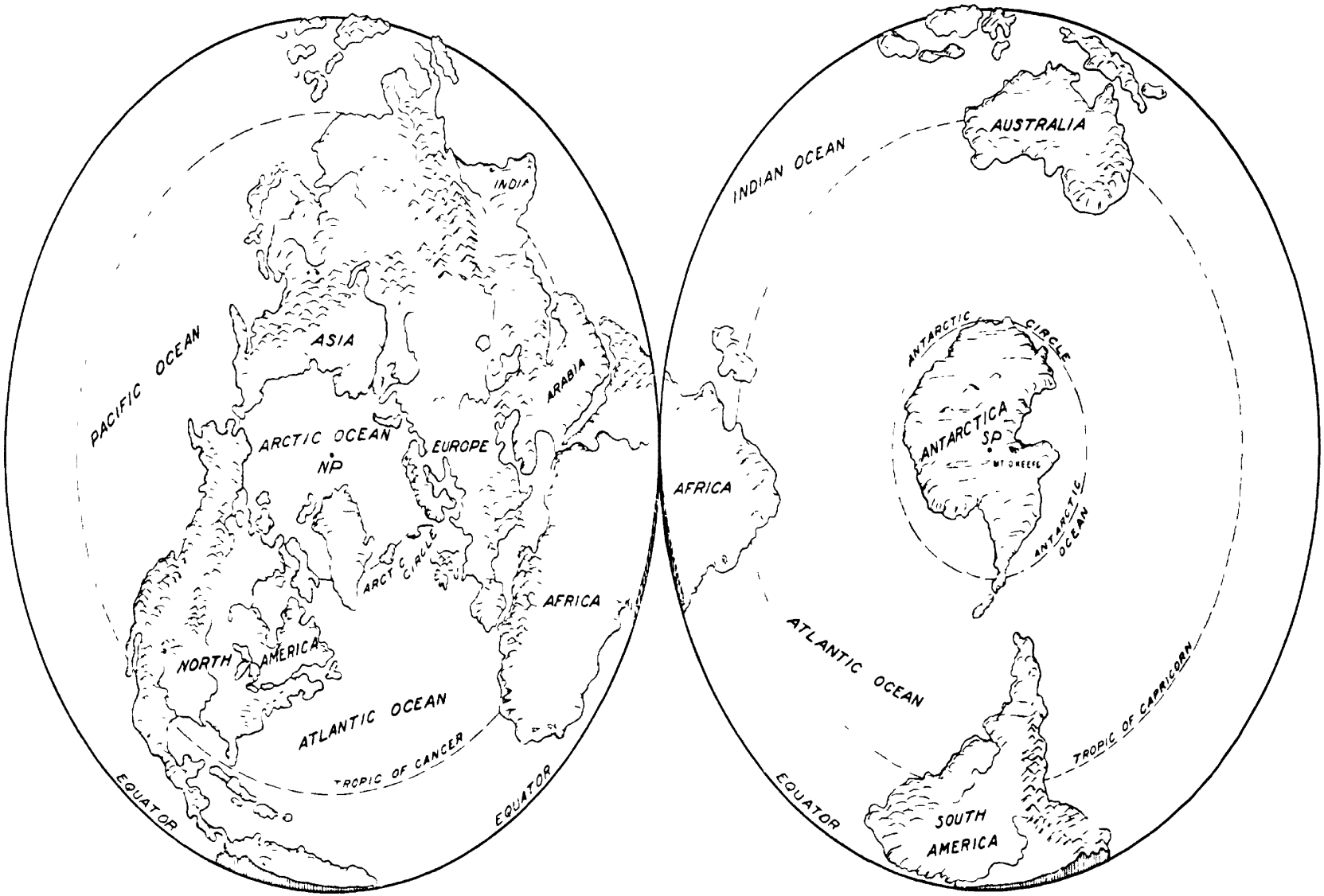


FIG 233 THE POLAR HEMISPHERES Note that the North Pole is in the Arctic Ocean, and the South Pole on the Antarctic Continent.

The story of discovery and exploration of the South Polar Region extends over almost two centuries and nearly every nationality of Europe made some contribution. Captain James Cook, who sailed extensively in the Pacific Ocean, initiated Antarctic exploration, when he sailed within the Antarctic Circle, reaching latitude 71° 10′ South in 1772-1775. He was stopped by the enormous ice pack which surrounds the south polar continent. By circumnavigating the earth in high southern latitudes he proved that if land did exist in the vicinity it was in still higher latitudes, and in all probability would be uninhabited and covered with perpetual snow and ice, for even the seas were filled with ice at many places.

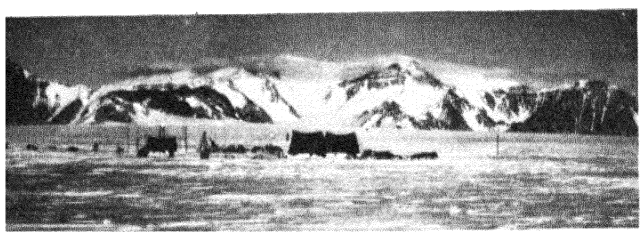


FIG. 234. MT. CZEGKA AND MT. JESSIE O'KEEFE. Most of the mountains of Antarctica are buried under snow and ice. (See Fig. 233.) (Courtesy American Geographical Society)

Early in the nineteenth century sealers began to sail far from their bases in Europe and in the United States, seeking virgin areas for valuable furs. Many of the small islands and island groups within the Antarctic region near the southern extremities of South America and Australia were discovered by seal and whale fishermen. If the islands did not appear immediately upon the maps and charts of the world, it was because these men did not wish the rest of the world to know the location of the richer and newer sealing and whaling waters and lands. In 1820, *Bransfield,* an Irish master mariner in the employ of the British Navy, first sighted the Antarctic Continent.

Since that time there has been a continuous train of discoveries and much exploration, until, today, the configuration of Antarctica is quite well known (Fig. 234). It is interesting to note the methods of exploration and their evolution. At first, the sailing vessel was relied upon and later the steam-powered vessels came, and today, when Admiral Byrd does scientific work in Antarctica, the best modern equipment is employed. The radio, airplane, and telephone are conscripted. The hazards are reduced to a minimum, and thus new knowledge concerning the "bottom of the world" is constantly being added.

Some names that are associated with exploration and discovery in the South Polar Region are *Byrd, Amundsen, Wilkins, Wilkes, Ross, Scott, Bruce, Filchner, Nordenskjold,* and *Charcot.* Amundsen was the first man to reach the South Pole (December 16, 1911) but only one month later (January 17, 1912) Scott duplicated the feat. Within the past decade Wilkins and Byrd have done considerable work in airplane reconnaissance and photography. This has provided a wealth of information to geographers and others who could not go to the South Polar Region for a personal view of the unusual landscape.[1]

THE LANDSCAPE OF ANTARCTICA. It is generally believed by most geographers and other scientists that Antarctica is an old plateau of ancient crystalline rock. It is, in many respects, similar to the Deccan and African blocks, one of the several exposed portions of the earth's surface which has remained relatively stable and consolidated for thousands of centuries. The insular margins, in part, are crystalline and some are evidently volcanic in origin as is indicated by their basaltic quality.

When an explorer visits Antarctica what does he see? Does he encounter rivers, mountains, forests, lakes, and other land forms and water bodies such as are distributed over the rest of the world? On the contrary, most of the landscape phenomena that are significant elsewhere are not visible here. There are no forests, no grasslands, no rivers, and it is only the loftiest peaks that project through the thousands of feet of ice and snow—the perpetual mantle of Antarctica.[2] There is a vast dome of ice over the continent—the accumulation of centuries. This is

[1] Byrd Antarctic Expedition, "Antarctica by Sea, Land and Air," *National Geographic Magazine,* August, 1930, Vol. 58, pp. 158-207.

[2] Roos, S. Edward, Wage, F. Alton, and Blackburn, Quin A., "Some Geographical Results of the Second Byrd Antarctic Expedition, 1933-1935," *Geographical Review,* October, 1937, Vol. 27, pp. 574-614.

the parent material for the icebergs and pack ice which float in the marginal seas. When one realizes that the annual precipitation in Antarctica is only about one foot, the length of time for such an enormous quantity of ice to accumulate almost staggers the imagination.

Here in the Antarctic Region is the home of the whale, the seal, and the penguin, where, as Amundsen has said, howling gales and furious storms roar over thousands of miles of desolate whiteness. The only travelers on "the bottom of the world" are the lonely sealers and whalers, and occasionally, a ship with explorers and great modern airplanes which alone have the power to master the Antarctic and ferret out the secrets which enable men who live in the favored latitudes of the world to learn more of nature and her ways. For example, better weather prediction awaits accurate information relative to the origin, movements, and effects of cold air masses. Polar explorers are gathering this much-needed knowledge.

What lure does the Antarctic hold for men? Is it rich in minerals, or is it a strategic location in peace or war? Or is it the mystery that taunts the explorer and challenges the adventurer to a chilling, daring experience in a land of snow and ice?

APPENDIX A

Climates of the Earth

THE EARTH, as a rotating, revolving sphere, has an inclined axis which at all times is nearly in line with the North Star. These five factors (rotation, revolution, sphericity, inclination of the axis, and parallelism of the axis), together with the irregular arrangement of continents and oceans, and the differences in the altitude of the land (seven factors in all), account chiefly for the uneven distribution of insolation (solar heat) on the earth's surface.[1] These seven factors in combination give rise to seven east-west temperature belts—belts which differ from each other in *mean annual* temperature, in *seasonal range* of temperature, and in temperature *variability* (Fig. 235). A delineation of these belts is the *first step* in the classification of climates. Each belt has a double name. The *first name* has purely temperature connotation, and the *second name* not only includes temperature meaning but also added factors, which involve other climatic considerations.

TEMPERATURE AND CLIMATIC BELTS

A. The Always-Warm or Tropical Belt.[2] This belt lies astride the equator and extends poleward to the isotherms, which indicate an average temperature of 65° F. for the coldest month. These two isotherms mark approximately the poleward limit of frost-free climate. Frost seldom occurs within the tropical belt except at high altitudes.

B. The Warm-to-Mild or Subtropical Belts. These two belts, one north and one south of the equator, cross all the continents except Antarctica. On the equatorward boundary is the always warm or tropical belt, and the poleward limit is the isotherm with an average temperature of 43° F. for the coldest month. This temperature (43° F.) is sometimes called "plant zero," because activities for most plants cease at approximately this temperature. In the subtropical belts, therefore, plant growth may be greatly retarded or entirely stopped for at least one month in the year.

C. The Temperate-to-Seasonal Extremes or Cyclonic Belts. These two belts encircle the middle portion of the northern and of the southern hemispheres and extend poleward to the isotherm of 50° F. for the warmest month. This isotherm marks approximately the poleward limits of tree growth.

D. The Cool-to-Very Cold or Polar Belts. These two belts, one surrounding each pole and extending equatorward to the isotherm of 50° F. for the warmest month, are the cool-to-very cold or polar belts. The limiting isotherm (50° F.) is on the margin of the tundras in the northern hemisphere.

CLIMATIC REGIONS OF THE WORLD

The *second step* in the classification of climates deals with precipitation. Areas within the climatic belts (temperature belts) differ from each other chiefly with reference to rainfall factors, the most important of which are the *mean annual*, the *seasonal distribution*, and the *variability*. The many combinations of temperature and rainfall features within the climatic belts justify the division of each climatic belt into a number of climatic regions. More than three score climatic regions in the world are easily recognizable (Fig. 236).

When careful studies and comparisons of climatic regions are made, certain combinations of temperature and rainfall emerge. These combinations may be called *climatic types* and each type is *representative* of a group of similar climatic regions.

Thus, the climates of the world fall into large zonal

[1] Renner, George T., *Global Geography*, Thomas Y. Crowell Company, New York, 1944, Chapter VI, "The Pattern of Climates," by Earl F. Lackey. These factors are explained in considerable detail in this reference.

[2] The letters (A, B, C, and D) associated with the description of the temperature belts correspond to the letters on the map, Fig. 235.

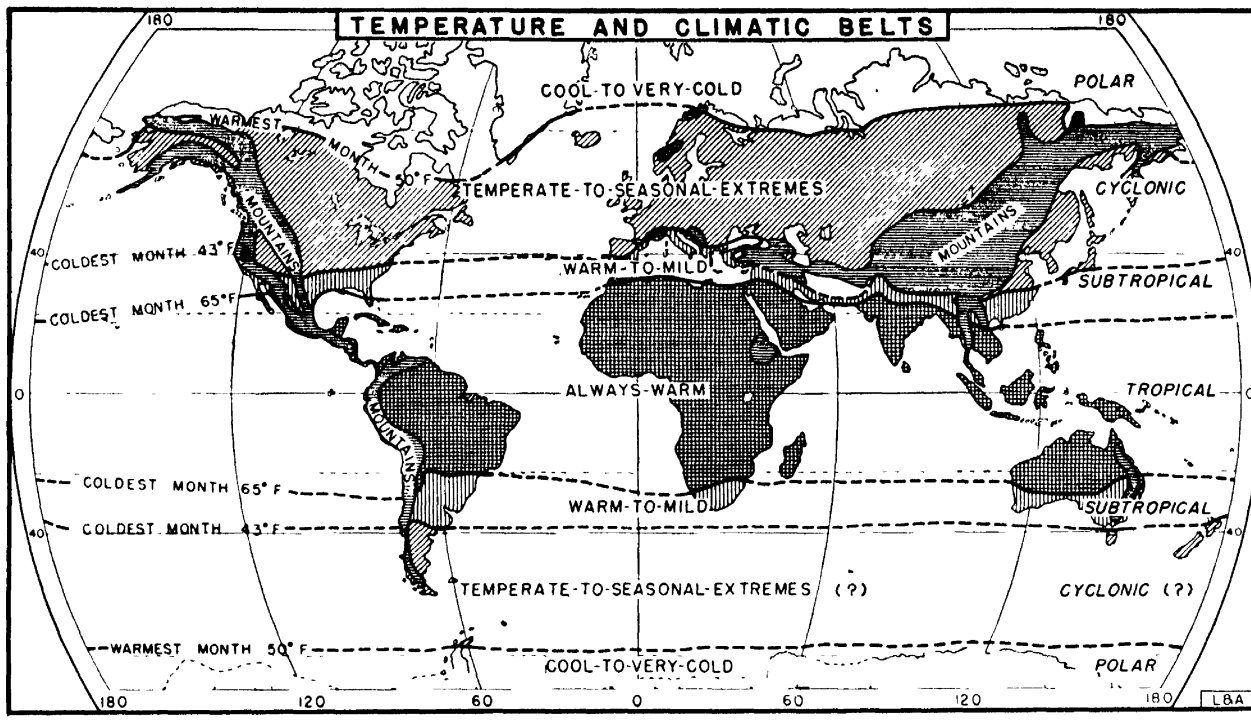


FIG. 235. TEMPERATURE AND CLIMATIC BELTS Note that the irregular trend of the isotherms marks some critical limit in regard to plant life. (See also Fig. 236)

groups corresponding to the distribution of climatic belts, and are designated as (A) *tropical*, (B) *subtropical*, (C) *cyclonic*, and (D) *polar* climates Each of the zonal groups includes several types, which differ from each other chiefly as to rainfall conditions.

(A) Tropical Climates

Tropical climates have relatively high temperatures and are associated with the always-warm temperature belt. Their poleward limits correspond in general with those of the trade winds Contrary to general belief, the average monthly temperatures are not excessively high, usually ranging from 65° to 85° F., except in highland sections where the temperatures are lower on account of the higher altitude. The summer temperatures in daytime quite often reach 100° F., in the drier tropical climates. The seasonal range is relatively small and, with few exceptions, the average temperature of the coolest month is more than 65° F. One can be reasonably sure what the weather will be from day to day and almost from hour to hour, hence the changeableness of the cyclonic belts is not present, but the diurnal ranges in temperature, as a rule, may be greater than the seasonal ranges. Three types are recognizable—namely, the (A_1) *tropical rainy*, the (A_2) *tropical wet and dry*, and the (A_3) *tropical dry*, the last having the arid and semiarid phases.[1] All of these types have continuously warm temperature but they differ from each other in the annual amount and the seasonal distribution of precipitation, which ranges from the always rainy to the always dry. More than *two dozen* climatic regions of the world occur within these three types

A_1. The *tropical rainy* type has no pronounced dry season. The relative humidity generally averages 80 per cent or more and the temperature is nearly the same at all times, therefore, the weather is quite monotonous. The total annual rainfall ordinarily is in excess of 60 inches, whereas in some places it is from 150 to 200 or more inches The typical short, torrential showers followed by brilliant sunshine are favorable for luxuriant growths of vegetation. Tropical broad-leaved evergreen rainforests and jungles characterize the vegetation. The winds usually are relatively light although violent storms sometimes do occur. Regions well-known for this type of climate are the Amazon Basin, the Congo Basin, the Malay Penin-

[1] The index letters, A_1, A_2, A_3, etc., correspond to the key designations on the map, Fig 236

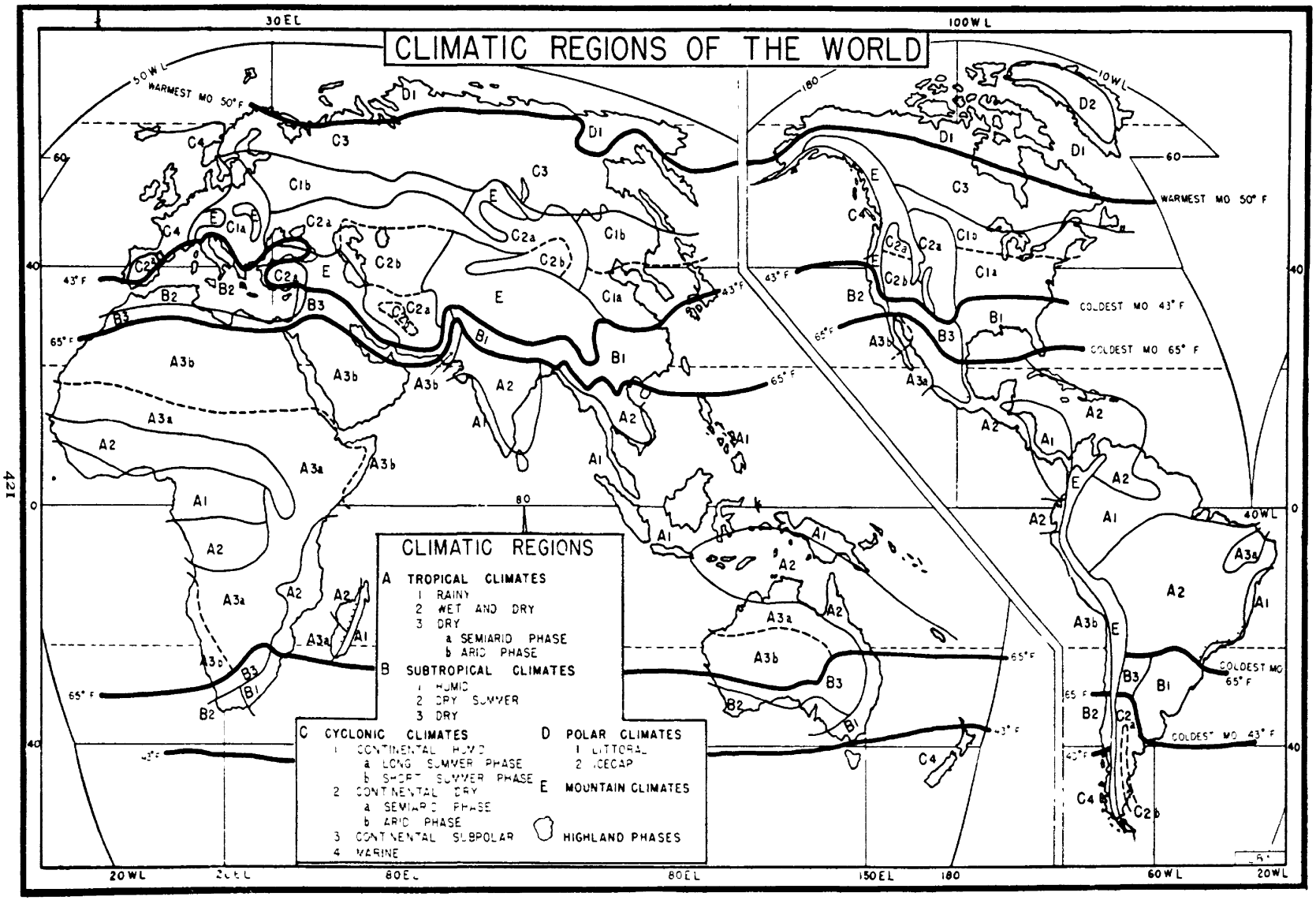


FIG. 236. CLIMATIC REGIONS OF THE WORLD Note that each region is classified as belonging to some climatic type (Arabic numerals) and to some climatic belt (capital letters) (See also Fig 235) (Data integrated from numerous sources)

sula, much of the East Indies, and the eastern coast of Central America.

A_2. The *tropical wet and dry* type differs from the tropical rainy type in that it has a pronounced short dry season. The average annual rainfall is from 30 to 60 inches and the relative humidity is much lower in the dry season. The period of heaviest rainfall is during the time of the year when the midday sun is highest. Because these climates are farther from the equator and because they are in the trade winds part of the year, the seasonal range in temperature is greater than in the tropical rainy areas. Tropical hurricanes and typhoons often occur on the poleward margins of these climates—for example, in the West Indies and the Philippines. Savanna vegetation consisting of tall grasses with clumps of deciduous trees characterizes the native flora. Leaf fall is caused by seasonal droughts rather than by low temperatures. These climates are typical in the southern Sudan of Africa, in much of India, in the Orinoco Basin, on the Brazilian Highlands, in western Central America, and in the West Indies.

A_3. The *tropical dry* type has both the (A_{3a}) *semiarid* and (A_{3b}) *arid* phases, the former with a long dry season of six to nine months, and the latter remaining dry during the entire year or perhaps having a short period with some rain. The average annual rainfall in the semiarid phase (A_{3a}) is usually less than 20 inches but more than 10 inches, and the diurnal temperature range is greater than the seasonal range. The natural vegetation consists of grasslands, shrub, and bush type species with numerous acacias and small cacti. The Kalahari grasslands, the northern Sudan in Africa, and the Australian steppes are representative regions of the tropical semiarid climates. The arid phase (A_{3b}), as a rule, has an average annual rainfall of less than 10 inches and a low relative humidity. Partly on account of the lower humidity and because of the increased latitude, the seasonal and daily changes in temperature in the tropical dry type are much greater than in the more humid tropical climates. The diurnal range in temperature usually is much greater than is the seasonal amplitude (range between the warmest and the coolest month). The vegetation in the arid phase as a whole is scant and consists of xerophytic types such as cacti, scrub plants, and numerous short-lived species which spring up rapidly after showers.

(B) Subtropical Climates

The subtropical climates are in the warm-to-mild temperature belts, approximately, in latitudes 30° north to 40° north and 30° south to 40° south. These are characterized by long warm summers with a frost-free season of from 9 to 11 months, and short, mild winters with short periods when freezes may occur. Although frosts usually are not serious, they sometimes do much damage. The annual amount and seasonal distribution of precipitation vary from less than 10 to more than 60 inches. In some areas the rainfall is quite evenly distributed through the year, in some it comes mostly in summer, and in others it occurs in winter. The subtropical climates are included within the belt where the average temperature of the coldest month is above 43° F. but below 65° F. The winter temperatures in the subtropical climates are usually more severe on the eastern than on the western margins of the continents, because of the "northers" and "southers" which are cold raw winter winds from the continental interiors. This is especially true in the northern hemisphere where there are large interior land masses. The subtropical climates may be classified into three major types—the (B_1) *subtropical humid*, the (B_2) *subtropical dry summer*, and the (B_3) *subtropical dry*.

B_1. *Subtropical humid climates* occur mostly in the eastern parts of the continents between 30° and 40° from the equator. The average annual rainfall of 30 to 60 inches is distributed quite evenly through the year with no pronounced dry season. Southeastern China is an exception because of the well-developed monsoons, and therefore, receives most of its precipitation in summer. Although the temperature conditions are similar for all the subtropical climates, the winter temperatures in the subtropical humid are lower and more variable than in the other types because of the cold polar air masses that may invade the regions from continental interiors. The native vegetation consists of broad-leaved evergreens such as live-oaks and magnolias, narrow-leaved evergreens mostly coniferous trees, broad-leaved deciduous trees such as oaks, hickory, birches, and tall grass prairies. Representative regions are in southeastern United States, southeastern China, the pampas of Argentina, and southeastern Australia.

B_2. The *subtropical dry summer type* (sometimes designated as the dry subtropical or Mediterranean climate) occurs on the west coasts in the same latitudes as the subtropical humid. Most of the average annual rainfall of 15 to 30 inches comes in the winter months when the westerlies prevail. The summers are warm and dry, the rate of evaporation high, and the relative humidity low, conditions which are particularly conducive to the fruit-drying industry. The native flora

consists principally of dry evergreen woodland and scrubland trees. The leaves of such trees are small, tough, leathery, and protected against evaporation by thick skins sometimes covered with fine hairs, or a waxy coating. Deciduous trees which lose their leaves because of drought are also present. The winter vegetation is green with an abundant growth of herbs, grasses, and shrubs; whereas the summer flora, except where irrigated, is brown and parched. Among the most common trees are the cork oak, olive, dwarf palm, oak, and chestnut. The principal regions conforming to this type are in the Mediterranean coastal areas, southern California, central Chilean Valley, and southwestern Australia.

B_3. The *subtropical dry type* occupies the drier sections of the subtropical belts.[1] Differentiation between the arid and semiarid phases of the subtropical dry climate is not attempted because of a lack of rainfall data, sparsity of population, and the nature of land utilization. This combination of climates lies in the warm-to-mild temperature belt, as a rule between the subtropical humid climate on the east coasts and the subtropical dry summer on the west coasts. The average annual rainfall varies from less than 10 inches to about 25 inches. The portions of this type nearest the subtropical dry summer have most rainfall in the winter, and those adjacent to the subtropical humid have a maximum rainfall in summer. In the arid areas the showers are few, scattered, and usually torrential. The vegetation varies from grassland in the more humid section to scattered scrub, cacti, bushes, and mesquite in the arid. Typical areas are in southwestern United States and northern Mexico, in Argentina west of the subtropical humid, in Asia-Minor and eastward across Iran, Iraq, and into Afghanistan, in northern Africa, and in Australia adjacent to representatives of the other two subtropical types.

(C) Cyclonic Climates

The cyclonic climates occupy broad belts in middle latitudes in which temperatures range from temperate to those with large seasonal extremes. The average annual temperatures are lower than in the subtropical climates. Associated with the cyclonic climates are two definite seasons a *frost-free season* and a *frost-probable* (or *frost-certain*) *season*. The former ranges from about seven months on the equatorward margin to the poleward margins where there is no month without its frost hazards. The frost-probable season ranges from about five months on the equatorward margins to the poleward margins where there is danger of frost every month in the year. The cyclonic climates may be classified into two major groups—the *continental* and the *marine*.

The continental group is characterized by pronounced seasonal temperature extremes, ranging from hot summers and cold winters adjacent to the subtropical belt to mild summers and very cold winters on the poleward margin. These climates occur within the interior of the large land masses in middle latitudes, especially in Eurasia and North America.

The marine type of the cyclonic climates is oceanic, and both the winters and summers are mild. These climates occur on the west coasts of the continents in the belts of westerly winds. The climates on the east coast in corresponding latitudes are neither as mild as the marine nor do they have as extreme temperatures as the climates in the continental interiors in the middle latitudes.

The continental group may be subdivided into three types of climate based chiefly upon precipitation. These are (C_1) the *continental humid*, (C_2) the *continental dry*, and (C_3) the *continental subpolar*.

C_1. The *continental humid* type has two phases—namely, the (C_{1a}) *long summer phase*, and the (C_{1b}) *short summer phase*.

C_{1a}. The *continental humid long-summer phase* is adjacent to the subtropical, and it has more than one month with the average temperature below 43° F., and not more than three months with average temperatures below freezing. It is not unusual to have temperatures above 100° F. in summer. The average annual rainfall varies from at least 20 inches in the drier parts to more than 50 inches in the humid sections. From 60 to 75 per cent of the precipitation comes in summer. The natural vegetation consists mainly of broad-leaved deciduous forests in the more rainy sections and tall prairie grasslands in the drier areas. Typical regions of this type of climate include the corn and winter wheat areas in the United States, the west central parts of Europe, and northern China.

C_{1b}. The *continental humid short-summer phase* lies on the poleward margins of the continental humid long-summer phase. The temperatures average below freezing (32° F.) for more than three months and above 50° F. for at least three months. The length of the growing season usually is 90 or more days. The

[1] Some climatologists divide these areas between the continental and the tropical semiarid and arid climates. Since the present classification of climates is based on temperature belts as a first criterion, the arid and semiarid areas between isotherms 65° and 43° F. for the coldest month are classified as subtropical.

daytime average temperatures are not as high as those in the long-summer phase. In North America the annual rainfall varies from 20 inches in the west to more than 40 inches on the Atlantic seaboard. Most of the precipitation falls in summer in the west, but in the east it is quite evenly distributed throughout the year. The vegetation consists principally of coniferous forests mixed with some deciduous hardwoods in the more humid portions and prairie grasslands on the drier margins. Typical areas are found in northern United States and in southern Canada eastward from the 100th meridian to the Atlantic coast, in Manchuria, and in Central Russia.

C_2. The *continental dry* type has two phases—namely, the (C_{2a}) *semiarid phase* and the (C_{2b}) *arid phase*.

C_{2a}. The *semiarid phase* is adjacent to the drier side of the continental humid type and the temperature conditions are similar. The rainfall averages from 10 to 20 inches, most of which occurs in summer. The low relative humidity, the high rate of evaporation, and the moderate to low rainfall are factors which enter into plant growth and efficient land use, and, consequently, crop growing is hazardous. The natural vegetation is composed mostly of mixed tall and short grasses, some sage brush, scattered bunch grasses, and some cacti. Typical areas are in the Great Plains of the United States and in the steppes of southeastern Russia.

C_{2b}. The *arid phase* of the continental dry type is similar to the semiarid phase except that the average annual rainfall is less than 10 inches. The vegetation is sparse and is composed of cacti, thorny bush, mesquite, and chapparal, in some places plants are almost lacking. Principal areas are found in the desert region in Arizona, the Mohave Desert of California, Russian Turkestan, the Mongolian Desert, and the Patagonian Tableland.

C_3. The *continental subpolar* type is on the poleward margins of the cyclonic belt. The annual temperatures are lower than in the continental humid, the seasonal ranges are greater, and as a rule the rainfall is less but usually more efficient because the rate of evaporation is lower. The average temperature of the warmest month on the colder margin is above 50° F., but below freezing everywhere for more than four months of the year, and generally above 50° F. for more than three months on the equatorward margin. In the northern hemisphere the best and most extensive coniferous forests, sometimes called taiga, are located in subpolar climates. Central and eastern Canada, central Alaska, northern Russia, Finland, and much of Siberia have subpolar climates.

C_4. The *marine* type is the most humid of the cyclonic climates, and occurs in the belt of the westerly winds on the west coasts of the continents in the middle latitudes. For this reason, the temperature and precipitation are profoundly influenced by the proximity of the ocean, an influence which is felt far inland if topographic barriers are absent. This is evidenced by the fact that the marine climate extends inland only a short distance in North America because the Coast Ranges and Cascade Mountains are adjacent and parallel to the coast. In Europe, the marine influence extends far into Germany. The seasonal temperature range is generally not more than 40° F. The winters are mild and the summers are cool. Freezing temperatures are not common nor are summer temperatures often in the 90's. The average annual rainfall varies from 20 to 100 inches or more and is quite evenly distributed throughout the year with a tendency toward heavier precipitation in winter. The rainfall is accompanied by much cloudiness and fog and the relative humidity is high at all times. The cyclonic marine climate is almost as temperate as the climate in tropical highlands, but the annual range in temperature in the former, as a rule, is greater.

The native vegetation consists of magnificent coniferous forests of Douglas firs, spruces, hemlocks, redwoods, and some mixed broad-leaved deciduous trees with heavy undergrowths of ferns and shrubs. Typical areas occur in the North American coastal region from Oregon to Alaska, on the western coast of Europe northward to the Arctic Circle in Norway; and south of the equator, regions with this climate are in Tasmania, New Zealand, and along the south Chilean coast.

(D) Polar Climates

The polar climates are in the vicinity of and poleward from the Arctic and Antarctic circles and in the cold-to-very-cold temperature belts. These climates are characterized by continuously low temperatures and relatively low precipitation. In the polar regions the noonday sun is never high. The sun does not rise above the horizon plane during the long winter in portions of the polar belt. The constantly high temperatures in the tropical lands may be a handicap to the people there, but the continuously low temperatures in high latitudes are even a greater hindrance to human occupancy. Polar climates may be classified into two types, the (D_1) *polar littoral,* and the (D_2) *ice cap.*

D_1. The *polar littoral* type extends equatorward from the poles to the isotherm of 50° F. for the warmest month. The winter average temperature is far below freezing. The growing season is extremely short, consequently, the natural vegetation consists of lichens, mosses, algae, and a few scraggly bushes and grasses on the equatorward side. The most extensive areas are in northern North America, along the coasts of southern Greenland, and in northern Eurasia.

D_2. The *ice cap* climate is cold all year. No long-time weather records are available but it is probable that the average annual temperature is about 10° F. with the coldest month more than 40° below zero Fahrenheit. There is no natural flora. The two most extensive areas are in Greenland and in Antarctica.

(E) Mountain Climates

Mountain climates may occur in any latitude because there is a vertical zonation of climate and vegetation in mountains similar to the zonations due to increases in latitude from the equator. In the vicinity of the equator the colder climates occur at much higher altitudes than they do near the poles. Because of the vertical zonation of temperature, people in tropical areas can find temperate places in the mountains where climatic conditions are favorable for human occupancy. In the higher latitudes, however, mountain climates are usually too cold for human inhabitants and for plant growth and consequently are sparsely populated.

APPENDIX B

The Earth's Garment of Vegetation

FROM THE POINT OF VIEW of human utilization the vegetational cover of the earth may be either natural or cultivated. The following brief outline deals only with the natural vegetation. Whether natural or cultivated, the vegetation of the earth may be divided into three major formations, each of which represents an adjustment to a number of environmental conditions.[1] The three major groups are (1) *forests and woodlands*, (2) *bush and scrub*, and (3) *grasses*.

THREE MAJOR FORMATIONS OF VEGETATION

FORESTS AND WOODLANDS FORMATIONS. Forests consist of the largest forms of plant life. As a rule, conditions for tree growth are more exacting than those for grasses or shrubs, especially while the trees are young. However, trees have such a wide range of adaptability that forests are found in latitudes even beyond 60°. In the tropics continuous growth is possible, but in the middle or high latitudes the cold of winter produces a period of dormancy. In the low latitudes a dormant period may synchronize with a season of low rainfall. At any rate, wherever forests occur the trees have a way of surviving most seasons which are unfavorable for growth.

BUSH AND SCRUB FORMATIONS. In areas where the rainfall is scanty or the temperatures are low, the unfavorable conditions are so nearly continuous that plants have but little opportunity for growth. Under such conditions trees are crowded out by the bushes and scrubs. These plants have a kind of adaptability not possessed by trees. The hard and shiny leaves of some scrub plants and the soft furry cover on others make the plants quite drought resistant, and prickly leaves, spines, and thorns may protect them from the ravages of animals.

GRASSLAND FORMATIONS. Grasses and their nongrassy herb associates (forbs) have a greater range of adaptability than either trees or scrubs because they do not require as much rainfall. Grasses and forbs are both annuals and perennials. Where the plant itself may not be able to withstand the unfavorable season, it is able to project its kind beyond the critical period by producing seed which can survive. Some of these plants known as *annuals* grow and mature seed in just a few weeks, or they grow and die each year. Other plants called perennials, although unable to live aboveground during the drought or cold periods, are able to live underground and send up new plants when the critical period has passed. Grasses and forbs have a much wider distribution over the earth than have either trees or shrubs because they are better able to adjust their requirements to adverse climatic conditions.

Two major root systems prevail among the grassland plants. (1) In most of the grasses, the roots are near the surface, are fibrous, much branched, and spread horizontally in every direction, thereby enabling them to absorb any moisture available from light or from heavier showers. (2) Many of the forbs have long, penetrating tap roots which extend deeply into the ground where they not only can use the soil moisture to the fullest extent but they also help to anchor the plant. The latter factor is particularly important in windy deserts. Some grassland plants have a combination of these two rooting systems.

NATURAL VEGETATION REGIONS OF THE WORLD

The adjustment of the three major formations of plant life to the large variety of climatic conditions in the world makes it possible to divide the natural

[1] Weaver, J. E., and Clements, F. E., *Plant Ecology*, McGraw-Hill Book Company, New York, 1938, Chapter 18, Finch, V. C., and Trewartha, G. T., *Elements of Geography, Physical and Cultural*, McGraw-Hill Book Company, New York, 1942, Chapter 23.

flora into vegetation regions in each of which a considerable uniformity of plant life exists. Plant regions synchronize so well with corresponding climatic conditions that if either is known the other can be predicted with considerable accuracy. The following broad classification of vegetation regions will satisfy for purposes of this discussion, but it should be remembered that the generalizations are very broad and that the specialist in plant geography would want to consider all aspects of this discussion in much more detail [1] (Fig. 287.)

1. Tropical Forests. In the tropical rainy climates the luxuriant forests consist mostly of broad-leaved evergreens which rise to great heights, often 100 feet or more, and many twining lianas and vines. The upper canopy of these dense forests is so thick that little sunlight penetrates and hence not much undergrowth is possible. In texture, the woods of the tropical rain forests are usually uniform because of the all-year growing periods without any pronounced drought season. Hundreds of species occur, among which are numerous oil and coconut palms and many nut, gum, and mangrove trees, and the giant grass, bamboo. The tropical rain forests are abundant in the Amazon and Congo basins, in the East Indies, and in Malaya.

On the drier margins of the tropical rainy regions and in tropical areas with a long rainy season the closely woven rain forests give way to moderate-sized and smaller trees. In these regions the inter-tree spaces are so crowded with intermixed tall grasses, shrubs, and vines, that human penetration is almost impossible. In fact it is more difficult to travel through these jungles than through the tropical rain forest. The dry season causes many of the trees to be deciduous. Tropical agriculture thrives best in regions of lighter tropical forests and savannas. Teak-woods, spice trees, such as cinnamon, pepper, ginger, camphorwood, tea trees, and bamboo are numerous. This type of vegetation is found in Ethiopia, southeastern Brazil, in the lower Ganges plain, in much of Indo-China and Burma, and in some sections of Central America.

2. Savanna and Scrub. Tropical savanna and scrub lands occupy larger areas in the world than do the tropical forests. In general, these regions coincide with the drier phases of the tropical wet and dry climates. The tropical scrub forest trees are usually deciduous broad-leaved, and the leaves are often leathery in texture. Dense thickets, grading into open park-like growths of low, stunted trees and thorny shrubs, give way to coarse grasses, which are green in the wet seasons but leafless and brown during the dry periods. The savannas vary from dense jungles of mixed growths of trees and tall grasses in the more humid sections to park-like areas with shorter grasses, clumps of deciduous trees or scattered stands which persist as outposts of the forests. The acacias of Africa and the mimosas of tropical America are among the most abundant trees of the tropical scrub forest.

The grasses are unusually coarse and tall, varying in heights from 4 to 10 or more feet, and the majority of them have tough, harsh blades, some leaves even having sharp, serrated edges. These areas are the big game hunters' paradise, for here is the rendezvous of such animals as the elephant, the hippopotamus, the leopard, the lion, the giraffe, the gazelle, the antelope, and the zebra. On the drier margin the savanna and scrub lands are generally not good for farming, but grazing is usually the leading industry—cattle of an inferior grade as a rule being raised.

The most wide-spread savannas and scrub forests are in Africa from Senegal in the French Sudan eastward to the Anglo-Egyptian Sudan, thence into the lake country and across the Zambezi area westward to the Atlantic Coast. A large area occurs in Brazil and Bolivia south of the Amazon rain forests and some small sections are located in the Guianas and Venezuela. Northern Australia also contains large areas of savanna and scrub forest lands.

3. Broad-leaved and Mixed Forests. These forests have a wide distribution, occurring in climates both subtropical and cyclonic. Almost pure stands of broad-leaved deciduous forests of oak, hickory, birch, beech, maple, and poplar, and mixed forests of broad-leaved deciduous trees and conifers originally covered extensive areas in continental humid climates, both in North America and in Eurasia.

In the subtropical humid climates are mixed forests of broad-leaved deciduous trees and such conifers as the white, the yellow, and the loblolly pines, the cypress, and also some of the hardier broad-leaved evergreens, such as live-oaks and magnolias. Southeastern United States, southern Japan, southeastern China, and southeastern Australia have this type of vegetation.

In the regions of subtropical dry summer, the winter is the growing season and the dormant period is during the warm summers. Here occur the dry forests of small, broad-leaved evergreen trees and bushes most of which have hard, thick, coriaceous leaves, so constructed as to resist evaporation. Trees usually grow in open expanses. Among the trees that thrive in this habitat are the cork oak and the olive with

[1] The following index numbers correspond to the key designations on the map, Fig. 287.

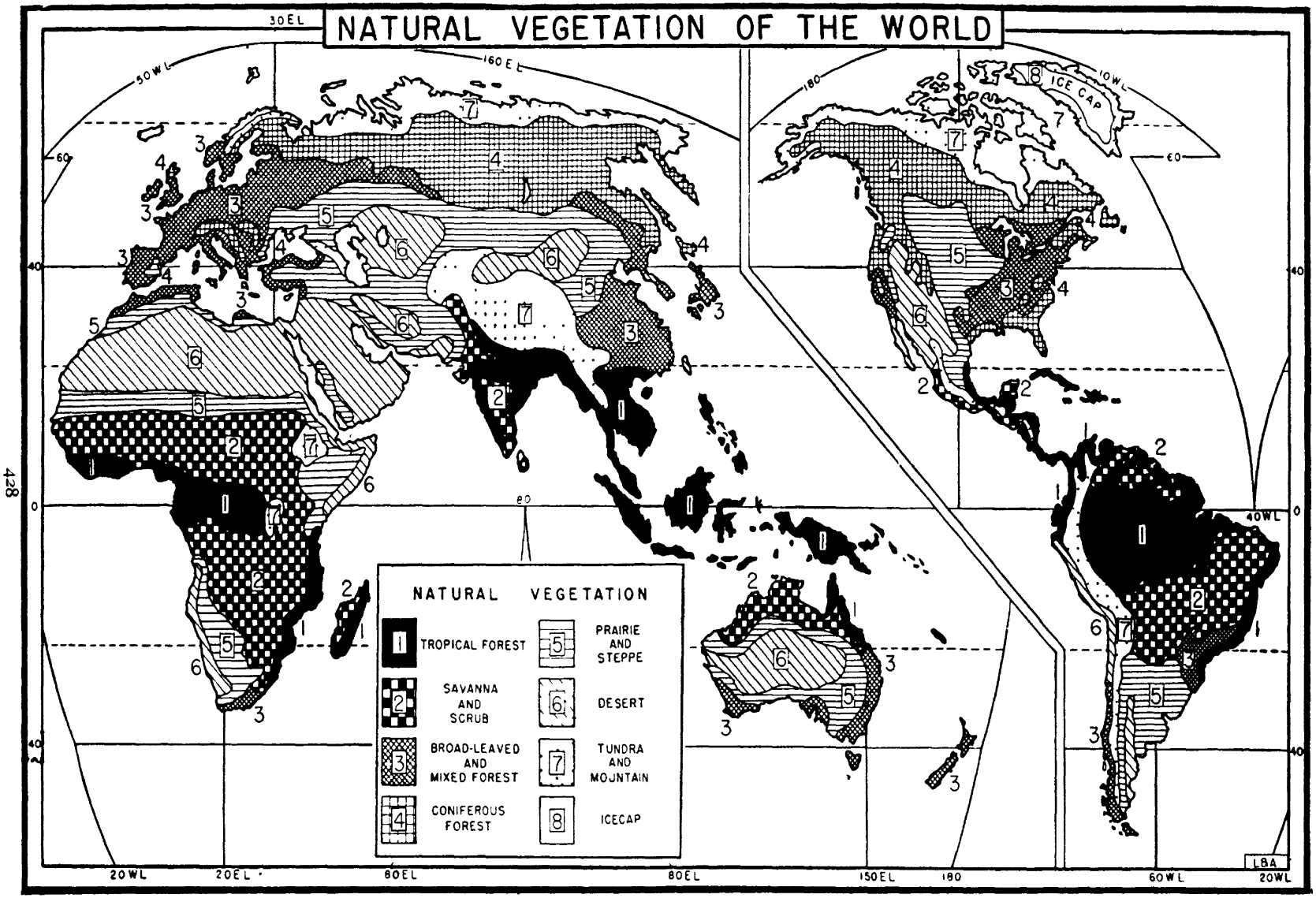


FIG 237. NATURAL VEGETATION OF THE WORLD. The various types of vegetation are responses in general to climatic factors of which variations in temperature and precipitation are the most important. (After Hardy and others)

their massive trunks, gnarled branches, and leathery leaves, and the laurel, the holly, and some live-oaks. California, Chile, the Mediterranean lands, and southern Africa and Australia have this type of vegetation.

4. Coniferous Forests. The most extensive coniferous forests, often called taiga, occur in the vicinity of 50° to 60° north latitude in Eurasia and North America, and are associated rather closely with the continental subpolar climates and the podsol soils. These forests are coniferous formations of such trees as spruce, fir, pine, hemlock, and larch, together with some deciduous species as the aspen, balsam, poplar, and birch which occupy the lower and swampier sections.

Because the frost-free season is short the trees grow slowly. As a rule the trees are high in pitch content and for this reason are extremely inflammable. This accounts in part for the destructive fires that so often sweep through the taiga forests. For centuries taiga lands have furnished the world with its major supply of furs.

The northern coniferous forest constitutes one of the world's largest reserves of lumber and pulpwood but, because of the slow growth of trees and the human tendency to be avaricious, these resources need to be guarded jealously.

Coniferous forests are also quite extensive in the warmer middle latitudes where the trees are generally larger than in the colder areas. Middle latitude stands occur in the sandy soils of the coastal plains, the Pacific northwest, Rocky Mountains, Wisconsin, Michigan, New York, Appalachian Mountains, and southern New England.

