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SHORT STUDIES IN
ECONOMIC & COMMERCIAL
GEOGRAPHY

With a foreword by

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FOREWORD

The study of Economic and Commercial Geography, and for that matter, General Geography, has long been neglected in this country and yet the importance of such a study can hardly be over-emphasised. Signs are however not wanting to show that our universities have, at last, come to realise the importance of geography in all its branches: and to-day it is gratifying that the subject is being given its proper place and recognition in the different university courses. It is indeed a happy augury of the times, that the University of Calcutta has recently included this subject for a post-graduate course.

In the commercial and industrial world, a knowledge of Economic and Commercial Geography is daily assuming increasing importance and it is in the fitness of things, that it has been recognised as an important subject for study, specially for students who are preparing themselves for a commercial career.

The present work has been written specially for such students. I am sure it will serve its object and be of use to those for whom it is specially intended. The general public will also find in it things which will deserve attention.

I recommend the book to all who are interested in the subject.

Teachers' Training Department,
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27-7-41.

A. N. BASU.

PREFACE

This little book does not pretend to have covered entirely that vast mass of facts and statistics, necessary and unnecessary, which sometimes forms the material of the books on Economic Geography, at present available to the Indian students. Although elementary, it is hoped that the book will be of much assistance to the Commerce students of the Universities of India, and open the way for them to the study of more comprehensive works on the subject. This treatise divides itself into two parts. In the first part, an attempt has been made to present the principles of Economic Geography on a world basis. The second part is concerned with the geographical description of the important countries of the world and explanation of the local differences upon which depends the existence of international trade and commerce. No pains have been spared to make the book up-to-date, but there are obvious limits to my task, in a world where events are moving fast—perhaps too fast for many of us. The present World War brings us the prospect of a radical change in the social and politico-economic condition of the world.

A book of this type can scarcely lay any claim to originality and wherever possible my debt to various eminent authors has been acknowledged in the foot-notes.

Lastly, I would be failing in my duty, if I do not express my gratitude to Prof. Anath Nath Bose, of the Calcutta University, for his having kindly written the foreword inspite of his numerous preoccupations.

All suggestions, from teachers and students alike, will be thankfully received.

Calcutta,
3-7-41.

M. N. B

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SHORT STUDIES IN ECONOMIC AND COMMERCIAL GEOGRAPHY

CHAPTER I

INTRODUCTION

Nature, Scope, and Method of Geography

Definition.—Geography etymologically means a *writing about the earth.* And indeed it originated from an attempt at systematizing the facts brought to light by early explorers and travellers. Hence the old text-book definition of the subject as *"a description of the world and its inhabitants."* But this definition is no longer entertained by modern writers, because it seems to relegate Geography to the status of a purely descriptive art. It is now-a-days contended that Geography is a science; it seeks to understand and interpret the causal relation obtaining between man and the world, or, as it is commonly put, between man and his physical environment. Hence the modern definition of the subject as *"the study of the world as the home of man—of the physical environment of the human species."*[1] The old definition, it may be noted, was not substantially incorrect; for Geography is still a study of the world and its inhabitants; but—and that is the all important point—man and the world are no longer to be treated separately, but only in their mutual relation.

Etymology.

Old View.

Modern View.

[1] Stamp, *Modern Geographical Ideas,* p. 3.

Causal Geography'.

Method.—As has just been indicated, modern geography, in effect, is 'causal geography'; it looks for causes and tries to trace their influence 'in the world of to-day.' Thus it works, in common with all other sciences, from cause to effect.[1] The facts unearthed by early explorers and systematized by geographers of their day were, no doubt, capable of study with a view to determine their underlying causes; and those who actually did study them that way took the reverse order of working from the effect to the cause. With the dawn of modern geography, however, it came to be realized that a handful of cause are at the root of a multitude of otherwise unrelated facts. So the modern geographer has taken to the course of working from cause to effect. Thus there has come about a complete reversal of method in the study of Geography.