5. Prairies and Steppes. The prairies and steppes are essentially grasslands associated with numerous non-grass herbs (forbs). Usually only a few trees appear which grow along the water courses. The prairies are an association of tall, nutritious grasses and forbs, growing on the more humid margins of the semiarid tropical, subtropical, and continental climates where the rainfall ranges from 20 inches to 40 inches. The sod of the prairies is unusually dense and tough—so tough that many pioneers constructed their houses of slabs of sod—and farming activities awaited the coming of the sharp steel plow. The deep, fertile soil in the prairie areas and the adequate rainfall enticed the pioneer agriculturalists in North America so persistently that now the former prairie grasslands are occupied by extensive fields of corn, wheat, oats, cotton, and numerous other crops.

The drier grasslands, known as steppes or sometimes as short grass prairies, occur in areas with less than 20 inches of rainfall, the amount of precipitation needed depending chiefly on latitude and altitude. The steppes consist of short grass and forb species, varying in quality from tufted, hard, wiry varieties to the soft, fine, velvety mat, formed by such plants as the buffalo, grama, and bunch grasses. Grazing animals relish some of the forbs as much or more than they do the grasses. The steppes are essentially pasture lands, the rainfall as a rule being so low that farming is precarious. Important regions of steppe or short grass lands are found in the Great Plains in North America, the Pampas area of South America, the famous steppes of southern Russia, and the large tropical areas in Africa and Australia.

6. Deserts. Deserts are widespread over the earth, occupying probably as much as one sixth of the land surface. Their extent, in general, is coincident with areas of low rainfall (10 or less inches), high evaporation, low humidity, and gray soils. Comparatively level lands in the trade winds, large sections in the subtropical belts of high pressure, and considerable areas on the leeward sides of mountains qualify climatically as deserts.

Although the vegetation of deserts is usually sparse, yet there is a large and diversified flora consisting of plants with special adaptation for their desert habitat. Many desert plants live mostly underground. Hundreds of species grow rapidly, bloom, and produce seeds during the short rainy seasons. Among the more hardy perennials are the cacti, sage brush, creosote bush, mesquite, and bunch grasses.

On the whole the desert has a peculiar weirdness with which most people are unfamiliar—an appearance which charms as one contemplates the remarkable adaptations of plants with their fuzzy or leathery leaves, their fat, hairy stems, their protective spines and thorns, and their uncouth aspect as compared with plants that are more familiar to us.

7. Tundra and Mountain. Tundra vegetation occurs chiefly in the regions of polar littoral climates and tundra soils. These areas are too cold for trees. The vegetation consists of some grasses, sedges, low tundra bushes, lichens, mosses, and algae on the warmer margin, and only the so-called sphagnum "moss" farther poleward. This "reindeer moss" is in fact fluffy, leathery lichens which grow especially in the tundras of North America.

Human occupancy in the tundras depends entirely on the ability of the people to utilize animals, such as the reindeer, the muskox, and the caribou, that live on the limited vegetation.

In high mountain lands the low temperature favors

the tundra types of vegetation, and it is here where transhumants utilize the mountain pastures in summer and migrate with their animals to the low adjacent valleys or plains for winter.

8. Icecap. The icecaps of Greenland and Antarctica are nearly devoid of vegetation, not only because of low temperature but also because of lack of plant food materials, and the fact that water is not available—the supply being continually congealed (frozen). These are indeed truly deserts because they are cold and dry, neither warmth nor moisture being available for plant growth.

APPENDIX C

Mature Soil Groups of the World

THE WORK that has been done in delineating soil regions of the world depends almost wholly on a knowledge of climate and vegetation, and therefore must be understood to be tentative, contingent on careful surveys that eventually will be made.[1] Any mapping of soil regions, covering areas that have not been examined in considerable detail, assumes that the soils are mature and, therefore, does not take into account those areas where the soil is youthful, abnormal, or poorly drained (Fig 238). For example, across the chernozem belt of North America flow many rivers -the Niobrara, Platte, Missouri, Kansas, Canadian, Arkansas, and others Along each of these streams and their almost countless tributaries are strips of youthful alluvial soil. In poorly drained areas, such as some of the old lake beds in Minnesota, or the recently emerged coastal plains of Virginia, the soils lack the normal horizon features. Such relatively small soil areas do not appear on the large, generalized soils map

DIVISIONS OF MATURE SOILS

The presence or absence of lime in the well-drained soils depends in a large measure on the amount and the seasonal distribution of rainfall the area receives. In temperate areas where the rainfall is usually more than 25 inches, and in tropical lands with more than 40 inches, the surface soil may lose practically all of its lime (calcium carbonate.) Such soils are called *non-lime-accumulating soils* or *pedalfers* (soils with aluminum and iron accumulations) [2]

In areas of rainfall less than 25 inches in the cyclonic belt and less than approximately 10 inches in the tropical regions, the percolating waters may return to the surface by capillarity, or may be lost from the soils through evaporation or by transpiration from plants, thus leaving accumulated layers of lime Soils of this kind are known as *lime accumulating soils* or *pedocals* (soils with calcium carbonate accumulations).

Pedalfers

The pedalfers may be divided into six broad groups, each covering large areas and deserving considerable attention.

1 LATERITE SOILS.[3] These soils develop in well-drained tropical rainy regions where the litter of leaves, vines, and other plant materials under the forest cover decomposes rapidly, giving the soil water a slight acid reaction. Under these conditions there is a deficiency of lime and humus because these materials, as well as other elements of fertility, are removed from the soil by leaching Laterite soils under normal conditions are also deficient in *potash* and *phosphorus*, and hence they are classed as *poor* soils They absorb water very rapidly, but with little or no expansion and can be plowed immediately after heavy rains Because of their usually high porosity, lateritic soils are also subject to drought Laterites predominate in the rainy tropics and, therefore, large areas are found in the Amazon and Congo basins

2. RED AND YELLOW SOILS The red and yellow soils are lateritic soils, or those in which the laterization process has become very evident but has not reached completion. Soils of this type occur chiefly in those parts of the tropics where there is a long rainy season and in which the savanna type of vegetation predominates, and in the subtropics having mixed coniferous and deciduous forests The color combination indicates a considerable loss of silica and an accumulation of iron and aluminum compounds. The red and yel-

[1] Kellogg, Charles E, *The Soils That Support Us*, The Macmillan Company, New York, 1941

[2] White, C. L., and Renner, G. T., *Geography, An Introduction to Human Ecology*, D Appleton-Century Company, New York, 1936, pp 405-422

[3] The numbers associated with the various soils correspond to the numbers on the map Fig 238

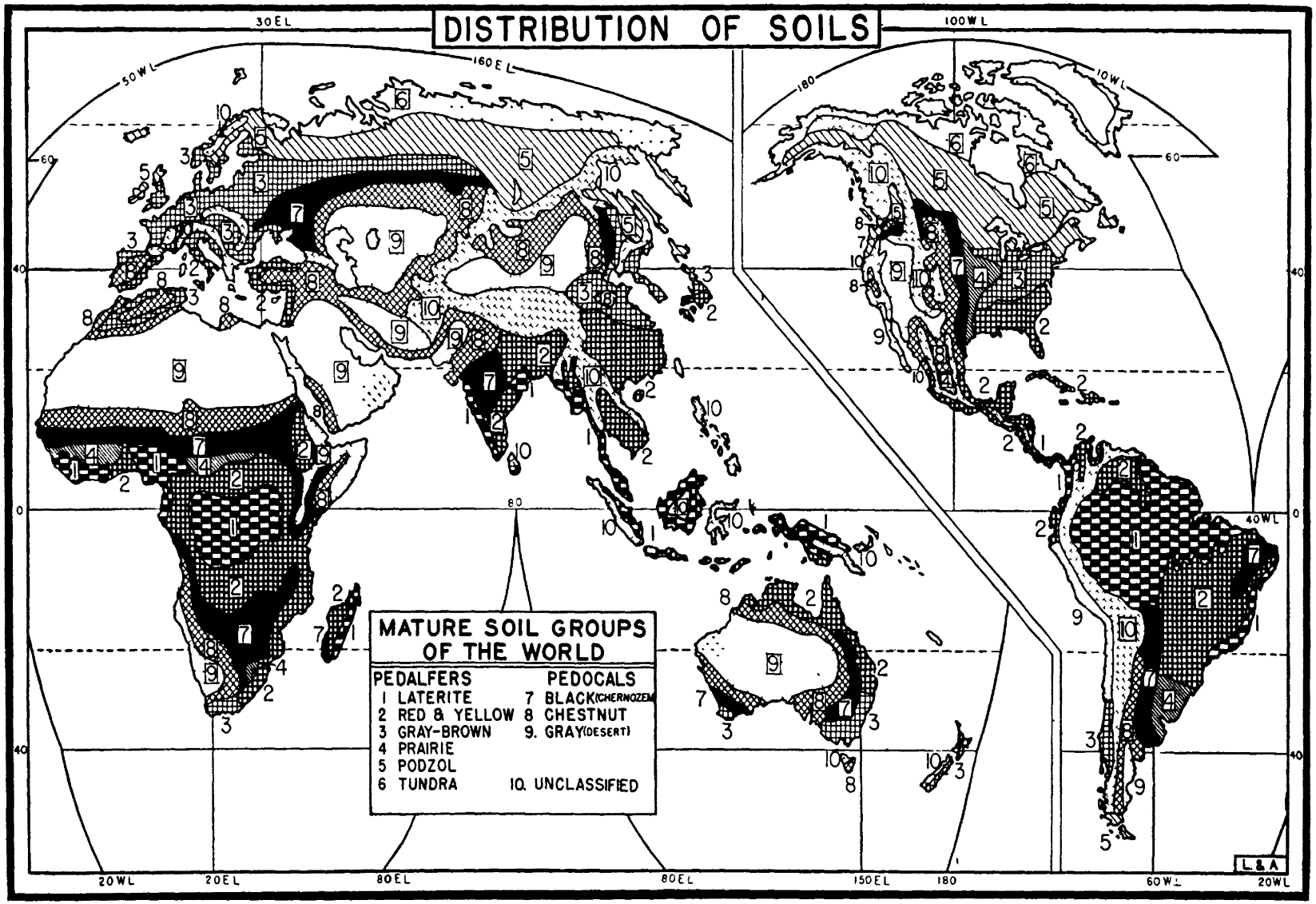


FIG 238 DISTRIBUTION OF THE MATURE SOILS OF THE WORLD There are close correlations between this soils map and those showing temperature, precipitation, and natural vegetation. (After Glinka, Marbut, Stremme and others, "Soils and Men," *Yearbook of the United States Department of Agriculture*, 1938, p. 865)

low soils are low in nitrates, potash, lime, and phosphorus. For this reason, fertilizers and careful management are essential if soil deterioration is to be prevented. Soils of this type are found extensively in southeastern United States, in Brazil, in southeastern Asia, and in south central Africa.

3. Gray-brown Soils. The gray-brown soils develop under conditions of the continental humid climate where the summers are long and also in the marine climate. The rainfall is relatively high—40 inches or more. As a rule, broad-leaved deciduous or coniferous forests are native in regions of the gray-brown soils. They are representative of conditions in which leaching of minerals is not complete although nearly all of the lime has been removed. Continuous cropping of gray-brown soils requires careful management and frequent additions of fertilizer and lime. As a rule the rainy season synchronizes so well with the growing season and is so dependable that little irrigation is necessary. On the whole these soils produce much small grain—wheat, oats, barley, rye—and an abundance of potatoes, vegetables, fruits, hay, and grasses. Typical areas are in northern United States from the Mississippi River to the Atlantic Coast, much of the interior plains region of Europe, and in southeastern Australia.

4. Prairie Soils. In North America the prairie soils have developed near the middle of the Central Lowland where the annual rainfall is from 25 to 35 inches. The prairie soils, dark brown in the south but black in the north, are among the richest soils in the world and formerly possessed a rich cover of luxuriant grass which early gave way to the pioneer's plow. They have little or no lime, but are of good structure and tilth and rich in essential minerals. These soils constitute large areas in the heart of the great American Corn Belt, in the Argentine Pampas, in the Russian and Siberian steppes, and in the southern Sudan.

5. Podzol Soils. The podzol soils are found in the cool moist areas of the upper middle latitudes—for example, in central and southeastern Canada and New England and in northern Eurasia. Coniferous forests formerly covered, and to a large extent still cover, these regions. The mature soils of podzol areas are whitish or gray in color. The litter on the surface decomposes slowly and the acid waters percolating through the soil almost completely remove the soluble minerals. The podzols are classed as poor soils. Successful farming depends on the addition of much lime and fertilizer.

6. Tundra Soils. Tundra soils occupy the Arctic coastal lands of North America, Eurasia, and much of the high mountain and plateau lands of the world. The surface soil is frozen most of the year, the subsoil being continually frozen in much of the tundra and alpine lands. Mosses, lichens, and grasses constitute the chief vegetation. Land utilization under these conditions is reduced to a low level.

Pedocals

Pedocalic soils develop in regions of arid, semiarid, or subhumid climate. The most extensive areas of pedocalic soils are those of moderate to low rainfall varying from less than 25 inches in the cyclonic climates to 40 or less inches in the tropics. They are characterized by an accumulation of lime carbonate as well as magnesium carbonate and evolve under a brush, short grass, or desert cover of vegetation. These soils are basic in their chemical reaction and under mature conditions are three in number, the *black soils*, the *chestnut soils*, and the *gray soils*.

7. Black Soils (Chernozems). The chernozems are black soils evolving in both tropical and middle latitude climates; in the latter where the temperatures are high in summer and the rainfall ranges from 15 to 25 inches, and in the former where precipitation is somewhat higher. The native vegetation is tall grass, most of which in continental areas has succumbed to the pioneer's need for farm land. The abundance of organic matter, especially grass roots, gives these soils their dark color in the upper 1 to 2 or more feet. They are the best soils in the world for crop production when rainfall is sufficient and properly distributed or irrigation is possible. The chief difficulty with the black soil is the seasonal rainfall variability which sometimes plays havoc with crops. Representative regions of chernozems are found in North America in a north-south belt extending from Alberta and Saskatchewan in Canada to the west coast of the Gulf of Mexico, in the famous black prairie of southern Russia, and in the central Sudan of Africa.

8. Chestnut Soils. The latitudinal distribution of these soils is similar to that of the chernozems. In middle latitudes the chestnut soils develop where the annual rainfall is from 10 to 15 inches, and in the tropical belt where it rains a little more—say from 15 to 20 inches. Short grass is the prevailing vegetation. These soils have little or no free lime at the surface but in some places the brown horizons are calcareous in their lower portions. Only a small amount of humus accumulates but the chestnut soils are rich in plant food elements and produce bountiful crops when sufficient rain falls. The drier portion furnishes poor pasturage. Good crops are grown under irrigation.

Chestnut soils occur in North America just east of the Rocky Mountains from Canada into Mexico next to the drier margin of the chernozems, in the California Valley, in much of the semiarid parts of Eurasia, and in eastern semiarid Australia.

9. Gray Soils. The lime zone in gray soils is at or near the surface which usually is loose and powdery. These are true desert soils and vary in color from light brownish gray in the temperate regions to reddish in the tropical and subtropical regions. Due to the scant vegetation, the humus content of the soils is very low. These are the least productive soils of the pedocalic group, chiefly because of low rainfall. Typical areas of these soils are in the Basin and Range Region of the United States, in the Mohave Desert of California, in the Australian desert, in the Sahara-Arabian desert, and in the great deserts of central Eurasia.

Unclassified or Undifferentiated Highland Soils

These soils are found in areas of steep, rocky, and broken lands mostly in mountains. They do not have a well-developed profile and therefore are mostly young soils. On mountain slopes there may be some mature soils which correspond roughly to the climatic and vegetational zonation but these areas are too small to be indicated on a general soils map of the world.

APPENDIX D

Measures of the Spread of Precipitation

MEANS, MEDIANS, AND PERCENTILES. The most used measure of precipitation is the *mean*, or average, and the usual measures of departure from the *mean* are the *maximum* and *minimum*—the spread in rainfall between the last two being known as the *range*. Another good measure of central tendency is the *median* (50 percentile). The *quartile deviations* (25-percentile or Q_1, and 75-percentile or Q_3) are measures associated with *departure* (spread) from the median. The median annual rainfall as a measure of central tendency always has just as many years above as below it. This is scarcely ever true of the *mean*. The *quartile deviations* as measures of *departure* from the median show the amount of precipitation or more that has fallen during 25% and 75% of the years in the record.

For example, in a 46-year period (1885-1930) at Calgary, Alberta, the median is 15.3 inches which indicates that the rainfall was above 15.3 inches during 23 of the years and below during 23 years. During the same 46 years, however, the rainfall exceeded the mean (16.5 inches) 19 times, and fell below the mean 27 times. In studying trends in rainfall, the median and quartile deviations indicate not only what the chances for rainfall are one half (50%) of the time, but also what the chances are for one fourth (25%) of the time and three fourths (75%) of the time.

EVENNESS (E) OF RAINFALL. The following is the average rainfall by months at Calgary:

January	0.4 in.	July	2.6 in.
February	0.6 in.	August	2.6 in.
March	0.8 in.	September	1.2 in.
April	0.7 in.	October	0.5 in.
May	2.5 in.	November	0.7 in.
June	3.1 in.	December	0.5 in.

The percentage of evenness[1] (F) of rainfall by months at Calgary is 55. If the amount of rainfall had been exactly the same for each of the twelve months, E would have been 100%. If all the rainfall had come in any one month with none during the other eleven, then E would have been 0%. The formula for this calculation is:

$$E = \frac{2C - P}{P \times N}$$

in which E is the percentage of evenness, P is the cumulative sum of the rainfall by months (in other words, the annual), C is the sum of the twelve accumulated sums in P, and N is the number of months (12).

DEPENDABILITY (D) OF RAINFALL. The percentage of rainfall dependability (D) at Calgary is 57. If the precipitation had been exactly the same during each of the 46 years then the difference between Q_1 and Q_3 would be 0, and the dependability (D) would have been 100%. If the difference between the first (Q_1) and third (Q_3) quartiles were equal to the median (Mdn), then the D would be 0%. The formula involves only the quartile deviations and the median. Thus,

$$D = \frac{Mdn}{Mdn} - \frac{(Q_1 - Q_3)}{Mdn}.$$

The computation is similar to that for variation found in books on statistical methods.[2]

[1] Wright, John K., "Annals of the Association of American Geographers" December, 1937, Vol. 27, pp. 177-211.

[2] Croxton, F. E., and Cowden, D. J., "Practical Business Statistics," Prentice-Hall, New York, 1937, pp. 217-219. In this reference the *standard deviation* is used instead of the *quartile deviation*, and the *mean* instead of the *median*.

APPENDIX E

Some General References

Atlases

Goode, J. Paul, *School Atlas,* Rand McNally and Co., Chicago, 1943.

Harrison, Richard Edes, *Look at the World,* Alfred A. Knopf, New York, 1944.

MacFadden, Clifford H., Kendall, Henry Madison, and Deasy, George F., *Atlas of World Affairs,* Thomas Y. Crowell Company, New York, 1946.

Philips, George, and McConnell, W. R., *Modern School Atlas,* D. Appleton and Company, New York, 1928.

Raisz, Erwin, *Atlas of Global Geography,* Harper and Brothers, New York, 1944.

Scenery-Type Maps

James, Preston E., *Outlines of Geography,* Ginn and Company, New York, 1943. Some excellent scenery-type maps of sections of Asia are available in this book.

Lobeck, Armin K., *Physiographic Diagram of United States,* The Geographical Press, New York, 1943 (wall and desk sizes)

Lobeck, Armin K., *Physiographic Diagram of Europe,* The Geographical Press, New York, 1944 (wall and desk sizes).

Lobeck, Armin K., *Physiographic Diagram of Asia,* The Geographical Press, New York, 1945 (desk size).

Lobeck, Armin K., *Physiographic Diagram of Africa,* The Geographical Press, Columbia University, New York, 1946.

Raisz, Erwin, *Land Forms of the United States,* Institute of Geographical Exploration, Cambridge, Mass., 1939.

Smith, Guy-Harold, *Physiographic Diagram of South America,* The Geographical Press, New York, 1935.

Yearbooks

Agricultural Statistics, United States Department of Agriculture, Washington, D. C. Secure copy for latest year available from Superintendent of Documents.

Foreign Commerce Yearbook, United States Department of Commerce, Washington. Secure for latest year available from Superintendent of Documents.

Minerals Yearbook, United States Department of Interior, Washington. Secure copy from Superintendent of Documents.

Statistical Abstract of the United States, United States Department of Commerce, Washington. Secure copy for latest year from Superintendent of Documents.

Reference Books on Systematic Geography

Bengtson, Nels A., and Van Royen, William, *Fundamentals of Economic Geography,* Prentice-Hall, Inc., New York, 1942.

Case, Earl C., and Bergsmark, Daniel R., *College Geography,* John Wiley and Sons, Inc., New York, 1940.

Davis, Darrell H., *The Earth and Man,* The Macmillan Company, New York, 1942.

Finch, Vernor C., and Trewartha, Glen T., *Elements of Geography, Physical and Cultural,* McGraw-Hill Book Company, New York, 1942.

Huntington, Ellsworth, *Principles of Human Geography,* John Wiley and Sons, Inc., New York, 1940.

James, Preston E., *Outlines of Geography,* Ginn and Company, New York, 1943.

Klimm, Lester F., Starkey, Otis P., and Hall, Norman F., *Introductory Economic Geography,* Harcourt, Brace and Company, New York, 1940.

Renner, George T., and Associates, *Global Geography,* Thomas Y. Crowell Company, New York, 1944.

White, C. L., and Renner, George T., *Geography, An Introduction to Human Ecology*, D. Appleton-Century Company, Inc., New York, 1936.

Some Reference Books on the Continents

North America

Atwood, Wallace W., *The Physiographic Provinces of North America*, Ginn and Company, New York, 1940.

Fenneman, Nevin M., *Physiography of Western United States*, 1931, and *Physiography of Eastern United States*, 1938, McGraw-Hill Book Company, New York.

Jones, Rodwell, and Bryan, P. W., *North America*, Lincoln MacVeagh, The Dial Press, New York, 1929.

Miller, George J., and Parkens, Almon E., *North America*, John Wiley and Sons, Inc., New York, 1928.

Smith, J. Russell, and Phillips, M. Ogden, *North America*, Harcourt, Brace and Company, New York, 1940.

White, C. L., and Foscue, Edwin J., *Regional Geography of Anglo-America*, Prentice-Hall, Inc., New York, 1943.

South America

Carlson, Fred A., *The Geography of Latin America*, Prentice-Hall, Inc., New York, 1943.

James, Preston E., *Latin America*, The Odyssey Press, Inc., New York, 1942

Jones, Clarence F., *South America*, Henry Holt and Company, New York, 1940.

Platt, Robert S., *Latin America, Countrysides, and United Regions*, McGraw-Hill Book Company, Inc., New York, 1942

Shanahan, E. W., *South America*, Methuen and Company, Ltd., London, 1927.

Europe

Blanchard, Raoul, and Crist, Raymond E., *A Geography of Europe*, Henry Holt and Company, New York, 1934.

Blanchard, W. O., and Visher, S. S., *Economic Geography of Europe*, McGraw-Hill Book Company, New York, 1931.

Bogardus, J. F., *Europe*, Harper and Brothers, New York, 1934.

Hubbard, George D., *The Geography of Europe*, D. Appleton-Century Company, New York, 1937.

Lyde, Lionel W., *The Continent of Europe*, Macmillan and Co., Ltd., London, 1924.

Van Valkenburg, Samuel, and Huntington, Ellsworth, *Europe*, John Wiley and Sons, Inc., New York, 1935.

Asia

Bergsmark, Daniel R., *Economic Geography of Asia*, Prentice-Hall, Inc., New York, 1935.

Cressey, George B., *Asia's Lands and Peoples*, McGraw-Hill Book Company, Inc., New York, 1944.

Stamp, L. Dudley, *Asia, An Economic and Regional Geography*, E. P. Dutton and Company, Inc., New York, 1929.

Africa and Australasia

Beaver, Stanley H., and Stamp, L. Dudley, *Africa, A Regional Geography*, Longmans, Green and Co., New York, 1934.

Fitzgerald, Walter, *Africa, A Social, Economic and Political Geography*, E. P. Dutton and Company, Inc., New York, 1933

Gregory, J. W., *Africa, A Geography Reader*, Rand McNally and Company, New York, 1928

Stamp, L. Dudley, *Australia and New Zealand*, Longmans, Green and Co., London, 1943

Taylor, Griffith, *Australia*, E. P. Dutton and Co., Inc., New York, 1943.

APPENDIX F

SOME IMPORTANT MINERAL RESOURCES OF THE WORLD

(Expressed in Percentage of World Totals)

Continents and Countries	Land Area 55,585,000 sq miles	Population 2,115,800,000 (estimate)	Aluminum (1943) 2,233,039 short tons	Bauxite (1943) 14,613,852 short tons	Copper (1939) Smelter production 2,638,720 short tons	Copper Ore (1939) Metal equivalent 3 011,341 short tons	Iron, Pig (1939) 118,918,132 short tons	Iron Ore (1939) Metal equivalent 220,460 000 short tons	Lead (1939) Smelter production 2,093,876 short tons	Lead Ore (1938) Mine basis 2,187,476 short tons	Zinc (1939) Smelter production 1,785,726 short tons	Zinc Ore (1939) Mine basis 2,066,813 short tons	Coal (1939) Bituminous and Lignite 1,474,877,400 short tons	Petroleum (1943) 2,222,228,000 bbls
NORTH AMERICA														
Canada	6 24	0 53	22 5		10 4	12 2			10 2	11 2	9 8	9 5	1 0	
Mexico	1 37	0 92			2 0	1 7			12 6	15 9	2.2			1 6
Newfoundland	0 09	0 01								1 6		3 2		
United States	5 15	6 22	41 2	46 2	36 4	36 9	39 9	26 3	22 5	18 9	28 4	28 2	26 8	67 6
SOUTH AMERICA														
Argentina	1 94	0 37										1.1		1.1
Brazil	5 91	1 45					1.2	0 2						
Chile	0 51	0 20			14 8	14 9		0 8						
Guiana, British	0 19	0 01		14 6										
Peru	0 87	0 13			1 5	1 8			1 4	3 3		1 1		
Surinam	0 10	0 09		12 1										
Venezuela	0 68	0 17												8 0
EUROPE														
Belgium	0 02	0 38					2 0		5 6		10 9		2 2	
Czechoslovakia	0 10	0 72					0 9	0 3						
Eire	0 05	0 14		0 8										
Finland	0 24	0 18			0 6	0 7								
Germany	0 36	3 12	17 3		3 0	1 1	19 5		10 7	5 4	13 1		3 2	
France	0 38	1 98	2 7	5 3			4 3		2 5		3 7		3 8	
Hungary	0 07	0 43	0 5	9 1										
Italy	0 23	2 00	1 7	2 3			0 8		2 2	2 3	2 2	5 5		
Netherlands	0 02	0 04									1 3		1 0	
Norway	0 21	0 01	0 8		0 5	0 8		0 7			2 8			
Poland	0 29	1 52							1 7					
Romania	0.22	0 85												1 6
Spain	0 38	1.12						1 8	1 6	1 8		1 8		
Sweden	0 29	0 03			0 5		0 7	6 9				1 8		
Switzerland	0 03	0 02	1 2											
Soviet Union	15 98	8 06	3 5	2 6	4 9	4 6	14 3		4 1	3 9	5 6			9 0
United Kingdom	0 17	0 22	2 8				7 8			1 7	3 1		17 6	
Yugoslavia	0 19	0 66		0 9	2 0	1 8		0 3		4 4				
ASIA														
Burma	0 46	0 69							4 7	4 6		2 4		
China	8 74	22 07					0 6						2 4	
India	3 06	15 98					1 9	1 6					1 9	
Iran	1 22	0 37												3 3
Iraq	0 36	0 17												1 2
Japan	0 29	3 41	5 4		1 7	3 9	2 9				3 4			
Malay States (Non-Fed)	0 04	0 01						1 0						
Netherlands Indies	0 42	2.87		1 9										0 9
Philippine Islands	0 21	0 06						0 6						
AFRICA														
Algeria	0 40	0 03						1 4						
Belgian Congo	1 75	0 24			5 6	6 1								
Gold Coast	0 15	0 17		1 2										
Morocco, Spanish	0 02	0 04						0 5						
Rhodesia, North	0 55	0 06			9 8	10 9					0 8	0 8		
Tunisia	0 09	0 01						0 4						
Union of So Africa	0 92	0 45						0 2					1 3	
AUSTRALASIA														
Australia	5 78	0 33			0 9		0 9	1 3			4 4		1 3	
ALL OTHERS	32 96	21 46	0 4	3 0	2.4	2 6	2 3	55 7	19 9	25 0	8 3	44 6	37 5	5 7
GRAND TOTALS	100 00	100 00	100 00	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0

SOME IMPORTANT PLANT AND ANIMAL RESOURCES OF THE WORLD

(Expressed in Percentage of World Totals)

Continents and Countries	Land Area 55,595,000 sq miles	Population 2,115 800 000 (estimate)	Corn (1944) 3,365,000,000 bu	Rice (1944-45) 6,828 000 000 bu	Wheat (1945, estimate) 5,030,000,000 bu	Beet Sugar (raw) (1945) 7,304,000 short tons	Cane Sugar (raw) (1945) 21 543 000 short tons	Potatoes (1939) 7,536,000,000 bu	Coffee 942-43) 3 968 . 00,000 lbs	Tobacco (1945-46) 6,345,800,000 lbs	Cotton (1944) 22,650,000 bales	Wool (1945, estimate) 3 790,000 000 lbs	Cattle (1945, estimate) 710 000,000 head
NORTH AMERICA													
Canada	6 24	0 53	0 2		5 8	1 2		0 8				0 5	1 5
Cuba	0 08	0 26	0 1				23 1		' 0	9 2			0 5
El Salvador	0 02	0 08							3 7				
Guatemala	0 08	0 14							3 9				
Mexico	1 37	0 92	1 8				2 2		3 1	0 6	2 4		
Puerto Rico	0 09	0 01								0 7			
United States	5 15	6 22	56 4	1 1	21 3	18 0	2 5	4 5		29 5	53 ,	10 4	11 1
SOUTH AMERICA													
Argentina	1 94	0 37	2 2	0 1			2 4	0 5		0 7	1 5	1 , 3	1 5
Brazil	5 91	1 45	3 9	1 1	3 7		6 4		36 1	3 5	6 6	1 1	5 8
Columbia	0 86	0 41							17 6				1 7
Peru	0 87	0 13		0 1	0 6		2 3				1 4		
Uruguay	0 1 ,	0 05	0 1									3 6	0 9
Venezuela	0 68	0 17					0 2		1 8		0 1		
EUROPE													
Belgium	0 02	0 38						1 6					
Bulgaria	0 08	0 29	0 5							1 0			
France	0 38	1 98	0 2			6 2		7 0				0 7	1 9
Germany	0 36	3 1 ?				15 0		27 3		9 4			2 7
Hungary	0 07	0 43						1 3		0 6			
Italy	0 2 ,	2 00	1 8	0 4	2 8			1 3		1 '		0 6	0 9
Poland	0 ?0	1 52				3 4		16 7					0 8
Romania	0 2 ?	0 85	7 6					1 0		0 9	0 1		
Spain	0 38	1 12	0 4	0 2		1 '		2 0			0 1	' 5	0 6
Soviet Russia	15 98	8 06				20 5		20 3				5 6	
ASIA													
Burma	0 46	0 69		3 4						1 1	0 4		
China	8 71	' ' 07		25 4			3 9			14 5	6 5	2 4	4 0
India, British	3 06	15 98		29 7	7 3		29 2		0 7	16 5	12 9	2 3	28 2
Iran	1 22	0 37		0 3	1 5						0 3	1 1	
Japan	0 29	3 41		7 8			0 5	0 9					
AFRICA													
Uganda	0 18	0 16							0 9				
Union of So Africa	0 92	0 45	1 2							0 4		0 1	1 8
AUSTRALASIA													
Australia	5 78	0 33	0 1				3 4					24 1	1 9
New Zealand	0 20	0 08										9 8	0 8
ALL OTHERS	37 42	26 05	23 5	30 1	56 8	33 9	23 9	11 8	20 2	9 9	14 4	15 9	31 1
GRAND TOTALS	100 00	100 00	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0

INDEX

Note: Pages preceded by an asterisk (*) refer to illustrations, and reading references are italicized.

ABACA (manila hemp), 409
Abadan, 219
Aberdeen, Scotland, 293
  rainfall and temperature, 290
Aberdeen, Wash., 89
Abnormal soils, 431
Abolitionist activity, 46
Absaroka Mountains, 69
Accra, 364
Ackerman, Edward A.
  An Algerian Oasis Community, 360
  Depletion in New England Fisheries, 47
Aconcagua Knot, 144, 145, 148
Aconcagua, Mt., 144, 145, 146
Acropolis in Athens, 243
Adam, Robert M., and Kenneth, John H.
  Nature Conservation in Scotland and Furth of Scotland, 291
Adams, John and John Quincy, 46
Adams, John Q.
  Settlements of the Northeastern Canadian Arctic, 117
Adams, Mt., 85, 91
Adana, 225
Addis Ababa, 373
  location, 373
  sewage disposal and water supply, 373
  temperature and rainfall, 371
Adelaide, 402
  location and site, 402
  marketing and shipping, 402
  rainfall conditions, 401
Aden, 247, 249
Aden and Hadhramaut, 249
  area and population, 249
  Suez Canal as related, 249
Aden, Gulf of, 245, 372, 373
Adirondack Mountains, 49, 105, 107, 111
  advantages for recreation, 50
  altitude and terrain, 107
  climatic conditions, 49
  historical associations, 50
  hydroelectric power, 50
  location, boundaries and area, 49
  natural vegetation, 49
  physiographic region, *16
  summer and winter sports, 50
Adirondacks, 57, 288
  bedrock and structure, 107
  blocked drainage ways, 107
  cultural features, 107
  glaciation, 107
  rift valleys, 107
Adriatic Sea, 208, 214, 230, 239
Aegean Sea, 204, 214, 217, 243
  Bosporus Dardanelles Breach, 204
Aegean, The Islands of the, 241
Aemilian Way, 238
Afghan Borderland, 227
Afghanistan, 219, 221, 227, 341
  Afghan Borderland, 227
  agricultural activities, 227
  buffer position, 227
  cities, 227
  location and extent, 227
  panhandle of, 227
  population, 227
  terrain, 227
  transportation, 227
Afghans, 227
  character of, 227
Africa, 371
Africa, 351
  A New Trans-African Route, 354
  antiquity of civilization of, 351
  Atlas Region, *357
  basins, 351
  basins and ridges, *352
  circumnavigation, 368
  climatic regions, *421
  coastal plains, 351
  divisions and regions, *355
  Eastern Highlands, *355
  Eastern Highlands and Allied features, 371
  Eastward from Gibraltar, 351
  marginal escarpments of, 351
  Northern Highlands and Associated Basins, 356
  Pharaohs of Egypt, 351
  physiographic diagram, 354
  physiographic divisions and regions, 354
  physiographic sketch, *352
  rainfall and temperature, *353
  relief and land forms, 351
  rift valleys, 371
  rivers, 354
  size and accessibility, 351
  structure and configuration, 351
  transition of tropical climate, 362
  Zambezi Gorge, *374
Africa, Configuration of, *352
Africa, Northern Highlands and Associated Basins, 356
  climatic diversity of, 356
  regional divisions of, 356
  unique features of, 356
African Native Worker, The, 384
Agassiz, Lake, 51, 54
Agrarian Problems in Spain, 232
Agriculture, 162
  animals and crops, 162
Agriculture, France, 317
  Swiss, 213
Agriculture in Finland, 301
Agriculture, Mechanization of in the USSR, 336
Agriculture of the Low Countries, Notes on the, 325
Agriculture, The Future of Manchurian, 278
Aguascalientes, 125
Ahaggar Mountains, *361
  canyons in sandstone, *361
Air Age, 351
  Africa as related to, 351
  Australia, 392
  high latitude flying, 8
  map, *8
  sky routes, 8
  Stellar Polar map, *7
  stratosphere navigation, 8
Aire Valley, 293
Aitchison, Alison E.
  Lowland and Highland Farms in Scotland, 288
Akron, 57
  rubber capital, 57
Alabama, 20, 25, 26
Alaska, 14, 70, 84, 100, 284, 298
  aeronautical center, 100
  agricultural possibilities, 102
  air age map, *101
  climatic conditions and regions, 101
  climatic regions, *121
  composition of population, 103
  cultural features, 102
  frontier country, 100
  glaciated mountains, 100
  "Gold Rush", 102
  great circle flying and motoring, 104
  highways, railways, waterways, airways, 103
  location and longitudinal extent, 100
  major divisions, 100
  mineral wealth, 102
  Mt McKinley, *102
  natural features, 100
  neglected area, 102
  panhandle, 100
  problems of the future, 103
  purchase by United States, 102
  rainfall and temperature, *12
  reasons for purchase, 102
  rectangular shape, 100
  riches, 102
  size and possibilities, 100
  strategic position, 100

Alaska, urban centers, 103
  Village of Unalaska, *103
Alaska-Canadian (Alcan) Highway, 103, 112
Alaskan Panhandle, 100
Alaska Peninsula, 100, 101
Alaska Range, 100, 102
Albania, 212, 216
  agricultural activities, 217
  character of people, 217
  cities, 217
  climate, 217
  "Cockpit of Europe," 217
  cultural features, 217
  land forms and structure, 217
  location, extent, boundaries, population, 216
  manufacturing and processing, 217
  minerals and ores, 217
  natural vegetation, 217
  physical features, 217
  prospects ahead, 217
  sketch map, *236, *212
  streams of, 217
Albania and Her Sons, 217
Albany, 57
  weather record, 38, 393
Alberta, 58, 73
Albuquerque, 74
Alcan Highway, 103, 112
Alep (*see* Aleppo), 251
Aleppo, 251, 252, 254
  decline, 251
Aleutian Islands, 84, 100, 101, 284
Aleuts, 103
Alexander the Great, 206, 226, 253, 257, 369
Alexandrette, 224, 251
Alexandria, 369
  center of learning, 369
  location and site, 369
Alfalfa, 171, 413
Alfold, Great, 310
Alfold, Little, 310
Algeria, 318, 357, 359, 364
  agricultural belts, 360
  climatic regions, 360
  crops and animals, 360
  urban centers, 360
Algerian Oasis Community, 4*n*, 360
Algiers, 360
  location and site, 360
Algiers, Bay of, 360
Algonquin Indians, 50
Alhambra, 234
  castle in Spain, 234
Allegheny Front, 65
Allegheny Mountains (Plateau), 37
Allegheny Plateau, 37, 38
  dairying and orcharding, 40
  glass industry, 40
  iron and steel manufacture, 40
  petroleum, first oil well, 40
Allegheny River, 37, *42, 42
Allied Nations, 358
Alluvial deposits, 316
  Central Plains of Europe, 316
Almasy, Paul
  Madagascar: Mystery Island, 377
Alpaca, 159
Alpine foreland, 309, 324
Alpine Highlands, 210, 211, 309, 321
  Bulgarian farmer, *216
  highway, *237
  lakes, 212
  location and area, 211
Alpine Highlands, relation to major and minor gateways, 211
  rivers, 212
  structure and relief, 211
  transportation as related to, 212
Alpine Peaks in Glacier Park, *73
Alps Mountains, 69, 239, 240, 306, 317, 335
  water power from, 238
Altai Mountains, 206, 345, 346
Altiplano, 145
Alto River, 182
Altyn Tagh Mountains, 221
Aluminum Industry of the Western Hemisphere, 191
Amadabad, 261
Amazon Basin, 149, 153, 155, 159, 166, 167, 183
  bordering regions, 167
  cultivated crops, 189
  domesticated animals, 189
  forest products, 188
  human activities, 188
  isolation, 188
  landscape features, 188
  location and extent, 167
  lumbering difficulties, 188
  population, 189
  rubber plantations, 188
  tropical forests, 149
  urban centers, 189
  vegetation, 149
Amazon Lowland, 137, 138
Amazon Plain, 167
  altitude and terrain, 167
  bedrock and soils, 167
Amazon River, 137, 145, 149
  depth and gradient, 167
  length and drainage area, 167
  Manaus, *189
  tributaries, 167
  unique features, 137
Amazonas, 189
Amazonia: Land of Great Forests and Rivers, 137
"American Mediterranean," 121
  (*see* Caribbean Sea and Gulf of Mexico)
American River, 87
Amerigo Vespucci, 177
Amsterdam, 318, 328, 329, 311
  historical leadership, 328
  situation and site, 328
Amu Darya (*see* Oxus), 227, 311
Amundsen, Roald, 416
Amur River, 265, 277, 278, 318
Amur Valley, 278
Anaconda, 74
Anatolia, 222
  "Land of the Rising Sun," 222
  Turkey, 222
Anatolia, Peninsula of, 201, *218
Anatolian Plateau, 217, 218
  Adjustments to Climate in Alpine Mediterranean Asia, 218
  associated gateways, 218
  associated water bodies, 217
  corridor features, 218
  physical features, 218
  "Threshold of Asia," 217
Anaximander, 225
Anchorage, 11, 103
Ancient civilization, 123
  Mexico, 123
Ancient Temple of Indo-China, *267
Ancient World, *5
Andaman Islands, 307
Andean Highlands, 138, 141, 166
  associated countries, 149
  relation to winds, 142
Andean Highlands and Associated Features, 142
  divisions, 142
Anderson, Sven Axel
  Forests and Forest Activities in Sweden, 299
Anderson, Esther S
  The Sugar Beet Industry of Nebraska, 62
  The Potato Industry in Nebraska, 62
Andes (*see* Northern, Central and Southern Andes), 145
Andes Highlands, 142
  climate factor, 142
  distribution of vegetation, 142
  relation to climate, 142
  relation to soils, 142
  reversal of leeward and windward, 142
Andes Mountains, 138, 142, 166, 167, 169
  barrier features, 138
  climatic effects, 138
  coalescence of ranges, 144
  continuity, 138
  parallel ranges, 144
  Straight of Magellan, *147
  unbroken continuity, 142
Andevorante, 377
Andizhan, 342
Anglo-America, 14
  areas occupied, 14
  distribution of English-speaking people, 14
Anglo-Egyptian Sudan, 364, 375
  accessibility, 363
  activities of people, 363
  crops and animals, 363
Angola, 381, 384
Angola Highlands, 382
Animal industry, 291
  United Kingdom's contributions, 291
Animal resources, 439
  table, 439
Animals, *157
  Llamas crossing a stream, *157
Ankara, 224, 251
  capital of Turkey, 225
  corridor city, 225
Annamese, 267
Annan, Joseph S
  The Gold Coast Colony, 364
Annapolis Valley, *110
Annapolis Cornwallis Valley, 110
Antarctic by Sea, Land and Air, 416
Antarctic Circle, 414, 416
Antarctic Continent, 416
Antarctic Region, 417
  life forms, 417
Antarctica, 389
  appraisal, 417
  bedrock and terrain, 416
  "bottom of the world," 416
  circumnavigation, 416
  coastline, 414
  configuration, 416
  discoverer, 416
  discovery and exploration, 414
  explorers, 416
  glacial landscape, 416
  glaciation, 416
  historical record, 414
  landscape, 416
  legend and story, 414
  methods of exploration, 416
  Mt Czegka and Mt Jessie O'Keefe, *416

Antarctica, polar hemisphere, *415
position and area, 414
precipitation, 417
remoteness, 390
scientist's objectives, 417
sealers and whalers, 416
Some Geographical Results of the Second Byrd Antarctic Expedition, 416
surrounding waters, 414
travel hazards, 416
Anthracite, 66
Ouachita Mountains, 66
Pennsylvania, 39
Anti-Atlas Mountains, 356
Antofagasta, 160
relation to copper, 161
Antofagasta-Bolivia Railway, 161
Antwerp, 329, 330
Anvers (*see* Antwerp), 330
Anzio, 240
Appalachian clubs, 30
Appalachian Highlands, 11, 17, 24, 47, 65, 397
A Bird's Eye Cross Section of the Central Appalachian Mountains and Plateaus, 24
attractions, 24
barrier effects, 24
bedrock and sub-structure as related to surface features, 24
club activities, 30
conservation of natural resources needed, 25
education and social welfare, 25
gateways and gaps, 24, *25
influence on settlement, 24
major divisions, 25
physiographic sketch, *26
playgrounds, 30
poverty, 24
resources, 25
rocks, minerals and fuels, 24
time sequence of major land forms, 24
vertical section, *26
Appalachian Highlands and Gateways, *25
Appalachian Mountains, 51
Appalachian Plateaus, 24, 36, 57
A Southern West Virginia Mining Community, 40
backward areas, 40
bedrock and structure, 37
bituminous coal mining, 40
caverns, caves and sinks, 37
cities and towns, 42
coal and petroleum, 37
diversity of activities, 40
drainage pattern, 37
escarpment, eastern edge, 36
even skyline and flat interfluves, 37
glacial and residual mantle, 37
mature soils, *132
misnamed mountains, 37
natural features, 36
natural vegetation, *128
physiographic sketch, *26
plateau sections, 37
problems of deforestation, flood control and soil erosion, 43
transportation facilities, 41
work of streams, 37
Appalachian Plateaus and Appalachian Ridge and Valley Region, 25, 36
appraisal for the future, 43
associated historical episodes, 38
bedrock and structure, 36
climatic conditions and regions, 38
Appalachian Plateaus and Appalachian Ridge and Valley Region, cultural features, 38
location and extent, 36
native vegetation, 38
physiographic section, *26
problems of markets, and transportation, 43
soil development, 38
Tennessee Valley Authority, 39
Appalachian Ridges and Valleys, 36, 65
folds, 36
Apennine Mountains, 230
power from, 238
Apennines, Ligurian, 239
Apples, 168
Massachusetts, 46
Ridge and Valley Region, 38
Virginia, 28
Apple Pie Ridge, 38
Appomattox, 27
Appraisal for tomorrow, 58
Glaciated Lowlands, 58
Apui River, 178
Arab traders, 276
Arabian-American Oil Company, 218
Arabian Desert, 254
"Arabian Knights," 254
Arabian matmel, 374
Arabian Plateau, 246
countries of, 247
Arabian Plateau countries, 247
cities, *224, 249
climate, 247
composition and population, 248
crops and animals, 248
cultural features, 248
future of, 249
handicrafts, 248
land utilization, three types, 248
mineral resources, 248
natural features, 247
political unrest, 248
rainfall and temperature, *198
social turbulence, 248
structure and terrain, 247
transportation and communication, 248
Arabian Sea, 246
Arabians, 372
Arabs, Forty Years Among the, 248
Arada River, 251
Arakan Highland 269
Aral Sea, 338, 340
Ararat, Mt 218
Arbuckle Mountains, 65
area and terrain, 65
Archangel, 297, 335, 336, 338
Archean or Pre-Cambrian Shield, 105
Arctic-Centered Map, *7, 8
Soviet Asia, *7
Arctic Circle, 70, 100, 268, 287, 295, 334, 338, 341, 347
Arctic Coast, 51, 105, 297
Arctic Coastal Plain, 100
Arctic, frigid, 11
Arctic Ocean, 51, 108, 287, 288, 315, 316, 338, 343
polar hemispheres, *415
Arctic Plains, 346
Ardennes Mountains, 303, 304, 317, 321
Argentina, 51, 146, 169, 192
Among the Sheep Ranches of Patagonia, 171
animals and animal products, 171
Bags of Wool at Rio Gallegos, *170
big estates, 170
Argentina, Buenos Aires, *171
climatic regions, *421
Comodoro Rivadavia Oil Field, *171
competition problems, 176
contrasted with Chile, 169
corn exports, 173
crops and animals, 171
cultivated crops, 172
cultural features, 170
estancieros, 173
export crops, 173
exports, 173
fuel deficiencies, 175
global trade, *173
grazing, 171
highways, 174
historical associations, 170
improved cattle, 173
Indians, 170
irrigation, 171
irrigation problems, 175
lakes and mountains, *169
land holdings, 175
land utilization, 170
latitude and area, 169
marketing difficulties, 175
mineral fuels, 171
mining, 172
natural features, 169
natural vegetation, 170
oases crops, 171
peripheral cities, 174
processing plants, 172
prospects ahead, 175
quebracho, *172
rainfall and temperature, *189
regions, 169
soils regions, 170
soils regions, *132
Spanish rule, 170
The Process of Pastoral and Agricultural Settlement on the Argentine Humid Pampa, 173
trade adjustments, 176
transportation problems, 175
urban centers, 174
vegetation in west, *170
vegetation regions, *128
Vineyard in the Andean Piedmont, Mendoza, A, 171
Argentina's Foreign Trade, *175
Argentina Chaco, 172
cotton and tobacco, 172
Argentinian Uplands 166
area and extent, 168
divisions, 168
Arica, 160
Arkansas River, 58, 61, 64, 65
Arkansas Valley, 65
Arkansas Valley and Ouachita Mountains 65
ridge and valley features, 65
Arkhangelsk (*see* Archangel), 335
Armenia, 334
Armenian Knot, 218, 219, 246
mountains diverging from, 210
nature of, 210
Armenian Plateau, 210, 218, 253
lakes within, 218
location and extent, 218
physical features, 218
rivers, 218
structure and terrain, 218
Armorican Plateau, 288
(*see* Brittany, Uplands of)
Artesian Basin, 100

Artesian Water and Australia's Pastoral Industry, 400
Artesian wells, 60
  Central Lowlands of Australia, *60
  Great Plains, *60
Aryan, 338
Asbestos, 110
  Canada, 110
  Laurentian Upland, 106
Asheville, 30
  "Land of the Sky," 35
Ashley, 72
Ashmead, Lt John
  The Japs Look at the Yanks, 286
Ashtabula, 54, 56
Asia, 198
  cities, *224
  rainfall and temperature, *198
  southeastern, *207
Asia's Lands and Peoples, 206
Asphalt, 133
  Trinidad, 133
Associated manufacturers, 54
Assyrian nation, 253
Assuan, 364
Assuan Dam, 368
Astoria, Oregon, 89, 90, 92
Astorians, 78
Astrakhan, 335
Asuncion, 179
  rainfall and temperature, 179
  situation and trade connections, 180
Aswân (*see* Assuan), 368
Atacama Desert, 147
  natural nitrates, 163
Atbara River, 367, 368
Athabaska, Lake, 106
Athenai (*see* Athens), 243
Athens, Greece, 243
  old and new, 243
  precipitation and temperature, 241
Atkinson, A. J.
  Albania and Her Sons, 217
Atlanta, 30
  crossroads city, 35
  "Gate City of the South," 35
  historical associations, 35
  manufactures and trade, 35
  state capital, 35
Atlantic and Gulf Coastal Plains, 17
  altitude and width, 17
  appraisal of current problems, 23
  cities, *21
  citrus and other fruits, 20
  climatic conditions and types, 19
  climatic regions, *121
  coastal cities 20
  coming of the share cropper, 19
  comparative sizes of cities, 20
  cultural features, 19
  dangers of one-crop system, 19
  distribution of native vegetation, 19
  distribution of rainfall, *12
  diversity of settler's interests, 19
  domestic water supply, 18
  Dutch influence, 20
  English influence, 20
  factors in construction, 17
  "Fall Line" cities, 20
  forests and forest products, 20
  French influence, 20
  ground water pollution, 18
  hazards of overproduction, 20
  historical connections, 19
  interior cities, 20
  Life in a Cotton Farming Community, 19
Atlantic and Gulf Coastal Plains, *Life in a Southern Sawmill Community*, 22
  manufacturing and processing, 20
  market and truck gardening, 20
  mature soils, *432
  minerals and mineral fuels, 18
  mining phosphates, *18
  native trees and forests, 19
  natural features, 17
  natural vegetation, *428
  need of fertilizers, 19
  origin of mantle rock, 18
  rainfall and growing season, 19
  sand hills and limestone sinks, 17
  sea foods, 20
  slave labor enters, 19
  soil erosion menace, *23
  soils and soil materials, 18
  Spanish influence, 20
  specialized crops, 19
  Swedish influence, 20
  terrain and subsurface features, 17
  terrain best adapted to settlement, 19
  The Landscape in Its Annual Cycle on the Prairies of Southwest Louisiana, 19
  Tidewater Virginia, Where History Lives, 19
  topography and drainage, 17
  tourist and resort areas, 20
  tung oil, 20
  urban centers, 20
  Where Florida Truck Crops Are Grown, 20
  world's cotton production, *20
Atlantic City, 20
  accessibility, 21
  location and site, 20
  weather record, 19
Atlantic Coast, 296, 317
Atlantic Coastal Plain, 17, 26, 44
Atlantic Ocean, 8, 51, 166, 167, 239, 257, 288, 316
  Eurasian lands bordering, 229
Atlantic Plain, 6
Atlas Mountain Region, 359
  climate of, 357
  minerals, 357
  seaside features, 357
  similar to southern Europe, 356
  structure and terrain, 356
Atlas Mountains, 351, 356, 359
  called "Island in the West," 356
  plateaus and valleys, 356
  Rif Range, 357
  sections of, 356
  submerged extremities of, 356
Atlas Mountains and Associated Features, 356
  location and extent, 356
  natural features, 356
Atlas Region, *357, 360
  agricultural pursuits, 358
  capabilities of people, 360
  climatic regions, *421
  cultural features, 358
  effects of war, 360
  looking to the future, 360
  native vegetation, 358
  phosphates, 360
  physiographic sketch, *357
  rainfall and temperature, *353
  resources, 358
  soils, 358
  trade conditions, 360
  vegetation regions, *428
  World War II, 358
Atlases, 436
Atmospheric phenomena, *3
Atomic warfare, 285
Atrato River, 148
Atrato Valley, 151
  minerals, 151
Atsuta Bay, 285
Attu, 100
Atwood, Jr., Wallace W.
  Crater Lake and Yosemite Through the Ages, 87
Atwood, W. W.
  Highways and Byways of Guatemala, 126
Atwood, Albert W.
  Tidewater Virginia, Where History Lives, 19
Auckland, 414
  cultural center, 405
  location and site, 405
  rainfall, 404
  temperature, 404
Auckland Peninsular Plains, 404
Augusta, 30
  historical associations, 35
  location and importance, 35
Austin Uplift, 58
Australia, 292, 391
  An Age, 392
  area and population, 391
  cities, *396
  crown colony of England, 391
  discovery of gold, 391
  divisions and regions, 392
  environmental factors, 392
  foreign trade, *392
  From East to West Across Northern Australia, 392
  global trade, *402
  historical background, 391
  introduction of cereals, 391
  introduction of sheep and cattle, 391
  isolation, 391
  mining, 391
  native Australasians, *391
  penal colony, 391
  rainfall and temperature, *394
  recent progress, 391
  relation to gateways, 392
  rift valleys, 400
  Rose Bay Flying Base, *400
  Sydney Harbor, *399
  Tasman, Abel J., 391
  transportation, 391
  vegetation and animals, 391
  wool production, *398
  World War II, 392
Australian Alps, 397
Australasia, 389
  cities, *396
  comparative areas, 390
  divisions and regions, *389
  history and pre-history, 390
  tropical agriculture, 390
  world-wide importance, 390
Australasia and Antarctica, 389
  areas included, 389
  divisions and regions, 390
Australasia, Treasure Islands of, 403
Austria, 308, 310, 331
  advantages and disadvantages, 309
  agricultural east, 310
  agricultural south, 310
  climatic diversity, 309
  crossroads position, 308
  cultural features, 309
  Danube water route, 309

Austria, east-west trench, 309
  gateways, *203
  historical allusions, 309
  land use in Alpine Valley, 309
  land use in the east, 309
  landlocked country, 310
  metallurgical and textile sections, 309
  natural features, 309
  panhandle to Switzerland, 309
  physiographic sketch, *203
  reduction in area by World War I, 309
  regions involved, 309
  shape, size, population, 309
  surrounding gateways, 308
  terrain and rivers, 309
  This Was Austria, 309
  tourist section (The Alps), 309
  trade relations, 310
  urban centers, 310
  Where Three Countries Meet The Region of Nauders, 309
Austrian Gate, 204
Austria, This Was, 309
Avon River, 298
Awash River, 373
Azerbaijan, 334
Azov, Sea of, 335, 339
Aztec Indians, 123

Bab-el-Mandib, St of, 247, 249
Babylon, Hanging Gardens of, 253
Babylonian Nation, 253
Babylon, Ruins of, 253, 251
Bad Lands, 59
Baghdad, 228, 248, 251, 252, 253, 254
  "Arabian Knights," 254
  Pontoon Bridge, *255
  temperature and rainfall, 253
Bagnold, Brigadier, R A
  Early Days of the Long Range Desert Group, 366
Bags of Wool at Rio Gallegos, *170
Bahama Islands, 121
  British crown colony, 131
  number and population, 131
  products and trade, 131
  submarine relations, 121
  winter resort, 131
Bahia Blanca, 168, 173
  location and hinterland, 174
  rainfall, 170
Bahia (*see* São Salvador), 186
Batevsky, Boris
  Siberia—the Storehouse of the Future, 345
Baikal, Lake, 206, 338, 344, 346
Baile Atha Cliath (*see* Dublin), 295
Bajada Grande, 175
Baker, Mt, 85
Baker, Oreg, 82
Bakersfield, 93
  petroleum field, 93
Bakony Forest, 306, 310, 312
  sub-structure, 310
Baku, 218, 385, 339
Balata, 150, 191
Balaton, Lake, 310
Balboa, Canal Zone, 130
Balboa, Vasco Nunez de, 125, 129
Bali, 107
Balkan Mountains, 212, 215
Balkan Peninsula, 204, 212
  Grecian Peninsula in relation to, 230
Balkans, 123
Balkash, Lake, 206, 338, 340
Ballarat, 399
Ballert, A G, and George, M C
  Notes on the Climate of the Coastal Fringe of North Africa, 356
Balsa, 188
Baltic-North Sea gateway, 327
Baltic Sea, 203, 288, 290, 299, 300, 331, 333, 334, 337, 338
Baltic Soviets, 338
  buffer position, 338
  land holdings and land use, 338
  glacial terrain, 338
  mutual regard, 338
  natural vegetation, 338
  social and economic change, 338
Baltic States (*see* Baltic Soviets), 338
Baltimore and Ohio Railroad, 21, 33
Baltimore, Lord (Cecilius Calvert), 33
Baltimore, 30
  historical associations, 33
  manufacturing and oystering, 33
  Oystering in the Chesapeake, 33
  railways and shipping, 33
  situation and site, 33
Bamboo, 409
Bamian Pass, 206
Bananas, 150
  Colombia, 151
  Guatemala, 126
Bananal Island, 183
Banff National Park, 70, 72, 112
  beauties, 73
Bangalore, 261
Banka, 410
Bangkok, 268
  house boats, 269
  river transport, 269
  situation and site, 268
Barbados, 119, 122, 133
Barbary Coast, 358
Barbary States, 359
Barbour, G B
  Harnessing the Columbia River, 75
Barcelona, 232
Barley, 159, 163
Barnaul, 345
  location and interests, 345
Baronowice, A Landed Estate in Polish Silesia, 332
Barranca Bermeja, *150
Barranquilla, 153
  situation and site, 153
Barre, 38
Barrier, Central Eurasian (*see* Eurasian Barrier), 200
Barrier, *201
  Eurasian, *201
Barriers and gateways, 200
Barth, Heinrich (African explorer), 363
Bartlett, Robert A
  Greenland from 1808 to Now, 118
Basel, 213, 324
Basin of Aquitaine, 318
Basin and Range Region of the United States, 75
  area and extent, 76
  block mountains, 76
  exploited minerals, 77
  glacial period, 76
  gold, silver and copper, 77
  structure and terrain, 76
Basins, 351
  of Africa, 351
Basins and Ranges, 169
Basins and ridges, 352
  Africa, *352
  Sudan Saharan Tableland, *352
Basra, 219, 251
Bass Strait, 395
Batavia, 410
  commercial center, 410
  location and site, 410
  shipping, 410
  transport lines, 410
Battle of Bunker Hill, 48
Battle of Quebec, 114
Battle of Tours, 202
  decisive conflict, 231
Batum, 340
Bauxite, 67
  Arkansas, 67
  British Guiana, 191
  Congo Basin, 380
  Katanga Highlands, 381
  Missionary Ridge, 39
Baylor, J Wright
  Climate and Man in the Columbia Plateau Area, 79
Bayonne, 30
Bear Paw Mountain, 58
Beans, 172
Beaver, S H.
  Railways in the Balkan Peninsula, 212
Bechuanaland, 383, 384
Bedouin, 249
Bedrock, 52
  Glaciated Lowland, 52
  New England-Acadian Upland, 15
Beet Sugar, *337
  world's production, *337
Beilan Pass, 251
Benia, 381
Beirut, 250, 252
Belem, 189
  entrepot, 189
  location, 189
Belfast, 293
  linen manufacture, 293
  location and hinterland, 293
Belfort, 320
  gateway position, 320
Belfort Gate, 202, 317, 324,
Belgian Congo, 325, 330, 381
  potential water power, 380
Belgium, 316, 317, 321, 325, 328, 338
  access to the sea, 329
  agricultural enterprises, 329
  Ardennes Mountains, 329
  Belgium Europe in Miniature, 329
  buffer position, 329
  cities, *214
  climate and natural vegetation, 329
  climatic regions, *121
  coal beds, 329
  crops and animals, 329
  cultural features, 329
  food supply, 330
  foreign trade, 330
  gateway position, 328
  historic battlefields, 329
  interest of ethnic groups, 329
  land ownership difficulties, 329
  linguistic stocks, 329
  location, area, population, 329
  manufacturing and processing, 330
  minerals and ores, 329
  natural features 329
  regions and terrain, 329
  Sambre Meuse route, 329
  urban centers, 30
Belgium—Europe in Miniature, 329
Belgium's Foreign Trade, *330
Belgrade, 214, 215, 218, 306, 311
  relation to Iron Gate, 215
  relation to Vardar-Morava Gateway

Belitong, 410
Belleterra, 188
Bello Horizonte, 185
  mining interests, 186
Belshaw, Horace
  Dairying Industry of New Zealand, 405
Benares, 261
  sacred city of the Hindus, 261
  situation and site, 261
Bendigo, 399
Bengal, Bay of, 255, 259, 268, 364, 407
Bengasi, 366
Benguela Current, 383
Ben Horin, Eliahu
  The Future of the Middle East, 250
Bergen, 296, 297
  location and importance, 297
Bergsmark, Daniel R
  Agriculture in Denmark, A Land of Specialized Farming and Cooperation, 326
Bering Sea, 101, 108, 269, 340
Bering Strait, 103, 287, 315, 334, 338, 346
Bering, Vitus, 88
Berkeley, 95
  education interest, 95
  fruit, vegetable and grain processing, 95
Berkshire Hills, 44, 47
Berlin, 223, 224, 273, 323, 324, 332
  capital of Germany, 323
  causes for growth, 323
  manufacturing interests, 323
  places of interest, 323
  rail and water connections 323
  situation and site, 323
  unfavorable situation, 324
Berlin Istanbul Railway, 216
Berlin to Baghdad Railway, 225, 252, 311
Bermuda, 191
  British crown colony, 191
  rendezvous for winter sports, 191
  sport fishing, 191
Berne, 218
Bethlehem, Pa., 39
Beverly Hills, 98
Beyrouth (*see* Beirut), 252
Big Horn Mountains, 60
Big Snowy Mountains, 58
Big Stone Mountain, 96
Bihor Massif, 305, 313
Bilbao, 293
Bellingham, 91
Billings, 64
Bingham Canyon, 77
Bingham, 81
Bio-Bio River, 164
Birmingham, Alabama, 89
  iron and steel center, 203
  iron and steel industry, 42
  location and local resources, 42
  manufactured goods, 42
  manufacture of hardware, 203
  situation and site, 203
  transportation facilities, 42
Birmingham, England, 291, 293
Bisbee, 77 82
Biscay, Bay of 292
Bismarck Archipelago, 407, 411
Bismarckburg, 362
  altitude and rainfall distribution, 362
Biwa, Lake, 285
Bizerte, 360
Black Earth region, 335
Black Forest, 303, 305, 324
Black Forest Its Human Geography, The, 303
Black Hills, 58, 76
  flowing wells, *60
  structure, *60
Black Prairie, 22
Black Sea, 217, 218, 222, 308, 312, 313, 314, 315, 331, 334 335, 338, 339
Black soils, 433
  climate and vegetation, 433
  handicaps, 433
  humus content, 433
  lime content, 433
  plant nutrients, 433
  representative areas, 433
Black Volta River, 362
Blackstone River, 44
Blanca Bay, 174
Blanchard, W O.
  The Landes Reclaimed Waste Lands of France, 318
  The Plains of the Po, 298
Block Mountains, *77
  Basin and Range region, 76
Blood, Pearle
  Oystering in the Chesapeake, 33
Bluefields, 128
Blue Grass Region, 37, 38, 43
  farming activities, 40
Blue Mountains, 81
Blue Nile, 361
Blue Ridge and Piedmont Upland, 25
  cities, *21
  climatic conditions and regions, 27
  cultural features, 27
  distribution of rainfall, *12
  historical episodes, 27
  location and extent, 25
  mantle rock 27
  mature soils 27, *132
  natural features, 26
  natural vegetation, 27, *128
  problematic factors, 35
  regional advantages, 35
  region's prospects, 35
  urban centers, 30
Blue Ridge, 24, 26, 35, 44, 107
  appearance and extent, 25
  barrier and protection, 27
  farming and crops, 29
  features, 26
  forests, 29
  handicrafts, 29
  highway improvements, 30
  Life in a Blue Ridge Hollow 29
  national parks, 30
  poor in minerals 30
  social relations, 30
  water gaps, 27
Blue Ridge Mountains, 30
Bochetta Pass, 239
Boers, 384
Boesch, Hans H
  El Iraq, 254
Bogota, 151
  cultural and education center, 151
  rainfall 149
  situation and site, 151
  temperature range, 149
Bohemia (*see* Czechoslovakia), 307
  industrial activities, 307
  manufactured goods, 307
Bohemian Basin 305, 308, 323
  structure of, 305
Bohemian Forest 304 305, 307
Bohemian Plateau, 309, 321
  mineral resources, 305
Boise, 81
  rainfall, 77
Boise River, 81
Bolan Pass, 247
Bolivia, 149, 155
  agricultural methods, 159
  airways, 160
  climatic conditions and regions 159
  climatic regions, *121
  coco leaves and cocaine, 160
  crops and animals, 159
  crop lands, 160
  cultural features, 159
  drainage, 159
  El Gran Chaco, 159
  forest products, 160
  highways, 160
  historical background, 159
  Inca civilization, 159
  independence, 159
  landlocked position, 161
  La Paz, *160
  location and area, 158
  lowlands, 160
  mining activities, 159
  natural features, 159
  natural vegetation, 159
  petroleum, 160
  possibilities for mining, 161
  problems confronting, 161
  railroads, 160
  rainfall and temperature, *139
  regions involved, 159
  revenue and trade, 160
  subsistence farming, 159
  tropical rain forest, 160
  urban centers, 160
  vegetation regions, *128
  volcanoes, 160
Bolivia as a Source of Tin, 160
Bolivian Andes, Ilto Farm in the, 159
Bolivian Plateau, 59, 145
  altitude and drainage, 145
  bedrock and terrain, 146
  lakes and regions, 145
  location and area, 145
  position and extent, 145
Boll weevil, 28
Bolles, Blair
  Should We Mind Holland's Business, 328
Bologna, 238
Bombay, 259, 260, 261
  "Gateway of India," 260
  site of, 260
Bombay Island, 260
Bonifacio gateway, *5
Bône, 360
Bonneville, Captain, 78
Bonneville Dam, 91
Bonneville, Lake, 76, 79, 81
Bonneville Project, *91
Boone, Daniel, 38
Borah, Leo A
  Utah, Carved by Wind and Water, 76
Borax, 222
Bordeaux, 202, 317, 319
  industries, 319
  location and importance, 319
  trade interests, 319
Borneo, 407, 408, 409
Bornholm Denmark in a Nutshell, 326
Bosnians of Yugoslavia, 215
Bosporus-Dardanelles Breach, 210, 216, 224, 243, 244
  crossroads position, 204
Bosporus Dardanelles Gateway, 204, 339
  German ambitions in relation to, 205
  historical significance, 204

Bosporus-Dardanelles Gateway, importance in World War II, 204
location and importance, 204
physical environs, 204
relation to "Cockpit of Europe," 205
The Human Geography of the Dardanelles, 204
Turkey as related to, 205
Bosporus, St. of, 223
Boston, 46, 47, 100
capital and metropolis, 47
gateway features, 47
historical associations, 48
outstanding interests, 47
rainfall and temperature, 45
situation and site, 47
trade facilities, 47
zones of industry, 47
Boston Massacre, 48
Boston Mountains, 65
structure and bedrock, 65
Boston Tea Party, 46, 48
Bothnia, Gulf of, 288, 298, 300
Botts, Adelbert K
Northbridge, Massachusetts, A Town That Moved Down Hill, 47
Botwood, 118
Boulder, 74
Boulder Dam, 80, *80, 81, 98
construction and use, 80
utilization, 80
Boulton, Laura C
Timbuktu and Beyond, 364
Boundaries in the Central Plains of Europe, 316
Bowdoin College, 46
Bowman, Isaiah
Amazonia Land of Great Forests and Rivers, 137
Valley of Eastern Bolivia, 160
Bozeman, 74
Braddock's Defeat, 38
Brahmanism, 408
Brahmaputra River, 219, 257
Brandt, Karl
The Fuel Crisis in Europe, 321
Brandywine River, 33
Bransfield, Edward, 116
Brasov, 312, 314
rainfall, 312
Bratislava (*see* Pressburg), 308
Bratton, Sam T
Land Utilization in the St Francis Basin, 67
Brazil, 16, 183, 192
adverse conditions, 189
area and population, 189
Carnauba Wax *Brazil's Monopoly Product*, 186
climatic conditions and regions, 183
climatic regions, *121
coastal lands, 184
coffee lands, 184
coffee production, *185
conditions favorable for coffee-growing, 184
crops and animals, 184
cultural features, 184
economic development, 184
explorers, 184
extent and climatic factors, 183
factors in urbanization, 185
foreign trade, *186
forest products 185
global trade, *173
harnessing rivers, 190
highways, 185
Brazil, historical associations, 184
hydro-electric development, *182
Iguassu Falls, *183
iron ore, 185
looking to the future, 189
Manaus, *189
manganese ore, 185
manufacturing industries, 185
mature soils, 184
mining, 185
natural features, 183
natural vegetation, 184
power possibilities, 190
physiographic regions, 183
railroad from Santos to São Paulo, *184
Rio de Janeiro, *187
rubber plantation, *188
softwood timber, 184
soils regions, *132
subduing the Amazon area, 189
The Battle of the Amazon, 188
trade compared with other countries, *13
temperature and rainfall, *139
transportation, 185
tropical hardwoods and dyewoods, 185
urban centers, 185
vegetation regions, *128
yerba mate, 185
Brazil's Foreign Trade, *186
Brazil nuts, 189
Brazil Takes a Census 183
Brazilian Highlands, 166, 167
Bremerton, 80
Brenner Pass, 208, 212, 240, 309, 310, 324
scheming at, 211
Brest, 287, 320
Bridgeport, 48
location and port, 48
Bridger, James, 72, 78
Brindisi, 239
Brisbane, 398
location and site, 398
weather record 397
Brisbane River 398
Bristol, 293, 295
location and site, 293
trade with Americas, 293
Bristol Channel, 288, 293
Britain, 133
Britain's Declining Role in World Affairs, 291
Britain's One Way Out, 291
British, 190
British and Danish North America, 105
British Columbia, 11, 73, 84, 108
British Commonwealth, 290, 381
British Crown Colony 276
Hong Kong 276
British East India Company, 260
British East Indian Empire, 257
British Empire 14, 57, 105, 290, 334
British Guiana, 14
British Honduras, 119
British Isles 287
physiographic sketch, *289
British Isles and Brittany, 287
adjacent sea floor, 288
relation to continental shelf, 287
terrain, 288
British Malaya 266, 270
British North America, 105
contrasts in longitudinal and latitudinal extent, 105
political divisions, 105
British Somaliland, 375
A Scotswoman in Somaliland, 375
Brittany, 287, 317, 320
industries, 320
structure and terrain, 288
Brittany Backward Child of a Stern Environment, 317
Brittany, Uplands of, 288
livestock, orcharding and fishing, 317
Brno (*see* Brunn), 308
Broad leaved and mixed forests, 127
associated trees, 127
deciduous forests, 127
distribution, 127
kinds of trees, 127
representative areas, 127
semiarid adaptation, 127
subtropical humid adaptation, 127
Brockton, 47
Brock, Jan O M.
Diversity and Unity in Southeast Asia, 407
Broken Hill District, 401
Bronx, Borough of 30
Brooklyn, Borough of, 30
Broome, 395
Brooks Range, 100, 108
Brown, Ralph H
The Mountain Communities of the Boulder Region, Colorado, 73
Bruce, W S, 416
Brunei, 410
Brunn, 308
Brunnen, 306
Brussels 330
Bruxelles (*see* Brussels), 330
Bryant, William Cullen, 46
Bryce Canyon, 76
Bucharest, 313, 314
capital and trade center 314
rainfall dependability 313
Buchanan, Captain Angus
Some Impressions of Abyssinia, 373
Bucuresti (*see* Bucharest) 314
Budapest, 306, 310 311, 312
ancient trading center, 312
damage in World War II, 312
flour milling center, 312
historical development, 312
rainfall, 311
situation and site, 312
Buddhism 408
Buenaventura, 148, 153
Buena Vista Lake, 92
Buenos Aires, 164, 168, 172, *171 180
location and size, 174
manufactures, 174
rail and water connections, 174
rainfall, 170
Buffalo 54, 56, 57
location and site, 56
Queen City of the Lakes, 56
Buffer position, 325
Low countries, 325
Bug River, 331 332, 339
Bukhara, 342, 343
antiquity, 343
location and site, 343
Bulgaria, 212, 215
age old conflicts, 216
basins, 215
cities, 216
climate, 215
crossroads location, 215
cultural features, 215
distribution of crops, 216
farm holdings, 216
Farmer, Bulgarian, *216

Bulgaria, intercontinental highway, 215
location, size and population, 215
looking to the future, 216
mineral wealth, 216
physical features, 215
transportation facilities, 216
Bulgaria, A Look at, 216
Bulgarian Farmer, *216
Bunker Hill, 46
Burchfiel, Jr., Lt. William
Our Tropical Outpost in Venezuela, 178
Burg, Amos
"Today on 'The Yukon Trail of 1898,'" 100
Burlington Railway, 62
Burlington, 49
Burma, 266, 268, 269, 407
cities, 269
crops grown, 269
location and area, 269
petroleum, 269
physical regions, 269
rainfall, 269
rainfall and temperature, *198
relation to British Empire, 269
rivers, 269
Burma cattle, 259
Burma, In the Rice Fields of, 269
Burma Road, 264, 269, 270
Burmese, 267
Burrard Inlet, 115
Bursa, 225
Bush and scrub, 426
adaptability, 426
protective features, 426
relations to temperature and rainfall, 426
Bush and scrub formations, 426
Butte, 74
Butterfield Trail, 82
Buzzard's Bay, 48
Byelorussia (*see* White Russia), 334
Byers, Carey
Future Strength of Germany, 325
Byrd, Antarctic Expedition
Antarctica by Sea, Land and Air, 416
Byrd, Richard F., 416
Bytown (*see* Ottawa), 115
Byzantian, 336

Cabinet woods, 188
Cabot, John, 109
Cacao, 184
Colombia, 151
Cadiz, 293
Caesars, Place of the, 289
Cairo, 369
location and site, 369
trade center, 369
Cajon Pass, 88
Calabar, 362
rainfall and temperature, 362
Calcutta, 259, 260, 261
rainfall, 257
Caledonia, New, 411
Calgary, 488
rainfall record, 115, 488
Cali, 158
California, 11, 105, 385
Imperial Valley farming, *97
Santa Ana Valley, *96
California, Gulf of, 84, 87, 119, 124, 125
California, Peninsula of, 84, 95, 119, 122
California Trail, 78, 81
California Valley, 84, 85, 162
alluvial piedmonts, 92
California Valley, appraisal for the future, 95
bedrock and crustal movements, 92
bonanza farming, 93
climatic assets and handicaps, 95
climatic conditions and regions 92
climatic regions, *421
cultural features, 93
fruits and field crops, 93
gateway location, 91
"Gold Rush," 93
ground water, 93
historical associations, 93
impact of World War II, 95
irrigation farming, 93
location and extent, 92
mature soils, 93
natural features, 92
natural vegetation, 93, *428
needed irrigation water, 95
petroleum, 93
placer mining, 93
power resources, 93
problem of balanced economy, 95
processing of fruits, 93
rainfall and temperature, *12
sediment filling, 92
sequence in sedimentation, 92
structure and terrain, 92
truck and poultry farming, 91
urban centers, 91
vertical section, *93
Callao, Peru, 157
harbor and site, 157
Cam, Diego, 380
Cambridge, 46
Camden, 30, 33
Cameron, C. R.
Maté In Important Brazilian Product, 185
Cameroons, 364, 381
Campania, 240
Campeche, Bay of, 125
Canada, 11
Canada, Dominion of, 14, 16, 49, 84, 105
Annapolis Valley, *110
appraisal for the future, 115
centers of glaciation, 105
cities, *113
climatic conditions and regions, 108
climatic regions, *421
comparative trade, *13
conservation problems, 116
crops and animals, 109
cultural features, 109
distribution of people, 112
exploration, 109
fishing and lumbering, 109
fur hunting and trading, 109
global trade, *112
Great Britain superimposed, 105
highways in the west, 112
historical associations, 109
hunting and trapping, 109
Laurentian Upland, *106
lumbering, *110
marine climate, 109
mature soils, 109, *132
natural features, 105
natural vegetation, 109, *128
nature of foreign trade, 112
problems of Canadian Arctic, 116
prosperity as related to the United States, 115
physiographic divisions and regions, 105
Quebec, *114
railroads in the west, 112
Canada, Dominion of, rainfall and temperature, *12
southeastern, land use, 110
tariff problems, 115
temperature and rainfall, *12
temperatures, rainfall and growing season, 108
transportation and trade, 112
transportation problems, 115
uninhabited areas, 109
urban centers, 112
Vancouver, *116
waterways, 111
Canada, Central and Western, 111
land use, 111
regions involved, 111
Canada from the Air, 105
Canada's Foreign Trade, *111
Canadian Intermontane Highlands, 112
field and orchard crops, 112
land use, 112
Canadian Pacific Railroad, 72, 112, 115
Canadian River, 58, 63
Canadian Rocky Mountains, 69
Canadian Rockies, 73
accessibility, 73
recreation and sports, 111
Canadian Shield, 105
Canary Islands, 356, 366
Canal Zone, 119, 129
Miraflores Locks, *129
Canals, 308
Elbe-Danube, 308
Canberra, 395
capital city, 398
Candia, 243
Cane sugar production, *131
Cuba, *131
Cannes, 320
Cantabrian Mountains, 290
Canterbury Landscapes A Study in New Zealand Geography, 401
Canterbury Plains, 404, 406
Canton, 276
ancient trade, 276
relation to Victoria, 276
situation and site, 276
Canyons in Sandstone, Ahaggar Mountains, *361
Cape Breton Island, 109
Cape Cod, 17, 18, 44, 47
Cape Diamond, 114
Cape Horn, 138
Cape North, 295
Cape of Good Hope, 351, 383, 384
Cape-to-Cairo Railroad, 370
Capetown, 381, 385
rainfall, 383
sea route, 385
situation and site, 385
Cape Verde Islands, 366
Cape York, 395
weather record, 397
Capital of the Confederacy, 34
"Capital of the Steppes" (*see* Omsk), 345
Capitol at Washington, D. C., 33
Capitol Building, *34
Capot Rey, R.
Dry and Humid Morphology in the Western Erg, 361
Capricorn, Tropic of, 147
Caracas, 178
location and site, 178
rainfall, 176
Caracas-to-Bogota Highway, 178
Caravan trade, 363
Sudan-Saharan Tableland, 363

Caravans, Camel, 254
Carcassonne Gap, 210, 211
  associated natural and cultural feature, 201
  location and importance, 201
Carcassonne Gateway, *202, 317, 320
Cardiff, England, 293
  early occupants, 293
Caribbean Coastal Lands, 149
Caribbean Lowlands, 142, 143
  location and extent, 142
Caribbean Sea, 120, 142, 149, 166, 176
Carlsbad Caverns, 59
Carnauba Wax Brazil's Monopoly Product, 186
Caroline Islands, 411, 414
Carpathian Gate, 204, 308, 310
Carpathian Mountains, 203, 204, 306, *306, 307, 313, 331, 333, 334
  physiographic sketch, *306
  summer resort, *313
Carpathian-Transylvanian Highland, 303, 305, 312, 313
  bedrock, structure and land forms, 305
  component sections, 305
  drainage of, 305
  evidences of glaciation, 305
  location and extent, 305
  minerals on the flanks, 305
  physiographic sketch, *306
  physiographic unity of, 305
Carpentaria, Gulf of, 400
Carpentaria, Gulf Plains of, 400
Carpenter, Edward
  quoted on irrigation, 258
Carson, Kit, 78
Carson Pass, 88
Carson Sink, 78
Cartagena, Colombia, 153
  rainfall, 149
Cartegena, Spain, 234
Carthage, 358, 360
  Rome and, 287
  settlers in Spain from, 231
Carthaginians, 319, 358
Casablanca (White House), 359
  location and hinterland, 359
  World War II, 359
Cascade Mountains, 11, 51, 84, 91
  Bonneville Project, *91
  Crater Lake, *86
  location and physical aspects, 85
  Mt Rainier, *86
  prominent peaks, 85
Cascade tunnel, 88
Casco Bay, 49
Casper, 64
Caspian Sea, 210, 218, 227, 315, 334, 335, 336, 338, 339, 340
Cassava, 150
Cassinian Way, 289
Castle Rock Buttes, 59
Castle, William R
  Hawaii, Then and Now, 412
Casto, E Ray
  Economic Geography of Palestine, 251
Catatumbo River, 145
Cathay, 272
Catskill Mountains (Plateau), 37
Catskill Plateau, 37, 38
  recreation center, 40
Catskills, The, 38
Cattle, 162, 170, 172, 184, 384
  breeds, 291
  India's production, 258
Caucasus Mountains, 218, 335, 337, 339
Cauca River, 143, 145
Cauca Valley, 145, 153
Cayenne Island, 191
  rainfall, 190
  location and site, 191
Cayenne River, 191
Celebes, 407
Celestial Empire, 272, 277
Cement industry, 39
  Lehigh Valley, 39
Cenis Pass, Mt, 212
Central America, 11
  climatic regions, *121
  hauling mahogany logs, *122
  oxcart transportation, *126
  Santa Maria Volcano, *121
  sisal harvest, *124
Central America and the West Indies, *120
Central American Traverse, 126
Central American countries, 123
  advantages of location, 130
  characteristics of people, 123
  earthquake hazards, 130
  historical association, 125
  looking to the future, 130
  mixed population, 123
  political unrest, 123
  power of United States, 125
  racial composition, 125
  scenic features, 130
  Spanish power, 125
Central American Highlands, 119
  bedrock, 120
  choice of canal site, 120
  climatic factors and regions, 122
  climatic regions, *121
  extent and terrain, 120
  faulting and folding, 120
  gateways, 121
  growing seasons, 122
  inter continental land bridge, 120
  location and trend, 120
  mature soils, 122
  migration of temperature and pressure belts, 122
  natural vegetation, *128
  ranges and massifs, 120
  temperature and rainfall, *12
  types of natural vegetation, 122
  valleys and basins, 120
  volcanic and earthquake activity, 120
Central Andes, 145, 153, 155, 159
  bedrock and structure, 145
  bifurcation, 145
  climatic zonation, 155
  structure and relief, 145
Central Barrier, 317
  complex character, 210
Central Barrier in Asia, 217
  countries within, 221
  great extent, 217
  six regions associated with, 217
  three major routes through, 217
Central Barrier in Europe, 211
  countries within, 212
  gateways, 211
  historical significance, 211
  physiographic regions, 211
  relations to World Wars I and II, 211
  two divisions, 211
Central Basin of Burma, 269
Central cordillera, 145, 155
Central Eurasian Barrier, 198, 315
  alternative names, 200
  Americas compared and contrasted, 210
  gateways in the east, 205
  land features north, 209
Central Eurasian Barrier, land features south and east, 209
  lands north, 287
  lands south and east, 225, 229, 245, 263
  outline, 209
Central Eurasian Barrier and Gateways (*see* Eurasian Barrier), 200, *201
Central Lowlands of Australia, 392
  appraisal for the future, 402
  artesian basin, 401
  Artesian Water and Australia's Pastoral Industry, 400
  artesian wells, *60
  Australia, 401
  bedrock and structure, 400
  cities, *396
  climatic conditions and regions, 401
  climatic regions, *121
  cultural features, 401
  divisions and regions, 387
  drainage, 400
  flowing wells, *60
  grain belt, 401
  grazing belt, 401
  historical background, 401
  intermittant streams, 400
  location and latitude, 400
  mature soils, 401
  metallic minerals, 401
  migration of wind belts, 401
  mixed farming area, 401
  monsoon effects, 401
  natural features, 400
  occurrence of minerals, 400
  railroads, 402
  rainfall and temperature, *394
  sales yard, *401
  saline lakes, 400
  sections, 400
  soil regions, *132
  stabilization of agriculture, 401
  transportation, 402
  urban centers, 402
  water supply, 400
  windward and leeward slopes, 401
Central Plains in Germany, 322
  concentric moraines and valleys, 322
  distribution of crops and animals, 323
  farming practices, 323
  manufacturing associated with crops, 323
  rock mantle and terrain, 322
  transportation facilities, 323
Central Plains of Europe, 315, 321, 329, 331, 334
  character of rivers, 316
  composition of mantle materials, 316
  continuity and levelness, 315
  drainage features, 316
  extent and shape, 315
  glaciated sections, 316
  physiographic features, 316
  topography and altitudes, 315
Central Plateau of France, 202, *202, 210 211, 317, 320
  beauties, 211
  contrasting sections, 211
  gateways in relation to, 211
  human occupancy, 211
  productivity low, 317
  relative ruggedness, 211
  rivers in relation, 211
  structure, 211
Central Rocky Mountains, 69
  altitude, structure and passes, 69
  sections, 69

Cernauti, 314
  timber and animal industries, 314
Cerro de Pasco, 155, 158
Ceylon, 256
Chad, Lake, 362
Chad Basin, Lake, 351
Chaldeans, 253, 366
Chambers, William T
  Life in a Cotton Farming Community, 19
  Life in a Southern Sawmill Community, 22
Champlain, Lake, 49
Champlain, Samuel de, 109, 115
Champlain Valleys, 107
Chandler, Douglas
  Belgium—Europe in Miniature, 329
Changsha, 276
Chapman, Olive Murray
  A Journey Among Primitive Tribes in Madagascar, 377
Chapman, Wendell and Lucille
  Lords of the Rockies, 72
Charcot, J., 416
Charles River, 47
Charleston, S. C., 19, 21
  weather record, 19
Charleston, W. Va., 43
Charlottesville, 27, 30
Chattahoochee River, 35
Chattanooga, 41
  historical connections, 41
  situation and site, 41
Chatet, Melville
  Rediscovering the Rhine
Chemnitz, 322
Chemulpo, 280
  rainfall, 279
Chernozems (*see* black soil), 433
  Canada, 109
  Great Plains, 59
  Hungary, 311
  India, 257
  Romania, 313
  Siberian Plain, 311
  Washington and Idaho, 78
Cherokee Indians, 64
Cherrapunji, 257
  rainfall, 257
Cherski Mountains, 346
Chesapeake and Ohio Railroad, 24
Chesapeake Bay, 19, 20, 33
Chestnut soils, 433
  associated climate and vegetation, 433
  grazing lands, 433
  Great Plains, 59
  humus deficiency, 433
  irrigation, 433
  profile, 433
  related to chernozems, 433
  representative areas, 434
  Sudan Saharan Tableland, 362
  Washington and Idaho, 78
Cheyenne, Wyo., 64
Chicago, 51, 56, 118
  educational and cultural center, 56
  industrial concentration, 55
  location, size and site, 55
  multiple manufactures, 55
  reasons for growth, 55
  trade and transportation, 55
  wholesale and retail center, 56
Chicago, Lake, 51
Chickamauga, Battle of, 38
Chicle, 124, 150, 188
Chihuahua, 125
  rainfall distribution, 122
Children in Germany, 323
Chile, 146, 149, 155
  agricultural problem, 164
  city distribution, 163
  climatic conditions and regions, 161
  climatic regions, *421
  cultural features, 162
  early explorers, 162
  estate agriculture, 162
  extent and surroundings, 161
  foreign trade, 163, *163
  global trade, 163
  historical backgrounds, 162
  Indian resistance, 162
  looking ahead, 164
  mining, 163
  mountains valleys and islands, 161
  natural features, 161
  natural nitrate monopoly, 163
  natural vegetation, 162
  ocean currents, 161
  problems of trade, 164
  processing and manufactures, 163
  rainfall and temperature, *139
  rural scene, *162
  Santiago, *164
  soils, 162
  soils regions, *132
  synthethic nitrates, 164
  urban centers, 163
  urban hinterlands, 163
  vegetation regions *128
Chile's Foreign Trade, *163
Chile's Land of Fire and Water, 163
Chilean coastal ranges and islands, 162
  non agricultural, 162
Chilean Trough and Coastal Ranges, 147
  extent and terrain, 148
  location and extent, 147
Chilean Valley, 163
  fruits and grains, 163
Chile, Northern, 162
  minerals, 162
Chile, Southern, 161
  marine climate, 161
Chilkoot Pass, 115
Chimborazo, Mt., 148, 145
Chimney Rock, 59
China, 20, 109, 220, 263, 264, 266, 271, 272, 277, 279, 285, 338, 342, 345, 348
  agriculture, 278
  ancient trade 272
  appraisal for the future 276
  carriers (human and animal), 274
  Cathay, 272
  Celestial Empire, 272
  China Opens Her Wild West, 273
  cities, *224
  climates, 272
  climatic regions, *121
  coastal lands, 274
  critical problems, 276
  crop seasons, 273
  crops grown, 273
  cultural features, 272
  distribution of types of agriculture, 273
  diversity of natural features, 272
  dust storms, 272
  empire of centuries, 272
  fishing industry, 274
  Floods of China, 274
  global trade, *268
  "Good Earth," 273
  Grand Canal, 275
  Great Wall, 264 *273
  impact of World War II, 276
China, *In a Chinese Harbor*, 271
  intensive farming, 273
  irrigation, 273
  Kalgan Gateway, 275
  Land of Famine, 274
  land utilization, 273, 274
  location and extent, 272
  loess, 220
  major political divisions, 272
  Manchuria, 277
  manufactures (cottage and factory types), 274
  migration of artisans, 274
  Mineral Resources of China, 276
  minerals, 274
  monsoon climate, 272
  natural features, 272
  natural vegetation, 272
  Occident impact, 272
  Oriental agriculture, 272
  outlook for trade, 274
  Peiping, 275
  plateau lands, 274
  proposals for improvement, 276
  rainfall and temperature *198, 272
  regions and terrain (*see* Chinese Plains and Uplands), 272
  Shanghai and Its Hinterland, 275
  Si Kiang basin, 278
  silk worms, 273
  soil conservation, 273
  soil differentiation, 272
  soil regions, *132
  succession of seasons, 272
  transportation and communication, 274
  types of agriculture, 273
  urban centers, 274
  vegetation regions, *128
  Willow Pattern Tea House, *276
  Winds and Fronts over Southeast Asia, 272
China Opens Her Wild West, 273
China's Foreign Trade, *275
Chinese Eastern Railway, 277
Chinese in Manchuria, 277
Chinese Manchurian Boys, *278
Chinese Plains and Uplands, 263, 264
  Hwang Ho basin, 265
  location and extent, 264
  rivers, 265
  Si Kiang basin, 265
  structure and terrain, 265
  Yangtze Kiang basin, 265
Chita, 278
Choco, Bay of, 153
Chocolate Mountains, 95
Cholon, 271
Chosen (*see* Korea), 263
Christchurch, 306
  location and hinterland, 306
Christian, John Leroy
  A Reconnaissance Tour in Western India, 257
Christiana Creek, 33
Christiania, Norway (*see* Oslo), 297
Christianity, 336
Christianity, Birthplace of, 245
Christmas Islands, 414
Chungking, 264, 273, 276
  capital of China, 276
  location in Red Basin, 276
Cibao Mountains, 131
Cibola, 82
Cigars, 132
  West Indies, 132
Cilician Gate, 218, 225, 251
Cincinnati, 57