Old method of working from effect to cause.

New method of working from cause to effect.

Environment and Man.

Scope.—Geography then is concerned with two fields of inquiry—environment and man. It must, therefore, deal with the origin and evolution of this environment as well as with human life and activity. Hence the geographer is led into the fields of various other sciences—Astronomy, Meteorology, Geology, Physiography, Botany, Ecology, Sociology, Economics etc. But the results culled from these and similar other sources do not constitute Geography; neither does the study of man as he is or of his social, political and economic institutions comprise Geography. Its chief interest lies in tracing the mutual relationship of man and his physical environment. That is its distinctive field, and a study of it is its special function. The geographer draws upon the results furnished by others, but he takes just so much as is required for his special purpose, *viz.*, to study the 'human environment' as such. No other science is concerned

Geography and other sciences.

Distinctive scope and function of Geography.

[1] Stamp, *A Commercial Geography*, p. 1. See also Case and Bergsmark, *College Geography*, p. VII.

with that environment as it is. "To geography belongs the task of making clear the relationship existing between environments and the distribution and activities of man."[1]

Classification.—Closely allied with the problem of scope is that of classification. Geography is commonly classified as follows:—

(1) *Mathematical Geography,* which is a study of the earth as a planet, *i.e.*, of its position in space, its shape and size, its rotation and revolution and the effects thereof, its division by the lines of latitude and longitude and various questions connected therewith.

(2) *Physical Geography,* a study of the earth's surface, such as the distribution of land and water; of atmosphere and its movements; of climate and weather and their effects; of the distribution of minerals, plants and animals.

(3) *Political Geography,* a study of the countries and states into which the land surface of the earth happens to be divided from time to time; of the inhabitants of these units; of their occupation, manners, customs, law and government.

(4) *Commercial Geography,* a study of the exchange of productions; of the places where these are produced; of the methods of their production and the means of their transportation.

It must, however, be noted here that the scheme of classification outlined here is neither complete nor quite flawless. There is every doubt, for example, about the logical validity of classifying Geography as mathematical, physical etc., simply in accordance with the subject-matter of each. It

[1] Case & Bergsmark, *College Geography*, p. IX. See also Stamp, *Modern Geographical Ideas*, p. 3, and J. F. Chamberlain, *Geography*, p. 17.

obviously smacks of old discarded ideas; what precisely is 'mathematical geography', it may be asked, if not a part—and a very insignificant part for the matter of that—of Astronomy? What, again, is 'physical geography' but a rather incoherent summary of certain results culled from Physiography, Meteorology, Geology, Botany, History, Politics, Anthropology etc.? And 'commercial geography' in the scheme outlined above is scarcely anything more than a puerile description of certain economic facts. Indeed such a classification clearly proves that "the old geography is not, unfortunately, dead yet.[1] It hardly makes any reference to the principle of human adjustment, which, it must always be borne in mind, is the cardinal principle of modern geography.[2]

Is this a valid classification?

Geography as essentially a point of view.

The fact is that Geography is not so much a science as a scientific point of view[3] just as history, in effect, is. And as such it has no definite subject-matter at all. In order to acquire a content, it has to associate itself with some adjective or other; for only in that way can there be any meaning in the terms 'political geography', 'commercial geography' etc.

Meaning of Commercial Geography.

In other words, the sphere of Geography is as wide as the sphere of human activity itself. This is one of the reasons indeed why "the claim has frequently been made that geogra-

[1] Stamp, *A Commercial Geography*, p. 1, *Modern Geographical Ideas*, p. 2.

[2] "The three great factors, ... topography, structure and climate, may be regarded as of equal importance. Consideration of the first two, and sometimes a part of the third, formed what was formerly the domain of the subject of "physical geography". We no longer consider it desirable to keep these watertight compartments in geography, and we recognise that the study of the old physical geography is an integral part of all geography."—Stamp, *Modern Geographical Ideas*, p. 9.