Cincinnati, location and site, 57
  pioneer importance, 57
  specialized manufactures, 57
Circum-Pacific Mountains, 205
Cirques, 69
Cities, *21
  Atlantic and Gulf Coastal Plains, *21
  Arabian Plateau countries, *224
  Asia, *224
  Australasia, *396
  Australia, *396
  Belgium, *214
  Central Lowlands of Australia, *396
  China, *224
  China (location and sites), 274
  East Indies, *396
  Eastern Highlands and Tasmania, *396
  Ethiopian Highlands, *365
  Europe, *214
  France, *214
  Germany, 214
  Greece, *214
  India, *224
  Iran, 227
  Italy, *214
  Madagascar, *365
  Morocco, 359
  New England-Acadian Region, *41
  New Zealand, *396
  North America, *113
  northeastern United States, *41
  Portugal, *214, 235
  Santiago, Chile, *164
  South African Highlands and Basins, *365
  South America, *152
  Spain, *214, 232
  Sudan-Saharan Tableland, *365
  Sydney Harbor, *399
  the United States, *21
  Western Plateau, Australia, *396
"City of Brotherly Love" (*see* Philadelphia), 33
"City of the Dead," 125
Clapp, Frederick G
  Tehran and the Elburz, 227
Clay, Henry, 291
Clermont-Ferrand, 317, 320
Cleveland, 54, 56
Clifford, B F H
  Habitability of the Kalahari, 384
Clifford, Sir Bede
  Across the Great Makarikari Salt Lake, 383
Climate, 19
  Alaska, 102
  Atlas Mountain Region, 357
  continental humid—long summer, 19
  diversity in North Africa, 356
  effects of Pacific Mountains, 87
  Great Plains, 59
  Iraq, 253
  Mongolian Plateaus, 220
  Newfoundland, 117
  Notes on the Climate of the Coastal Fringe of North Africa, 356
  Rocky Mountains, 70
  seven factors, 418
  Southern California Lowlands, 97
  subtropical humid, 19
  Tarim Basin, 221
  The Pattern of Climates, 418
  Tibetan Plateau, 220
  tropical wet and dry, 19
  Turkey, 222
  West Indies, 123
  zonal groups, 419
Climate and Man in the Columbia Plateau Area, 79
Climate of British Bechuanaland, Some Notes on the, 383
Climates of the earth, 419
Climatic Belts, *420
  delineation, 420
Climatic conditions and regions, 45
  New England, 45
Climatic features, 296
  Bergen, Trondhjem and Tromso, 296
  France, 317
  Japan, 281
Climatic regions, *421
  Africa, *421
  Alaska, *421
  Argentina, *421
  Atlas Region, *421
  Belgium, *421
  Bolivia, *421
  Brazil, *421
  California Valley, *421
  Canada, *421
  Central American Highlands, *421
  Central Lowlands (Australia), *421
  Chile, *421
  China, *421
  Colombia, *421
  Congo Basin, *421
  East Africa, *421
  East Indies, *421
  Eastern Highlands and Mountains, *421
  Eastern Highlands and Tasmania, *421
  Ethiopian Highland, *421
  Explanation, 419
  France, *421
  Glaciated Lowland, *421
  Great Plains, *421
  Greece, *421
  Greenland, *421
  Guianas, *421
  Hungary, *421
  India, *421
  Intermontane Highlands, *421
  Iraq, *421
  Irish Free State, *421
  Italy, *421
  Japan, *421
  Madagascar, *421
  Manchuria, *421
  New Zealand, *421
  New England-Acadian Region, *421
  Pacific Borderlands, *421
  Pacific slope lands, *421
  Paraguay, *421
  Puget Sound Lowland, *421
  Rainfall factors, 419
  Romania, *421
  Spain, *421
  Spanish North America, *421
  Siberian Plain, *421
  South African Highlands and Basins, *421
  Southern California Lowlands, *421
  Southern Interior Highlands, *421
  Soviet Europe, *421
  Sudan Saharan Tableland, *421
  Sweden, *421
  Syria and Palestine, *421
  Turanian Plain, *421
  Turkey, *421
  Two controlling elements, 419
  Uruguay, *421
  Venezuela, *421
  West Indies, *421
  Western Plateau, *421
  Yugoslavia, *421
Climatic type, 419
  explanation, 419
Clothing manufacture, 32
  New York City, 32
Clubb, Edmund
  Floods of China, 274
Cluj, 314
Coal, 163
  A Southern West Virginia Mining Community, 40
  anthracite, 41
  France, 317
  Manchuria, 278
  Pittsburgh's area, 42
  Poland, 331
  Ruhr Basin, 304
  Ruhr Valley, 322
  Saar Basin, 304, 321
  Sambre Meuse field 321
  Siberian Plain, 343
  Silesian field, 305
  Southern Interior Highlands, 66
  Turkey, 222
  United Kingdom, 290
  world's production, *39
Coal mining problems, 43
  Appalachian Plateaus, 43
Coastal Piedmont, 155
Coastal Piedmont, Plains and Ranges, 147
  description, 148
  location and boundaries, 148
  physiographic sketch, *146
Coastal Plains, 11
  divisions, 17
  location and extent, 17
  monotony of landscape, 17
  nature of shoreline, 17
  shoreline features, 17
Coastal Plains of Europe, 331
Coast Ranges, 51, 84, 92, 95, 108, 119
Coastal Ranges, 148
  Altitudes, 147
  Colombia, 148
  continental shelf adjacent, 85
  drowned breaches, 84
  drowned sections, 147
  earthquakes associated, 85
  structure and vulcanism, 85
Cobalt, Canada, 110
Cochabamba Peru, 158
"Cockpit of Europe," 217
  Albania 217
  Bospor Dardanelles Gateway, 205
Coconuts 177, 409
  Sporadic Islands, 414
Coffee, 126
  Brazil, 185
  Colombia, 151
  Costa Rica, 128
  Guatemala, 126
  Haiti and Jamaica, 132
  optimum conditions, 184
  railroad from Santos to São Paulo, *184
  world's production, *185
Coffee Industry of Colombia, The, 151
Coffee Lands of Southeastern Brazil, The, 184
Col, Pyrenees gateway, 211
Coliseum, 239
Collective farms, 336
  operation and land use, 336
Colleges of New England, 46
Collier, James E
  Artesian Water and Australia's Pastoral Industry, 400
  The Aluminum Industry of Western Hemisphere, 191

Cologne, 322, 323, 324
ancient connections, 323
focal location, 323
situation and site, 323
trade of, 323
Colombo, 256, 262
Colon, 129
Atlantic terminus of Panama Canal, 130
Colorado, 69
Colorado Delta, 119
Colorado National Forest, 82
Colorado Plateau, 75, 119
bedrock and terrain, 76
Boulder Dam, *80
cities, 82
copper production, *82
desert wonderland, 80
factors of occupancy, 80
mineral prospects, 77
prehistoric features, 77
San Francisco Mountains, 77
Southwestern Desert Vegetation, Its Adaptations and Utilization, 80
spectacular features, 76
Colorado River, 70, 75, 78, 87, 96, 98
Colorado Springs, 74
Colombia, 144, 148, 149
air transportation, 151
area and configuration, 149
Barranca Bermeja, *150
cattle, 151
cities, 151
climate, 149
climatic regions, *421
coffee lands, 150
cultural features, 150
earth products, 151
explorers, 150
foreign trade, 151
future prospects, 153
health factors, 151
Istmina on San Juan River, *151
location and extent, 149
Magdalena route, 150
mixed population, 150
Native's Hut, *150
natural regions, 149
natural vegetation, 128
need for initiative, 153
oil town in Magdalena, *150
Pacific Coastal problems, 153
petroleum, 150
platinum and gold, 150
population, 150
rain forests, 150
rainfall and temperature, *139
Colombia, Transportation Problems of, 151
Columbia Highway, 88
Columbia Plateau, 75, 77, 112
bedrock and terrain, 75
cities, 81
glacial outwash, 78
Grand Coulee, 75
Grand Coulee Project, *76
location and area, 75
mineral prospects, 77
orcharding, 79
Steamboat Rock, *76
unusual phenomena, 75
Yakima Valley, *79
Columbia River, 70, 75, 78, 88, 89, 91, 112
Columbia River basin, 40
Columbia River gateway, 84, 88
Columbia, S. C., 30, 35
Columbus, Ohio, 54, 57
Columbus, Christopher, 123, 125, 130, 257, 296
exploring for Spain, 232
Columbus, Ga., 30
Commerce Building, 34
Commencement Bay, 91
Commonwealth of Australia, 395
Como, Lake, 212
Comodoro Rivadavia, 175
petroleum, 171
Comodoro Rivadavia Oil Field, *171
Comparative trade of different countries, *13
Computations, 433
dependability, 433
evenness, 433
Concepcion Bay, 164
Concepcion, 163
location and site, 164
Concord, 46
Confederate army, 27
Configuration, *352
South African Highlands and Basins, *352
Southern Highlands and Basins, *355
Conformation of Non-Irrigated Desert Occupance to Transportation Patterns, 366
Congo Basin, 351, 361
Africa, 379
altitudes and contour, 379
animal life, 380
appraisal for the future, 381
bedrock and structure, 379
Belgian, 325
circus wild animals, 380
climatic conditions and regions, 380, *421
commercial agriculture, 381
comparison to Amazon, 379
configuration and area, 379
cultural features, 380
domesticated plants and animals, 381
drainage and terrain, 379
European activities, 381
exploitation of people and resources, 382
explorers, 380
handicaps, 381
historical associations, 380
Keeping House on the Congo, 381
King Leopold, 380
leeward location, 380
Liberia and the Belgian Congo, 380
location and boundaries, 379
mantle rock, 379
mature soils, 380
minerals, 380
native and European occupants, 381
natives' welfare, 382
natural features, 379
natural vegetation, 380
opportunities, 381
plantation system, 381
political divisions, 381
population density, 381
primitive agriculture, 381
railways, 381
rainfall, 380
rainfall and temperature *353
relation to rift valleys, 379
river transport, 381
rivers, 379
soil regions, *132
stream load, 379
transportation, 381
travel, 380
Congo Basin, tropical rain forests, 380
tropical savannas, 380
urban centers, 381
vegetation regions, *428
water table and lakes, 379
Congo River, 354, 362, 373, 380
Congressional Library, 34
Coniferous forests, 429
associated soils, 429
associated trees, 429
conservation, 429
fire hazards, 429
location and climate, 429
rate of growth, 429
representative areas, 429
reserves, 429
Connecticut, 31, 44, 45, 47
Connecticut River, 45, 48
Connecticut Valley, 45
submergence and emergence, 45
Constanta, 314
Constance, Lake, 212, 324
Constantinople, 204, 223, 311
Continental arid climate, 77
Basin and Range Region, 77
Columbia Plateau, 77
native vegetation, 424
representative regions, 424
temperature and rainfall distribution 424
Continental climates, 423
interior locations, 423
occurrence, 423
temperature extremes, 423
three phases, 423
Continental Congress, First and Second, 33
Continental dry climate, 108, 423
Canada, 108
two phases, 424
Continental glaciation, 51
School Atlas, 51
Continental humid climates, 423
Canada, 108
Glaciated Lowlands, 52
long summers, 423
northern Appalachians, 38
two phases, 423
Continental humid long-summer, 423
native vegetation, 423
northern Blue Ridge and Piedmont, 27
representative regions, 423
temperature and rainfall and distribution, 423
Continental humid, short-summer, 424
compared with long-summer phase, 424
native vegetation, 424
representative regions, 424
temperature and rainfall distribution, 423
Continental semiarid climates, 424
agricultural hazards, 424
natural vegetation, 424
representative regions, 424
temperature and rainfall conditions, 424
Continental shelf, 17
Continental subpolar climates, 423
Canada, 52, 108
effectiveness of rainfall, 424
location and temperature conditions, 424
low precipitation, 424
native vegetation, 424
representative regions, 424
temperature limits, 424

Continents, 3
classified into divisions, 4
physiographic divisions, 3
physiographic divisions and regions, 4
Contour Basin Listing, *62
Contrasting Regional Morphology of Soil Erosion in New Zealand, 405
Cook, Capt. James, 391, 403, 416
Hawaiian Islands, 412
Cook Inlet, 102
Cook, Mount, 403
Cook Strait, 403
Coosa Valley, 36
Copenhagen, 300, 327
situation and site, 327
Copper, 155, 159, 163, 172, 185, 383
Congo Basin, 380
Katanga Highlands, 381
Peru, 158
Arizona, 82
Bingham, 81
Copper River Valley, 103
Coquimbo, 162, 163
Corcovado Gulf, 168
Cordillera Blanca, 155
Cordillera Occidental, 118
Cordillera Real, 115, 160
Cordilleran Glacier, 51, 105, 108
Cordova, Alaska, 103
Cordoba, Arg., 174
location and interests, 174
vacation and tourist center, 174
water supply, 174
Cordoba Mountains, 174
Cordoba, Spain, 284
Corfu, 244
Corinth, Gulf of, 243
Corinth, Isthmus of, 230, 243
Corinthian Columns, 239
Corinto, 128
Corn, 150, 159, 163, 172, 184
Cuzco, *157
world's production, *53
"Corn Belt," 54
Glaciated Lowland, 53
Cornwall, 202, 288, 290, 294
highlands, 288
Cornwallis, General, 27
Coronado, Francisco, 78, 82, 150
Corridor, Polish, 331
Corridors and gaps, 53
Corrientes, 175
Corrientes, Cape, 95
Corsica, 230
Cortez, Hernando, 123, 125, 150
Corumba, 188
Costa Rica, 119, 123
area, climate and soils, 128
banana lands, 128
coffee farmers, 128
composition of population, 129
democratic enterprise, 128
global trade, 129, *128
livestock section, 128
"Rich Coast," 128
structure and terrain, 128
Cotopaxi, Mt., 138, *138, 145
Cotton, 20, 154, 172, 184, 273
Atlantic and Gulf Coastal Plains, 20
boll weevil, 20, 28
by-products, 20
India's production, 258
Liverpool, 292
Piedmont Upland, 28
related to human welfare, 28
world's production, 20
Cotton Pickers, *342
Turanian Plain, *342
Coulter, John Wesley
Peiping, 275
The Island of Hawaii, 412
Council Bluffs, Iowa, 57
Countries, 290
Northwest Highland, 290
Countries in the Interior Plains and Associated Uplands of South America, 169
Countries of the Central Plains of Europe, 316
uncertainties as to boundaries, 316
Countries of the Interior and Northern Plains and Uplands of Eurasia, 316
Countries of the West Central Highlands and Associated Lowlands of Eurasia, 306
Country Life in Norway, 297
Coventry, 293
Cowlitz River, 89
Cranberries, 46
bogs of Cape Cod, 46
Cranberry bogs, 107
Crater Lake, 85, *86
Crater Lake and Yosemite Through the Ages, 87
Creek Indians, 64
"Crescent City" (*see* New Orleans), 22
Cressey, George B.
Asia's Lands and Peoples, 206
Crete, 243
Crimean Peninsula, 335
Croatian Gateway, 202, 204, 210, 211, 308
associated natural and cultural features, 202
location and importance, 202
Peartree Pass, 202
World War II, 203
Crone, G. R.
Inland Waterways of Germany, 322
Notes on the Agriculture of the Low Countries, 325
The Site and Growth of Paris, 318
Crossroads, 204
Bosporus Dardanelles Breach, 204
"Crossroads of the Pacific", 111
Hawaiian Islands, 111
Croxton, F. F., and Cowden, D. J.
Practical Business Statistics, 133
Cryolite in Greenland, 118
Ctesiphon, Ruins of, 254
Cuba, 119, 121, 130, 132
altitudes and terrain, 131
area and population, 131
cane sugar production, *131
foreign trade, *132
global trade, *127
Mariel, A Sugar District in Cuba, 132
tillable land, 131
tobacco processing, 132
sugar cane, 132
Cuba's Foreign Trade, *132
Ciudad Trujillo, 133
Ciudad Bolivar, 178
situation and site, 178
Cullinan diamond, 385
Cultivated Slopes along the Moselle, *322
Cultural features of the landscape, 3
three levels, 3
Cumberland Gap, 38
Cumberland, Kenneth B.
Canterbury Landscapes: A Study in New Zealand Geography, 404
Contrasting Regional Morphology of Soil Erosion in New Zealand, 405
Cumberland Plateau, 37, 65
A Study of the Succession of Human Activities in the Kentucky Mountains, 40
Cumberland Mountains (Plateau), 37
Cumberland Valley, 27, 36
Cumbrian Mountains, 288
Curaçao Island, 133
Curzon Line, 331
Cutlery, 293
Sheffield, 293
Cut over lands, 53
Cuxhaven, 323
Cuyaba, 188
Cuyhoga River, 56
Cuzco Corn, *157
Cuzco, 158
Inca capital, 158
Cyclonic belts, 419
isothermal and vegetational limits, 419
Cyclonic marine climates, 423
frost relationships, 423
latitude and temperature limits, 423
two major groups, 423
Cyclonic continental climates, 423
Czechoslovakia, 307, 310, 311, 314, 331
agricultural activities, 307
climate, 307
composition of population, 307
configuration and bounds, 307
contrasts between eastern and western, 307
cultural features, 307
Czechoslovaks, Yankees of Europe, 308
eastern section (Ruthenia), 307
encompassing mountains, 307
historical setting, 307
imports and exports, 308
I Saw Czechoslovakia, 308
land locked position and trade, 308
land utilization, 307
metallurgical industries, 307
middle section (Moravia), 307
natural features, 307
neighbors, 307
outlook for the future, 308
precarious situation, 307
progressiveness, 307
railways and waterways, 308
slavic wedge, 307
transportation and markets, 308
urban centers, 308
western section (Bohemia), 307
wood and woodworking, 308
Czechoslovakia, I Saw, 308
Czechoslovaks, Yankees of Europe, 308

Dahomey, 364
Dairen, 278
location and situation, 278
temperature and rainfall, 277
Dairying, 309
Austria, 309
Dairy products, 328
Netherlands, The, 328
Dairying Industry of New Zealand, 405
Dakar, role in World War II, 364
Dallas, 22, 62, 63
cotton and oil interests, 22
petroleum interests, 63
Dalmatian Coast, 212, 214
Daly Waters, 402
Damascus, 249, 250, 251
Damietta mouth of the Nile, 369
Danish Islands, 315
Danish North America, 118
Greenland, 118

Danube, Plain of the, 313
Danube River, 212 *305, 306, 307, 308, 311, 312, 313, 316, 322, 324
Danube-Sava Valleys, 202
Danzig, 322, 332
Dardanelles, St of the, 222
Dar es-Salaam, 375
  rainfall, 374
Darien, Gulf of, 142
Darius I, 257
Darling Basin, 401
Dartmouth College, 46
Darwin, 402
  weather record, 393
"Date City," 254
Date palms, 254
Davis, D H
  A Study of the Succession of Human Activities in the Kentucky Mountains, 40
  Some Aspects of Urbanization in Japan, 285
Davis, Jefferson, 94
Dawson, 74, 105, 115
  The Klondike News, *109
Dawson Creek, B C, 109, 112
Dead Sea, *2, 245, 252
Dean, Vera Micheles
  Russia and Her Neighbors in Europe, 336
Deasy, George F
  The Future of Manchurian Agriculture, 278
Death Valley, 76
Debreczen, 312
Deccan Plateau, 247, 257, 261, 262
  rivers and terrain, 247
Declaration of Independence, 93
Delaware, 17
Delaware and Lackawanna Railroad, 24
Delaware River, 24, 33, 37
Delaware Water Gap, 24
Delhi, 260, 261
Delhi, New, 261
  capital of India 261
  situation and site, 261
de Lynden, Baron R A.
  Liberia 366
Demavend, Mt, 227
Demerara River, 191
Denham, Dixon (African explorer), 368
Denmark, 316, 325
  agriculture, 326
  Agriculture in Denmark, A Land of Specialized Farming and Cooperation, 326
  Baltic Sea Routes, 325
  Bornholm Denmark in a Nutshell, 326
  cooperatives, 326
  crops and animals 326
  cultural features, 326
  Denmark's Frontier and Minority Problem, 326
  foreign trade, 326
  German aggression, 326
  global trade, *326
  manufacturing and processing, 326
  moraine ares, 325
  natural features 325
  specialized agriculture, 326
  terrain and soils, 326
  urban centers, 326
Denver, 68
  development and importance, 68
  situation and site 62
Denver and Rio Grande Railroad, 72
Dependability of rainfall, 313, 433
  formula, 433
  Omaha and Chicago, 52
Derby, 293
Desaguadero River, 146
Desert and scrub, 122
  Central America, 122
Deserts, 129
  adaptations, 429
  appearance, 429
  climatic regions, 429
  distribution and area, 429
  diversified flora, 429
  plant associations, 429
  protective features, 429
  related rainfall regions, 429
Desert Versus Forest in East Africa, 374
DeSoto, Hernando, 150
Detroit, 54, 105
  associated industries, 57
  automobile capital, 57
  communications, 57
  locational advantages, 56
Detroit River, 57
Devil's Tower, *59
Devon, 288
Diana, Goddess, 225
Diamonds, 185, 383
  Netherlands, The, 328
Dias, Bartolomeu, 6, 235, 383
  explorations, 351
Diego-Suarez 377
"Dimple of the Universe," 43
Dinaric Alps, 212
Dniedawa, 373
Dismal Swamp, 17
Distribution of population of the world, *14
District of Mackenzie, 58
Distribution of towns on the Great Plains, 63
Diversity and Unity in Southeast Asia, 107
Divisions and regions
  Africa, *355
  Australasia, *389
  Australasia and Antarctica, 390
  Central Lowlands (Australia), *389
  Eastern African Highlands, *355
  Eurasia, *208
  Germany *208
  North America, 13
  North of Eurasian Barrier, *208
  Northwest Highlands, *208
  Southern Highlands and Basins, *352
  South America, *140
Divisions of the Continents, *1
Dixey, F
  The Nyasa-Shire Rift 378
Dnepr River (*see* Dnieper), 339
Dnieper River, 316, 339
Dniepropetrovsk 339
Dnieprostroy Dam, 337, 339
Dniester River, 305, 331, 339
Dobby, F H G
  Agrarian Problems in Spain, 232
  Winds and Fronts over Southeast Asia, 272
Dobruja massif (*see* Romania), 313
  hunter's paradise, 313
Dominion of Canada, 105
Dominion of New Zealand, 103
Dominican Republic, 130, 131
Don River, 337, 339
Donetz Basin, 337, 339
Dortmund, 322
Douglas, 77, 82
Douglas fir, 91, 109
Douro River, 230, 234
Dover, Strait of, 288, 294, 316
Drake, Colonel, and the first oil well, 40
Drake, Sir Francis, 88
Drakensberg Mountains, 351, 382
Drava River, 306
Dresden, 322, 323, 324
  historical connections, 324
  industries of, 324
  situation for trade and transportation, 324
Dry farming
  Great Plains, 61
Dual Empire, 309, 310
  (*see* Austria Hungary)
Dual monarchy, 311
Dublin, 293, 295
  location and hinterland, 295
Dublin Bay, 295
Duncan, King of the Scots, 291
Duncan, Lt. David D
  Okinawa, Threshold to Japan, 284
Dundee, 293
Dunedin, 106
  location and site, 106
  railway connections, 106
  rainfall, 104
Duisburg-Hamborn, 322
Duluth, 105, 335
  iron ore shipping point, 56
Durand, Loyal, Jr
  Baronowice, A Landed Estate in Polish Silesia, 332
Durango, 82
Durban, 385
  location and site, 385
  rainfall, 383
  tourist center, 385
Dusseldorf, 322
Dust Storms, *61
Dutch, 190
Dutch East Indies, 107
Dutch Guiana (*see* Surinam), 32, 190
Dutch influences, 20
Dutch West India Company, 32
Dvina River, 336
Dyewoods, 188
Dzungarian Gate, 206
  Kalgan Gateway and the, 206

Fari, F M
  Mechanization of Agriculture in the USSR, 336
Farly, General Jubal, 27
Earth products
  building stones and clay manufactures 89
  building stone in New England, 15
Earthquakes
  Coastal Ranges of United States, 85
  Helena, Mont, 70
  San Francisco, 85
East Africa
  climatic regions, *121
  physiographic sketch, *367
  rift valleys, *367
  rainfall and temperature, *353
East African basin, 351
East African Highlands, 351
  British territory, 375
  European exploitation, 376
  French possessions, 375
  Italian possessions, 375
  political divisions, 375
  Portuguese East Africa, 375
  problems ahead, 376

East African Highlands, urban centers, 375
  welfare of natives, 376
East Brazilian Highlands, 179, 183, 192
  associated plain, 182
  bordering region, 182
  Brazilian old lands, 182
  compared with Laurentian Uplands, 182
  denuded sections, 182
  drainage, 182
  marginal escarpment, 182
  mineral resources, 182
  Parana Plateau, 182
East Brazilian Highlands and Coastal Plain, 181
  latitude and extent, 182
East Cape, 334
East India Company, 257, 383
East Indies, 390, 407
  agricultural panorama, 409
  alluvial deposits, 408
  archeology, 408
  automobiles, 410
  cash crops, 409
  circum-Pacific Mountains, 407
  cities, *396
  climatic factors, 408
  climatic regions, *421
  coastal plains, 408
  colonial systems, 408
  commercial agriculture, 409
  crops grown, 409
  crossroad location, 410
  cultural features, 408
  distribution of crops, 409
  Diversity and Unity in Southeast Asia, 407
  European colonial policies, 408
  exploitation of products and peoples, 408
  factors of regional unity, 407
  form and extent, 407
  gateways, *6
  handicrafts, 410
  high tropical productivity, 410
  historical elements, 408
  islands included, 407
  Japanese aggression 411
  Java, the Economic Geography of a Tropical Island, 409
  lava soils, 408
  location and importance, 407
  looking ahead, 410
  manufactures, 410
  mature soils, 408
  metallic minerals, 409
  mountainous structure, 408
  natural features, 407
  natural vegetation 408
  native services, 410
  native travel, 410
  Netherlands, The 325
  origin of people, 408
  outrigger boats, *409
  over all area, 407
  petroleum, 409
  plantation agriculture, 409
  political outlook, 411
  population 407
  processing, 410
  railroads, 410
  rainfall and temperature, *394
  Recent Developments in The Netherlands Indies, 409
  relation to Alpine system, 407
  rubber industry, 409
  seasons of rainfall, 408
East Indies, strategic gateways, 410
  subsistence agriculture, 409
  substructure, 407
  transportation system, 410
  unique products, 407
  urban centers, 410
  volcanoes, 408
  world significance, 410
  welfare of natives, 410
East River, 30
East St Louis, 57
Eastern Australia
  Sydney Faces the War Front Down Under, 398
Eastern (Oriental) cordillera, 145
Eastern Highlands and Associated Plains of South America, 141, 167, 181
  bedrock, 181
  extent and location, 181
  regions, 181
Eastern Highlands and Allied Features of Africa, 371
  Eastern Plateaus, Mountains and Plains, 371
  Ethiopian Highland, 371
  Madagascar, 371
Eastern Highlands and Tasmania, 392, 395
  advantages and handicaps, 399
  cities, *396
  climatic regions, *421
  coal districts, 397
  location and extent, 395
  metallic minerals, 398
  prospects for sky travel 399
  rainfall and temperature, *394
  soil regions *432
  survey for the future, 399
  vegetation regions, *428
Eastern Highlands of Australia, 397
  agriculture, 397
  altitude and peaks, 397
  cattle, 397
  cattle belt 397
  climatic conditions and regions, 397
  coal, 397
  coastal plain 395
  drainage and streams, 397
  environmental advantages, 397
  geologic history, 395
  grain belt, 397
  mature soils 397
  migration of wind belts, 397
  minerals and ores, 397
  mining, forestry, manufacturing, commerce, 397
  natural vegetation, 397
  occurrence of coal beds, 395
  pastoral agriculture, 397
  political divisions, 395
  recreation, 397
  sheep, 397
  sheep belt, 397
  slopes, 395
  structure, 395
  sugar cane, 397
  transportation facilities, 398
  transportation system, 397
  urban centers, 398
  windward and leeward slopes, 397
Eastern Plateaus, Mountains, and Plains of Africa 373
  climatic regions, *421
  bedrock, 374
  commercial crops, 375
  cultural features, 374
Eastern Plateaus, Mountains, and Plains of Africa, *Desert Versus Forests in East Africa*, 374
  distribution of people, 375
  Elgon, Mt , 373
  exploration and settlement, 374
  extent and sections 373
  historical background, 374
  Kenya, Mt , 373
  Kilimanjaro, Mt , 373
  mature soils, 374
  natural features, 373
  natural vegetation, 374
  Notes on the Geography of the Fundura District of Tanganyika Territory, 375
  origin of rivers, 373
  physiographic sketch, *397
  plantation system, 375
  rainfall and temperature, 374
  Ruwenzori, Mt , 373
  structural history, 373
  subsistence crops, 375
  transportation, 375
  waterfalls, 373
  Zambezi Gorge, *374
Eastern Sierra Madre, 119
Ebro River, 229
Ebro Valley, 229, 232, 234
Economic Geography of Greece, 243
Economic Geography of Palestine, 251
Ecuador, 148, 149
  climatic conditions, 153
  climatic regions, *421
  Cotopaxi, Mt , *138
  critical problems, 155
  crops and animals, 154
  cultural features, 154
  economic conditions, 154
  foreign trade, 154, *154
  forest products, 154
  historical associations, 154
  location and size, 153
  looking ahead 155
  mountains and basins, 154
  natural features, 153
  natural vegetation, 154
  origin of name, 154
  physiographic regions, 153
  rainfall and temperature, *139
  transportation, 154
  urban centers, 154
  vegetation regions, *428
Ecuador, A High Farm in the Central Plateau, 154
Ecuador's Foreign Trade, *154
Edinburgh, 291, 293
  book making center, 93
  location and site, 293
Edmonton, 115
Egypt, 1, 6, 68, 351, 369
  constructional materials, 368
  crops and manufactured goods, 369
  cultures, 368
  Daily Life in Ancient Egypt, 369
  floods, 368
  foreign trade, *369
  future interests, 370
  harnessing the Nile, 370
  irrigation 368
  monuments, 369
  Nile Valley, 369
  originality of people, 368
  Pharaohs, 351
  physiographic sketch, *246
  Problems of the Nile Valley, 370
  quarries, 368

Egypt, shape, size and boundaries, 369
transportation, 369
urban centers, 369
Egyptian Pharaohs, 366
Egypt's Foreign Trade, *369
Eire (*see* Irish Free State), 290, 293, 295
Eisen, Edna E.
The Structure of Rhine Traffic, 322
Ekblaw, W. Elmer
Facets of Fjord Economy A Study of Life on Sogne Fjord, Norway, 297
El Niño current, 161
El Obeid, 364
El Paso, 82
historical associations, 82
El Salvador, 119, 123
area and population, 127
coffee lands, 127
general welfare, 127
global trade, 127
land holdings, 127
national spirit, 127
Elbe River, 305, 307, 308, 315, 316, 322, 323
Elbe-Danube canal, 308
Elburz Mountains, 210, 218, 227
Elizabeth, 31
Elizabeth, Queen, 257
Elizabeth River, 21
Ellesmere Land, 118
Emba River, 335
Emerson, Ralph Waldo, 46
Emery, 222
England, 130, 290, 297, 315, 317
sheep, *291
English, 27, 32
English Channel, 288, 292, 294
English influences, 20
English settlement, 19
Enguri Su, 224
Enisei River (*see* Yenisei), 315
Eniwetok, 407
Enns River, 309, 316
Epheses, Ancient city of, 225
E pluribus unum, 16
Equal-area map, *14
Equimault Harbor, 115
Erakleion (*see* Candia), 213
Erickson, Franklin C
The Tobacco Belt of North Carolina, 28
Transhumance in the Land of Economy of Schächtenthal, 213
Erie Canal (*see* New York Barge Canal), 24, 54
Erie, Lake, 24, 54, 56, 108
Erie, Pa., 56
Eritrea (Italian), 375
Erzgebirge (*see* Ore Mountains), 307
Erzurum, 225
Esdraelon, Plains of, 252
Eskimos, 109, 110
Esquiline Hill, 239
Essen, 322
Estonia, 334, 338
Ethiopia, 372
cities, 373
distribution of population, 372
landlocked country, 372
looking ahead, 373
size, 372
Some Impressions of Abyssinia, 373
Ethiopian Highlands, 351, 371
altitude and terrain, 371
cities, *365
climatic conditions, 371
Ethiopian Highlands, climatic regions, *421
composition of population, 372
crops and animals, 372
crystalline foundation, 372
cultural features, 372
drainage, 371
eastern escarpment, 371
exportable products, 372
healthfulness, 372
historical associations, 372
interstream areas, 371
isolation, 372
lava rocks, 372
location and area, 371
natural features, 371
Nile floods, 372
physiographic sketch, *367
rainfall and temperature, *353
soil regions, *432
subsistence crops, 372
transportation, 372
tropical wet and dry climate, 371
variations in climate, 372
vegetation regions, *428
water power resources, 372
zonation of vegetation, 372
Etna, Mt., 230
Eucalyptus, 393, 397
Eugene, 92
Euphrates River, 218, 246, 253, 254
Eurasia, 197, 315
adjustment to forests, 199
applied intelligence, 199
Barriers and Gateways, *201
comparative factors, 197
contrasts in land utilization, 197
divisions and regions, *208
grassland adjustments, 199
influence of latitude, 198
intensity of occupance, 199
Lapland landscape, *296
Lapps, 199
man's adaptability, 199
related to large water bodies, 198
Eurasian Barrier, 200
alternative names, 198
Anatolia, *218
characteristics, 200
comparison of lands north with lands south, 287
difficulties in crossing, 200
divisions south, 229
extent of area north, 287
great extent, 198
human occupancy south, 229
lands south and east, 229, 245, 263
natural conditions north, 287
nature of lands south, 229
primitive man north, 287
regions south of western section, 229
routes through, compared, 210
some characteristics, 198
Tarim Basin, *221
termini, 198
three divisions north, 287
Tibetan Plateau, *219
varying width of area north, 287
western division south, 229
Eureka, 89
Europe, 16, 19, 129, 133
Central Plains, 315
cities, *214
Fuel Crisis in Europe, 321
gateways, *203
Iron Gate, *204
Italian Peninsula, *236
Europe, rainfall and temperature, 197
south of the barrier, 231
Evangeline, Longfellow's
Evenness of rainfall, 27, 433
computation, 433
formula, 433
rainfall, 433
Everglades, 17
Expanding World, *6
Mercator Map, *6
Explorers, Great Plains, 60
Coronado, Mallets, Lewis and Clark, Ashley, Astorians, Frémont, Mormons, 60
Fyre, Lake, 400

Fabulous Yellowstone, 73
Fairbanks, 11, 103, 112
rainfall and temperature, 102
Falkland Islands, 171
Fall Line, 17, 31
breaks in transportation, 26
defined, 26
power sites, 29
relation to Piedmont Upland, 26
relative to village sites, 26
"Fall Line Cities," 27
Fall River, 47, 48
Fall River-New Bedford area, 47
Far East, 102, 129, 240, 249, 252, 263, 275, 278, 289, 291, 319, 342
Faroe Islands, 288
Farming, 53
Glaciated Lowland, 53
Sudan Saharan Tableland, *363
Federated Capital Territory, 395
Federated Malay States, 266
Fenner, Charles
The Murray River Basin, 401
Fenneman, Nevin M
Physiography of Western United States, 69
Fergana, Plain of, 342
Fergana, 342
Fez, 359
Fezzan Basin, 361
Fibers, 185
Fiji Islands, 411
climate and soils, 413
latitude, 413
markets, 414
production problems, 414
subsistence crops, 414
sugar cane, 413
volcanic origin, 413
Fiji Sugar Industry, 414
Filby, A. E.
A New Trans-African Route, 354
Filchner, W., 416
Finch, V. C., and Trewartha, G. T.
Elements of Geography, 426
Finger Lakes, 37
Finland, 290, 300, 338
Agriculture in Finland, 301
climatic features, 301
consumer cooperation, 302
crops and animals grown, 301
cultural features, 301
diplomatic adventures, 302
foreign trade, 301
geological features, 301
glaciation, 300
land utilization, 301
length of summer and of winter days 300
location, size and population, 300

Finland, mineral industries, 301
natural features, 300
natural vegetation, 301
origin and language of the Finns, 301
outlook for the future, 302
people and cities, 301
physical regions, 301
political history, 301
soils, 301
structure and terrain, 301
The Nomads of Arctic Lapland, 300
The Petsamo Region, 301
totalitarianism experiences, 302
wood-working industries, 301
Finland's Foreign Trade, *301
Finland, Gulf of, 288
Finnish Peneplain, 335
Finns, 338
Firenze (*see* Florence), 239
First oil well, 38
Firth of Forth, 293
Fish, 178
Fish, W. B.
The Lebanon, 252
Fisher, Clyde
The Nomads of Arctic Lapland, 300
Fisheries, 102
Alaska, 102
Depletion in New England Fisheries, 47
New England, 46
Fisheries, The British, 294
Fishings industry, 110, 296
Canada, 110
Japan, 283
Newfoundland, 117
Newfoundland Banks, 117
Turkey, 229
Norwegian, 296
training for seamanship, 271
Fiume, 215, 240
Flagstaff, 82
rainfall, 77
Flanders Gateway, 208, 317, 321, 329, 330
Flanders Lowlands, 316
Flatwoods Country, 17
Flemings, 329
Flinders Highland, 401
Florence, Ala., 98
weather record, 38
Florence, Italy, 239
Return to Florence, 239
Florida, 11, 14, 17, 20
resort area, 21
Florida, Strait of, 121
Flowing wells
Great Plains, *60
Foochow, 276
Forbs, 426, 429
Fordlandia, 188
Forest adjustments, 109
Furasia, 109
Forest Industry, 109
Laurentian Uplands, 109
Forest products, 163
Forests, 27
Blue Ridge and Piedmont Upland, 27
Canada, 109
Finland, 301
Glaciated Lowland, 52
New Zealand, 414
Rocky Mountains, 71
teak and mahogany, 267
Forest and Gardens Along the Alaskan Highway, 112
Forests and woodlands, 426
periods of dormancy, 426
range of adaptability, 426
Forests and woodlands, relations to temperature and rainfall, 426
time of growth, 426
Forests and woodlands formations, 426
Foreign trade, 13
Argentina, *175
Australia, *392
Belgium, *330
Brazil, *186
Canada, *111
Chile, *163
China, *275
Cuba, *132
Ecuador, *154
Egypt, *369
Finland, *301
France, *319
Greece, *243
Guatemala, *127
India, *259
Italy, *238
Japan, *284
Morocco, *359
New Zealand, *405
Peru, *158
Poland, *332
Sweden, *300
Turkey, *223
Union of South Africa, *385
United Kingdom, *292
United States, *56
Venezuela, *177
Foreign Trade of Different Countries Compared, *13
Fort Collins, 61
Fort Duquesne (*see* Pittsburgh), 38, 43
Fort Necessity, 38
Fort Pitt (*see* Pittsburgh), 43
Fort Smith, 68
Fort William, 115
Fort Worth, 63
Forts Moultrie and Sumter, 21
"Forty niners," 78
use of passes, 88
Forty Years Among the Arabs, 248
Formosa, 268, 265, 280
Formula, 433
dependability of rainfall, 433
evenness of rainfall, 433
Forum, The, 239
Fossil Falls, 76
Fossilized ivory, 313
Foster, Alice
The Guayaquil Lowland, 154
Foynes, Ireland, 118
Frankfort-on Main (*see* Frankfurt), 323
industries, 324
medieval connections, 324
Fraser River, 89, 115
Fraser Valley, 112
France, 125, 130, 133, 231, 306, 314, 315, 316, 321, 328, 330, 338
agricultural activities, 317
area and population, 316
barrier boundaries, 316
Basin of Aquitaine, 318
basis of industry in Central Plateau, 317
bordering seas, 316
Brittany: Backward Child of a Stern Environment, 317
Central Plateau, *202
cities, *214
climatic conditions and features, 317
climatic regions, *121
crops grown, 317
cultural features, 317
diversity of physical features, 317
France, empire, 318
enemies on frontiers, 317
evenness and dependability of rainfall 317
gateways associated, 317
Gateway of Poitou, 318
global trade, *319
human activities in Brittany, 317
international relations, 320
Julius Caesar, 316
land use in Central Plains, 318
Landes, The, 318
looking to the future, 320
manufacturing in the Rhenish Highlands, 318
mature soils, 317
natural features, 316
Normandy beachhead, 318
overseas possessions, 318
Paris Basin, 318
productivity in Central Plateau, 317
physiographic sketch, *304
railways, 318
rainfall and temperature, *197, 317
regions involved, 317
Rhenish Highlands, *304
strategic routes, 317
The Site and Growth of Paris, 318
trade compared, *13
unity of people, 316
urban centers, 318
waterways, 318
France's Foreign Trade, *319
Freeman, Otis W.
The Pacific Island World, 403
Freetown, 364
Fremantle, 395
Frémont, John C., 78
French, 190
French and Fort Duquesne, 43
French Colonists, 38
French Equatorial Africa, 364, 381
French Guiana, 318
French Huguenots, 27, 383
French Indo China, 266, 271, 318
house boat, *271
Laos Annamese highland, 271
location, extent and population, 271
Mekong basin, 271
physical divisions, 271
Red River basin, 271
rainfall and temperature, *198
trade and transport, 271
French influences, 20
French Somaliland, 375
French West Africa, 364
Fresno, 95
temperature and rainfall, 92
Frisian Islands, West, 327
From East to West Across Northern Australia, 392
Front Range, 62
Fuel Crisis in Europe, 321
Fueling stations, 408
Pacific Islands, 408
Fuji (volcano), 281
Fulton's "Clermont," 85
Furlong, C. W.
Among the Sheep Ranches of Patagonia, 171
Furs, *347
Siberia, *347
Fusan, Korea, 280
Fushun, Coal of, 278
Future of the Lake Superior Iron Ore Supply, 107
Future of the Middle East, The, 250

Future Strength of Germany, 325
Fyn, 325

GABLS, 360
Galati Gate, 203, 204, 306, 313
  associated features, 203
Gallirose iron district, 297
Gallup, 82
Galveston, 23
  situation and site, 23
Gama, Vasco da, 6, 235, 368, 374
Gambia, 364
Gand (*see* Ghent), 330
Ganges River, 257, 259, 261
  tide in the, 266
Ganges, Plain of the, 264
Ganges Valley, 269
Garda, Lake, 212
Garden of the Gods, 74
Garonne River, 211, 317, 318
Garrison, William Lloyd, 46
Gary, 56, 339
"Gate City of the South" (Atlanta, Ga), 35
Gates, Donald S
  The Sod House, 59
Gathering Oranges, *283
Gatun Lake, 121
Gauls, 237
  Romans and 237
Gaza, 250
"Gateway to the Far East," 270
Gateways, *5
  ancient water routes, *5
  Appalachian, *25
  associated with France, 317
  Austria, *203
  Baltic-North Sea route, 327
  Belgium's position, 328
  Bonifacio, 5
  Bosporus Dardanelles, 339
  Carcassonne, *202
  Carcassonne Gap, 201
  Carpathian, *306, 310
  Central American, 121
  Central Plateau of France, *202
  characteristics in West, 201
  difficulties in East, 205
  effect of the period of discovery, 8
  Eurasia, *201
  Europe, *203
  Flanders, 330
  France in War and Peace, 317
  Galati Gap 306, 313
  Gate of Hercules, 239
  historical significance in East, 206
  inter oceanic, *6
  Iron Gate, 305, 314
  Lorraine, 308
  Moravian, 304, 305, 308
  Marrakech, 359
  Otronto, 5
  Panama Canal, 129
  Poitou, 202
  Rhone Saone, *202
  summary of Eurasian, 208
  surrounding Austria, 308
  through the Eurasian Barrier, 200
  through the Pyrenees, 211
  West Indies, 121
Gdynia, 331
Geelong, 399
General Acha, 170
  rainfall, 170
Geneva, Lake, 212
Geneva, 213
Geneva Pass, 212
Genoa, 239
  unbalanced trade, 239
Genova (*see* Genoa), 239
Geographic Regions of the Sudan, 363
Geographical Results of the Second Byrd Antarctic Expedition, Some, 416
Geography An Introduction to Human Ecology, 88, 131
Geography, Elements of, 426
George, Lake, 50, 107
Georgetown, 191
  industry, 191
  location and trade, 191
  temperature and rainfall, 190
Georgia, 17, 26, 331
Georgian Bay, 106, 110
German East Prussia, 333
German Empire, 321
German Plains, 329
German Polish Lowlands, 316
German Uplands, 309, 321, 322
German Uplands and Bohemian Plateau, 303, 304 (*see* Germany and Czechoslovakia)
  agricultural activities, 322
  animal industries, 322
  forest products, 322
  Germany, *305
  location, extent and area, 304
  physiographic sketch, *305
  rivers, 305
  specialized industries, 322
  sub-sections, 304
  topographic diversity, 304
  transportation facilities, 322
Germans, 27, 338
  difficulties in World War II 335
Germany, 125, 297, 298, 301, 306, 307, 314, 316, 317, 320, 326, 328, 329, 330, 331, 332, 338
  Along the Moselle, *322
  Children in Germany, 323
  cities, *214
  climatic conditions, 321
  cultural features, 321
  dearth of natural boundaries, 321
  distribution of peoples, 321
  diversity of land forms, 321
  divisions and regions, *208
  domestic trade, 323
  Future Strength of Germany, 325
  German states, 321
  Germany's prospects, 324
  Hall of Fame *322
  Inland Waterways of Germany, 322
  lake-spotted section, 323
  mature soils, 321
  military proclivities, 320
  moral perversity, 325
  natural features, 321
  natural vegetation, 321
  occupation zones, 325
  rainfall and temperature, *197
  Rediscovering the Rhine, 321
  regions involved, 321
  Rhenish Highlands, *304
  rivers as related to moraines, 323
  scientific achievements, 320
  scientific propensities, 325
  soil regions, *132
  tardy development of, 320
  The Leipzig Trade Fairs, 324
  The Structure of Rhine Traffic, 322
  The Walhalla, *322
  unification of, 321
  urban centers, 323
  vegetation regions *128
Germany, *War's Wake in the Rhineland*, 325
  World War II bombing of cities, 323
Gettysburg, Battle of, 27
Ghats, Western, 255
Ghent, 330
Ghost Towns, 74
Giant Mountains, 307
Gibraltar, Strait of, 6, 138, 233, 239 351
Gilbert Islands, 411
Gilmore, Eddy
  Crimea Reborn, 335
Glacial deposition, 316
  Central Plains of Europe, 316
Glacial drift, 52
  Glaciated Lowland, 52
Glacial lakes, 51
Glacial outwash, 78
  scablands on Columbia Plateau, 78
Glaciated Lowland of the United States, 51, 57, 107
  animal production, 53
  appraisal for tomorrow, 58
  bedrock and structure, 52
  building stone, 52
  Canadian section, 108
  climatic conditions and regions, 52
  climatic regions, *121
  conquering the forests and grasslands, 53
  "Corn Belt," 53
  critical problems, 58
  deforestation, 52
  Delavan Prairie An Illinois Corn Belt Community, 54
  distribution of cities, 55
  drainage obstructions, 51
  effects of post glacial erosion, 51
  explorers, 53
  forested section, 52
  glacial advances and retreats, 51
  glacial invasions 51
  highway construction, 54
  historical associations, 53
  iron and steel manufacture, 54
  kinds of forests, 52
  mantle rock and terrain, 51
  manufactures, 54
  mature soils, *132
  natural environmental complex, 54
  natural vegetation, *128
  petroleum deposits, 52
  prairie landscape, 52
  processing farm products, 54
  productivity of soils, 52
  provisions for education, 55
  Queen City of the Lakes, 56
  rainfall and temperature, *12
  rural-urban relations, 54
  settlements along water courses, 53
  spring wheat and flax, 54
  terrain and cities, *55
  transition in soil types, 52
  transportation, 53
  transportation facilities, 58
  types of city sites, 55
  urban centers, 54
  urban decentralization, 58
  world's production of corn, *53
Glaciated Lowland and Associated Superior Upland of the United States 51
Glaciation, 105
  Canadian, 105
  effect on terrain, 107
  Glaciated Lowlands, 51

Glaciation, New England-Acadian Upland, 44
Newfoundland, 117
outwash in New England, 44
relation to human activities, 44
Rocky Mountains, 69
scouring and deposition, 105
Glacier National Park, 70
grandeurs of glacial carving, 73
Glasgow, 293, 295
manufactures, 293
shipbuilding, 293
situation and site, 293
Glendale, 98
Glenmore, 294
Global Geography, 418
The Pattern of Climates, 418
Global Trade, *402
Australia, *402
Argentina, *173
Brazil, *173
Canada, *112
Chile, *163
China, *268
Costa Rica, *128
Cuba, *127
Denmark, *326
France, *319
Guatemala, *126
Guatemala, *127
Honduras, *128
India, *260
Italy, *213
Japan, *260
Mexico, *112
Mexican, 125
New Zealand, *402
Norway, *297
Panama Canal, 129
Peru, 157, *158
Portugal, *233
Siam, *268
Spain, *233
Switzerland, *213
United Kindom, *32
United States, *32
Uruguay, *178
Venezuela, *178
Global War, 112
Globe, 77
Gloucester, 46
Goats, 184
Gobi Desert, 206, 220, 261
dust storms, 220
erosional agents, 220
nature of, 220
rivers, 220
Goethe, 324
Going to Market, *133
Gokcha, Lake, 218
Gold, 155, 159, 172, 185, 222, 383
Gold Coast, 363, 364
Gold Coast Colony, The, 364
Golden Gate, 84, 92, 94
Golden Gate Bridge, 94
Golden Horn, 223
Golden Pagoda, 269
Goldfield, 77
"Gold Rush," 93, 94
Western Australia, 393
Gondwanaland, 376
Good Hope, Cape of, 6, 351
Goode, J Paul
Maps of continental glaciation, 51
Gorki, 339
Goshen Hole, 59
Gota, River, 300
Goteborg (*see* Gothenburg), 300
Gothenburg, Sweden, 300
location and activities, 300
Goths, 237
Romans and, 237
Gould, Charles A
Brazil Takes a Census, 183
Goyaz Plateau, 183
Grain, 170
Grain Coast, 363
Grain crops, 111
Interior Plains of Canada, 111
Granada Island, 133
Granada, Nicaragua, 128
Granada, Spain, 234
"Granary of Europe," 360
Gran Chaco, 168, 179
alfalfa, 172
quebracho, *172
tannic acid, 172
Gran Chaco, El, 159
Grand Canal (China), 275
Grand Canal (Venice), 240
Grand Canyon of the Colorado, 76
Grand Coulee, 75
origin, 75
Grand Coulee Dam, 81
hydro power and irrigation 81
Grand Coulee Project, *76, 83
Grand Island, 64
Grand Junction, 82
situation and site, 82
Grand Mesa, 82
Grand Tetons, 70, *71
Grand Trunk Pacific Railway, 112
Grand Wash, 78
Grapefruit, 162
Grapes, 162
Grasses, 126
Grassland adjustments, 109
Eurasia, 109
Grassland formations, 126
Grasslands, 179
animals 126
associations, 126
Canada, 109
fibrous roots, 126
perennials, 126
range of adaptability, 126
root system, 126
tap roots, 126
wide distribution, 126
Grattan, C Hartley
Britain's One Way Out, 294
Gray-brown soils, 27, 52, 133
associated climates and vegetation 133
Blue Ridge and Piedmont Uplands, 27
crops adapted 133
deficiencies, 133
development, 133
management, 133
representative regions, 133
Southern Interior Highlands, 67
Gray soils, 133, 134
associated climate and vegetation, 134
humus deficiency 134
lime accumulations, 134
productivity, 134
representative areas, 134
Gray's *Elegy Written in a Country Churchyard*, 114
Graz, 310
Grazing, 384
Great Plains, 61
Greater Antilles, 121
altitudes and terrain, 121
component islands 121
Greater Antilles, countries included, 131
early slave labor, 131
foreign trade 132
island composition 131
manufactures and processing, 132
mountainous backbone, 131
submarine foundation, 121
subsistence crops, 132
sugar cane, 131
terrain and climate, 131
tropical estate agriculture, 131
tropical woods, 132
Great Basin of the United States, 11, 78, 87
Block Mountain, *77
Farms Basin similar to 221
Truckee Carson Project 80
Great Basin Explorers, 78
dangers and hardships, 78
Great Bear Lake, 105
radium-uranium ore, 106
Great Belt, 325
Great Britain, 90 254, 288, 290, 294, 295, 328
Central Plains section, 288
effects of glaciation 288
mountainous sections, 288
structure and land forms, 288
Great Chinese Wall, *273
Great Circle, *7
travel and transportation, *7
Great Circle Routes, *101
Great Explorer, 83
Great Falls, 64
Great Kapella Mountains, 203
Great Khingan Mountains, 220
Great Lakes, 51, 53, 56, 67, 109, 115, 290, 337
modified by glacial action 52
Great Lakes St Lawrence Lowland Industrial Heart of Canada, 111
Great Lakes St Lawrence Waterway, 111
development, 111
feature, 111
materials shipped, 111
Great Lakes Waterway, 54, 107
Great Meadows, 38
Great Northern Railroad 88
Great Plains of North America, 51, 65
aboriginal occupants 60
altitude and drainage, 58
artesian wells, *60
bedrock and structure, 58
beveled margins, 59
Black Hills, *60
boundaries and extent, 58
Canadian section, 108
climatic conditions and regions, 59
climatic regions, *121
coal reserves, 61
contour basin listing, *62
crops and animals, 61
cultural features, 60
Devil's Tower, *59
distribution of towns, *63
dry farming, 61
dust storms *61
early explorers, 60
erosional features 58
flowing wells, 59
grazing industry, 61
hazards of farming, 59
historical associations, 60
irrigation, 61
marketing problems 64
mature soils, 59, *132
mineral resources, 61
munition plants in World War II, 64

Great Plains of North America, natural vegetation, 59, *128
overloaded streams, 58
patterns of urban settlement, 62
peripheral cities, 62
petroleum production, *18
processing industries, 62
problems of the future, 64
prospects ahead, 64
rainfall and temperature, *12
role of airways, highways and railways, 62
salt and gypsum, 62
settler's vicissitudes, 60
slaughter of the bisons, 60
structure of the Black Hills, *60
subsurface water, 58
The Sod House, 59
The Song of the Indian Wars, 60
transportation facilities, 62
unwise use, 60
uplift features, 58
urban centers, 62
wheat production, *61
Great Salt Lake, 76, 78, 81
Great Salt Lake Oasis, 80
Great Slave Lake, 105
Great Smoky Mountains, 26, 41
Great Smoky Mountain National Park 30, 35
Great St Bernard Pass, 212
Great Valley (*see* Ridge and Valley Region), 27, 36, 38, 44
divided into sections, 36
roadway, 27, 38
Shenandoah—"Daughter of the Stars," 39
soils and crops, 38
Great Wall, 206, 264, 275
in relation to the Kalgan Gateway, 206
Greater London, 292
Grecian Peninsula and Associated Islands, 218, 229, 230
bedrock and substructure, 230
contrasts in terrain, 231
divisions, 230
karst sections, 231
location and extent, 230
mountainous nature, 230
physiographic sketch, *242
rivers and valleys, 231
structure and terrain, 230
Greece, 231, 241, *242
Albania, *242
ancient city-states, 241
athwart Bosporus-Dardanelles Breach, 242
cities, *214
climate, 241
climatic regions, *421
crops grown, 242
cultural features, 241
disintegration of ancient, 242
land use, 242
location, area and population, 241
looking to the future, 244
lure of the sea, 241
manufactures, 243
mineral resources, 241
natural features, 241
natural vegetation, 241
patterns of culture, 241
people and cities, 243
Population Density in Greece, 241
protected coves and valleys, 241
rainfall and temperature, *197
scholars of ancient, 241
Greece, soils, 241
structure and terrain, 241
The Islands of the Aegean, 241
trade compared, *13
transportation and trade, 242
Greece, The Birthplace of Science and Free Speech, 241
Greece's Foreign Trade, *43
Greeley, 61
Greek mariners, 374
Greeks, 319, 372
Green Mountains, 44, 48
Green River City, Wyo., 78
Greenheart, 191
Greenland, 296, 325
aeronautical possibilities, 118
area and population, 118
climatic regions, *121
Eskimos, 118
glacial cover, 118
human occupants, 118
iceberg menace, 118
location and altitude, 118
minerals, 118
natural vegetation, *128
Norwegian exploration, 118
nunataks, 118
plants and animals, 118
prospects, 118
Scandanavian occupants, 118
Greenland from 1898 to Now, 118
Greenwich, 290
rainfall and temperature, 290
Gregory, J W
Africa, 359, 371, 379
The Lake System of Western Australia, 393
Guadalupe, 122
Guadalquiver River, 229, 233
Guadalquiver Valley, 229, 232
Guadiana River, 230, 234
Guam, 103
Guaqui, 158
Guatemala, 119, 121, 123, 127
banana culture, 126
coffee lands, 126
composition of population, 126
crops and animals, 126
extent and area, 126
global trade, 126, *127
impact of World War II, 126
oxcart transportation, *126
room for pioneering, 126
terrain and climate, 126
Guatemala City, 126
situation and site, 126
trade connections, 126
Guatemala's Foreign Trade, *127
Guava, 412
Guayaquil, 142, 148
situation and site, 151
transportation facilities, 155
Guayaquil, Gulf of, 148
Guayaquil Lowland, The, 154
Guayas River, 148, 154
Guiana, British, 191
bauxite, 191
Guiana Highlands, 166, 167, 176, 183
Guiana Highlands and Coastal Plain, 181
altitude and slope, 181
associated coastal plain, 181
bedrock and terrain, 181
extent and age, 181
stream erosion, 181
tropical rain forest, 176
"Guiana Island," 181
Guianas, 183, 190
Guianas, agricultural activities, 191
area, 190
climatic conditions and regions, 190
climatic regions, *421
colonial problems, 191
cultivated lands, 190
cultural features, 190
economic development, 190
economic stagnation, 191
forest products, 191
future outlook, 191
historical background, 190
mantle rock and soils, 190
mining, 191
natural features, 190
Plantations in the Coastal Lowlands, 191
racial integration, 190
rainfall and temperature, *139
regions involved, 190
relations to mother countries, 191
The Aluminum Industry of the Western Hemisphere, 191
The Rupununi Savannahs of British Guiana, 190
trade, 191
trade winds, 190
tropical rain forests, 190
urban centers, 191
vegetation regions, 190, *128
Guiana, Gulf of, 354, 361
Gukla Pass, 204
Gulf Coast, 17, 19, 124
Gulf Coastal Plain of the United States, 17, 22, 51, 119
Mexican crops, 124
Gulf Stream, 117, 283
Gum, 185

Haas, William H.
The American Empire, 409, 411
Habana, 132
attacks by privateer, 132
cultural and resort center, 133
harbor and trade facilities, 132
historical associations, 132
location and site, 132
Habitability of the Kalahari, 384
Hackensack River, 32
Hadhramaut, 217
Haifa, 252, 254
Haile Selassie ("Lion of Judah"), 372
Haiti, 119, 130, 131
Halifax, 16
Halvorson, Lynn H
The Great Karroo of South Africa, 382
Hamadan, 226, 227
Hamburg, 224, 308, 321, 323
foreign trade, 323
location and hinterland, 323
Hammerfest, 100, 287
Hancock, John, 16
Hangchow, 276
Hankow, 275
location and site, 275
Yangtze River, 275
Hannibal, 240
founding of Bursa, 22
Hannibal's army, 358
Hanoi, 271
Hanseatic League, 323
Haparanda, 298
temperature range, 298
Hapsburgs, 309
Harrar, 373
appearance, 373
transportation, 373
Harbin, 278, 279

Harbin, location and hinterland, 279
  temperature and rainfall, 277
Harbor, In A Chinese, 276
Hardwood trees, *45
Hari Rud, 228
Harnessing the Columbia River, 75
Harper's Ferry, 24
  Cumberland canal and road, 27
  John Brown tragedy, 27
Harris, Chauncy D
  Ethnic Groups in the Cities of the Soviet Union, 331
  The Cities of the Soviet Union, 339
Harrisburg, 26, 39
  capital city, location and name, 41
  gateway position, 41
Harrison, J V.
  Scenic Routes in Southern Iran, 226
Hart, G H C
  Recent Developments in the Netherlands Indies, 109
Hartford, 48
  insurance and hardware center, 48
  location and site, 48
Hartshorne, Richard
  The Upper Silesian Industrial District, 331
Harvard College, 46, 48
Harz Mountains, 305, 321
Hauling Mahogany Logs, *122
Hauraki Gulf, 405
Haverhill, 47
Hawaii, 411
Hawaiian Islands, 390, *411, 411
  acquisition by United States, 412
  American Empire, The, 411
  area and number, 411
  bedrock and mantle materials, 411
  commercial agriculture, 412
  "Crossroads of the Pacific," 411
  cultural features, 412
  discovery, 412
  historical record, 412
  location and extent, 411
  manufactures, 413
  mature soils, 412
  minor commercial crops, 412
  native tribes, 412
  native vegetation, 412
  natural features, 411
  physiographic sketch, *411
  pineapple field, *413
  pineapple industry, 412
  plantation system, 412
  prospects, 413
  rainfall distribution, 412
  relief features, 411
  relief to commercial agriculture, 412
  stability of economy, 412
  submarine platform, 411
  subsistence crops, 412
  sugar cane, 412
  sugar production, 412
  The Island of Hawaii, 412
  tourist industry, 413
  trade wind climate, 411
  transportation facilities, 413
  urban centers, 413
  volcanic origin, 411
  windward and leeward slopes, 412
Hawaii, Territory of, 411
Hawaii, Then and Now, 412
Hawkesbury River, 398
Hayes, William C
  Daily Life in Ancient Egypt, 369
Hebron, Palestine, 1
Hecataeus, 225
Heden, Sven, 206
  explorer in Central Asia, 221
Heights of Abraham, 114
Heijo (*see* Pyengyang), 280
Heine, Heinrich
  Die Lorelei, 301
Helena, 71
Hellespont (*see* Bosporus-Dardanelles Breach), 200
Helsingfors, Finland, 302
  experiences in World War II, 302
  situation and trade, 302
Helsinki (*see* Helsingfors), 302
Henequen, 124
Hennepin, Louis, 53
Henry, Patrick, 34
Henry, Thomas R
  Wars Wake in the Rhineland, 325
Herat, 228
Hercules, Gate of, 239
Herzegovinians, 215
Herculaneum, 240
Hevea brasiliensis (rubber tree), 188
High Atlas, 356, 358
  irrigation, 358
  native vegetation, 358
  precipitation, 358
  snow, 358
High Plains Region of Western Texas, The, 61
Highways, 88
  Italy, *237
  Pacific Mountains of U S, 88
  Stone Basket Bridge, *220
Highways and Byways of Guatemala, 126
Himalaya Mountains, 142, 206, 210, 219, 220, 246, 247, 261
Hindle, W H
  The Trouble Isn't Over in Iran, 227
Hindu Kush Mountains, 206, 210, 227, 247, 287, 315, 340, 341
Hindus, 262, 313
Hinduism, 308
Hiroshima, 285
Hispaniola, 121, 131, 132
Hitch, Margaret A
  Life in a Blue Ridge Hollow, 30
Hobart, 399
  city pattern, 399
  location and site, 399
  weather record, 397
Hoboken, 31
Hogs, 53
  "Corn Belt" production, 53
Hokitika, 404
  rainfall, 404
Hokkaido, 280, 282, 284
Holland, 329
Holland vehicular tunnel, 32
Hollywood, 98
Holmes, Oliver Wendell, 46
Homer, Greek poet, 225
  "Iliad and Odyssey," 225
Homs, 251
Holy Bible, 1
Holyoke, 48
  situation and site, 48
Honduras, 6, 119, 123
  area and population, 126
  composition of the population, 126
  effects of World War II, 126
  global trade, *128
  subsistence and commercial crops, 126
  transportation and trade, 126
Honduras, Gulf of, 121
Hong Kong (Victoria), 276
  British Crown Colony, 276
Hong Kong, Island of, 276
Honolulu, 413
  entrepot, 413
  location and site, 413
  rainfall, 412
  ship-repair yards, 413
  U S Naval Base, 413
Honshu, 280, 281, 282, 284
Hood, Mt, 85, 91
Hoosac Mountains, 44
Hooghly River, 260
Hoover, J W.
  Southwestern Desert Vegetation, Its Adaptations and Utilization, 80
Hoquiam, 89
Horn, Cape, 146
Hostel movement, 47
  New England, 47
Hot Springs, Ark, 68
  health resort, 68
  situation and site, 68
  therapeutic springs, 68
Hot Springs National Park, 68
Houghton, Mt, 390
House Boat in Saigon, *271
Houston, General Sam, 22
Houston Ship Channel, 22
Houston, 22
How Folded Mountains Are Made, *72
Howrah, 260
Huascaran, Mt, 145
Hudson Bay, 51, 106, 107
Hudson Bay Company, 109
Hudson Bay Lowlands, 105, 107
  bedrock and terrain, 107
Hudson-Champlain Lowland, 44
Hudson, Henry, 32
  Mohawk Hudson Gateway, 27
Hudson Lowland, 49
Hudson River, 24, 25, 26, 30, 36, 50
Hudson Strait, 288
Human Activities in the Kentucky Mountains, A Study of the Succession of, 40
Humboldt, Alexander von, 344
Humboldt River, 78, 81
Humboldt Current, 161
"Hump, The," 269
Hungarian Gate, 204
Hungarian Plain, 203, 204, 214, 303, 305, 307, 309, 310, 311, 312
  encircling highlands, 305
  physiographic sketch, *306
  rivers, 306
  salt basins, 306
  structural basin, 306
  sub-structure and terrain, 306
Hungary, 307, 310
  agricultural development, 311
  Alfolds compared, 310
  boundary problems, 312
  climate, 311
  climatic regions, *121
  countryside and villages, 311
  crops and animals, 311
  cultural features, 311
  dangers of drought, 311
  development of transportation, 311
  effects of World War II, 312
  equestrian skill, 311
  foreign trade, 311
  historical features, 311
  Hungarian prospects, 312
  landlocked position, 311
  mature soils, 311
  natural features, 310
  natural vegetation, 311
  nature of manufacturing, 311

Hungary, physiographic sketch, *306
pre-World War II area, 310
railways and waterways, 311
rainfall and temperature, *197
region involved, 310
rivers, 311
scattered population, 312
size, shape, population, 310
Southeastern Europe A Study in Geographic Disunity, 311
The Role of Peasant Hungary in Europe, 311
urban centers, 311
Hungary, Plains of, 203
Huns, 309
Hunter River, 308
Huntington, Ellsworth
Afghan Borderland, 227
explorer in Central Asia, 221
Farms and Villages of Sweden, 298
quoted, 258
Huntington, W Va , 13
Huron, Lake, 109, 110, 115
Hurricanes, 22
Gulf Coastal Plains, 22
West Indies, 123
Hwang Ho, 206, 219, 220, 263, 265
delta, 265
Hyderabad, 261
rainfall, 256
situation and size, 261
Hydroelectric development, Brazil, *182, 190
Hydroelectric power, 317
France, 317
Tennessee Valley Authority, 40

Iberian Peninsula, 229, *230
isolated position, 229
location and boundaries, 229
lowlands, 229
mountains, 229
structure and terrain, 229
Threshing Scene, *232
units, 229
Iberian Plateau, 202
Icebreaker in the Arctic, *346
Siberian Upland, *346
Icecap, 130
plant limitations, 130
Icecap climates, 124
representative regions, 425
temperature and precipitation, 425
Iceland, 296, 325
Icelandic Low, 287
Ichang 275
Idaho Falls 81
"Idaho baking potato," 79
Igharghar Basin, 361
Iguassu Falls, 182, *183
Iguassu River, 182
Iowa, 51 52, 53, 335
"Iliad and Odyssey," 225
Illimani Mt , 160
Illampu, Mt , 146, 160
Illinois, 51 52, 53, 54, 66, 335
Imlay, Nevada, 77
rainfall and growing season, 77
Imperial Valley, 95, 96
cotton growing, 97
Imperial Valley Farming, *97
Imports and exports, *175
Argentina, *175
Australia, *392, *402
Belgium, *330
Brazil, *178
China, *268, 275
Imports and exports, Denmark, *326
Egypt, *369
Greece, *243
Finland, *301
France, *319
India, *259, *260
Italy, *238
Japan, *260, *284
Morocco, *369
New Zealand, *402, *405
Norway, *297
Poland, *332
Sweden, *300
Turkey, *223
Union of South Africa, *385
United Kingdom, *32, *292
United States, *32, *111
Venezuela, *177
Imports and Exports of Different Countries, *13
Impressions of Abyssinia, Some, 373
Inca Empire, 156
destruction, 156
social order, 156
Incas, *156
Machu Picchu, *156
Incas Empire Builders of the Andes, The, 156
India, 247, 255, *256, 263, 264, 285
A Reconnaissance Tour in Western India, 257
abnormal soils, 257
agricultural activities, 258
ancient cultures, 257
animal production, 258
areal distribution of people, 259
antiquity of, 255
British problems, 257
cattle production, 258
cities, *224
climatic regions, *421
climate, 256
critical problems, 262
crops grown, 258
cultural feature, 257
Deccan Village in India, A, 261
decline in river transport, 259
diverse traits and dialects, 255
domestic activities (quoted from Huntington), 258
early invasions, 257
East India Company, 257
Geography of the West Coast of India, 255
global trade, 259, *260
handicrafts, 259
importance of irrigation, 258
In the Tea Gardens of Assam, 258
Indian appraisal, 262
industrialization, 259
lack of large urban centers, 259
location, bounds, area and population, 255
manufacturing, 259
monsoons, 256
natural features, 255
natural vegetation, 257
people and cities 259
primitive industries, 259
promise of airways, 259
Queen Elizabeth and, 257
quote on irrigation, 258
rainfall and temperature, *198
rice production, *258
rivers, 255
Sepoy Mutiny, 257
soil regions, *432
India, soils, 257
structure and terrain (*see* Indian Plains and Plateaus), 255
sugar cane and cane sugar, 258
threshing, 258
transitions in soil types, 257
transportation, 259
vegetation regions, *428
World War II, 258
India's Foreign Trade, 259
India East Coast, 247
Indian Lake, 107
Indian Ocean, 8, 245, 246, 269, 371
Indian Ocean Borderlands, 245
antiquity, 245
countries associated, 247
Eurasian lands bordering, 229
economic stagnation, 245
location and extent, 245
regions, 245
Indian Plains and Plateau, 245, 246
barrier boundaries, 246
isolation, 246
land routes, 247
location, extent and population, 247
nature of the coastline, 247
physiographic sketch, *256
three great surface features, 247
Indiana, 52, 53, 54, 57, 325
Indianapolis, 51, 57
growing season, 52
temperature and rainfall, 52
Indians, 103
Indo-China, 263, 264, 285
ancient temple, *267
Buddhist temples, 267
looking ahead, 271
Indo-China and Malaya, *264
physiographic sketch, *264
Indo-Chinese countries, 267
agricultural activities, 267
ancient civilizations, 267
bedrock and structure, 266
climate, 266
composite population, 267
countries, 266
dependencies among, 266
draft animals, 267
importance of fishing, 267
location, area and population, 266
mantle rock and terrain, 266
minerals and ores, 267
natural vegetation, 267
plantation rubber, 267
rainfall and temperature, *198
rubber production, 267
soil development, 266
soil regions, *432
transportation difficulties, 267
tropical timber, 267
vegetation regions, *428
Indo-Chinese Peninsula, 263
archeological research, 263
Isthmus of Kra, 264
location and extent 263
Malay Peninsula, 263
rivers associated, 264
trend of physical features, 264
vegetation and terrain, 263
Indo-Gangetic Plain, 247, 260, 262
irrigation, 247
rivers, 247
terrain, 247
"Indus, Gift of the," 260
Indus River, 219 257
Industrial activities, 331
Poland, 331

Industries, 322
  bombing in Germany, 322
Interior and Northern Plains and Uplands of Eurasia, 287, 315
  ancient sea floor, 315
  climatic conditions, 315
  diversity of vegetation, 315
  landlocked seas and rivers, 315
  location and extent, 315
  physiographic regions, 315
  submerged section, 315
  terrain and rivers, 315
  translation climatic and vegetation zone, 315
Interior Basins and Ranges of South America, 159, 167, 168, 171
  altitude and terrain, 169
  bedrock and mantle materials, 169
  drainage, 169
  location, area and extent, 168
  minerals, 172
  oases, 171
Interior Brazilian Plateaus, 181, 183
  altitude and drainage, 182
  bedrock and denudation, 183
  cattle country, 187
  extent and area, 182
  included sections, 183
  isolation and settlement, 187
  potential grazing area, 187
  rivers and interfluves, 182
  semiaridity, 188
  subsistence agriculture, 188
  towns, 188
  transportation facilities 187
  unexplored sections, 182
Interior Lowlands, 141, 142
Interior Lowlands and Associated Uplands of South America, 166
  divisions 166
  location and extent, 166
Interior Plains of the United States, 51, 111, 166
  bedrock and structure, 166
  boundary features, 166
  comparisons and contrasts, 166
  diversity of natural vegetation, 51
  grasslands, 166
  human occupants 166
  location and extent, 51
  physiographic regions, 166
  plants and animals, 166
  rain forests, 166
  relation to glaciation, 51
Interior Plains and Associated Uplands of South America 169
  countries included, 169
Interior Plains of Canada, 111
  forest and tundras, 111
  land use, 111
  natural vegetation, 111
Intermontane Highlands in the United States, 75, 100
  appraisal for the future, 82
  bedrock and structure, 75
  Canadian section 108
  cities, reasons for, 80
  climate features in United States, 77
  climatic regions, *121
  crops and markets, 79
  dry farming and irrigation, 79
  exploration and settlement, 78
  historical associations, 78
  human occupancy, 75
  irrigation and power, 83
  land utilization 78
  latitude, altitude, 75
Intermontane Highlands in the United States, location and extent, 75
  mature soils, 77, *132
  natural vegetation, 78, *128
  nature's equilibrium, 83
  nature's limitations, 80
  parent soil materials, 77
  pastoral activities, 78
  problems of markets and balanced production, 82
  rainfall and temperature, *12
  regional divisions, 75
  regions within United States, 75
  rivers and drainage, 75
  routes across 80
  transportation difficulties, 80
  urban centers, 80
Inn River, 309
Innsbruck, 324
  crossroads position, 310
  rainfall, 309
International boundaries, 316
  Central Plains of Europe, 316
Interregional relations, 6
  airplane's impact, 6
  dissemination and force of ideas 6
  effects of the period of discovery, 6
  exchange of commodities, 6
  mastery of the air and its influence, 8
  mastery of the sea and its influence 6
  need of confidence and goodwill, 8
  "Ships of the Skies," 8
  shrinking world, 8
  "The Air Age," 8
Inside Passage, 84, 89
Insurance center, 48
  Hartford, Conn 48
Inter-American Highway, 104, 124
Inter-American Highway, The, 130
International city (Tangier) 359
  situation and site, 359
Interoceanic gateway, 129
  Panama Canal, 129
Investigators Route of the, *2
Ipswich, 398
Iquique, 164
  relation to nitrates, 164
  water supply and railways, 164
Iquitos, 157
  location and site, 157
  trade and transportation, 157
Iran, 219, 221, 226
  agricultural activities, 226
  British concessions, 226
  cities, 227
  climate, 226
  cultural features, 226
  irrigation, 226
  kanats, 226
  location, area and population, 226
  manufacturing, 226
  mineral resources, 226
  natural features 226
  natural vegetation, 226
  Persian Empire, 226
  plateau, *205
  problem of the people, 227
  rainfall and temperature, *198
  relation to World War I, 226
  rug-making, 226
  soils, 226
  Some Routes in Southern Iran, 226
  Soviet interests, 226
  structure and terrain (*see* Iranian Plateau), 226
  transportation 226
  The Trouble Isn't Over in Iran, 227
Iran, vegetation regions, *128
  World War II, 226
Iranian Plateau, 219
  countries associated with, 219
  karst features, 219
  location size and extent, 219
  minerals, 219
  petroleum concessions, 219
  rivers, 219
  structure and terrain, 219
Iran, Plateau of, 225, 246, 247
Iraq, 246 247, 253
  agricultural activities, 254
  ancient fertility, 253
  ancient metropoli 254
  area and population, 253
  cities, 254
  climate, 253
  climatic regions, *121
  cultural features 253
  global trade 254
  historical allusion 253
  human activities, 254
  irrigation, 253
  location and boundaries 253
  looking to the future, 255
  motorization, 255
  natural features 253
  natural vegetation 253
  nomad attacks, 253
  petroleum, 254
  Pontoon Bridge *255
  rainfall and temperature *198
  ravaging neighbors, 253
  rejuvenation, 255
  soils, 253
  structure and terrain (*see* Mesopotamian Valley), 253
  transportation and communication, 254
Iraq, Fl, 254
Ireland, 288, 290
  physiographic sketch, *289
  Stacking Peat, *295
Irish Free State 290, 294
  agricultural production, 295
  ancient outpost 294
  cities and problems, 295
  climatic elements, 294
  climatic regions, *121
  cultural features, 294
  dominion status 295
  industrial pursuits, 295
  location, area, population, 294
  Old Ireland, Mother of New Eire, 295
  natural vegetation and soils, 294
  rainfall and temperature, *197
  rivers and bogs, 294
  structure and terrain, 294
  trade orientation 295
  vicissitude of the Irish, 294
Irish Sea, 288, 293, 295
Iron and steel, 293
  Allegheny Plateau, 40
  Birmingham center, 298
  Iranian Plateau, 219
  Japan 284
  manufactures in United Kingdom, 291
  need of iron ore, coal and limestone, 89
  Pittsburgh, 40
  role of the Great Lakes, 41
  Swedish activities, 299
Iron Gate 293 *294, 294, 305, 306, 314
Iron ore, 169
  associated natural features, 203
  Birmingham district, 42
  Bohemian Basin 305
  Brazil 185

Iron ore, Great Lakes transportation, 54
Kiruna and Gallivare (Sweden), 297
Lake Superior district, 41
Laurentian Upland, 106
mining and transportation, 107
North Africa, 357
Poland, 331
Siberian Plain, 343
Slate Mountains, 304
Superior Upland, 54
Turkey, 222
Iroquois Indians, 50
Irrigation, 61
Great Plains, 61
Iran, 226
realist and dreamer, 83
problems of, in Washington, 79
Irrigation water supply, 363
Irrawaddy River, 264, 269
Irtysh River, 345
Isfahan, 227
Islam, 248
Island of Hawaii, The, 112
Isle de France (*see* Paris Basin), 318
Isolation problems, 83
Intermontane Highland, 83
Israelites, 1
Istanbul, 204, 223
Istmina, *151
Isthmus of Suez, 351
Italian Peninsula, *296, 279
Albania, *236
Italian Peninsula and Associated Islands, 229
location and extent, 230
strategic position, 230
structure and terrain, 230
Italian Somaliland, 378, 375
Italy, 291, 295, 309, 314, 317, 321, 324
Aemilian Way, 238
agriculture, 237
ancient highways, 238
building stone, 237
Campania, 240
Cassian Way, 239
cheap labor, 238
cities, *214, 238
climate, 295
climatic regions, *121
commerce and trade, 238
crops grown, 237
cultural features, 237
distribution of cities, 238
distribution of people, 237
global trade, *213
highway, *237
historical significance, 237
imports and exports, 238
industrial activities, 238
Italian Peninsula, *236
land utilization, 235
location, area, population, 235
manufactures, 238
mineral resources, 236
natural features, 235
nature of boundaries, 235
Plains of the Po, The, 238
prospects, Italian, 241
rainfall and temperature, *107
recreation and travel, 238
soil depletion and reclamation, 237
soils, 236
strategic location, 237
tourism, 238
water power 238
World War II connections 240
zonation of croplands 238
Italy's Foreign Trade, *238
Ivigtat, 118
Ivory Coast, 363, 361
Iwo Jima, 107
Izmir, Turkey (*see* Smyrna), 224

Jablonica Pass, 204
Jackson Hole, 70
Jackson, "Stonewall," 27
Jacksonville, 22
Jaffa, 252
Jamaica, 119, 121, 132
Jamaica, British colony, 131
James, Edward W
The Inter-American Highway, 130
James, Preston E
The Coffee Lands of Southeastern Brazil, 184
The Geographic Setting of Tacna-Arica Dispute, 156
The Process of Pastoral and Agricultural Settlement on the Argentine Humid Pampa, 173
The Shari Plain, 361
Transportation Problems of Colombia, 151
James River, 19, 21, 24, 28, 35
Jamestown, 19
January River (*see* Rio de Janeiro), 186
Japan, 101, 254, 259, 266, 268, 271, 278, 279, 280, 348
adjacent waters, 281
aggressions, 285
air transport, 284
area and population, 280
areal distribution of rainfall, 281
ascendancy in Manchuria, 277
cheap labor, 284
constituent areas, 280
crops and cropping systems, 282
cultural features, 282
climatic features, 281
climatic regions, *121
damaged cities, 285
dearth of agricultural land, 282
dearth of minerals, 284
distribution of population, 282
early culture, 282
farming practices, 282
fishing in foreign waters, 283
former possessions, 80
gathering oranges, *283
global opportunities, 285
global trade, *260
hurricanes (*see* typhoons), 281
importance of fishing, 283
impact of the Occident, 282
industrial agglomerations, 285
industrial development, 283
influence of ocean currents, 281
iron and steel manufactures, 284
Japanese outlook, 286
land utilization, 282
location, extent, population, 280
Manchuria 279
merchant marine, 284
minerals and ores, 283
monsoons, 281
mountains and plains, 280
natural features, 280
natural vegetation, 282, 283
numerous metropoli, 285
Occidental influence, 282
Okinawa, Threshold to Japan, 284
Port Mitsumi *283
post-war pressures 285
pre-war trade, 285
Japan, railways and highways, 284, 285
rainfall and temperature, *198
seasonal distribution of rainfall, 281
silk industry, 283, *284
shipbuilding centers, 285
soil development, 282
Some Aspects of Urbanization in Japan, 285
strategy in World War II, 284
structure and terrain, 280
subsurface instability, 281
sundry manufactures, 284
textile industries, 283
The Climate of Japan and Formosa, 281
The Japanese Landscape, 281
Tokyo, capital, 285
transportation, 284
Unknown Japan, 282
urban centers, 285
use of fertilizers, 282
use of power, 283
use of Manchurian minerals, 284
use of scrap iron, 284
vegetation regions, *128
volcanic activity, 281
wood-working, 283
Japan and Formosa, The Climate of, 281
Japan Current (*see* Kuro Siwo), 281
Japan, Sea of, 265, 279, 281
Japan's Foreign Trade, *284
Japanese Empire, 285
Japanese Landscape, The, 281
Japanese in Manchuria, 277
Japanese outlook, 286
dearth of arable land
limited mineral resources, 286
population growth, 286
restricted activities, 286
The Japs Look at the Yanks, 286
Japs Look at the Yanks, The, 286
Jasper National Park, 70, 72, 112
Java, 107, 108, 109
plantation agriculture 109
Java, the Economic Geography of a Tropical Island, 109
Jefferson Memorial, 34
Jefferson, Mt., 91
Jefferson, Thomas, 27, 72
Jerked beef, 173
Jersey City, 30, 32
location and site, 92
Jerusalem, 251, 252
adjacent terrain and climate, 251
landscape sketch, *2
sacred city, 251
Jews, 348, 372
Jhelum River, 261
Jinsen (*see* Chemulpo), 280
Joliet, 58
Johannesburg, 385
industry and manufactures, 385
location and growth, 385
Witwatersrand gold field, 385
Johnston Island, 107
Johnston, Pfc Charles F
Conformation of Non-Irrigated Desert Occupance to Transportation Patterns, 366
Jones, Clarence F
Major Physiographic Regions, 138
Jones, Rodwell
The British Fisheries, 291
Joplin 67
zinc and lead interest, 67
Jordan River, Palestine, 1
Jordan River, Utah, 81

Jordan Valley, 245, 252
Jordan Valley Authority (proposed), 252
Jowar (millet), 261
Journey Among Primitive Tribes in Madagascar, A, 377
Journey Through the Quattara Depression, A, 368
Juan de Fuca, Strait of, 84, 89
Juba River, 372
Judaism, homeland of, 245
Julian Alps, 203
Julius Caesar, 316
  expeditions into France, 316
Juneau, 103
Jupiter, Temple of, 239
Jura Mountains, 212, 324
Jute, 258
  India's production, 258
Jutland, 325

KABUL, 206, 227, 261
Kabul River, 206
Kalgan Gateway, 206, 217, 275
  location and importance, 206
  historical significance, 206
Kalahari basins, 351
Kalahari, Habitability of the, 384
Kalahari steppe, 384
Kamchatka, 263, 265, 407
Kamchatka Peninsula, 101
Kamloops, Canada, 115
Kanats, 226
  Iran, 226
  operations of, 226
Kangaroos, *391
Kano, 364
Kano A Sudanese Metropolis, 364
Kansas, 53, 66, 311
Kansas City, Mo., 62, 67
  processing and marketing center, 57
Kansas (Kaw) River, 57
Kaoliang, 273, 278
Kapok, 154, 409
Karachi, 259, 260, 261
  "Gift of the Indus," 260
  situation and site, 260
Karaganda, 348
Karakorum, ancient city of, 208
Karakoram Mountains, 219, 221
Karroo of South Africa, The Great, 382
Karroo system, 382
  erosive effects, 382
  mantle materials, 382
Karst formations, 36
Karst topography, 203, 212, 214
  nature of, 212
Kasai River, 379, 381
Kashgar, 206
Kashmir, 261
Kashmir, Vale of, 261
  Happy Valley, 261
Katahdin, Mount, 44
Katanga Highlands, 382
  minerals and ores, 381
Katanga River, 379
Kauai, 411
Kauri pine, 404
Kavalla, 213
Kaw River (*see* Kansas), 57
Kawakawa, 406
Kazak, 341
Keeping House on the Congo, 381
Keewatin Glacier, 51, 105
Keijo (*see* Seoul), 280
Kellogg, Charles F.
  The Soils that Support Us, 131
Kemp, Harold S.
  Brittany Backward Child of a Stern Environment, 317
  Queen City of the Lakes, 56
Kentucky, 40
  settlement, 38
"Kentucky Derby," 43
  Louisville, Ky., 43
Kenya Colony, 375
Kerak (*see* Trans Jordan), 252
Kerkyra (*see* Corfu), 241
Ketchikan, 100, 103
Key West, 16, 132
Khabarovsk, 278, 348
Khan, Genghis, 206
Kharkov, 334, 339
  location and manufactures, 339
Khartoum, 361
  rainfall and temperature distribution, 362
Khingan Mountains, Great, 265
Khingan Mountains, Little, 265
Khiva, 342 [261
Khyber Pass, *205, 206, 217, 227, 247, 257,
  associated physical and cultural features, 206
  decline in the use of, 206
  location and importance, 206
  route into and out of India, 206
Kiev, 336, 339
  situation and site, 339
Kimberley, 383, 384
  rainfall, 383
"King Corn," 53
  Glaciated Lowland, 53
"King Cotton" (*see* Cotton), 28
King Solomon, 252
  temple of, 252
King's Mountain, Battle of, 27
Kings River, 87, 92
Kingston, 133
Kipling's, "On the Road to Mandalay," 270
Kirghiz, 341, 347
Kirghis Steppes, 206, 336, 340, 343
Kirkuk oil field, 252
Kiso Siwo, 281
Kiruna iron district, 297
Kithara Mountains, 246
Kittatinny Mountains, 36
Kjolen Mountains, 290, 297, 298
Klamath Mountains (Klamath Knot), 84, 85, 89, 92
Klondike, 70, 103, 115
Klondike News, The, *103
Knots, 145
  Aconcagua, 145
  Pacific Mountains and Valleys, *85
  Pasto, 145
Knoxville, 30, 39, 40
  location and quarrying interests, 41
  weather record, 38
Kobe, 285
Kobenhavn (*see* Copenhagen), 327
Kolkhoz (*see* collective farms), 336
Komsomolsk, Soviet Union, 348
Konya, 225
Kootenay River, 112
Kordofan Plateau, 364
Korea, 263, 265, 266, 279, 280
  animal industry, 280
  buffer position, 279
  climatic features, 279
  crops grown, 280
  cultural features, 279
  Jap Rule in the Hermit Nation, 280
  Japanese occupation, 279
Korea, Korean prospects, 280
  land forms, 279
  land reforms, 280
  land ownership, 280
  land utilization, 280
  location, extent and population, 279
  mining and fishing, 280
  natural features, 279
  natural vegetation, 279
  transportation and trade, 280
  urban centers, 280
  World War II, 279
Kosciusko, Mt., 395, 397
Kra, Isthmus of, 264, 271
Krakatoa Volcano, 108
Krasnoyarsk, 347
  industrial interests, 347
  peripheral location, 347
  situation and site, 347
Kremlin, 335, 339
Krivoi Rog, 337, 339
Kronstadt (*see* Petrograd), 314
Kuchnelt Leddihn, Erik R. V.
  The Petsamo Region, 301
  Where Three Countries Meet The Region of Naudeis, 309
Kunlun Mountains, 210, 219, 221
Kunming, China, 269
Kura River, 218, 340
Kurdistan Mountains, 210
Kurile Islands, 101, 265, 280, 281
Kuskokwim River, 101
Kuwait and Bahrein, 249
  location and land use, 249
  pearl fisheries, 249
  petroleum concessions, 249
Kuwaik River, 251
Kuznetsk, 345
Kuznetsk Basin, 343
Kwajalein, 407
Kyoto, Japan, 285
Kyushu, 279, 280, 281, 282

LABRADOR, 14
Labrador Current, 117, 283
Labrador glacier, 51, 105
Labrador Peninsula, 106
Lachine Canal, 111
Lackey, Earl F.
  The Pattern of Climates, 118
Lacustrine plains, 52
Ladoga, Lake, 288
Lagos, 361
Lagos dos Patos, 187
La Grande, 82
La Guaira, 178
Lahore, 261
  Indo Mogul city, 261
  site and situation, 261
Lake Chad Basin, 361
Lake Chad depression, 363
  agricultural activities, 363
Lake District (Cumbrian), 288
  recreation, 288
Lake Erie cities, 56
Lake Eyre, South Australia, 400
Lake sites, 55
  cities, 55
Lake Superior, 40
  iron ore district, 41
Lake System of Western Australia, The, 393
Lakes and Mountains, *169
Lancaster, 28
"Land of the Big Red Apple," 67
"Land of the Sky" (*see* Asheville, N. C.), 35

Land Use and Water Supply Problems in Southern California, 98
Land utilization, 110
  Laurentian Upland, 110
Landes Reclaimed Waste Lands of France, The, 318
Landes, The, 318
Landscape Levels, Three, *3
Landscape phenomena, 2
  atmospheric features, 2
  features on three levels, 2
  natural and cultural features, 3
  subsurface features, 2
  surface features, 2
  three levels, *3
Landscape study, 1
  comparative difficulties, 2
  complexity of variable factors, 2
  limited control of variables, 2
  meanings derived from recorded phenomena, 1
  natural and cultural features, 1
  observed phenomena, 1
  observing, describing, interpreting, 1
  reasons for diversity of interpretations, 1
  scientific procedure, 1
  The Promised Land, *2
  three stages, 1
  variable percentage of accuracy, 2
  ways of recording phenomena, 1
Lansing, 57
La Paz, 160, *160
  location and importance, 160
  rainfall, 159
"La Petite Roche" (*see* Little Rock), 67
Lapland Landscape, *296
Lapland, The Nomads of Arctic, 300
Lapps, 285
  Eurasia, 199
Laramie, 71
Laredo, 124
La Salle, Robert Cavelier, 53
La Serena, 162
Las Vegas, N Mex, 74
Las Vegas, Nev, 81
Lashio, 264, 269, 270
Lassen Peak, 87
Laterite soils, 431
  associated climate and vegetation, 431
  deficiency of plant food elements, 431
  effects of water absorption, 431
  lime and humus deficiency, 431
  representative areas, 431
Laterites, 408
  India, 257
Lattimore, Owen
  China Opens Her Wild West, 273
Latvia, 334, 338
Launceston, 399
Laurentian Peneplain, 51, 105
  associated lowlands, 105
  location and area, 105
  regions associated, 105
Laurentian Peneplain and Associated Features, 105
Laurentian Upland, 25, 49, 105, *106, 107, 108, 111, 114
  agricultural possibilities, 110
  alternate names, 105
  altitude and drainage, 106
  bedrock and minerals, 106
  boundary delineated, 105
  evidences of glaciation, 106
  evidences of post-glacial erosion, 107
  forests industries, 109
  geological age, 105
  human occupancy, 110
Laurentian Upland, land use, 109
  mineral resources, 110
  natural vegetation, 107
  ores of iron, copper, nickel, cobalt, graphite, 106
  outline and area, 105
  radium-uranium ore, 106
  recreation and sports, 110
  sawmills and wood pulp, 109
  subpolar resources, 110
  Thousand Islands International Bridge, *50
  unoccupied areas, 109
  utilization in subpolar areas, 110
Laurentide Mountains, 106
Lausanne, 213
Lawrence, 47, 48
Lead, 222
Lead Ore, 304
  Slate Mountains, 304
  Southern Interior Highlands of the United States, 66
Leadville, 74
Leather industry, 46
  New England, 46
Lebanon, 250, 252
  landscape features, 252
Lebanon, Cedars of, 250, 252
Lebanon Mountains, 250, 351
Lebanon, Pa, 39
Lebanon Range, 252
Lebanon, Republic of, 251
Lebanon, The, 252
Lebanon Valley, Pa, 36
Lebanese Republic, 252
Lee, Robert E, 27, 31
Leeds, 291, 293
  locational advantages, 293
Leeward Islands, 133
Leghorn, 289
Le Havre, 318
Lehigh Valley, 39
Leicester, 293
Leipzig, 322, 324, 344
  fairs, 324
  fur-trading center, 324
  publishing center, 324
Leipzig Trade Fairs, The, 324
Lemberg, 333
Lemert, Ben F
  Uruguay and the Uruguayans, 192
Lemert, Ben F, and Rose V
  Mexico Rural Life in the Northeastern Coastal Plain, 124
Lemons, 162
Lemons, Hoyt
  A Primitive Handicraft Industry in a Modern Setting, 67
Lena River, 315, 343, 346, 347
L'Enfant, Major (designer of Washington, D C), 33
Leningrad, 335, 338, 339
  founding and changes in name, 339
  problems in development, 339
  situation and site, 339
Leon, 128
Leopold II, Lake, 379
Leopoldville, 381
  location and importance, 381
Lesbos, Island of, 244
Lesser Antilles, 121
  climatic conditions, 133
  component parts, 121
  crops, 133
  crude agricultural methods, 133
  foreign possessions, 133
Lesser Antilles, included islands, 133
  structure and terrain, 121
Letts, 338
Lewis and Clark Expedition, 72, 78, 88 90, 344
Lewis Range, an overthrust, 70
Lewiston, 81
Lexington, Mass, 46
Liao River, 265, 278
Liao River plain, 279
Liaotung Peninsula, 278
Libby Prison, 34
Liberia, 364
Liberia, 366
Liberia, Republic of, 366
  origin and government, 366
  population, 366
Liberia and The Belgian Congo, 380
Libyan Basin, 361
Liege, 330
Life in a Blue Ridge Hollow, 30
Life in a Cotton Farming Community, 19
Life in a Southern Sawmill Community, 22
Lima, 157
  situation and site, 157
  capital and cultural center, 157
  pedocals, 431
Limoges, 320
  porcelain manufactures, 320
Limon, 129
Limpopo River, 382
Lincoln, 57
Lincoln Memorial, 34
Lisboa (*see* Lisbon), 235
Lisbon, 235
  catastrophe of 1755, 235
  evenness and dependability of rainfall 235
  rainfall and temperature of, 235
Literary characters of New England, 46
Lithuania, 334, 338
Little Rock, 67
  bauxite mining, 67
Little Belt, 325
Little Rocky Mountains, 58
"Little Venice" (*see* Venezuela), 176
Littoral of Pacific Colombia and Ecuador, The, 148
Liverpool, 292, 295
  foreign trade center, 292
  processing center, 292
  situation and site, 292
Livingstone, David, 380
Livorno (*see* Leghorn), 289
Llama, 159
Llamas Crossing a Stream, *157
Llanos, 166, 176
  farming districts, 177
Llaneros (cowboys of the Llanos), 177
Llullaillaco, Mt, 146
Loading Lumber, *90
Lobeck, Armin K
  Physiographic Diagram of Africa, 351
  Physiographic Diagram of Asia, 209
  Physiographic Diagram of Europe, 209
  Physiographic Diagram of the United States, 13
Lobito (Angola), 381
Locarno, 213
Lodz, 332
Loess, 52
  Glaciated Lowland, 52
Loess deposits, 316
  Central Plains of Europe, 316
Loire River, 211, 320
Lowell, 46

Lombards, 237
  Romans and, 237
Lombardy-Adriatic depression, 230
Lombardy, Plains of, 202, 204, 238
  structure and land forms, 230
Lombok, 407
London, 273, 292, 318
  devastation by World War II, 292
  internal development, 292
  railway center, 292
  sequent development, 292
  situation and site, 292
London Tower, 291
Long Beach, 98
Long Lake, 107
Long Island, 18, 30
Long Island Sound, 48
Long's Peak, 69
Longfellow, Henry Wadsworth, 46
Longmont, 61
Longstreet, James, 35
  first steamboat, 35
Lookout Mountain, 36
  "Battle above the Clouds," 41
Lop Nor, 221
Loram, 56
Lorelei, Die, 304
Lords of the Rockies, 72
Lorraine Depression, 303
Lorraine Gateway, 303, 317, 321
Los Angeles, 16, 80, 82, 164
  location and site, 98
  manufacturing and processing, 98
  "Our Lady Queen of the Angels," 98
  petroleum resources, 97
  power resources, 98
  rainfall, 97
  transportation facilities, 98
  water supply, 98
Los Angeles Basin, 98
Los Angeles Lowland, 95
Louisiana, 17, 18, 20
Louisiana Territory, 72
Louisville, 43
  "Kentucky Derby," 43
  situation and importance, 43
Lourenco Marques (Mozambique), 375
Low Countries of the North Sea Coast, 325
  buffer position, 325
  climate of, 325
  Notes on the Agriculture of the Low Countries, 325
  overseas possessions, 325
  rainfall and temperature, 197
  relation to strong neighbors, 325
  strategic location, 325
Lowell Astronomical Observatory, 82
Lowell: A Study of Industrial Development, 46
Lowell, 47, 48
"Lowell of the South" (*see* Augusta Ga.), 85
Lower Nile Valley and Its Margins, 366
  ancient origins, 366
  natural features, 366
Lubeck, 322
Lucerne, 218
Lucerne, Lake, 212
Lucknow, 261
  situation and site, 261
Ludwig Canal, 321
Lulea-Narvik Railway, 209
Luluabug 380
  temperature, 380
Lumber, 162
  raft on the Volga, *335
Lumbering, 88
  Geography An Introduction to Human Ecology, 88
  Pacific Mountains of U.S., 88
Lumbering in Southeastern Canada, *110
Lumbering industry, 15
Luneburg heath, 321
Luray Cavern, 36
Luray, 36
Luxembourg, 304, 330
Luzon, 407
Lwów (*see* Lemberg), 333
Lynchburg, 30, 35
Lynn, 47
Lyon, 319
  location and industries, 319
  relation to Rhone-Saone Corridor, 319
Lyttleton, 406

Macassar, 410
MacDonnell Ranges, 392
Machu Picchu, *156
Mackenzie River, 51, 105
MacMillan, Donald B., 118
Macon, 30, 35
Madagascar, 318
  areal and seasonal rainfall distribution, 377
  bedrock and terrain, 376
  cities, *365, 377
  climatic conditions and regions, 376
  climatic regions, *121
  coral reefs, 376
  critical problems, 378
  cultural features, 377
  colonial policy 377
  commercial crops, 377
  diversity of land forms 376
  drainage and slopes 376
  future outlook 378
  geological origin 376
  historical associations, 377
  Journey Among Primitive Tribes in Madagascar, 1, 377
  land ownership, 377
  latitude and population, 376
  location and area, 376
  mature soils, 377
  minerals and ores, 376
  missionary enterprise 177
  natural vegetation 377
  physiographic sketch, *367
  plants and animals 377
  rainfall and temperature, *358
  subsistence crops, 377
  transportation 377
  vegetation regions, *128
  white man dominance, 377
Madagascar Mystery Island, 377
Madeira River, 182
Madigan, C. T.
  Lake Eyre, South Australia, 400
Madison, 57
Madras 247 259, 260, 261
  location and site, 260
  navigation canal, 260
Madrid, 232
  temperature and precipitation, 231
Magdalena Plain, 145, 149
  coastal lands and rivers, 141
  crops and animals, 150
  location and drainage, 143
  meaning, 142
  productive capacity, 150
  railroads, 151
  structure and terrain, 143
Magdalena River, 143, 145, 149
Magdalena River, characteristics and appearance, 141
Magdalena Valley, 144, 145
Magellan, Ferdinand, 114
Magellan, Strait of, 146, *147, 161, 166 169
Madjerda Valley, 360
Maggiore, Lake, 212
Magnitogorsk, 339
  steel manufactures, 339
  "*Magnetic City*," *Core of Valiant Russia's Industrial Might*, 339
Mahogany, 188
Maikop, 335
Main River, 324
Maine, 11, 14, 15
Maize, 278
Majunga, 377
Makarikari Salt Lake, Across the Great 388
Malacca, Strait of, 270, 291, 410
Malaga, 233
Malar Lake, 300
Malay Peninsula, 263, 264, 267, 268, 270 407 409
Malay States, 270
  cities, 270
  crops, 270
  rubber production, *270
  terrain and coastline, 270
  importance of tin, 270
  influence of monsoons, 270
  Japanese invasion, 270
  location and area, 270
  natural vegetation and soils, 270
Malmo, 300
Malta, 230
  World War II, 230
Mammoth Cave, 37
Managua, 128
Managua, Lake, 128
Manasarowar, Lake, 219
Manaus (Manaos) 189
  situation and site, 189
  temperature and rainfall, 189
  transportation and trade, 189
Manaus, Showing Wharves, *189
Manchester, 291, 292 293
  associated industries, 293
  location and site, 292
Manchester Ship Canal, 292
Manchuria, 229, 263, 265, 266, 272, 277 280
  agricultural activities, 277
  animal industry, 278
  Chinese Manchurian Boys, *278
  climatic features, 277
  climatic regions, *121
  colonization, 277
  composition of population, 277
  crops grown, 278
  cultural features, 277
  development of soils, 277
  increase in population 277
  Japanese ascendency, 277
  land utilization 277
  location, extent and area, 277
  looking to the future, 279
  manufactures, 278
  mineral resources 278
  monsoon effects, 277
  natural features, 277
  natural vegetation, 277
  part of China, 277
  railway ownership, 277
  rainfall and temperature, *198
  soil regions, *432

Manchuria, structure and terrain (*see* Manchurian Plains and Uplands), 277
The Resources of Manchuria, 278
The Future of Manchurian Agriculture, 278
transportation and communication, 278
urban centers, 278
vegetation regions, *428
Manchuria, The Resources of, 278
Manchurian Plains and Uplands, 263, 265
location and extent, 265
rivers, 265
minerals, 265
structure and terrain, 265
Manchukuo (*see* Manchuria), 263
Manchus, 277
Mandalay, 269
location and site, 269
railway and water connections, 270
temperature and rainfall, 266
Mandalay, On the Road to, 270
Mandates, British and French, 250
Manganese ore, 222
Brazil, 185
Manhattan Island, *31, 260
purchase, 30
Manhattan, Borough of, 30
Manheim, 324
strategic location, 324
Manila, 410
earthquakes, 410
location and site, 410
manufactures and exports, 410
Manila Bay, 410
Manitoba, 52, 314
Manufacturers, 274
China, 274
Glaciated Lowland, 54
Sweden, 299
Manufacturing, 328
Birmingham area, 42
Netherlands, The, 328
New York City, 32
Rhenish Highlands of France, 318
Switzerland, 213
Maori tribes, 404
Maps, 8
evolution in construction, 8
Maracaibo Basin, 142, 145, 176, 178
bedrock and structure, 141
crops and animals, 177
enervating climate, 177
grassland, 176
location and terrain, 141
petroleum, 141, 177
petroleum handicaps agriculture, 177
rock structures 177
structural depression, 142, 176
Maracaibo City, 178
location and importance, 178
petroleum interests, 178
rainfall, 176
Maracaibo, Lake, 142, 145, 176, 178
Marajo Island, 167
Marble Bar, 393
weather record, 393
Marble quarries, 89
Tennessee and Georgia, 39
Marcy, Mt., 107
Marden, Luis
Panama, Bridge of the World, 129
Mariana Islands, 411
Marine Climates, 109
Canada, 109
cloudiness and fog, 424
coastal locations, 423, 424
Marine Climates, equable temperatures, 423, 424
native vegetation, 424
occurrence, 423
rainfall, amount and distribution, 424
representative regions, 424
temperature ranges, 424
westerly winds, 424
Maritime Canada, 110
field crops and dairying, 111
orcharding, 111
role of the rivers, 111
Maritsa River, 204, 212
Maritsa Valley, 216
Marmara, Sea of, 204, 217, 222, 223
Marquette, Jacques, 53
Marrakech, 359
gateway position, 359
Marseille, 239, 317, 319
founding and antiquity of, 319
situation and site, 319
entrepôt of Levant, 319
Marshall Islands, 414
Our New Military Wards, The Marshalls, 414
Marston, Jay
Uganda, Land of Something New, 375
Martha's Vineyard, 18, 44
Martinique, 122
Matterhorns, 69
Maryland, 27
Mashhad, 227
Masqat (*see* Muscat), 247
Massachusetts, 18, 44, 45
Massachusetts Bay, 47
Massif, explained, 181
Matanuska Valley, 102, 103
colonization, 102
outlook, 103
pioneering difficulties, 102
Matanuska Valley of Southern Alaska, The, 102
Maté An Important Brazilian Product, 185
Mather, D C M
A Journey Through the Qattara Depression, 368
Mato Grosso Plateau, 183, 187
Mature soils, 431
Appalachian Plateaus and the Ridge and Valley Regions, 38
climatic factors, 431
Canada, *432
development, 431
France, 317
Germany, 321
horizon features, 431
Intermontane Highlands, *432
mapping, 431
Mexico, *432
New England-Acadian Region, *432
Southern Interior Highlands of the United States, *432
related to vegetation, 431
two-fold classification, 431
Maturin, 178
situation and interests, 178
Maui, 411
Maumee, Lake, 51
Maumee River, 56
Mauna Kea, 411
altitude, 411
Maximum, 433
Mazatlan, 125
rainfall, 122
McBride, Ruth Q
Keeping House on the Congo, 381
McCartney, Lt. Benjamin C.
Return to Florence, 239
McClintock, John C
The Battle of the Amazon, 188
McCune, Shannon
Saigon, French Indo-China, 271
McKinley, Mt., 100, *102
Mead, Lake, 80
Mead, William R.
Agriculture in Finland, 301
Mean, 433
Mean Annual Rainfall of North America, *12
Mean Annual Rainfall of South America, *139
Means, Philip A
The Incas Empire Builders of the Andes, 156
Measurements, 435
Croxton and Crowden, 435
Measures of Distributions, Some, 435
Mecca, 248, 249
Holy City of Islam, 249
Mechanized farming, 64
Great Plains, 64
Medan, 410
Medellin, 153
Median, 433
Medicinal plants, 185
Medina, 248, 249
Mediterranean, 368
eastern and western, 237
strategic routes, 237
trade routes, 237
Mediterranean Checkerboard, 229
Mediterranean Climates (*see* subtropical dry summer climate), 422
Mediterranean Coast, 1
Mediterranean Lands, 229
Mediterranean Peninsulas, 231
Mediterranean Peninsulas and Associated Islands, 229
Mediterranean-Red Sea Gateway (Suez Canal), 375
Mediterranean Region, 201
Geography of the Mediterranean Region, 201
Mediterranean Sea, 6, 210, 217, 218, 222, 245, 291, 316, 368
early navigation, 231
Meerschaum, 222
Meigs, 3rd, Peveril
Water Planning in the Great Central Valley, California, 95
Mekong basin, 271
land use, 271
Tonlé Sap, 271
Mekong (River), 219, 264, 268, 271
Melanesia, 411
Melbourne, 399
commerce and shipping, 399
location and site, 398
Menam (River), 264
Mendoza, 169
rainfall, 169
situation and site, 174
water supply and irrigation, 175
Mercator, Gerard, 8
Mercator Map, *6
Merced River, 87
Merchant's Harbor (*see* Copenhagen), 327
Merriam, Willis B
Forest Situation in the Pacific Northwest, 90
Merrimac River, 44, 48
Mersey River, 292
Mersey Valley, 292

Merv, 341, 342
Mesa de Mayo, 59
Mesa Verde, 76
Mesa Verde National Park, 82
Meseta, 229
  nature of, 231
Mesopotamia, 6, 249, 250
Mesopotamia, Syria and Egypt, *246
Mesopotamian Valley, 245, 246, 253, 254
  location and meaning, 246
  nature of, 246
  petroleum, 246
  piedmont, 246
  structure, 246
  terrain, 246
Metallic ores, 357
  North Africa, 357
Meuse River, 329
  Rhone-Saone Corridor, 202
Mexican Plateau, 75, 77, 119, 122, 124
  basaltic areas, 120
  basins and ranges, 119
  bedrock and structure, 119
  boundary and relief, 119
  differential erosion, 119
  drainage and streams, 120
  extent and area, 119
  mesas and buttes, 120
  variations in altitude, 119
Mexico, 6, 19, 69, 119
  climatic conditions and regions, 122
  diet and beverage, 124
  early Spanish, 123
  Expedition Unearths Buried Masterpieces of Carved Jade, 123
  farming on the plateau, 124
  forest products, 124
  foreign trade, 125
  global trade, *112
  grazing lands, 124
  Henequen. The Green Gold of Yucatan, 124
  historical associations, 123
  looking to the future, 125
  Magdalena Atipac A Pueblo in the Central Plateau, 124
  mature soils, 122, *132
  mineral resources, 124
  mining methods, 124
  natural vegetation, 122, *128
  political unrest, 123
  problems of the people, 125
  subsistence crops, 124
  temperature and rainfall, *12
  transportation, 124
  urban centers, 125
Mexico City, 119, 124, 155
  capital, resort and educational center, 125
  situation and site, 125
  temperature and rainfall, 122
Mexico, Gulf of, 17, 18, 22, 23, 35
Mexico Rural Life in the Northeastern Coastal Plain, 124
Miami, 22
Miami Beach, 22
Michigan, 51, 54, 106
Michigan, Lake, 54, 109
Micronesia, 411
Mid-Continent oil field, 62, 64
Middle Ages, 239, 254
Middle East, 254
Midland Valley of Great Britain, 288, 290, 293, 294
  coal deposits, 288
  rift nature, 288
"Midnight Sun, Land of the," 295
Midway, 403
Milan, 236, 238, 239
Milano (*see* Milan), 239
"Mile High City" (*see* Denver), 62
Miletus, Ancient city of, 225
Miller, Eugene Willard
  Petroleum in the Economy of Venezuela, 177
Milstead, Harley P.
  Bolivia as a Source of Tin, 160
Milwaukee, 56
Milwaukee River, 56
  location and site, 56
  processing center, 56
Minas Geraes, 185
  mining area, 185
Mindanao, On the Road to Tokyo, 407
Mineral Resources of Romania, 313
Mineral resources, 61
  Great Plains, 61
  table, 438
Mineral Resources of China, 276
Minerals, 18
  Gulf Coastal Plains, 18
Minerals and Mineral fuels, 337
  Soviet Europe, 337
Minimum, 433
Mining Phosphates, *18
Minneapolis, 54, 57, 62, 312
  location and site, 57
  processing center, 57
Minnedoka project, 79
Minnesota, 51, 52, 54, 106
Minuit, Peter, 30
Miraflores Locks, *129
Missionary Ridge, 36, 41
Missionary Ridge, Battle of, 38
Mississippi, 17, 18
Mississippi embayment, 17
Mississippi-Missouri River, 167
Mississippi River, 22, 37, 53
Mississippi Valley, 18
Missoula, 74
Missouri, 54, 129
Missouri River, 53, 57, 61, 65, 70
Missouri Mississippi River, 313
Missouri River basin, 40
Misti, Mt., 146
"Mistress of the East" (Nineveh), 255
Misurata, 366
Mitchell, General William, 104
Mitchell, Mt., 26, 307
Mitre Peak and Milford Sound, *104
Mixed farming, *363
  Sudan-Saharan Tableland, *363
Mobile, Ala., 22
Moçambique, 375
  rainfall, 374
Modena, 238
Mogador, 357
Mohammed, 249
Mohammedanism, 358, 408
  birthplace, 245
Mohammedans, 343
  in Spain, 231
Mohave Desert, 76, 87
Mohawk-Hudson gateway, 24, 30
Mohawk-Hudson Valley, 24
Mohawk River, 36
Mohawk Valley, 49, 56
Mohawk gateway, 53
  associated cities, 57
Moldau River (*see* Vitava River), 308
Moldavia, 334
Mollendo, 158, 160
Molucca Islands, 407, 409
Mombasa, 375
Mona Passage, 121
Monaco, 320
Monadnock, defined, 35
Mongalla, 362
  rainfall, 362
Mongolia, 272
Mongolian Desert, 275
Mongolian Plateaus, 210
  climate, 220
  mountains associated, 220
  natural vegetation, 220
  terrain, 220
  vegetation regions, *128
  water supplies, 221
Mongolian Plateaus and Basins, 220
  location, extent and area, 220
Mongols, 341
  Kalgan Gateway and the, 206
"Monkchester" (*see* Newcastle), 292
Monongahela River, 37, *42, 42
Monrovia, 366
Monsoons, 256
  India, 256
  Indo-China, 266
Monte Carlo, France, 320
Montevideo, 180
  situation and site, 192
  trade and resort interests, 192
Montgomery, 22, 30
  importance today, 35
  location and site, 35
Monticello, 27
Montreal, 107, 111
  commercial handicaps, 114
  gateway position, 114
  railway and waterway facilities, 114
  situation and hinterland, 114
Moore, W Robert
  Chile's Land of Fire and Water, 169
  Our New Military Wards, The Marshalls, 414
  Rhodesia, Hobby and Hope of Cecil Rhodes, 384
  Skyline Drive in the Pyrenees, 211
Moors in Spain, 231
Moosejaw, 115
Moraines, 326
  Denmark, 326
Morava River, 307, 212
Moravia (*see* Czechoslovakia), 307
Moravian Gateway, 209, 204, 208, 304, 305, 308
  associated natural features, 203
Moravian Heights, 307
Morgan, Sir Henry, 125, 130
Moritzen, Julius
  Denmark's Frontier and Minority Problem, 326
  Scandinavia and European Reconstruction, 207
Mormon Trail, 72
Mormons, 80
  Salt Lake oasis, 80
  vicissitudes, 81
Moroccan and Shotts plateaus, 358
  native vegetation, 358
Moroccan Plateau, 357
Morocco, 357, 359
  cities, 359
  foreign trade, *359
Morocco's Foreign Trade, *359
Morro Castle, 133
Morro do Chapeo, 184
  rainfall, 184
Moscow, 335, 338, 339, 341, 342, 344, 345
  capital and importance, 339
  Kremlin, 339

Moselle River, 202
  Rhone-Saone Corridor, 202
Moses, 1
Moskva (*see* Moscow), 339
Moslems, 248, 262
Mosul, 251, 255
Motagua River, 126
Mounts Czegka and Jessie O Keefe, *416
Mountain climates, 425
  climatic zonation, 425
  unclassified, 425
  zonation of vegetation, 425
Mount Vernon, N Y , 31
Mount Vernon, Va , 27
Mountain Weather Station, *342
  Turanian Plain, *342
Mountain vegetation, 430
  transhumance, 430
  zonal arrangements, 429
Mountaineers, 30
Mozambique, 373, 375
Mozambique Current, 383
Mun, Lady
  A Look at Bulgaria, 216
Mukden, 277, 278, 279
  ancient capital of Manchu Empire, 279
  location and surroundings, 279
  plan of the city, 279
Mulberry trees, 273
Mulhouse, 304, 324
  Rhine Rhone Canal and, 324
Munich, 310, 322, 324
  industries, 324
  situation and site, 324
Muchen (*see* Munich), 324
Murcia, 234
Murmansk, 297, 338
Murphy, Raymond E.
  A Southern West Virginia Mining Community, 40
Murphy, Robert Cushman
  The Littoral of Pacific Colombia and Ecuador, 148
Murray-Darling River, 397, 400
Murray River Basin, 400
Murray River Basin, The, 401
Muscat, 247, 249
Muscovite Kingdom, 335
Muscovy (Ancient Russia), 341
Muskegs, defined, 107
Mutton, Alice F A
  The Black Forest Its Human Geography, 303
Myres, J L
  Islands of the Aegean, The, 241
Mytilene, 244

Nagasaki, 285
Nagova, 281, 285
  pottery industry, 286
Nairobi, 376
Nanking, 276
Nan Shan Mountains, 220, 221
Nantes, 320
Nantucket Island, 18, 41
Napier, 406
Naples, 230, 240
Naples, Bay of, 240
Napoli (*see* Naples), 240
Narragansett Bay, 18
"Narrows" (*see* Lake George), 107
Narvik, 297
Nashville, 43
  Nashville Basin, 43
  processing interests, 43
Nashville Basin, 37, 38
  "Dimple of the Universe," 43
Nashville Basin, farming activities, 40
Nassau, 131
Natal, 384
National Gallery of Art, 34
Natural Bridge, 36, *37
Natural features of the landscape, 3
  three levels, 3
Native Australasians, *391
Native's Hut, Caribbean Coast, *150
Natural gas, 18
Natural levies, 17
Natural Vegetation, 38
  Appalachian Plateaus and the Ridge and Valley Region, 38
  California Valley, *428
  Canada, 109, *428
  Central American Highlands, *428
  Colombia, *428
  Elements of Geography, 426
  formations, 426
  Germany, 321
  Glaciated Lowland, *428
  Great Plains, 59, *428
  indicator of climate, 427
  Intermontane Highlands, *428
  Mexico, *428
  New England, *428
  Pacific Mountains and Valleys, *428
  Plant Ecology, 426
  Rocky Mountains, 71, *428
  Siberian Plain, 344
  Southern Interior Highlands, 66, *428
  Turkey, 222
Natural vegetation map, *428
Natural vegetation regions, 426
  relations to climate, 426
  types involved, 427
Navajo Indians, 82
Nazareth Threshing Floor, *252
Near East, 249, 255
Nebraska, 51, 52, 54, 265, 335
Nebuchadnezzar, 253
Necker River, 324
Negroes, 103
Neihardt, John G
  Song of Jed Smith, 78
  The Song of the Indian Wars, 60
Nelson River, 51
Nervion River, 233
Netherlands Indies, 325, 407
Netherlands Indies, Recent Developments in, 409
Netherlands, The, 130, 139, 316, 325, 327, 330, 338
  agricultural specialization, 327
  cultural features, 327
  diamond cutting, 328
  dikes and canals, 327
  empire relationships, 328
  fishing industry, 328
  foreign trade 328
  historical references, 327
  location size and population, 327
  looking to the future 328
  manufacturing and processing, 328
  natural features, 327
  natural vegetation, 327
  Occupance in the Lowest Rhineland, 327
  overseas possessions, 327
  polders, 327
  precarious trade situation, 328
  reclamation problems, 327
  regions of, 327
  routes to the sea, 327
  Should We Mind Holland's Business?, 328
Netherlands, The, structure and terrain, 327
  trade compared, *13
  uplands and glaciated sections, 327
  urban centers, 328
  World War II, 327, 328
Nevada, 11, 304
Nevada de Colima (Colima Knot), 84
Newark, 30, 31
  location and site, 32
  satellite of New York City, 32
Newark Bay, 32
Newcastle, Australia, 398
Newcastle, England, 292
Newfoundland, 11, 14, 106
  aeronautical importance, 118
  agricultural difficulties, 117
  area and population, 117
  climatic conditions, 117
  foreign trade, 117
  forest and power resources, 117
  future political status, 118
  glaciation and terrain, 117
  harvest of the sea, 117
  looking to the future, 118
  ore reserves, 117
  political and economic status, 117
  rainfall and temperature, *12
  transportation and communications, 118
Newfoundland and Labrador, 105, 117
  people and cities, 118
Newfoundland Banks, 117
Newport, 41
Newport News, 21
New Amsterdam, *31, 32
New Bedford, 17, 18
New Brunswick, N J , 31
New Brunswick, Canada, 44, 46, 108, 111
New Caledonia, 414
New England, 11, 19, 30, 36, 49, 111
  competition for markets, 49
  contribution to national heritage, 46
  Depletion in New England Fisheries, 47
  dispossessing the native Indians, 46
  evolution of manufacturing, 46
  fishing industry, 46
  food supply, 49
  hardware and jewelry, 46
  hardwood trees, *15
  historical and literary associations, 46
  hostel movement, 47
  kinds of fish, 47
  Lowell A Study of Industrial Development, 46
  need for intensive specialization, 49
  needed raw materials, 49
  Northbridge, Massachusetts, A Town That Moved Down Hill, 47
  rainfall distribution, *12
  scenic and recreational features, 47
  specialized agriculture, 46
  statesmen and patriots, 46
  textile industry, 46
  tourist business, 47
  unique factors in urban evolution, 47
  uniqueness of towns and cities, 47
  urban centers, 47
  variable urban densities, 47
  water supplies, 47
  West Indian trade, 131
New England-Acadian Region, 107
  cities, *41
  climatic regions, *421
  mature soils, *432
  natural vegetation, *428
New England-Acadian Upland, 25, 44, 110
  bedrock and mantle rock, 45

New England-Acadian Upland, bouldery terrain, 45
causes of variable weather, 15
climatic conditions and regions, 45
component parts, 44
cultural features, 46
effects of peneplanation, 44
forest trees, 45
glacial invasion, 44
inhospitable features, 46
lakes and waterfalls, 44
location and extent, 44
lumbering industry, 45
mature soils, 45
natural vegetation, 45
political divisions, 46
quarrying, importance, 45
resort and playground areas, 45
ship building industry, 45
stream incision, 44
surveying the future, 49
terrain and gateways, 44
variety of coastlines, 44
New England-Acadian Upland and the Adirondack Mountains, 44
New Guinea, 407, 409
primitive tribes, 408
New Hampshire, 44, 45
New Haven, 46, 48
educational and historic interests, 48
location and site, 48
New Haven Harbor, 48
New Hebrides, 390, 411
New Jersey, 17, 26, 27, 91, 40
New Orleans, 18, 21, 22, 105, 261, 265
French quarter, 22
situation and site, 22
trade and shipping interests, 22
New Providence Island, 131
New Rochelle, 31
New Scotland (*see* Nova Scotia), 46
New South Wales, 395, 398
New York Barge Canal, 54, 56, 58
New York City, 18, 26, 30, *31, 31, 32, 33, 40, 48, 49, 52, 56, 84, 111, 124, 260, 273
area and satellites, 31
bedrock as related to building and subway construction 30
density of population, 31
discovery of site, 32
educational and cultural center, 31
financial and trade centers, 31
five boroughs, 30
food supply, 31
hinterland and markets, 30
manufacturing center, 32
railway, seaway and airway connections, 30
situation and site, 30
transportation facilities, 31
water front and wharfage, 30
New Zealand, 389, 414
aborigines, 404
altitudes and terrain, 403
animal depredations, 407
animals raised, 404
bedrock and streams, 404
Canterbury Landscapes A Study in New Zealand Geography, 404
cereals and fruits, 405
cities, *396, 405
climatic conditions, 404
climatic regions, *421
composition of the population, 405
conservation practices, 406
New Zealand, *Contrasting Regional Morphology of Soil Erosion in New Zealand*, 405
cultural features, 404
Dairying Industry of New Zealand, 405
European colonization, 404
foreign trade, 405, *405
forests, 404
geological phenomena, 403
geysers, 403
glaciation, 403
global trade, *402
grasslands, 404
historical associations, 404
land utilization, 405
location and area, 403
marine influences, 404
marketing, 405
marketing problems, 407
Milford Sound, *404
minerals, 404
Mitre Peak, *404
modern transformation, 404
mountains, 403
natural features, 403
natural vegetation, 404
outlook, 406
plains areas, 404
power development, 405
processing activities, 405
rainfall and temperature, *394
Remarkable Mountains, *406
seasonal rainfall distribution, 404
snowfields, 404
thermal waters, 403
transportation, 405
vicissitudes of war, 407
volcanism, 404
Ngami, Lake, 382
Niagara Falls 76
Niagara River, 76
Nicaragua, 119, 123
area and population, 127
forest resources, 128
interoceanic canal site, 128
lowlands, 128
Pan-American Highway, 128
social turbulence, 128
terrain and climate, 128
trade compared, *13
urbanization, 128
Nicaragua, Lake, 121, 128
Nicaragua route, 121
Nice, 320
French Riviera, 320
situation and site, 320
Nickel mines, 110
Canada, 110
Sudbury, Canada, 115
Nicobar Island, 407
Nigeria, 361
Niger River, 354, 361
Nikopol, 337
Nile Delta, 367
extent and area, 367
"Nile" period, 369
Nile River, 251, 362, 366
cataracts, 354, 367
channel and valley, 367
characteristics, 366
cultural features, 368
delta section, 367
floods, 368
navigability, 366
placid section, 366
rock-walled section, 367
rhythmic fluctuations, 367
Nile River, sources, 367
tributaries, 367
Nile Valley, 356, 368
agricultural year, 368
A Journey Through the Qattara Depression, 368
bedrock 368
crops, 368
farm management, 369
flood period, 368
foreign trade, 368
future interests, 370
historical records, 368
irrigation, 368
land corridor, 368
physiographic sketch, *246
Problems of the Nile Valley, 370
trade winds, 368
water supplies, 369
Nineveh, Ruins of, 253, 255
Nish, 204
Nitrate District of Tarapaca, Chile An Aerial Traverse, 163
Nitrates, 163
Atacama Desert, 163
Nizhni-Novgorod (*see* Gorki), 335, 339
Nomadic life, 110
Eskimo herders, 110
Nomads, 248
Arabian, 248
Non-lime accumulating soils, 431
Nonni River, 265, 278
Nordenskjold, O., 416
Nordics, 336
Norfolk, 21
Normandy, 318
beachhead, 318
North African cities, 360
water supply, 360
North America, 11, 26, 32, 120, 296, 344
areas occupied by early immigrants, 14
Central Lowlands, 13
classified into divisions and regions, 13
climatic contrasts, 11
countries and peoples, 14
diversity of relief and terrain, 11
divisions, and regions, classified, 13
Eastern Highlands, 13
introduction, 11
linguistic groups, 14
multiplicity of landscape details, 11
panorama of features and interests, 11
Physiographic Divisions and Regions, *15
rainfall and temperature, *12
seasonal distribution of rainfall and temperature, *12
uneven distribution of people, 11
variable factors in human occupancy, 11
Western Highlands, 13
North Cape, 351
North Carolina, 20, 25, 28, 38
North Dakota, 277
North Island, 403
North of Eurasian Barrier, *208
divisions and regions, *208
North Platte, 61 313
temperature rainfall growing season, 59
North Sea, 288, 308, 316
Northern Andes, 145, 149, 176
altitudes of ranges, 145
cereal crops, 151
crops, 151
high plain, 145
prongs, 149
ranges, 145

Northern Andes Mountains, 143
Northern Hemisphere, 8
Northern Highlands and Associated Basins of Africa, 356
  location, extent, 356
Northern Pacific Railroad, 62, 72
Northern Rhodesia, 384
Northern Rocky Mountains, 69
  Lewis and Clark Expedition, 69
Northern South America, *144
Northern Territory, 392
"Northers," 122
Northwest Highlands of Europe, 287, 317
  countries within, 290
  divisions and regions, *208
  geological age, 287
  ice free harbors, 287
  latitudinal extent, 287
  mild climate, 287
  two regions, 287
Northwest Passage, 109
Norwalk, 31
Norway, 290, 295, 298, 326
  agriculture, 296
  cities, 297
  climatic factors, 296
  Country Life in Norway, 297
  crops and animals, 296
  cultural features, 296
  Facets of Fjord Economy A Study of Life on Sogne Fjord, Norway, 297
  factors in isolation, 295
  fiord coast, 295
  German invasion, 297
  global trade, *297
  harvest of the sea, 296
  homogeneity of people, 296
  importance of navigation, 297
  inside passage, 295
  Lapland Landscape, *296
  life among the Lapps, 296
  location and extent, 295
  manufacturing industries, 297
  natural features, 295
  natural vegetation, 296, 297
  Norwegian prospects, 297
  "*Nursery of Seamen*," 296
  power facilities, 298
  rainfall and temperature, *197
  Scandinavian and European Reconstruction, 297
  structure and terrain (*see* Scandinavian Highland), 295
  summer days and winter days, 296
  tourists and scenery, 298
  transhumance, 296
  waste land, 96
Notes on the Geography of the Tunduru District off Tanganyika Territory, 375
Nottingham, 298
Nova Scotia, 44, 46, 110
Novo-Sibirsk, 342, 345
  relation to mining interests, 345
  situation and significance, 345
Nuclear power, 294
Nullarbor Plain, 392
Nunataks, 118
Nuremberg, 322, 324
  medieval connections, 324
  site and modern interests, 324
Nurnberg (*see* Nuremberg), 324
Nyasa, Lake, 373, 375
Nyasaland, 375
Nyasa Shire Rift, The, 373

Oahu, 411
Oakland, 95
Oakland, railway terminus, 95
Oases, 171
  Argentine crops, 171
  San Juan and Mendoza Oases, 171
  Tucuman and Jujuy, 171
Oats, 163
Oaxica, 124
Ob River, 345, 345
Occidental impact on China, 272
Occupance, 199
  intensity in Eurasia, 199
Occupance in the Lowest Rhineland 327
Oceans and Inter-Oceanic gateways, *6
Ocean current, 281
  Japan in relation to, 281
Oceania, 411
  area included, 411
  island groups, 411
Ochiai, 281
Oden Forest, 305
Odenwald, 303
Oder River, 307, 316, 322, 323, 330
Odessa, 338, 339
  foreign trade, 339
  situation and site, 339
Ogden, 81
  location and site, 81
Ogden River, 81
Ogilvie, A G
  Population Density in Greece, 241
Ohio, 40, 52, 53, 54, 57
Ohio River, 17, 37, 40, 42, *42, 43
  canals, locks, floods, 43
  falls, 43
  hydroelectricity and navigation, 43
Oka River, 339
Okanagan Mountains, 108
Okavango River, 382
Okavango swamp, 382
Okhotsk, Sea of, 263, 265
Okinawa, 407
Okinawa, Threshold to Japan, 284
Oklahoma, 66, 311
Oklahoma City, 63
  land rush, 63
  location and site, 63
  oil boom, 63
Oliver, Douglas L
  Treasure Islands of Australasia, 403
Olympia, 89
  temperature, rainfall and growing season, 89
Olympic Mountains, 85, 91
  rainfall, 85
Om River, 345
Omaha, 54, 62
  livestock market, 57
  meat packing, 57
Oman, 249
Oman, Gulf of, 247
Oman, Sultinate of, 247
  land use and products, 249
  size and population, 249
Omduiman, 361
Omsk, 344, 345
  location and appearance, 345
Onega, Lake, 288
Ontario, 54, 108
Ontario, Lake, 107, 108, 115
Oporto, Portugal, 235
Optical goods, 57
Oran, 360
Orange Free State, 384
Orange River, 382
Oranges, 162
  Japan, *283
Orantes River, 251
Ore Mountains, 305, 307
  depleted minerals, 305
Oregon Trail, 57, 72, 82, 90
Orient, 22, 277, 278, 279, 316
Oriental agriculture, 272
Oriental Cordillera, 155
Orientals, 103
Orinoco Plain, 149, 166, 167, 176
  area and location, 166
  bedrock and mantle materials, 167
  cattle grazing, 177
  cattleman's problems, 177
  crops, 177
  drainage, 166
  Gold seeking Spaniards, 177
  grassland, 176, 177
  ground water, 176
  historic role of cattle, 177
  llanetos, 177
  mantle rock, 176
  mature soils, 176
  native population, 178
  rainfall, 176
  savannas (llanos), 177
  terrain, 167
Orinoco River, 145, 149
Orlando, 22
Orleans, Duke of, 22
Orthodox Church, 336
Oruro, 161
Ozark Plateau, 65
  A Primitive Handicraft Industry in a Modern Setting, 67
  area and extent, 65
  bedrock and structure, 65
  recreation and tourism, 67
  terrain and drainage, 65
Oslo, 297
  industries, 297
  location and site, 297
Ostrich Farm, *384
Osaka, 281, 285
Osaka Bay, 285
Otago Harbor, 406
Otago Plateau, 406
Otira Pass, 406
Otronto gateway, *5
Ottawa, 115
  fur trade, 115
  historical associations, 115
  industries, 115
  situation and site, 115
Ottawa River, 109
Ottoman Empire, 358, 362
Ouachita Mountains, 65
  anthracite, 66
  folded structure, 65
Outrigger Boats, *109
Overthrust mountains (*see* Lewis Range) 70
Oxcart Transportation, *126
Oxholm, Axel H
  Country Life in Norway, 297
Oxus River 227, 315, 341, 342, 343
Oystering in the Chesapeake, 88

Pacific Borderlands of Asia, *121
  climatic regions, *121
Pacific Coast, 318
Pacific Coast Highway, 98
Pacific Islands, 414
  adventure and romance, 414
  control, 414
  included islands, 407
  outrigger boats, *109
  role in world trade, 414
Pacific Islands and Antarctica, 403

Pacific Mountains and Lowlands of North America, 84, 100
coalescence of ranges, 84
discontinuity, 84
dual ranges, 84
enclosed lowlands, 84
landward ranges, 84
location and extent, 84
sunken coastal mountains, 84
Pacific Mountains and Valleys of the United States, *85
natural vegetation, *128
Pacific Mountains of the United States, 84
accessibility a problem, 89
barrier effects, 88
Canadian section, 108
climate as an asset, 89
climatic conditions and regions, 87
cultural features, 87
coastal explorations, 88
conservation problems, 89
detritus covered sections, 87
early occupants, 88
forests and other natural vegetation, 87
fruit growing and farming, 88
gateways and passes, 88
historical associations, 87
inner ranges, 85
looking to the future, 89
lumbering and wood processing, 88
mountains included, 84
natural features, 84
petroleum and minerals, 88
railways and highways, 88
urban centers, 88
Pacific Ocean, 8, 142, 264, 274, 416
Abel J Tasman, 403
area, 403
Capt. James Cook, 403
Eurasian lands bordering, 229
explorations, 403
fueling stations, 403
islands, 403
waterway, 403
Pacific Ocean Borderlands of Asia, 263
ancient culture, 263
climatic range, 263
countries within, 266
divisions and regions, 263
location and extent 263
structure and terrain, 263
unity of, 263
volcanic island fringe, 263
Pacific Ranges of Colombia, 148
bedrock and terrain, 148
Pacific Slope of South America, 153
Pacific Slope Lands of South America, 142, 147
climatic counterparts in North America, 147
climatic regions, *121
compared to western coast of North America, 147
divisions and regions, *140
diversity of human activities, 147
natural vegetation, 147
physiographic features and regions, 147
Paducah, 40
Palace of the Popes, 239
Palau, 407
Palembang, 410
Palermo 236, 239, 240
foreign domination, 240
Palestine, 245, 247, 250, 251, 252
ancient Jewish homeland, 251
cities, 251
Palestine, East Africa, *367
landscape sketch, *2
location, area, population, 251
Nazareth Threshing Floor, *252
Promised Land, The, *2
terrain, activities and products, 251
Palestine, Economic Geography of, 251
Palmyra, Ruins of, 252
Pamir, 206, 221
Pamir Knot, 219
mountains diverging from, 210
nature of, 210
Pampas, 167, 169
alfalfa, 173
bedrock and mantle materials, 168
climate, 170
corn belt, 173
crops and animals, 172
distribution of people, 173
drainage and ground water, 168
evolution, 172
extent and boundaries, 168
jerked beef, 173
processing farm crops, 173
railway lines, 173
topography and altitudes, 168
wheat, 173
Pampas Region, 166
Panama, 119, 148
Balboa, 129
composition of population, 129
distribution of people, 129
exploration, 129
extent and area, 129
farms and plantations, 129
geological instability, 129
historical factors, 129
relation to Panama Canal, 129
Panama, Bridge of the World, 129
Panama Canal, 22, 57, 98, 115, 121, 153, 371
global trade connections, 120
interoceanic gateway, *6, 129
Miraflores locks, *129
Panama City, 129
change of site 130
historical connections, 130
location and site, 130
Panama, Isthmus of, 120
Panama route 121
Pan American Highway, 126, 129, 157, 174, 185, 192
Nicaragua, 128
Pan American Airways, 192
Pan American Union Building, *187
Panhandle, 227
Afghanistan, 227
Alaskan, 100
Papaya, 113
"Paper City, The" (*see* Holyoke, Mass), 48
Papua, 389
Para (*see* Belem), 189
Paraguay, 169
climatic conditions, 179
climatic regions, *121
composition of population, 179
crops, 180
cultural features, 179
foreign trade, 180
historical background, 180
human welfare, 180
landlocked position, 179
location and area, 179
mantle rock and terrain, 179
mature soils, 179
natural features, 179
natural vegetation, 179
Paraguay, occupations, 180
physical inheritance, 179
plantation of yerba mate, *180
rainfall and temperature, *139
stagnation paradox, 180
vegetation regions, *128
Paraguayan Farm, A, 180
Paraguay River, 168, 187
Parana, 175
Parana Paraguay Plains, 159, 166, 167, 168, 169, 175, 183
altitude and slope, 167
bedrock and mantle materials, 168
boundaries and extent, 167
cattle industry, 172
drainage and terrain, 167
plant and animal production, 172
stream beds and gradients, 168
Parana-Paraguay River, 167
Paramaribo, 191
rainfall, 190
Parana Plateau 179, 182
Parana River, 145, 168, 175, 179, 182
Paris, 278, 318, 323, 324
antiquity, 318
capital and chief city, 318
international importance, 318
monuments, boulevards, etc, 318
railway center, 318
situation and site, 318
Paris Basin, 303, 316, 317, 318, 329
bedrock and structure, 318
industrial activities, 318
land use, 318
"Paris of South America" (*see* Buenos Aires), 171
Paris Lyon-Mediterranean Railway, 317, 319
Paris, The Site and Growth of, 318
Park, Mungo (African explorer), 368
Park River, 48
Parker, Margaret Terrell
Lowell A Study of Industrial Development, 46
Parkins, A E
The High Plains Region of Western Texas, 61
Parthenon in Athens, 213
Pasadena, 98
Pasig River, 410
Passaic River, 32
Passes (*see* gateways) *203
Alpine Highland, 212
Bochetta, 239
Uspallata, 146
Pasto Knot, 144, 145
Patagonia, 171
Patagonia, Among the Sheep Ranches of, 171
Patagonian Tableland, 168, 169, 175, 181
altitude and terrain, 169
glaciation, 169
location and extent, 169
rivers and lakes, 169
shoreline, 169
sub-cordilleran trough, 169, 181
Paterson, 30, 31
historical associations, 32
Industries, 32
"Silk City," 32
Patras (*see* Patras), 243
Patras, 243
Patrician Glacier, 51, 105
Patric, John
Czechoslovaks, Yankees of Europe, 308
Pattern of Climates, The, 118
Pearl Harbor, 413

Peartree Pass (*see* Croatian Gateway), 202
Peasant Hungary in Europe, The Role of, 311
Peat, *293
  Ireland, *293
Pecos River, 58, 61
Pedalfers, 431
  aluminum and iron accumulation, 431
  non lime-accumulating soils, 431
  six groups, 431
Pedocals, 93
  California Valley, 93
  calcium carbonate accumulating soils, 431
  climatic limitations, 133
  lime-accumulating soils, 431
  lime zone, 433
  profile, 433
  Sudan Saharan Tableland, 362
  three groups, 433
Pegasus Bay, 406
Pegnitz River, 324
Pei-Kiang (North River), 276
Peiraievs (Piraeus), 243
Peloponnesos, 230
Penang, 266
Pendleton, 82
Peneplanation (defined), 44
  New England-Acadian Upland, 44
Pennine Chain, 288
  coal on flanks, 288
Pennine Mountains, 293
Pennsylvania, 11, 27, 28, 36, 38, 40
  slate and anthracite, 89
Pennsylvania Railroad, 24
Penobscot River, 44
Pensacola Bay, 22
Pensacola, 22
Pentagon Building, The, 34
Pequannock River, 48
Percentile, 433
Pernambuco (*see* Recife), 186
Perris Plain, 95
Persia, 341
  decline in importance, 226
Persia, an ancient country, 226
Persian Empire, 226
Persian Gulf, 224, 226, 227, 245, 246, 247, 251, 253, 254
Perth, 395
  location and site, 395
  weather record, 393
Peru, 149
  agricultural activities, 156
  animal life, 155
  animal resources, 156
  climatic zonation, 155
  copper, 158
  crops grown, 156
  cultural features, 156
  Cuzco corn, *157
  domesticated animals, 156
  global trade, 157, *158
  historical connections, 156
  Inca Empire, 156
  independence from Spain, 156
  irrigation possibilities, 158
  land ownership, 158
  Llamas Crossing a Stream, *157
  location, area and population, 155
  Machu Picchu, *156
  mature soils, 155
  mineral resources, 155
  mountain ranges, 155
  natural features, 155
  natural vegetation, 155
  need for irrigation, 156
Peru, Ocean-to-Amazon Highway, 157
  official language, 155
  plantation agriculture, 156
  rainfall and temperature, *139
  surveying the future, 158
  The Coast Waters and Coast Lands of Peru, 155
  Trans-Andine Highway, 157
  trans-mountain communication, 157
  transportation facilities, 156
  transportation problems, 158
  urban centers, 157
  war over nitrates, 156
  Western Piedmont climate, 155
Peruvian Andes, 158
Peruvian current, 161
Peshawar, 261
  location and site, 261
Peiping, 104, 220, 275
  Kalgan Gateway and, 206
  location and site, 275
  rainfall, 272
Petaluma, 94
Petsamo Region, The, 301
Petrograd (*see* Leningrad), 339
Petroleum, 18, 172, 410
  "Big Inch" pipe line, 18
  California Valley, 93
  Colombia, 150
  concessions in Iran, 219
  East Indies, 109
  Ecuador, 151
  first oil well, 40
  flanks of Transylvania Alps, 305
  Genoese trade, 239
  Glaciated Lowland, 52
  Iran, 226
  Iranian Plateau, 219
  Iraq, 254
  Kuwait and Bahrein, 249
  Maracaibo Basin, 144, 177
  Maracaibo City, 178
  Poland, 331
  Pittsburgh field, 42
  Ploesti fields in Romania, 313
  refining, 18
  resources of Saudi Arabia, 248
  Southern Interior Highlands, 66
  transportation, 18
  Tulsa, 64
  world's production, *18
Petroleum Production, World's, *18
Pharaohs, 253, 368, 369
Pharos, Island of, 369
Philadelphia, 30, 33, 38, 41
  "City of Brotherly Love," 33
  historical connections, 33
  manufacturing center, 33
  railway and shipping center, 33
  situation and site, 33
Philippine Islands, 390, 407, 409
  American Empire, The, 409
  independence, 411
  Mindanao, On the Road to Tokyo, 407
  products, 409
Philippopolis, 216
Phoenicians, 319
  Africa, 351
Phoenician ship builders, 250
Phoenix, 82
Phosphates, 18
  Coastal plains, *18
Phosphate rock, 357
  North Africa, 357
Physiographic Diagram of Africa, 354
Physiographic Diagram of Asia, 209
Physiographic Diagram of Europe, 209
Physiographic Diagram of South America 141
Physiographic Diagram of the United States, 13
Physiographic divisions and regions of the continents
  delineation and classification, 4
  difficulties in delineating, 208
  Africa, 354, *355
  Australasia, *389, 390
  Eurasia, *208, 209
  North America, 13, 14, *15, *16
  South America, *140, 141
  United States, The, 13, 14, *16
Physiographic region, 3
  nature of, 3
Physiographic Regions, 208
  Eurasia divided into, 208
  Mediterranean Borderlands, 229
  outline for Africa, 354
  outline for Eurasia, 209
  South America, 141
Physiographic sketches, *26
  across Appalachians, *26
  across California Valley, *93
  Appalachian gateways, *25
  Appalachian Plateaus, *26
  Africa, *352
  Anatolia, *218
  Atlas Region, *357
  Black Hills and Adjacent Great Plains *60
  Bohemian Plateau, *305
  British Isles, *289
  Carpathians, *306
  Central America and the West Indies, *120
  Central Plateau of France, *202
  East Africa, *367
  Eastern Plateaus and Mountains of Africa, *367
  Egypt, *246
  Ethiopian Highland, *367
  German Uplands, *305
  Grand Coulee Project, *76
  Greece, *242
  Hawaiian Islands, *111
  Hungary, *306
  Hungarian Plain, *306
  Iberian Peninsula, *230
  India, *256
  Indo China and Malaya, *264
  Iran, *205
  Ireland, *289
  Italian Peninsula, *236
  Italy, *236
  Laurentian Upland, *106
  Madagascar, *367
  Mesopotamia, Syria and Egypt, *246
  northern South America, *141
  Ozarks, *66
  Pacific Mountains and Valleys, *85
  Plateau of Iran, *205
  Plateau of Tibet, *219
  Rhenish Highlands, *204
  Ridge and Valley Region, *26
  Rocky Mountain Region, *70
  San Francisco and Environ, *94
  secondary European gateways, *203
  South American west coast, *146
  southeastern Asia, *207
  Tarim Basin, *221
  three landscape levels, *3
  The Promised Land, *2
  Turanian Plain, *341
  West Indies, *120

Physiography of Western United States, 69
Piacenza, 238
Piedmont, 230
  Italy, 230
"Piedmont" defined, 26
Piedmont Upland of the United States, 20, 35, 41
  contrasts in dwelling structures, 28
  cotton growing, 28
  dearth of minerals, 28
  early occupancy, 27
  factors favoring manufacturing and trade, 29
  "Fall Line," 26
  "Fall Line" cities, 30
  farming activities, 27
  fruits and crops, 27
  interior cities, 30
  location and extent, 26
  mixed nationalities, 27
  port and tidewater cities, 30
  reclamation practices, 28
  revolution in farm practices, 28
  soil conservation, *29
  stream incision, 26
  strip cropping, *29
  structure and terrain, 26
  The Tobacco Belt of North Carolina, 28
  World's Tobacco Production, *28
Pig iron production, world's, 54
Pike's Peak, 69, 74
Pilgrims, 19
Pilsen, 308
Pineapple Field, Hawaiian Islands, *413
Pineapple industry, 412
  environmental factors, 412
  Hawaiian Islands, 412
Pine Ridge Escarpment, 59
Pioneers, 53
  Glaciated Lowland, 53
Piraeus, 243
Pisa, 239
Pittsburgh, 37, 38, *42, 56
  historical connections 43
  iron and steel manufacturing, 42
  manufacturing interests, 42
  railway center, 42
  situation and site, 42
  transportation facilities, 42
  weather record, 38
Pittsburgh-Youngstown, iron and steel district, 40
Pizarro, Francisco, 125, 150, 157
Placid, Lake, 107
Plains of India, 219
Plant and animal products, 358
Plant Ecology, 426
Plant resources, 439
  table, 439
Plantation agriculture, 409
  crops grown, 409
  factors involved, 409
  foreign management, 409
  native labor, 409
Plantation of Yerba Maté, *180
"Plant zero," 419
Plateau of Anatolia, 210
Plateau of France, 211
Plateau of Iran, *205, 210, 218, 225
Plateau of Shotts, 356
Plateau of Tibet, 210, *219
Platt, Robert S
  A High Farm in the Central Plateau, Ecuador, 154
  A Paraguayan Farm, 180
Platt, Robert S., *A Vineyard in the Andean Piedmont, Mendoza*, 171
  Alto Farm in the Bolivian Andes, 159
  Central American Traverse, 126
  Magdalena Alipac A Pueblo in the Central Plateau, 124
  Manuel, A Sugar District in Cuba, 132
  Plantations in the Coastal Lowlands (British Guiana), 191
Platte River, 58, 61, 70
Plovdiv (*see* Philippopolis), 216
Plymouth, Mass., 19, 36, 124
Plzen (*see* Pilsen), 308
Po, Plains of, 202
Po River, 212, 230
Po Valley, 239, 240
Pocatello, 81
  gateway city, 81
Pocono Plateau, 37
Podzol soils, 52, 433
  associated vegetation, 433
  characteristics, 133
  climatic prerequisites, 133
  New England, 45
  representative areas, 433
Poe, Edgar Allan, 31
Poitou Gateway, 202
  associated natural features, 202
  Battle of Tours, 202
Polamar, Mt., 88
Poland, 307, 316, 330
  Baronowice, A Landed Estate in Polish Silesia, 332
  climate, 331
  compactness, 330
  crop-growing areas, 331
  cultural features 331
  Curzon Line, 331
  destruction of cities in World War II, 332
  drainage systems, 331
  effects of glaciation, 331
  ethnic and religious composition, 330
  foreign trade, 332
  future boundaries, 333
  German aggression, 331
  German-Polish frontier, 330
  historical references, 331
  industrialized section, 331
  location, area, population, 330
  loess-covered areas, 331
  natural features, 331
  natural vegetation, 331
  new boundaries, 331
  petroleum and water power, 331
  Polish outlook, 333
  Polish-Soviet boundary, 331
  processing activities, 331
  rainfall and temperature, *107
  reconstructed railways and waterways, 333
  relation to Vistula River, 330
  Silesian coal and iron ore, 331
  The Upper Silesian Industrial District, 331
  transportation facilities, 332
  urban centers, 332
  zone of conflict 331
Poland's Foreign Trade, *332
Polar belts, 419
  isothermal and vegetational boundaries, 419
  Polar climates, 424
  high temperature range, 424
  location and temperature, 424
  low insolation, 424
  low precipitation, 424
Polar littoral climates, 424
  native vegetation, 425
  temperature extremes, 425
  representative regions, 425
Polar Hemispheres, *115
Polders, 327
Pole Centered Map, *7
Poles, 338
Polish Corridor, 331, 333
Polo, Marco, 206
Polynesia, 411
Pomona, 98
Pompeii 240
Ponce de Leon, 125
Pontchartrain, Lake, 22
Pontianak, 410
Pontic Mountains, 210, 218, 222
Pontoon Bridge, *255
  Baghdad, *255
  Pony Express, 80
Poopo, Lake, 145
Popayan, 153
Popplewell, G. D., and Harcus, I. F.
  Notes on the Geography of the Lundwin District of Tanganyika Territory, 375
Population Density in Greece, 241
Population of the world, *14
Port Adelaide, 402
Port Angeles, 89
Port Arthur, 115
Port-au Prince, 133
Port Elizabeth, 386
  location and hinterland, 386
  rainfall, 388
Port Melbourne, 398
Port Mitsumi, *283
Port Moresby, 410
Port Nicholson, 405
Port Phillip Bay, 398
Port Said, 369
Port of Spain, 134, 178
Port Sudan, 361
Portland, 91
  situation and site 91
"Portland Heights," 91
Portland, Me., 16, 36, 39, 281
Portland, Ore., 52, 91
  advantages for trade and industry, 91
Porto (*see* Oporto), 235
Porto Alegre 187
  location and site, 187
Portsmouth, 21
Portugal, 231, 234
  cities, *214, 235
  climate, 235
  crops grown, 235
  cultural features, 235 [235
  facilities for travel and transportation, fishing and manufacturing, 235
  foreign trade, 235
  Gibraltar gateway and, 234
  global trade, *233
  influence in Brazil, 235
  land utilization, 235
  location, area, population, 234
  natural features, 234
  natural vegetation, 235
  place in history, 235
  soils, 235
  terrain and rivers, 234
Portuguese, 192
Portuguese explorers, 380
Portuguese Guinea, 366
Portuguese traders, 276
Post, Lauren C
  The Landscape in Its Annual Cycle on

the Prairies of Southwest Louisiana, 19
Post-War Air Routes, The Geography of, 340
Potash, 305
flank of Harz Mountains, 305
rift valley, 304
Potash, soda and borax, 77
Basin and Range Region, 77
Potato Industry in Nebraska, The, 62
Potatoes, 159, 172
Maine, 46
world's production, *337
Poteau River, 68
Potomac gateway, 24
Potomac River, 24, 33
Potosi, 161
Powell, Major J. W., 78
Power, *182
hydroelectric development in Brazil, *182
Prague, 224, 308, 329
situation and site, 308
Praha (*see* Prague), 308
Prairie grasses, 52
Prairie grassland, 53
forestation, 53
role of the steel plow, 53
Prairie Provinces, 115
Prairie soils, 52, 433
associated vegetation, 433
characteristics, 433
crop adaptation, 433
representative areas, 433
Sudan-Saharan Tableland, 362
temperature and rainfall association, 433
Prairies and steppes, 429
agricultural lands, 429
associated climates and plants, 429
grasslands, 429
grazing lands, 429
nutritional qualities, 429
related soils, 429
representative regions, 429
tough sod, 429
varieties of grasses and forbs, 429
Pre-Cambrian Shield, *106
Precious stones, 185
Precipitation, 433
departure, 433
maximum, 433
mean, 433
measurements, 433
median, 433
minimum, 433
percentiles, 433
quartile deviation, 433
spread, 433
Presidential Range, 44
Pressburg, 308, 311
Pretoria, 384, 385
mining interests, 386
Price, Willard
Jap Rule in the Hermit Nation, 280
Unknown Japan, 282
Primmer, George H.
Adjustments to Climate in Alpine Mediterranean Asia, 218
Future of the Lake Superior Iron Ore Supply, 107
Prince Edward Island, 111
Prince Henry, 295
Prince Rupert, 109, 112
Pripet River, 331
Problems for the future, 58
Problems for the future, Glaciated Lowland, 58
Great Plains, 64
Processing activities, 132
West Indies, 132
Prospects, 324
Germany's, 324
Promised Land, The, 1, 2, *2
Protestants, 338
Providence, 48
location and site, 48
Provo, 81
Provo River, 81
Pruitt, Fredonia M.
The Coffee Industry of Colombia, 151
Prut River, 305, 314, 331
Ptolemaic Map of the Ancient World, *5
Ptolemy, Claudius, 6
Pueblo, 64
Puerto Barrios, 126
Puerto Colombia, 153
Puerto Rico, 119, 121, 130, 131, 132, 133, 155
Puget Sound, 84, 89, 90, 91
Puget Sound Lowland, 84, 85, 115
altitude and terrain, 89
climatic conditions and regions, 89
climatic regions, *421
compared with western Europe, 92
crops and animals, 90
cultural features, 90
farming activities, 90
Forest Situation in the Pacific Northwest, 90
forests and lumbering, 90
glaciation and drainage, 89
historical connections, 90
loading lumber, *90
location and area, 89
looking ahead, 92
manufacturing and processing, 90
mature soils, 89
natural features, 89
natural vegetation, 90, *128
rainfall and temperature, *12
relation to World War II, 92
structure and ground water, 89
trade relations, 90
urban centers, 90
Pulque, 124
Puna, 145
Puno, 158, 160
Punta, The, 133
Puntarenas, 129
Puyallup Valley, 91
Pyengyang, 280
Pyramids, 368, 369
Pyrenees Mountains, 210, 211, 230, 231, 234, 287, 315, 317
evidences of glaciation, 211
barrier features, 211
human adjustments in relation to, 211
roadways across, 231
sheep, *238
Skyline Drive in the Pyrenees, 211

Quarrying, 45
New England, 45, 48
Quartile deviation explained, 435
Quebec, 106, 111, 281, 288
city, *114
embarkation point, 114
historical associations, 114
industry and trade, 114
ocean port, 114
situation and site, 114
World War II diplomatic notables, 114
Quebec, Province of, 277
Quebracho, *172, 172
timber, 180
utilization, 172
"Queen of American Waters" (*see* Lake George), 107
Queens, Borough of, 30
Queensland, 395, 397, 414
Quesada (Ximenes de), Gonzalo, 150
Quincy, 48
Quinine, 407
Quinoa, defined, 159
Quito, Ecuador, 155
location and setting, 155
Quito-Guayaquil railway, 155

Radium, 380
Congo Basin, 380
Radium-uranium ore, 381
Katanga Highland, 381
Laurentian Upland, 106
Raft of lumber, on the Volga, *335
Railroad from Santos to São Paulo, *184
Railroads, 402
Central Lowlands of Australia, 402
Eastern Australia, 398
Mexico, 124
New Zealand, 405
Rocky Mountains, 72
South Africa, 385
Railway-highway network sites, 55
Railways, 53
Czechoslovakia, 308
Glaciated Lowland, 53
Hungary, 311
India, 259
Japanese, 285
Pacific Mountains of U. S., 88
Soviet Europe, 338
Trans-Iranian, 227
Rainfall, 433
Calgary, Canada, 433
dependability (*see* Appendix D), 435
dependability in United Kingdom, 290
evenness, 433
evenness and dependability, 294, 317
France, 317
mean annual, 419
seasonal distribution, 419
variability, 419
Rainfall and temperature, *353
Africa, *353
Arabian Plateau, *198
Argentina, *139
Asia, *198
Atlas Region, *353
Australia, *394
Burma, *198
Canada, *12
Central Lowlands (Australia), *394
Chile, *139
China, *198
Congo Basin, *353
Copenhagen and Brussels, 325
East Africa, *353
East Indies, *394
Eastern Highlands and Mountains, *353
Eastern Highlands and Tasmania, *394
Ethiopian Highland, *353
Europe, *197
France, *197
French Indo-China, *198
Germany, *197
Greece, *197
Guianas, *139
Hungary, *197

Rainfall and temperature, India, *198
Indo-Chinese countries, *198
Iran, *198
Iraq, *198
Irish Free State, *197
Italy, *197
Japan, *198
Low countries, *198
Madagascar, *353
Manchuria, *198
New Zealand, *394
Norway, *197
Poland, *197
Romania, *197
Rome, 236
Siberian Plain, *198
Siberian Upland, *198
South African Highlands and Basins, *353
Soviet Europe, *197
Spain, *197
Sudan-Saharan Tableland, *353
Sweden, *197
Syria and Associated Countries, *198
Turanian Plain, *198
Turkey, *198
United Kingdom, *197
Upsala and Gothenburg, 298
Uruguay, *139
Western Plateau of Australia, *394
Rainfall distribution, *12
New England, *12
Peru, *139
windward and leeward, *139
Rain forests, 150
Colombia, 150
Rainier, Mt., 85, *86, 91
Raleigh, 30
Rangoon, 269
Golden Pagoda, 269
situation and site, 269
Rangoon River, 269
Rappahannock River, 27
Raton Mesas, 59
Raup, H. F.
Land Use and Water Supply Problems in Southern California, 98
Raup, Hugh M.
Forest and Gardens Along the Alaskan Highway, 112
Recife, 186
situation and site, 186
trade advantages, 186
Reclamation Service, United States, 81
Recreation areas, 50
Adirondack Mountains, 50
Red and yellow soils, 27, 131
deficiencies, 431
laterized in part, 431
management, 433
rainfall and vegetation, 431
representative areas, 433
southern Piedmont Upland, 27
Red Basin (China), 265, 273
Red Monoliths, 82
Red River, 54, 65, 70, 271
Red River Basin (French Indo-China), 271
minerals and land use, 271
Red Sea, 245, 248, 249, 351, 356, 371, 372
Red Sea rift, 247
Redwood trees (Sequoia), 87
Reef City (*see* Recife), 186
Reference books, 436
Africa, 437
Asia, 437
atlases, 436
Australia, 437
Reference books, continents, 437
Europe, 437
North America, 437
scenery-type maps, 436
South America, 437
systematic geography, 436
yearbooks, 436
Reggio, 238
Regina, 115
Regional geography, 1
Biblical illustration, 1
geographic reconnaissance, 1
landscape study, 1
materials included, 2
organized knowledge, 2
Promised Land, The, 1
Regional Studies, 1
basic procedure, 1
ensemble of related phenomena, 2
The Promised Land, *2
Regions and Countries Integrated, 5
advantages secured, 5
difficulties involved, 5
variable procedures, 5
Remarkable Mountains, The, *106
Renner, George T.
Geographic Regions of the Sudan, 363
Reno, 81
location and importance, 81
Republic of Texas, 22
Residual material, 316
Central Plains of Europe, 316
Resin, 185
Resistencia, 175
Resorts, 213
Switzerland, 213
Resorts and playgrounds, 45
New England, 45
Revolutionary War, 19, 40
Rhenish Highlands, 303, 317, 321, 322
agricultural area, 321
along the Moselle, *322
basis of unity, 303
coal beds associated, 304
Germany, *304
industrial centers, 322
industries associated, 322
minerals, 304
minerals associated, 321
mining districts, 321
physiographic features 303
physiographic sketch, *304
railways and waterways, 322
Rhine gorge, 304
structure, bedrock and terrain, 303, 304
sub-regions, 304
The Black Forest: Its Human Geography, 303
Rhine gorge, 304
Die Loreley, 304
nature and importance, 304
navigability and beauty, 304
Rhine, Rediscovering the, 321
Rhine rift valley, 303, 320
sequential steps in formation, 303
terrain, 303
Rhine River, 212, 303, 305, 316, 322, 327, 328
Belfort Gateway and, 202
Rhine Valley, 303, 317, 320
Rhine Rhone route, 319
Rhine Rhone waterway, 319
Rhode Island, 44, 47
urban population, 47
Rhodesia, Hobby and Hope of Cecil Rhodes, 384
Rhodope Mountains, 212, 215
Rhone River, 211, 212, 317, 322
Rhone Valley, 239
Rhone Rhine waterway, 324
Rhone Saone Corridor, 202, *202, 210, 211, 240, 317, 320
Alpine Highlands as related to, 212
antiquity, 202
as a waterway, 318
associated gateways, 202
associated natural and cultural features, 202
location and importance, 202
Roman highway, 202
World War II, 202
Ria coast (New England), 44
Rice, 151, 172, 184, 377
India, *258
"Rich Coast" (*see* Costa Rica), 128
Rich, John L.
A Bird's Eye Cross Section of the Central Appalachian Mountains and Plateaus, 24
The Nitrate District of Tarapaca, Chile: An Ideal Traverse, 163
Richmond, Borough of, 30
Richmond, 30
historical connections, 34
industrial specialization, 34
site and surroundings, 34
Ridge and Valley Region (Appalachian Ridges and Valleys) of the United States, 36
caves and caverns (*see* karst), 36
evolution of land forms, 36
forested ridges, 38
Great Valley features, 36
marble quarries, 39
mature soils, *132
metamorphosed rocks, 36
natural bridge, *37
natural vegetation, *128
physiographic sketch, *26
processing farm products, 39
quarrying metamorphic rocks, 39
ridge features, 36
ridges and valleys contrasted, 39
terrain and stream incisions, 36
urban centers, 41
woodworking industries, 39
Rideau Canal, 115
Riesengebirge (*see* Giant Mountains), 307
Rift valleys, 250, 351, 356, 382
adirondacks, 107
adjacent terrain, 353
Africa, 351
Australia, 400
characteristics, 250
diagrams, *246, *304, *367
East Africa, *267
physiographic sketch, *367
Promised Land, The, *2
structure, 351
Syrian Arabian Plateau, 245
Rio Apure, 166
Rio Araguaya, 183
Rio Bermejo, 168, 169
Rio Cassiquiare, 181
Rio Colorado, 174
Rio Cuarto, 168, 171
Rio de Janeiro, 182, 184, 185, 186, *187
cultural and educational center, 186
manufactures and trade, 186
situation and site, 186
Rio de la Plata, 159, 167, 174, 181, 182, 192
Rio de Oro, 366
Rio Grande, 18, 23, 58, 69, 70

Rio Grande Valley, 20
Rio Guaviare, 167
Rio Japura, 167
Rio Javary, 167
Rio Madeira, 167
Rio Marañon, 167
Rio Meta, 166
Rio Negro, 167, 181
Rio Orinoco, 166, 181
Rio Ozama, 133
Rio Paraguay, 168, 188
Rio Parana, 174
Rio Pilcomayo, 168, 169
Rio Primero, 174
Rio Salado, 168, 169, 174
Rio São Francisco, 190
  possibilities, 190
Rio South Bermejo, 168
Rio Tapajoz, 188
Rio Uruguay, 192
Rio Verde Valley, 125
Rip Van Winkle, 38
River sites, cities having, 55
Rivers, 354
  flooding of African, 354
  Hari Rud, 228
  India, 255
  obstructions in African, 354
Riverside, 98
Riviera, French, 320
Roanoke, 35, 39
Roanoke River, 24
"Roaring Forties," 162
Robertson, C J.
  Fiji Sugar Industry, 414
Rochester, 57
Rockhampton, 399
Rocky Mountain Fur Company, 72, 78
Rocky Mountain National Park, 73, 70
Rocky Mountain Region, *70
  Grand Tetons, *71
  model of folded mountain, *72
Rocky Mountains, 11, 51, 58, 59, 69, 75, 81, 100, 108, 111, 119
  Alpine Peaks, *73
  bedrock and structure, 70
  characteristics of soils, 71
  climatic diversity, 70
  conservation need, 74
  cultural features, 71
  evidences of human occupancy, 71
  frontier opportunities, 71
  future developments, 74
  "Ghost Towns," 74
  glacial carving, 69
  historical references, 72
  human interests, 73
  location and latitudinal extent, 69, 70
  Lords of the Rockies, 72
  mineral production, 73
  mineralization, 70
  natural features, 69
  natural vegetation, 71, *428
  passes and breaches, 69
  playgrounds and recreation, 70
  power and recreation resources, 70
  relations to Great Plains, 70
  relation to rainfall and irrigation, 71
  rivers and drainage, 70
  routes, 72
  sports and recreation, 73
  subsections, 69
  The Mountain Communities of the Boulder Region, Colorado, 73
  urban centers, 71
  utilization problems, 71
  water storage, 71
Roma (*see* Rome), 239
Roman Catholics, 338
Roman Empire, 358
Romania, 307, 310, 312, 330
  amalgamation area, 313
  ancient travel route, 313
  area, population, boundaries, 312
  articles of commerce, 314
  climate, 312
  climatic regions, *421
  compactness, 312
  configuration and terrain, 312
  crops and animals, 313
  cultural features, 313
  discordant elements, 312
  disuniting factors, 312
  Dobruja, 313
  foreign trade, 314
  grazing lands, 313
  Iron Gate, *204
  isolated dwellings unusual, 314
  land of many villages, 314
  land utilization, 313
  life dominated by rural economy, 314
  mature soils, 313
  Mineral Resources of Romania, 313
  natural features, 312
  natural vegetation, 313
  petroleum in World War II, 313
  Ploesti oil fields, 313
  radiating streams, 312
  railways and waterways, 314
  rainfall and temperature, *197
  Romanian outlook, 314
  semiaridity, 314
  settlements relative to World War II, 314
  several physiographic regions involved, 312
  soil regions, *132
  transportation facilities, 314
  Transylvanian piedmont, 312
  urban centers, 314
  vegetation regions, *428
Romans, 319
  settlement in Spain, 231
Rome, Ga., 39
Rome, Italy, 236, 239, 272, 273
  Carthage and, 237
  "Eternal City," 239
  political city, 239
"Roof of the World," 206
Roos, S Edward, Wage, F Alton, and Blackburn, Quin A
  Some Geographical Results of the Second Byrd Antarctic Expedition, 416
Roosevelt, Franklin D., 111
Rosario, 168, 173
  location and interests, 174
Rose Bay Flying Base, *400
Rose, John K
  Delevan Prairie An Illinois Corn Belt Community, 54
Rosetta mouth of the Nile, 369
Ross, J C., 416
Ross Sea, 414
Rostov, 338, 339
Rotterdam, 318, 328, 329
  location and importance, 328
Rotterdam Marseille water route, 320
Roucek, Joseph S
  Economic Geography of Greece, 213
  Mineral Resources of Romania, 313
  Resources of Yugoslavia, 215
  Southeastern Europe—A Study in Geographic Disunity, 311
Rouen, 318
Routes, 251
  Cape of Good Hope, 251
  Egypt-Red Sea, 251
  Suez Canal, 251
Royal Gorge, 72, 74
Rubber, 185, 409
  plantation in Brazil, *188
  production, *270
Rubber Growers, The, 270
Rubber Industry, 409
  East Indies, 409
  natural vs synthetic, 409
Rubber Plantation, *188
  Amazon Basin, *188
Rubber tree (Hevea brasilensis), 188
Rudolf, Lake, 373
Ruhr Basin, 301, 331, 337
Ruhr Valley, 321
Ruins, 253
  Babylon, 253
  Ephesus, 225
  Miletus, 225
  Nineveh, 253
  Palmyra, 251
  Troy, 225
Ryukyu Islands, 280
Ruiz, 150
Rural Landscape, *299
  Sweden, *299
Rural Scene, *162
Russia (*see* Soviet Europe), 279, 298, 316 331, 334
  in Manchuria, 279
Russia and Her Neighbors in Europe 336
Russian Plain, 316
Russian Soviet, 334
Russian Turkestan, 340
Russians, 313
Russians in Manchuria, 277
Ruthenia, 307
  terrain, 307
Rutland, 48

Saar Basin, 304, 321
Sacramento, 95
  temperature and rainfall, 93
Sacramento River, 92, 94
Sacramento Valley, 95
Saguenay River, 108
Saharan Atlas Mountains, 356
Sahara Desert, 356, 358, 362
Saigon, 266
  house boat, *271
Saigon, French Indo-China, 271
St Augustine, 19
St Charles River, 114
St Elias Range (St Elias Knot), 84
St Francois Mountains, 65, 66, 67
St George, Gulf of, 169, 175
St Gotthard Pass, 212, 239
St. Gotthard Tunnel, 239
St. Helens, Mt., 91
St Johns, 46, 105
  industry and trade, 118
  situation and size, 118
  temperature and rainfall, 117
  World War II, 118
St. Lawrence, Gulf of, 114
St Lawrence Lowland 105, 110, 114
  crustal movements, 108
  geological features, 107
  location and extent, 107
St Lawrence River, 49, *50, 51, 53, 106 107, 109, 111, 114
St Lawrence Valley, 110
  farming activities, 111

St. Lawrence Valley, field and animal products, 111
hydro-power abundance, 111
mineral fuel deficiency, 111
St. Louis, 57, 67
historical associations, 57
location and site, 57
manufacturing and processing, 57
St. Lucia Island, 133
St. Paul, 57
capital of Minnesota, 57
growing season, 52
St. Peters, 239
St. Petersburg, 22
St. Thomas Island, 133
Saipan, 107
Sajama, Mt., 146
Sakhalin Island, 265, 281, 282
Salem Platform, 65
Salerno, 240
Sales Yard, New South Wales, *101
Salt, 18, 222
Salt Lake City, 81
growth and importance, 81
situation and site, 81
Salt Lake Oasis, 79
farming, 80
Salt River, 82
Salta, 168
Saltillo, 124
Salton Sea, 97
Salween River, 264, 269
Salzach River, 309
Samarinda, 110
Samarkand, 342, 343
architectural contrasts, 343
strategic location, 343
Sambre River, 329
Sambre-Meuse coal field, 321, 329
Sambre-Meuse route, 329
Samoyeds, 335
San Antonio, 22, 82
San Bernardino, 98
San Bernardino Mountains, 95
San Bernardino Valley, 95
San Diego, 88
airways terminal, 98
harbor facilities, 98
railway and highway terminal, 98
rainfall, 97
situation and site, 98
San Domingo, 119
San Fernando de Apure, 178
San Fernando Valley, 95
San Francisco, 84, 88
gateway position, 91
lag of the seasons, 91
landlocked harbor, 91
manufacturing and processing, 91
situation and site, 91
water supply, 91
world trade, 91
San Francisco and Environs, *91
San Francisco Bay, 88
San Francisco Mountains, *77
San Francisco-Oakland Bridge, 91
San Francisco Peaks, 82
San Gabriel Knot, 92, 95
San Gabriel Mountains (San Gabriel Knot), 84, 95, 98
San Joaquin River, 92, 91, 95
San Joaquin Valley, 93
San José, 121, 129
San Juan, 133
situation and site, 133
trade center, 133
San Juan River, 121, 128, 148
San Lorenzo Island, 157
San Louis Potosi, 125
San Matias, Gulf of, 169
San Pedro, 98
San Salvador, 127
location and trade facilities, 127
Sandakan, 110
Sanders, F. M.
The Climate of Japan and Formosa, 281
Sandford, K. S.
Problems of the Nile Valley, 370
Sandhills, 59
Sandusky, 56
Santa Ana, 98
Santa Ana Valley, *96
Santa Barbara, 89
Santa Cruz, 89
Santa Elena Peninsula, 154
Santa Fe, Argentine, 174
situation and interests, 174
Santa Fe, N. Mex., 74
Santa Fe Railway, 62, 72
Santa Fe Trail, 57, 82
Santa Maria Volcano, *121
Santa Monica, 98
Santiago, *164
rainfall dependability, 161
situation and site, 164
Santiago de Cuba, 133
situation and site, 133
trade center, 133
Santis, 212
Santos, 186
location and site, 186
Santos River, 186
São Francisco, 182
São Francisco River, 182
São Francisco Valley, 182
São Paulo, 182, 185
coffee capital, 184
"Heart of Coffee Land," 186
highland trade and industrial center, 186
São Salvador, 186
trade and industrial interests, 186
Saracens, 243
Sarajevo, 215
Saranac Lake, 107
Sardinia, 230
Sarmiento Mount, 146
Saskatchewan, 58, 311
Sasketoon, 115
Satellite cities, 31
Saudi Arabia, 247, 248
government and religion, 248
location and bounds, 248
petroleum reserves, 248
products and trade, 248
Saudi Arabia, Water Resources of, 248
Sava River, 212, 306
Savanna and scrub, 427
adaptations, 427
agricultural adjustments, 427
animal associations, 427
climates involved, 427
native vegetation, 427
plant associations, 427
representative areas, 427
size and quality of grasses, 427
trees and grasses, 427
Savannah, 21, 35
Savannah River, 21
Savannas, 184
Brazil, 184
Central America, 122
Sayan Mountains, 316
"Scablands," 78
Scandinavia, 301
Scandinavia and European Reconstruction, 297
Scandinavian Peninsula, 290
fiord coast, 290
Scandinavian Highlands and Finnish Peneplain, 288
crystalline core, 290
location and extent, 288
structure and land forms, 288
Scheldt River, 327, 329, 330
Schenectady, N. Y., 57
Schley, Major General Julian L.
Ocean-to-Amazon Highway, 157
Schoewe, Walter H.
Glaciers and Glaciation of South America, 148
Schuylkill River, 33
Schuylkill Valley, 39
Schwarzwald (*see* Black Forest), 303
Scotch Irish, 27
Scotland, 288
Lowland and Highland Farms in Scotland, 288
Scotswoman in Somaliland, A, 375
Scott, John
"Magnetic City," Core of Valiant Russia's Industrial Might, 339
Scott, R. F., 416
Scottish Highlands, 288, 290
bedrock, 288
Scottish Lowlands, 291
Scottsbluff, 61
Scottsbluff Mountain, 59
Scranton, 39, 41
anthracite mining, 41
associated industries, 41
location and site, 41
silk, woolen and knit goods, 41
Scrub forest area, 179
Brazil, 184
Scutari, 217
Sea to Sahara Settlement Zones in Eastern Algeria, 362
Sealers, 417
Seattle, 16, 90, 100
Oriental and Alaskan trade, 90
situation and site, 90
Secondary Gateways, *203
Section Across the Appalachian Highlands, *26
Sedan, 329
Seeland, 325
Seine River, 316, 322
Rhone Saone Corridor and, 202
Sekondi, 361
Seleucia, Ruins of, 254
Semi deciduous forest, 179
Semple, Ellen C.
Influence of Geographic Environment 200
Geography of the Mediterranean Region, 201
Seneca Falls, 37
Senegal, 361
Seoul, 280
Sepoy Mutiny, 257
Sequoia (*see* Redwood trees), 87
Serbians, 215
Settlements of the Northeastern Canadian Arctic, 117
"Seven Cities of Cibola," 78
Severn River, 293
Severn Valley, 288
Sevilla (*see* Seville), 293
Seward, 103
Seyhan River, 225

Sfax, 360
's Gravenhage (*see* The Hague), 328
Shan Plateau, 269
Shanghai, 275
  gateway to China, 275
  situation and site, 275
  Willow Pattern Tea House, *276
Shanghai and Its Hinterland, 275
Shantung Peninsula, 265, 276
Shantz and Marbut, 380
  soils of Africa, 380
Shari Plain, The, 361
Shasta, Mt., 85
Shat el-Arab (River), 246, 254
Shattuck, Dr. George C.
  Liberia and the Belgian Congo, 380
Shaw, Earl B.
  The Rupununi Savannahs of British Guiana, 190
Shawnee Hills, 65
Shearer, M. H.
  The Matanuska Valley of Southern Alaska, 102
Sheep, 162, 170, 384
  Bags of Wool at Rio Gallegos, *170
  Pyrenees Mountains, *233
  southern England, *291
Sheep in the Pyrenees, *233
Sheffield, 291, 293
  favorable location, 293
  noted for cutlery, 293
Shenandoah, 36
Shenandoah—"Daughter of the Stars," 39
Shenandoah National Park, 30
Shenandoah Valley, 27, 36, 38
Sheridan's Ride, 38
Sherman's March to the Sea, 27
Shikoku, 280, 281, 282
Shipbuilding, 293
  Glasgow's importance, 293
"Ships of the Desert" (camel), 362
Shiraz, 227
Shoshone Falls, 81
Shotts, Plateau of, 356
Shustar, 219, 227
Sjaelland (*see* Seeland), 325
Siam, 266, 267
  agricultural area, 268
  boundaries, area and population, 267
  forested section, 268
  global trade, *268
  inhospitable section, 268
  landscape features, 268
  manufactures and trade, 268
Siam, Gulf of, 268
Siamese, 267
Sian Gateway, 206, 217
  historical significance, 206
  location and importance, 206
  natural and cultural features associated with, 206
Siberia—the Storehouse of the Future, 315
Siberia, *317
  furs, *317
Siberian Plain, 315, 316, 334, 340, 348, 346
  adjustment to forests, grasslands and tundras, 344, 345
  altitude and slope, 343
  bedrock and structure, 343
  belted human adjustments, 344
  climatic regions, 343, *121
  cultural features, 344
  diversity of possibilities, 346
  east-west belts of soils and vegetation, 344
  isolation, 344
  Kalgan Gateway, 206
Siberian Plain, land of exiles, 344
  location and extent, 343
  looking to the future, 346
  mature soils, 344
  natural features, 343
  natural vegetation, 344
  ores and fuels, 343
  planned economy on trial, 346
  railway development, 345
  rainfall and temperature, *198
  rainfall efficiency, 344
  reasons for cold climate, 344
  river systems, 343
  Siberia—the Storehouse of the Future, 345
  soil regions, *432
  urban centers, 345
  vegetation regions, *428
Siberian Turkestan, 340
Siberian Uplands, 315, 334, 340, 346
  altitude and terrain, 346
  climatic features, 346
  cultural features, 347
  future as related to China and Japan, 348
  human activities, 347
  icebreakers, *346
  location and extent, 346
  looking to the future, 348
  mountains, 346
  natural features, 346
  natural vegetation, 347
  remoteness and lack of development, 347
  problem of remoteness, 348
  rivers, 346
  temperature and rainfall, 346
  urban centers, limiting factors, 347
Sicily, 18, 230, 237, 256
"Siege of the Alamo," 23
Sierra de Cordoba, 169, 234
Sierra de la Ventana, 168
Sierra de Landil, 168
Sierra del Sur, 119
Sierra Leone, 361
Sierra Madre, Eastern, 69
Sierra Madre Oriental (*see* Sierra Madre, Eastern), 69
Sierra Madre, Western, 95
Sierra Maestra Range, 131
Sierra Nevada-Cascade ranges, 75
Sierra Nevada Mountains, 11, 78, 84, 88, 92, 230
  bedrock and structure, 85
  physical aspects, 85
  Yosemite Falls *87
Sierra Nevada Mountains in Spain, 234
Signal Mountain, 41
Si Kiang, 265, 276
Si Kiang basin, 275
  human activities, 278
Silesian coal field, 305
  plebiscite concerning, 308
Silesian Industrial District, The Upper, 331
Silk, world's production, 273, *281
"Silk City" (*see* Paterson, N. J.), 32
Silk industry and production, 282, 383
  Japan, 282
Silk worms, 273
Silver, 155, 159, 172, 222
Simon Bolivar Highway, 151
Simpich, Frederick
  Mediterranean Checkerboard, 229
  Mindanao, On the Road to Tokyo, 407
Simplon Pass, 212, 239
Simplon Tunnel, 239
Sinai Peninsula, 247
Singapore, 264, 270, 271, 410
  emporium of tropical animals, 270
  "Gateway to the Far East," 270
  situation and site, 270
Sinkiang, 272
Sisal Harvest, *124
Sitka, 101
  rainfall and temperature, 101
Skagerrak, 298, 299
Skagway, 103, 112, 115
Skerry Guard, 295
Sketch across the Ozarks, A, *66
Skyline Drive, 30
Slate Mountains, 303, 304
  Pennsylvania, 39
Slave Coast, 363
Slovakia, 307
Slovenes, 215
Smaland Highland, 290
Smith, Guy-Harold
  Physiographic Diagram of South America, 141
Smith, Helen L.
  Shanghai and Its Hinterland, 275
Smith, Captain John, 34
Smith, Jedediah, 72, 78, 88
"Smoky City" (*see* Pittsburgh), 42
Smyrna, 223, 224
Smyrna, Gulf of, 224
Smyrna rugs, 224
Snake River, 76, 78, 81
Snake River Valley, 81
Sneesby, G. W.
  Some Notes on the Climate of British Bechuanaland, 383
Sod House, The, 59
Sofia, 216, 311
  Morava Valley as related, 216
Sofia Basin, 216
Soil Erosion Menace, *23
Soil Regions of the World, *432
Soils, *132
  Glaciated Lowland, *132
  India, 257
  Siberian Plain, 344
  West Indies, 123
Soils, mature, *432
  Great Plains, *432
  types in Glaciated Lowland, 52
Soils of lava origin, 408
Soils regions, *432
  Argentina, *132
  Brazil, *432
  Central Lowlands (Australia), *132
  Chile, *132
  China, *132
  Congo Basin, *432
  Eastern Highlands and Tasmania, *132
  Ethiopian Highlands, *432
  Germany, *132
  India, *432
  Indo-China, *132
  Manchuria, *432
  Romania, *432
  Siberian Plain, *432
  Soviet Europe, *432
  South African Highlands and Basin *432
  Spain, *132
  Sudan-Saharan Tableland, *432
  Turanian Plain, *132
  Turkey, *432
  Venezuela, *132
  Western Plateau, *432
Soils That Support Us, The, 491

Solomons, 407
Solomon Islands, 411
Solway Firth, 288
Song of the Indian Wars, The, 60
Song of Jed Smith, 78
Sonora Pass, 88
Sonoran Desert, 76, 96, 119, 121
Sound, The, 325
Sousse, 360
South African Highlands and Basins, 383
  Across the Great Makarikari Salt Lake, 383
  agricultural conditions, 384
  altitude and terrain, 382
  bedrock and vulcanism, 382
  Boer War, 384
  cities, *365
  climatic conditions and regions, 383
  climatic regions, *421
  coal, 383
  configuration, *352
  crops and animals, 384
  cultural features, 383
  discovery of gold, 384
  drainage and area, 382
  history and settlement, 383
  Karroo system, 382
  land use, 384
  location and boundaries, 382
  looking ahead, 386
  mantle rock, 382
  mature soils, 383
  migration of wind and pressure belts, 383
  minerals and ores, 383
  motor truck and airlines, 385
  natural features, 382
  natural vegetation, 383
  occurrence of minerals, 383
  ostrich farm, *384
  physiographic sketch *352
  political divisions, 384
  pressure on natives, 384
  primitive carriers, 385
  prospects, 386
  rainfall and temperature, *353
  soil regions, *132
  Some Notes on the Climate of British Bechuanaland, 383
  The African Native Worker, 384
  The Great Karroo of South Africa, 382
  transportation, 385
  urban centers, 385
  vegetation regions, *128
  weather stations, 383
South America, 14, 22, 129, 135, 137, 145, 341
  cities, *152
  compared with North America, 198
  continuity of mountains, *143
  divisions and regions, *140
  divisions, regions, countries, 138
  Glaciers and Glaciation of South America, 148
  great natural features, 137
  Major Physiographic Regions, 138
  major surface features, 141
  mean annual rainfall, *139
  North Coast, *146
  Pan American Union Building, *137
  physiographic divisions and regions, *140
  physiographic regions outlined, 141
  rainfall distribution, *139
  seasonal distribution of temperature and rainfall, *139
  West Coast, *144, *146
South America, Northern, *141
  physiographic sketch, *141
South Australia, 392
South China Sea, 263, 264, 272
South Island, 403
South Manchurian Railway, 277, 278, 279
South Pass, 72, 81
South Platte River, 62
South Polar Region, 414
South Sea Islands, 129
South Seas, 414
  romance, 414
South West Africa, 384
Southern Alps, 403
Southern Andes, 145
  characteristics, 146
  continuity, 146
  glaciation, 146
  mature soils, 147
  scenery, 146
  snowline, 147
  Strait of Magellan, *147
  Uspallata Pass, 146
  volcanic peaks, 147
Southeastern Asia, *207
Southern Pacific Railroad, 62, 72, 125
Southern Railroad, 24, 35
Southern Rocky Mountains, 69
Southern Rhodesia, 384
"Southers," 122
Southampton, 292
  double tide, 292
  port of call, 292
Southern California Lowlands, 84, 119
  character of streams, 96
  climatic conditions and regions, 97, *121
  cooperatives, 97
  cultural features, 97
  deltaic features, 96
  evolving scene, 97
  frost hazards, 98
  ground water resources, 96
  historical imprints, 97
  Imperial Valley farming, *97
  location and extent, 95
  motion picture business, 98
  orcharding, 97
  petroleum resources, 97
  power and fuel problems, 98
  promoters' paradise, 99
  rainfall and temperature, *12
  region's prospects, 98
  relation to Gulf of California, 96
  reunions and picnics, 98
  Santa Ana Valley, *96
  soils and natural vegetation, 97
  Spanish influences, 97
  structure and terrain, 96
  timing the marketing, 97
  truck farming, 97
  urban centers 98
  water supply problems, 98
Southern California Lowlands and Associated Features, 95
Southern Highlands and Basins of Africa, 379
  diversity of features, 379
  extent and area, 379
  physiographic sketch, *355
  configuration, *355
  divisions and regions, *352
Southern Interior Highlands of the United States, 65
  climatic conditions and regions, 66
  climatic regions, *121
  cultural features, 67
  effects of isolation, 67
Southern Interior Highlands of the United States, historical associations, 67
  immigrants, 67
  Land of the Big Red Apple, 67
  Land Utilization in the St. Francis Basin, 67
  lead production, *66
  location and extent, 65
  looking to the future, 68
  mature soils, 67, *132
  migration, 68
  mineralization, 66
  natural features, 65
  natural vegetation, 66, *128
  problems of isolation, 68
  petroleum on flanks, 66
  products and markets, 67
  regions included, 65
  Sketch across the Ozarks, A, *66
  transportation, 67
  urban centers, 67
  zinc production, *68
Soviet Asia, 340
  arctic centered map, *7
  contrasts in climate, 340
  ethnic and linguistic diversities, 340
  location extent, population, 340
  Turanian Plain, *341
  units of the Soviet Union, 340
Soviet Europe (*see* Russia), 334
  beet sugar, *337
  chernozem or prairie belt, 335
  climatic regions, *121
  comparative industrial output, 337
  collective farms (Kolkhoz), 336
  Crimea Reborn, 335
  crops and animals in the north, 336
  cultural features, 335
  deciduous broad leaved forest belt, 335
  east west belts of climate, vegetation and soils, 335
  economic planning, 338
  evolution of transport services, 338
  farm practices 336
  "Field Folk," 336
  foreign trade, 338
  "Forest Folk," 336
  forest industries, 336
  future of Soviet Europe, 340
  Geography of Post-War Air Routes, 340
  highway development, 338
  historical development, 335
  industrial evolution, 337
  invasion from Asia, 336
  "Magnetic City," Core of Valiant Russia's Industrial Might, 339
  land holdings, 336
  Mechanization of Agriculture in the USSR, 336
  minerals and mineral fuels, 337
  motorization of transport, 338
  natural features, 334
  new patterns in social and economic life, 340
  petroleum and minerals, 335
  potatoes, *337
  post war developments, 340
  power resources and use, 337
  raft of lumber, *335
  railways, 337
  rainfall and temperature, *197
  Russia and Her Neighbors in Europe 336
  social and economic trends, 338
  soil regions, *132
  state farms (Sovkhoz), 336

Soviet Europe, steppe (short grass) region, 335
Straw-Thatched Log House, *336
structure and terrain, 334
taiga forest belt, 335
The Cities of the Soviet Union, 339
training in aircraft in World War II, 340
Transport in the Development of Soviet Policy, 338
Tundra region, 335
United States-Soviet relations, 340
urban centers, 338
vegetation regions, *428
Voyaging Down the Volga, 337
water routes, 337
waterways in winter, 337
Soviet Far East, 348
Soviet Union, 311, 316, 331, 333, 334, 339
Bosporus Dardanelles Gateway as related to, 205
Ethnic Groups in the Cities of the Soviet Union, 334
major physiographic divisions, 334
number and comparative size of soviets, 334
population distribution, 334
variety of climates, natural vegetation and soils, 334
Soviet Union, The Cities of the, 339
Sovkhoz (*see* state farms), 336
Soybeans, 273, 278
Spain, 130, 231, 321
agricultural practices, 232
ancient foreigners, 231
boundaries and national integrity, 231
cities, *214, 232
climate, 231
climatic regions, *121
colonies in America, 232
crops grown, 232
cultural features, 231
domesticated animals, 232
farming, 232
fishing industry, 232
global trade, *233
Iberian Peninsula, *230
internal strife, 232
land utilization practices, 232
location, area, population, 231
meseta, 231
mineral resources, 232
natural features, 231
natural vegetation, 231
part of Iberian Peninsula, 231
problems and prospects, 231
rainfall and temperature, *197
settled by Moors, 231
Sheep, *233
soil regions, *432
soils, 231
statistics on cities, 232
transportation and roadways, 231
Threshing Scene, *232
vegetation region, *128
Spanish, 192
Spanish-American War, 130
Spanish Conquistadors, 78
Spanish Guinea, 381
Spanish influences, 20
Spanish North America, 14, 119
Central America and the West Indies, *120
climate, natural vegetation and soils, 122
climatic regions, *121
countries included, 123
Spanish North America, physical features, 119
physiographic regions, 119
political events, 119
shape, extent and area, 119
united provinces, 123
Spanish Padres of the Cross, 78
Spanish settlement, 19
Spencer Gulf, 400
Sporades Islands, 411
Sphinx, 369
Spokane, 81
Grand Coulee Dam, 81
Spokane Falls, 81
Sponge gathering, 22
Sporadic Islands, 414
crops, 414
political control, 414
strategic outposts, 414
World War II, 414
Spread of precipitation, 133
Spree River, 323
Springfield, Mass., 18
hardware and firearms, 18
Springfield, Mo., 67
location and site, 67
rainfall distribution, 66
Springfield, Ohio, 57
Springfield Platform, 65, 67
Srinagar, 261
"Asiatic Venice," 261
location and site, 261
Staats, J. Riley
India East Coast, 247
Stacking Peat, *295
Stadtlander, Elizabeth
New Caledonia, 414
Stalinabad, 312
Stalingrad, 337
Germans at, 337
Standard of living, 376
Stamford, 31
Stanley, Henry M., 380
Stanovoi Mountains, 265, 316
State farms, 336
operation and land use, 336
Steamboat Rock, *76
"Steel City" (*see* Pittsburgh), 42
Stellar Polar Map, *7, *113
mountains and plains, *113
Stettin, 323
Stewart, John R.
The Resources of Manchuria, 258
Stillwell, Richard
Greece, the Birthplace of Science and Free Speech, 241
Stillwell Road, Land Route to China, 269
Stirling, Matthew W.
Expedition Unearths Buried Masterpieces of Carved Jade, 123
Stockholm, 300
situation and site, 300
"Venice of the North," 300
Stockton, 95
Stone Basket Bridge, *220
Stone Mountain, 85
Confederate Memorial, 85
"Stonewalls," fences in New England, 15
Stotz, Carl L.
The Human Geography of the Dardanelles, 204
Strain, Warren
Carnauba Wax: Brazil's Monopoly Product, 186
Geography of the West Coast of India, 255
Strait of the Dardanelles, 203
Strait of Dover, 316
Strait of Gibraltar, 351
Strait of Magellan, 147
Strasbourg, 320, 324
strategic location, 320
Straw-Thatched Log House, *336
Striae (glacial scratches), 106
Strip Cropping Cotton and Small Grain *29
Structural depression defined, 89
Structure of the Black Hills, *60
Structure of Rhine Traffic, The, 322
Subsistence crops, 132
West Indies, 132
Subsurface phenomena, *3
Subsurface water, 58
Great Plains, 58
Subtropical belts, 119
isothermal and vegetational boundaries, 119
limiting factors, 119
Subtropical climates, 122
contrasts in rainfall, 122
isothermal limits, 122
latitudinal and temperature limits, 122
relation to large land masses, 122
seasonal temperature contrasts, 122
temperature hazards, 122
three types, 122
Subtropical dry climate, 77
Colorado Plateau, 77
explanation, 123
location, 123
Mexico, 122
native vegetation, 123
possible phases, 123
rainfall, amount and distribution, 123
representative regions, 123
torrential rains, 123
Subtropical, dry summer climate, 92
California Valley, 92
coastal locations, 122
Mediterranean climate, 122
native vegetation, 123
rainfall, amount and distribution, 122
relation to prevailing winds, 122
representative regions, 123
Subtropical humid climates, 397
coastal locations, 122
exceptions, 122
native vegetation, 122
rainfall, amount and distribution, 122
representative regions, 122
southern Appalachians, 98
southern Blue Ridge and Piedmont, 27
variable temperatures, 122
Sucre, 160
official capital, 160
Sudan, 363
Sudan Government Railway, 361
Sudan Saharan Tablelands, 361
areas included, 361
basins and ridges, *352
bedrock and mantle rock, 361
British owned urban centers, 364
British possessions, 361
canyons in sandstone, *361
cities, *365
climatic regions, *121
configuration, *352
cultural features, 362
diversity of activities, 363
domesticated animals, 363
Dry and Humid Morphology in the Western Erg, 361
Early Days of the Long Range Desert Group, 366

Sudan-Saharan Tablelands, erg desert, 361
explorers and missionaries, 362
French possessions, 364
future of the region, 366
future motor roads, 366
Geographic Regions of the Sudan, 363
hammada desert, 361
historical connections, 362
isolation, 363
isolation and aridity, 366
Italian possessions, 364
Kano A Sudanese Metropolis, 364
land forms and altitudes, 361
Liberia, Republic of, 366
limits of productive capacity, 366
location and extent, 360
mature soils, 362
minerals, 362
mixed farming, *363
mountain ranges, 361
natural features, 361
natural vegetation and animals, 362
nomadic herders and traders, 363
oases and crops, 363
political divisions, 363
Portuguese territory, 366
rainfall and temperature, *353
reg desert, 361
ridges and basins, 361
Sea to Sahara Settlement Zones in Eastern Algeria, 362
soil regions, *132
Spanish territory, 366
streams, 361
subsistence crops, 363
The Gold Coast Colony, 364
The Shari Plain, 361
Timbuktu and Beyond, 364
urban centers, 364
vegetation regions, 361, *128
Sudan-Saharan Tablelands and Associated Basins, 360
Sudetes (Mountains), 305, 307
Sudbury, 115
nickel and copper, 115
Suez Canal, 249, 252, 262, 370, 373
Suez, Isthmus of, 351
Sugar, 177
Sugar Beet Industry of Nebraska, The, 62
Sugar beets, 61
Great Plains, 61
Sugar cane, 20, 154, 172, 184, 377
Colombia, 151
Cuba, 132
derivatives, 132
Greater Antilles, 131
Gulf Coastal Plain, 20
Hawaiian Islands, 412
Sulaiman Mountains, 206, 210, 246
Sulphur, 18
Sumatra, 389, 407, 409
Summer Resort, *313
Carpathian Mountains, *313
Sunda Islands, 407
Sunda Strait, 408, 410
Sundaram, K J G
A Deccan Village in India, 261
Sungari River, 278, 279
Superior, Lake, 110
Superior Upland, 56, 105
cultural features, 107
glaciation, 107
iron ore, 54, 107
location and extent, 107
open pit mining, 107
related to Glaciated Lowland, 51
related to iron manufacture, 51
Superior Upland, strip mining, 107
world's pig iron production, *51
Supreme Court Building, 34
Surface phenomena, *3
Surinam (Dutch Guiana), 190
Surinam River, 191
Susquehanna gap, 27
migrating peoples, 27
Susquehanna gateway, 24
Susquehanna River, 24, 37, 41
Sutherland, Mason
Bornholm Denmark in a Nutshell, 326
Suva, 414
trade and route position, 414
Svec, M Melvina
Voyaging Down the Volga, 337
Swakopmund, 383
rainfall, 383
Swan River, 395
Sweden, 290, 298, 301, 315, 325, 326
agriculture and animal industries, 298
character of people, 298
climatic factors, 298
climatic regions, *121
consumer cooperatives, 298
cultural features, 298
effect of glaciation, 298
Farms and Villages of Sweden, 298
foreign trade, 299
Forests and Forest Activities in Sweden, 299
forests, 298
future, 300
industrial activities, 298
iron and steel industries, 299
location, area and population, 298
mature soils, 298
medieval trade, 298
minerals and ores, 299
natural features, 298
natural vegetation, 298
neutrality, 300
physical features (*see* Scandinavian Highland), 298
position in World War II, 299
railways and waterways, 299
rainfall and temperature, *197
relations with neighbors, 298
rural landscape, *299
structure and terrain, 298
urban centers, 300
woodworking industries, 298
Sweden's Foreign Trade, *300
Swedish influences, 20
Sweet corn, 46
Maine, 46
Swine, 162, 184
Swiss Plateau, 212
Switzerland, 73, 212, 309, 317, 330
agricultural activities, 212
beauties and marvels, 213
cities, 213, *214
climate, 212
cultural features, 212
global trade *213
historical characters associated, 213
location, size and population, 212
looking to the future, 213
manufacturing 213
minerals lacking 213
natural features, 212
natural vegetation, 212
progressive people, 212
rainfall and temperature, *197
resorts, 213
some historical items, 213
transhumance, 213
"Switzerland of Africa," 371
Sydney, 398
factories, 398
location and site, 398
recreation 398
Rose Bay Flying Base, *400
wool market, 398
Sydney Faces the War Front Down Under, 398
Sydney Harbor, *399
Syr Darya, 341, 342
Syracuse, 57
Syria, 250
area and population 251
global trade, 251
land use and products, 251
minerals and manufactures 251
remnant of former greatness, 250
structure and land forms, 251
Syria and Associated Countries, 250
climate, 250
climatic regions, *121
cultural features, 250
historical association, 250
homeland of religious faiths, 250
looking to the future, 252
mandated territories within, 251
natural features 250
natural vegetation, 250
rainfall and temperature, *198
soils, 250
triangular roadway, 250
turmoil and confusion, 250
unique location, 250
Syrian-Arabian Plateau, 245, 253
boundaries and area, 245
comparisons and contrasts, 245
landscape sketch, *246
relation to Africa, 245
rift valleys as related, 245
structure and terrain, 245
two groups of countries, 247
unity, 245
Syrian Desert, 251, 252
Szeged, 312

Tabet, 139
animal resources, 139
mineral resources, 138
plant resources, 139
Table Bay, 385
Tabriz, 227
Tacna-Arica Dispute, The Geographic Setting of, 156
Tacoma, 90, 91
location and site, 91
Tacoma, Mt (*see* Mt Rainier), 91
Taconic Mountains, 48
Tadzkik, 341
Tagua nuts, 151
Tagus River, 230, 234
Taiga (*see* coniferous forests), 129
Taihoku, 281
Taimyr Peninsula, 340
Taiwan (*see* Formosa), 263
Takla Makan, 221
Tamatave, 377
rainfall and temperature, 376
Tampa, 22
Tampico, 125
petroleum interests, 125
Tanana River, 101, 103
Tananarive, 378
constructional materials, 378
location and site, 378
rainfall and temperature, 376
Tanganyika, Lake, 373, 375

Tanganyika Territory, 375
Tangier, 357, 359
Tangier zone, 359
Tannin, 172
Taranto, 239
Tarim Basin, 206, 210, *221
  climate, 221
  Great Basin similar to, 221
  lakes, 221
  location and extent, 221
  mountains associated, 221
  rivers, 221
  terrain, 221
Tarim Basin and Associated Basins, 221
Tarim River, 221
Taro, 412
Tartars, 343, 347
Tashkent, 341, 342
  situation and site, 342
  trade facilities, 342
Tasman, Abel J., 391, 403, 404
Tasman, Mount, 403
Taunton River, 48
Taurus Mountains, 210, 218, 222, 225, 251
Taylor, Griffith
  Australia, 401
  Sea to Sahara Settlement Zones in Eastern Algeria, 362
Taylor, Mt., 76
Tayman, Nelson Grant
  Stillwell Road Land Route to China, 269
Tea, 273, 409
  Japan, 282
Tegucigalpa, 127
  situation and site, 127
Teheran, 226, 227
Tehran (*see* Teheran), 227
Tehuantepec, Isthmus of, 84, 120
Tehuantepec, Lowlands of, 120
Tehuantepec route, 121
Tel Aviv, 252
Tell Atlas, 357
  artesian wells, 358
  semi-nomadic people, 358
  transhumance, 358
Temperature, 317
  France, 317
  mean annual, 418
  seasonal range, 418
  variability, 418
Temperature belts, *420
  delineation, 418
Temperature and climatic belts, 418, *420
  cyclonic (temperate to seasonal extremes), 419
  polar (cool to very cold), 419
  subtropical (warm to mild), 419
  tropical (always warm), 418
Tennessee, 36
Tennessee River, 41
Tennessee River Basin, 39
Tennessee Valley, 36
Tennessee Valley Authority, 39
  location and extent, 40
  major objectives, 40
  pattern enterprise, 40
  social and economic experiments, 39
Terek Pass, 206
Terrain and cities in the vicinity of the Great Lakes, *55
Terry, Michael
  From East to West Across Northern Australia, 392
Test, River, 292
Teton Mountains, 69
Texas, 18, 66
Texas, Republic of, 22
Texcoco, Lake, 125
Textile industries, 283
  Japan, 283
  United Kingdom, 291
Thailand (*see* Siam), 266, 267, 268, 270
Thales, 225
Thalweg, defined, 97
Thames Estuary, 292
Thames River, 291, 292
Thar Desert, 261
The Hague, 328
  Court of International Justice, 328
"The Hub" (*see* Boston, Mass.), 47
The Remarkables, South Island, *406
Thermaikos (*see* Gulf of Thessalonikē), 243
Thessalonikē, Gulf of, 243
Thessalonikē, 243
Thetford Mines, 110
Thompson River, 115
Thoreau, Henry David, 46
Thousand Islands, 49, 108
Thousand Islands International Bridge, *50
Threshing Scene, *232
Thuringian Forest, 304
Tibesti Mountains, 361
Tibet, 267, 269, 271, 272
  Plateau of, *219
  Stone Basket Bridge, *220
Tibet, Plateau of, 263, 265
Tibetan Plateau, 219, 220
  climate, 220
  irrigation adjacent, 220
  location and extent, 219
  mountains associated, 219
  rivers and lakes, 219
  remoteness, 219
  structure and terrain, 219
Tidewater Virginia, Where History Lives, 19
Tien Shan Mountains, 206, 210, 221
Tientsin, 275
  situation and site, 275
Tierra del Fuego, 146, 169, 171
  snowline, 142
Tiflis, 227, 229
Tigris River, 218, 246, 253, 254
Tillman, Bridget M.
  A Scotswoman in Somaliland, 375
Timan Mountains, 335
Timbuktu, 361
  location and site, 361
Timbuktu and Beyond, 361
Timor, 407, 409
Tin, 267, 409
  Indo China, 267
Tinley, J. M.
  The African Native Worker, 384
Tirana, 217
Tisa River, 306
Tisza River (*see* Tisa), 306, 311, 314
Titicaca, Lake, 145
  description, 146
  fresh water, 146
Titusville, first oil well, 40
Tobacco, 28, 154, 172, 184
  Connecticut Valley, 46
  southern Piedmont Upland, 28
  The Tobacco Belt of North Carolina, 28
  West Indies, 132
  world's production, *28
Tobago Island, 133
Tobruk, 366
Today on "The Yukon Trail of 1898," 100
Togoland, 364
Tokyo, 281, 285
  factor in growth, 285
  Imperial University, 285
  situation and site, 285
Tokyo Bay, 285
Toledo, 56
  location and site, 56
Tom River, 343, 345
Tomsk, 343, 344, 345
  location and importance, 345
Tonopah, 77, 81
Torino (*see* Turin), 240
Toronto, 115
  location and site, 115
Topography, meaning, 4
  Jamaica, Hispaniola and Puerto Rico, 131
Toquilla fiber, 150
Tortillas, 124
Toulouse, 202, 320
  antiquity, 320
  gateway position, 320
Touring, 213
  Switzerland, 213
Tourism, 47
  New England, 47
Tourism and recreation, 83
  Intermontane Region, 83
Tourist area, 22
  Florida, 22
Tourist industry, 413
  Hawaiian Islands, 413
Tours, Battle of, 231
Trabzon (Trebizond), 225
Trade, 259
  India, 259
Trade compared, *13
  France, *13
  Greece, *13
  Netherlands, *13
  Nicaragua, *13
Trade of Different Countries, *13
Trade winds, 183
  Brazil, 183
  Lesser Antilles, 133
Trans Andine Railway, 164
Transcaucasia, 331
Transhumance, 341
  Switzerland, 213
  Turanian Plain, 341
Trans-Iranian Railway, 227, 338
Trans-Jordan, 250, 252
  landscape features, 252
Trans-Pecos Highland, 69
Transportation, 51
  competition in Glaciated Lowland, 54
  East Indies, 410
  Hungary, 311
  Japan, 281
  Poland, 332
  relation to period of discovery, 8
  relation to great cities, 51
  Turkey, 223
  West Indies, 132
Trans-Siberian Railway, 277, 278, 338, 342, 345, 347, 348
Trans-Turkestan Railway, 338
Transvaal, 384
Transvaal gold mine, 383
Transylvania, 313
  bedrock and terrain, 313
Transylvanian Alps, 305, 306, 312, 315
Transylvanian Basin, 305, 312, 314
Trieste, 215, 240
Treasure Islands of Australasia, 403
Trebizond (Trabzon), 225

Trenton, 30, 33
Trinidad, Colo., 74
Trinidad Island, 133
  asphalt, 133
  commercial value, 133
  exports, 134
Tripoli, 254, 366
Tropic of Cancer, 122
Tropical belt, 419
  isothermal and vegetational limits, 419
  limiting factors, 419
Tropical climates, 420
  diurnal ranges, 420
  monotony, 420
  monthly temperature ranges, 420
  number of regions, 420
  poleward limits, 420
  similarities and contrasts, 420
  Spanish North America, 122
  types, 420
Tropical dry climates, 362
  Africa, 362
  Mexico, 122
  native vegetation, 422
  phases, 422
  rainfall, amount and distribution, 422
  representative regions, 422
  temperature ranges, 422
Tropical forests, 122
  broad-leaved evergreens, 427
  Central America, 122
  jungle type, 427
  plant associations, 427
Tropical jungles, 427
  agricultural possibilities, 427
  kinds of trees, 427
  plant associations, 427
  representative areas, 427
Tropical plantations, 409
  East Indies, 409
Tropical products, 876
Tropical rain forests, 408
  East Indies, 408
  Guianas, 190
  kinds of trees, 427
  representative regions, 427
  texture of wood, 427
Tropical rainy climate, 362
  Africa, 362
  Brazil, 183
  continuous monotony, 420
  East Indies, 408
  natural vegetation, 420
  representative regions, 420
  rainfall, amount and distribution, 420
Tropical wet and dry climate, 397
  Africa, 362
  Brazil, 183
  hurricanes and typhoons, 122
  native vegetation, 422
  rainfall, amount and distribution, 422
  relation to wind belts, 422
  representative regions, 422
Trojan Pass, 204
Troy, 204
  Athens, 243
  gateway position, 204, 222
Troy, ancient, 204, 222, 225
Truck Crops Are Grown, Where Florida, 20
Truck farming, 46
  New England, 46
Truckee Pass, 78, 81, 88
Truckee River, 81
Tsaidam Basin, 20
Tsingtao, 276
Tucson, 82
Tucuman, 174
  rail connections, 174
  rainfall, 169
  situation and site, 174
Tulaikov, N. M.
  Agriculture in the Dry Regions of the USSR, 341
Tulare Lake, 92
Tulsa, 64
  historical associations, 64
  petroleum center, 64
Tulufan, 221
Tundra, 429
  associated animals, 429
  human occupancy, 429
  location and extent, 429
  plant association, 429
Tundra and Mountains, 429
Tundra soils, 433
  arctic coastal lands, 133
  characteristics, 133
  utilization, 133
Tung oil, 20
Tung-Kiang (East River), 276
Tunguska rivers, 346
  Upper, Middle and Lower, 346
Tunis, 360
  ancient connections, 360
  location and site, 360
Tunis, Gulf of, 357, 360
Tunisia, 357, 359, 360
  crops and animals, 360
  date palms, 360
Tuolumne River, 87
Turanian Plain, 206, 226, 315, 334, 339, 340, *341
  agricultural specialization, 342
  animals grown, 341
  appraisal for the future, 343
  bedrock and structure, 341
  climatic conditions, 341
  climatic regions, *121
  cotton pickers, *342
  crops grown, 342
  cultural features, 341
  diversity of peoples and interests, 343
  irrigation, 342
  land locked rivers, 340
  location, extent and area, 340
  mature soils, 341
  migrants from, 341
  mountain weather station, *342
  natural features, 340
  natural vegetation, 341
  pastoral nomadism, 341
  rainfall and growing season, 341
  rainfall and temperature, *198
  soil regions, *132
  terrain and drainage, 340
  transhumance, 341
  transportation and communications, 342
  urban centers, 342
  vegetation regions, *128
Turin, 238, 240
Turin Hill, 240
Turkestan, 226
Turkey, 221
  agricultural activities, 223
  Anatolia, 222
  antiquity of the area, 222
  cities, 223, *224
  climate, 222
  climatic regions, *121
  commerce and trade, 223
  composition of population, 222
  crops grown, 223
  cultural features, 222
Turkey, fisheries, 223
  historical associations, 222
  inter-continental corridor, 222
  "Land of the Rising Sun," 222
  location, size and population, 221
  manufacturing, 223
  metal working in, 222
  minerals and ores, 222
  natural features, 222
  natural vegetation, 222
  power resources, 223
  problems of the people 225
  rainfall and temperature, *198
  renaissance, 222
  sketch map *218
  soil regions, *132
  soils, 222
  transportation, 223
  vegetation regions, 128
Turkey's foreign trade, *223
Turtles, 178
Twin Cities, 57
  Kansas City, Mo. and Kansas City, Kans., 57
  Minneapolis and St. Paul, 57
Twin Falls, 81
Twitchell, K. S.
  Water Resources of Saudi Arabia, 248
Tyne River, 292
Tyne Valley, 288
Typhoons (*see* hurricanes), 281

Ubangi River, 379, 381
Uganda, Land of Something New, 375
Uintah Mountains, 69
Ukraine, 334, 335, 337, 339
Unalaska, Village of, *103
Unaka Mountains, 26
Undifferentiated soils, 434
  kind, 434
  mostly young, 434
Union of South Africa, 384
  area and population, 384
  foreign trade, *385
  frontier features, 386
  problem of transportation, 386
Union of Soviet Socialist Republics (*see* USSR), 334
Union Pacific Railroad, 62, 64, 72, 78, 81, 88
United Kingdom, 259, 290, 295, 301, 314, 326, 328, 330, 332 336, 338
  appraisal for tomorrow, 294
  barrier boundaries, 290
  Britain's Declining Role in World Affairs, 294
  Britain's One Way Out, 294
  climatic features, 290
  contribution to breeds of animals, 291
  cultural features, 290
  damage to urban centers in World War II, 291
  diplomatic problem, 294
  early internecine struggles, 290
  east coastal cities, 292
  eclipse of sea power, 291
  fisheries and seamanship, 291
  food supplies 294
  global trade, *32
  history, literature, legend, 290
  inland cities, 291
  insularity, 290
  interior cities, 293
  location area population, 290
  manufactures, 291
  mature soils, 290
  mineral resources, 290

United Kingdom, multiplicity of large cities, 291
natural features, 290
natural vegetation, 290
Nature Conservation in Scotland and Furth of Scotland, 291
political connotation, 290
prolonged naval supremacy, 291
rainfall and temperature, 197
related political units, 290
Scottish cities, 293
sequent occupance, 290
services of merchant marine, 291
strategic gateways controlled, 291
strategic location, 290
structure and terrain (*see* British Isles and Brittany), 290
textile industries, 291
The British Fisheries, 294
urban centers, 291
west coastal cities, 292
world trade, 291
United Kingdom of Great Britain and Northern Ireland, 290
United Kingdom's Foreign Trade, *292
United Nations, 280, 333
Pacific Islands, 114
United Provinces of Central America, 123
reasons for dissolution, 123
United States, 6, 14, 16, 19, 125, 133, 254, 259, 278, 285, 325, 328, 330, 332, 338, 340
advantageous location, 16
coal production, *39
copper production, *82
extent and area, 16
foreign trade, *56
global trade, *32
increase in number of states and in population, 16
lead production, *66
northeastern cities, *41
petroleum production, *18
pig iron production, *54
Physiographic Divisions and Regions, *15
splendid inheritance, 16
trade with Italy, 239
West Indian problems, 130
wheat production, *61
zinc production, *68
United States Military Academy, 35
Unknown Japan, 282
Ural Mountains, 287, 315, 316, 334, 335, 336, 343
Ural River, 316
Urban agglomerations in Germany, 323
Urban center, *55
Great Lakes area, *55
New England, 17
Rio de Janeiro, *187
Rocky Mountains, 74
South America, *152
unique factors in New England, 17
Urbanization in Japan, Some Aspects of, 285
Urga, 220
Urmia, Lake, 218, 227
Ur, Ruins of, 255
Uruguay, 183
altitude and slopes, 192
buffer position, 192
cattle and cattle products, 192
climatic regions, *121
climatic conditions, 192
cultural features, 192
field and orchard crops, 192
Uruguay, global trade, *178, 192
grazing industry, 192
historical background, 192
land utilization, 192
location, area and population, 192
natural features, 192
needed economic diversity, 193
outlook, 193
rainfall and temperature, *139
transportation, 192
urban center, 192
vegetation and soils, 192
wool and mutton sheep, 192
Uruguay and the Uruguayans, 192
Uruguay River, 167, 182
Uskub Pass, 203
Uspallata Pass, 146, 164, 174
USSR (*see* Union of Soviet Socialist Republics), 334
latitude, longitude and time, 334
location, extent and area, 334
Ussuri River, 277
Utah, Carved by Wind and Water, 76
Utah Lake, 81
Utrecht, 328
Uzbek, 341

Vaal River, 382
Valencia, Ireland, 294
temperature and rainfall, 294
Valencia, Spain, 233
Valencia, Venezuela, 178
Valdai Hills, 316
Valdivia, 161
rainfall and temperature, 161
Valladolid, Spain, 234
Valley of Chile, 147
agricultural activities, 162
comparison with corresponding lowlands in North America, 147
comparison with Valley of California, 148
glaciation, 148
isolation, 162
mantle rock and terrain, 148
North American counterpart, 162
rural scene, *162
Valley of Eastern Bolivia, 160
Valley of Paradise, 162
Valparaiso, 162
location and connections, 164
Valparaiso, Bay of, 161
Vancouver, 105, 112, *116
gateway position, 115
prospects, 115
railway and steamship terminus, 115
situation and site, 115
Vandals, 231
Spain, 231
Vaner, Lake, 299
Van Buren, Me., growing season and rainfall, 45
Van Cleef, Eugene
The Leipzig Trade Fairs, 324
Van Ess, John
Forty Years Among the Arabs, 248
Van, Lake, 218
Van Valkenburg, S
Java, the Economic Geography of a Tropical Island, 409
Vardar-Morava Gateway, 203, 210, 211, 243, 244
custodians of, 204
historical features, 204
location and importance, 203
relation of World War II to, 204
Vardar River, 212
Vatican, 239
Vatter, Lake, 299
Vegetables, 163, 171
Vegetation regions, *428
Argentina, *428
Atlas Region, *428
Bolivia, *428
Brazil, *428
Chile, *428
China, *428
Congo Basin, *428
Eastern Highlands and Tasmania, *428
Ethiopian Highland, *428
Germany, *428
Guianas, *428
India, *428
Indo-China, *428
Iran, *428
Japan, *428
Madagascar, *428
Manchuria, *428
Mongolian Plateau, *428
Paraguay, *428
Romania, *428
Siberian Plain, *428
South African Highlands and Basins, *428
Soviet Europe, *428
Spain, *428
Sudan-Saharan Tableland, *428
Turanian Plain, *428
Turkey, *428
Venezuela, *428
Western Plateau of Australia, *428
Yugoslavia, *428
Vegetation, western Argentina, *170
Venezia (*see* Venice), 240
Venezuela, 145, 169
appraisal, 179
better government needed, 179
climatic conditions and regions, 176 *421
cultural features, 176
delta land homes, 178
drainage, 176
global trade, *178
historical background, 176
immigrants needed, 179
location and area, 176
natural boundaries, 176
natural features, 176
needed transportation, 179
Petroleum in the Economy of Venezuela, 177
physiographic regions, 176
products of the streams, 178
rainfall and temperature, *139
rainy season, 176
soil regions, *132
unification needed, 179
urban centers, 178
vegetation regions, 176, *428
Venezuela, Gulf of, 121, 178
Venezuela, Our Tropical Outpost in, 178
Venezuela's foreign trade, 177
Venice, 238, 240, 310
Grand Canal, 240
"Water City," 240
"Venice of the East" (*see* Bangkok), 268
"Venice of the North" (*see* Stockholm) 300
Ventura, 89
Vera Cruz, 124, 125
"City of the Dead," 125
Verkhoyansk, 344
January temperature, 247
Verkhoyansk Ridge, 346

Vermont, 44, 45
urban population, 47
Vertical Section Across California Valley, *93
Verona, 238
Vesuvius, Mt, 230, 240
Vladivostok, 278, 281, 345
location and port facilities, 348
role in World War II, 348
Vichy, retreat to, 211
Vicksburg, 22
location and site, 22
siege, 22
Victoria, 395
Victoria basin, 373
Victoria, Canada, 109, 115
Victoria, China, 276
Victoria Embankment, 385
Victoria, Lake, 367, 373
Vienna, 306, 309, 310, 311, 324
center of politics and intrigue, 310
multiple industries, 310
rainfall and temperature, 309
reasons for decline, 310
situation and site, 310
'White Elephant,' 309
world renowned, 310
Vienna Basin, 309
cosmopolitan occupants, 309
crossroads position, 309
grain and truck farming, 310
size, terrain, importance, 309
Vikings, 296
Vineyard in the Andean Piedmont, Mendoza, I, 171
Virgin Islands, 119, 130
going to market, *133
Panama Canal outpost, 133
Virginia, 17, 20, 28
apples, 28
Virginia City, 77, 81
Vistula River, 305, 307, 315, 316, 330, 331, 332
Vltava River, 308
Volcanic Islands and Peninsulas of Asia, 263, 265
bedrock and volcanism, 266
coastal plains, 266
location and extent, 265
nature of the rivers, 266
structure and terrain, 265
Volcanoes, *138
Cotopaxi, Mt, *138, 155
Volga River, 315, 316, 335, 336, 337, 339
raft of lumber, *335
Volga, Voyaging Down the, 337
Von Engeln, O D
In a Chinese Harbor, 276
The Japanese Landscape, 281
Vosburgh, Frederick G
Fabulous Yellowstone, 73
Vosges Mountains, 303

Wadi Draa, 356
Wadi Halfa, 364
Walachian Plain, 203, 204, 215, 306, 312, 314, 315
Walden Ridge, 36, 41
Wales, 290
Walhalla, The, *322
Walker, Harrison Howell
Old Ireland, Mother of New Eire, 295
Sydney Faces the War Front Down Under, 398
Walker, Joseph, 88
Walker Pass, 88
Walkill Valley, 36
Walla Walla, 81
Walla Walla River, 81
Walloons, 329
Waln, Nora
Children in Germany, 323
I Saw Czechoslovakia, 308
Wang, King Ping
Mineral Resources of China, 276
Wanklyn, Harriet
The Role of Peasant Hungary in Europe, 311
Wann, John I
Where Florida Truck Crops Are Grown, 20
War Between the States, 19, 27, 34, 38, 260
Warsaw, 332
capital, 332
industries, 332
rainfall distribution, 331
War's Wake in the Rhineland, 325
Warszawa (*see* Warsaw), 332
Wasatch Mountains, 79, 81
fossil beaches and terraces, 76
Washington, D C., 19, 27, 30, *34, 328
capital of the United States, 33
design of the city, 33
historical associations, 34
location and site, 33
Pan American Union Building, *137
political and cultural center, 34
role in World War II, 34
Washington, George, 27, 33, 43
Washington Lake, 90
Washington, Mt, 44
Waterbury, 48
clock and brass goods, 48
situation and site, 48
Waterfalls, 44
New England-Acadian Upland, *44
Iguassu Falls, *183
Zambezi Gorge, *374
Waterton-Glacier International Peace Park, 70, 111
Waterloo, 329
Water Planning in the Great Central Valley, California, 95
Water power, 337
Dnieprostroy Dam, 337
Poland, 331
Water Resources of Saudi Arabia, 248
Water Routes, 337
Soviet Europe, 337
Water Supplies, 47
New England, 47
North African cities, 360
Waterways, 308
Czechoslovakia, 308
Glaciated Lowland, 53
Hungary, 311
Inland Waterways of Germany, 322
Panama Canal, 120
Rotterdam-Marseilles, 320
Watkins Glen, 37
Watt, James, 291
Wayland, F J
Desert Versus Forest in East Africa, 374
Weather record, 393
Marble Bar, 393
Weather station, *342
Turanian Plain, *342
Weaver, J E, and Clements, F E
Plant Ecology, 426
Weber River, 81
Webster, Daniel, 46
Weddell Sea, 114
Wei Ho, 206
Wellington, 406
Wellington, railway connections, 406
rainfall, 401
settlement, 406
situation and site, 405
transformation of site, 405
Wellington, Mt, 399
Wellington Plains, 401
Welsh Highlands, 288, 294
Welsh Mountains, 288
minerals in, 288
Wenchow, 276
Weser River, 305, 316
West Central Highlands and Associated Lowlands of Eurasia, 287, 303
bedrock and structure, 303
contrasts in land use, 303
contrasts in terrain, 303
countries associated, 306
location and extent, 303
regions included, 303
West Coast of South America, *146
West Indian Archipelago, 119
contrasts in structure and land forms, 121
insular coherence, 121
achievement of independence, 130
historical associations, 130
political turmoil, 130
West Indies, 22, 120
advantages and handicaps, 134
appraisal for the future, 134
avenues to progress, 134
climatic conditions and regions, 123
climatic regions, *121
convergence of chains, 121
distribution of natural vegetation, 123
extent and area, 121
gateways, 121
going to market, *138
hurricanes, 123
mature soils, 123
population density, 121
railroads, 132
rainfall distribution, 123
relation to United States, 134
temperature and rainfall, *12
three groups, 121
trade winds, 123
transportation patterns, 132
West Point, 35
United States Military Academy, 35
West River (*see* Si Kiang), 265
West Saharan Basin, 351, 361
West Saharan depression, 361
West Virginia, 40
Westerlies, 161
Western Australia, 392
Western cordillera of South America (Occidental), 145
Western Ghats, 255
Western Plateau of Australia, 392
altitude and terrain, 392
bedrock and peneplanation, 392
belts of activities, 395
climatic limitations, 393
climatic regions, 393, *121
crops and animal industries, 393
coastal plain, 392
distribution of people, 393
dunes and rock deserts, 393
"Empty Australia," 393
exploration and control, 393
gold rush, 393
historical background, 393
Lake System of Western Australia, The, 393
looking to the future, 395

Western Plateau of Australia, mature soils, 393
migration of rain belt, 393
mining activities, 395
monsoons, 393
natural features, 392
political divisions, 392
population and size, 392
rainfall and temperature, 393, *394
soil regions, *432
streams and lakes, 392
timber resources, 393
transportation facilities, 393
urban centers, 395
vegetation regions, 393, *428
Western Sierra Madre Mountains, 84, 87, 119, 125
Whalers, 417
Whangpoo River, 275
Wheat, 159, 163
Whiskey Rebellion, 38
Whitbeck, R. H.
The Coast Waters and Coast Lands of Peru, 155
White, C. Langdon and Renner, George T.
Geography An Introduction to Human Ecology, 88, 431
White, C. Langdon, and Foscus, Edwin J., 124
White, C. Langdon
Shenandoah—"Daughter of the Stars," 89
"White Elephant" (*see* Vienna), 309
Whitehorse, 103, 115
White Mountains, 41, 107
White Nile, 364
White Nile basin, 351, 361
White Nile River, 378
White Pass, 103, 115
White Pass and Yukon Railway, 112, 115
White Russia, 331
White Sea, 287, 288, 315, 316
Whitney, Eli, and the cotton gin, 35
Whitney, Mt., 87
Whittaker, J. Russell
The Great Lakes-St. Lawrence Lowland· Industrial Heart of Canada, 111
Whittier, John Greenleaf, 46
Whittlesley, Derwent
Kano A Sudanese Metropolis, 364
Occupance in the Lowest Rhineland, 327
Wichita, 63
location and importance, 63
role in World War II, 63
Wichita Mountains, 65
bedrock and structure, 66
Wicker, Cyrus French
Eastward from Gibraltar, 351
Wien (*see* Vienna), 310
Wienerwald Mountains, 310
Wilderness, Battle of the, 19
Wild oranges, 172
Wilkes-Barre, 39, 41
Wiles, Charles, 416
Wilkins, Sir Hubert, 416
Willamette River, 89, 91
Willamette Valley, 84, 89, 90
Williams College, 46
Williams, Maynard Owen
The Turkish Republic Comes of Age, 223
Williams, Roger, 18
Willow Pattern Tea House, *276
Wilmington, 30
Wilmington, historical associations, 33
site and industries, 33
Wilson, J. A.
Canada from the Air, 105
Winchester, Battle of, 38
Windhoek, 383
rainfall, 383
Wind River Mountains, 69
Winds and Fronts over Southeast Asia, 272
Windsor, 57, 105
Windward Channel, 121
Windward Islands, 133
Wine, 163
Winnipeg, 105, 330
location and site, 115
temperature and rainfall, 52
Winnipeg, Lake, 106
Winston-Salem, 30
Wisconsin, 51, 52, 54, 106
Wohl, Paul
Transport in the Development of Soviet Policy, 338
Wolfe, General James, 114
Wood carving, 213
Switzerland, 213
Woods, Lake-of-the-, 106
Woodworking industry, 49
New England, 49
Wool, *170
Bags of Wool at Rio Gallegos, *170
world's production, *398
Worcester, 18
World Affairs, Britain's Declining Role in, 294
World War I, 215
Sarajevo and, 215
World War II, 254, 325
Atlas Region, 358
Australia, 392
Casablanca, 359
Coventry's destruction, 293
dilemma in British shipping, 291
Greenland, 118
impact on China, 276
India, 258
Indo China as related, 264
Japan, 285
Malay States, 270
Narvik, iron ore port, 297
North Africa, 351
petroleum, 254
Stalingrad, 337
World, New, 319
World's Cane Sugar Production, *131
World's Climatic belts and regions, *121
World's Coal Production, *89
World's Coffee Production, *185
World's Copper Production, *82
World's Corn Production, *53
World's Cotton Production, *20
World's Lead Production, *66
World's Petroleum Production, *18
World's Pig Iron Production, *54
World's Potato Production, *337
World's Raw Beet Sugar Production, *337
World's Rice Production, *258
World's Rubber Production, *270
World's Silk Production, *284
World's Soil Regions, *432
World's Tobacco Production, *28
World's Vegetation Regions, *428
World's Wheat Production, *61
World's Wool Production, *398
World's Zinc Production, *68
Wrangell, 103
Wright, John K.
Annals of the Association of American Geographers, 433
Some Measures of Distributions, 433
Wuppertal, 322
Wyoming Basin, 69

Yablonovoi Mountains, 220
Yakima River, 81
Yakima Valley, *79
irrigation, 79, 81
Yakutsk, 347
location and appearance, 347
former prison camp, 347
Yale University, 46, 48
Yalu River, 265
Yangtze basin, 273, 275
Yangtze delta, 276
Yangtze Kiang, 263, 265
basin of, 265
gorge, 265
Yangtze River, 219, 272, 273, 275, 276
Yarra River, 398
Yellow River (*see* Hwang Ho), 265
Yellow Sea, 264, 265, 279, 280
Yellowstone National Park, 70
wonders and accessibility, 73
Yellowstone River, 61
Yemen, 247, 249
area, population, activities, 249
Yenisei River, 315, 343, 345, 346, 347
Yerba Maté Plantation, *180
Yokkaichi, 285
Yokohama, 281, 285
Yonkers, 31
Yorktown, 19
Yosemite Falls, *87
Yosemite Valley, 88
wonders, 87
Young, Ernest
In the Rice Fields of Burma, 269
In the Tea Gardens of Assam, 258
The Rubber Growers, 270
Young soils, 431
examples, 431
Yucatan, 17
crop growing, 124
sisal harvest, *124
Yucatan, Peninsula of, 122
Yugoslavia, 212, 214, 311
agriculture, 215
cities and transportation, 215
climate, 214
climatic regions, *421
cultural features, 215
location, size and terrain, 214
look ahead, 215
minerals, 215
natural vegetation, 214
physical features, 214
polyglot population, 215
Resources of Yugoslavia, 215
vegetation regions, *428
Yugoslavs, 309
Yukon-Canadian Plateau, 75, 100, 105
bedrock and structure, 108
erosion cycles, 108
geological events, 108
glacial action, 108
location and extent, 108
mineral prospects, 108
terrain and drainage, 108
Yukon-Kuskokwim Basin, 100
Yukon Railroad, 103
Yukon River, 70, 75, 100, 108, 112, 115
Yukon Territory, 100
Yuma, 77

Yuma, rainfall and growing season, 77
rainfall, 97
Yunnan Plateau, 265, 275

ZAGREB, 215
Zambezi Falls, 354
Zambezi Gorge, *374
Zambezi River, 351, 354, 371, 373, 382
Zanzibar, 375
Zanzibar coast, 374
Zanzibar Island, 375
Zarafshan River, 343
Zaragoza, 231
Zaria, 364
Zin, Desert of, 1
Zinc, 222
Zinc, Slate Mountains, 304
Southern Interior Highlands of the United States, 66
Zion Canyon, 76
Zuider Zee, 328
Zuñi Indians, 78, 82
Zuñi Mountains, 76
Zurich, 212, 213, 324