[3] Stamp, *Modern Geographical Ideas*, p. 44.

phy is the mother of sciences."[1] Commercial Geography can, thus, be defined as a study of the world in relation to man's economic and allied activities.

Summary

Geography is a study of the *world as the home of man.* Its method consists in working from *cause to effect.* Its scope includes (1) the physical environment and (2) man; but its function is to study the mutual relationship of the two. It takes into account the results of various other sciences, but only with a view to explain the mutual relationship of man and his environment. It is commonly classified as (1) mathematical, (2) physical, (3) political and (4) commercial; but this is a doubtful classification, because it does not give adequate consideration to the mutual relationship of man and his environment. The problems treated in the so-called branches of Geography should be regarded as constituting the integral parts of all Geography. Geography in effect is a point of view and its sphere is as wide as that of human activity itself. Commercial Geography would then mean a study of the world from the viewpoint of man's economic and allied activities.

STUDIES AND QUESTIONS

1. "Geography is the study of the world as the home of man." —Explain.

2. The claim has often been made that Geography is a science, neither more nor less. Is it a valid claim? Give reasons for your answer.

3. Discuss the scope and function of Geography as a science.

4. "The claim has frequently been made that Geography is the mother of sciences." What do you think of this claim and why? Explain in this connexion as clearly as you can the relation of Geography to Astronomy, Meteorology, Geology and Economics.

5. Define Commercial Geography. Do you think that a classification of Geography as mathematical, physical, political and commercial is quite logical? Give reasons for your answer.

[1] Case & Bergsmark, *College Geography*, p. VII.

CHAPTER II

The Environmental Factors

Man & Environment.—The earth is the great reservoir whence man derives the raw materials with which he builds his own world. While, therefore, Mother Earth supplies him with raw materials, he furnishes the design, and thus is reared up every cultural fabric on the face of the earth. The relationship is as close as it can be wished to be. The force which the geographical factors exert on man has, however, been often referred to as *'Geographical Control'*. In a sense this is not a wrong conception; for certainly the world or the physical environment sets broad limits to human activity and enterprise, and often does it drive him to specified lines of action. Yet, as it has been pointed out by others, man is, to all intents and purposes, a free agent so far as the design is concerned, and, what is more, he is rightly credited with some amount of creative genius. Hence many prefer to call it *'Geographical Influence'*: we are, doubtless, greatly influenced by environmental factors, but not really controlled by them. Human life is not wholly determined by geographical forces; rather man always tries to mitigate the disadvantages imposed by them and often proves quite successful in the attempt.

Geographical Control *vs.* Geographical Influence.

If then Geography is to be a study of the world as the home of man, our first task here would be to analyse the environment which constitutes the world. It must also be noted before we proceed with the analysis that environment, though capable of analysis, really affects us as a whole. The task of the geographer is, therefore, twofold: he must analyse the different factors of the environment so as to trace the in-

Environment acts as a whole.

Geographer's twofold task.

fluence exerted by each severally, and then take into account the influence exercised by the whole collectively. What then are the factors constituting the physical environment?

1. Location or Position.—Of these location or position is one, and by many is it regarded as the prime factor.[1] What exactly is meant by location? A country or a town or even a home is situated in a particular spot which is unalterable; that is its exact position or location. In that sense location is an absolute fact,—it is fixed. But it also stands in a certain relationship to its neighbourhood; it may be so many yards north of a certain hillock, so many cubits south of a certain tank, and so on. Our daily life is greatly influenced by these facts. If the distance of the main road from our home be considerable, we prepare for going to school or college rather early; if our home be near about the main road we are not in such a hurry; a man who is obliged to catch a local train for attending office, does not habitually return home for tiffin. Widen your outlook, and note the relative position of your town or village on the map of your district. It is possible likewise to ascertain the position of a country or a state. Thus India holds a central position in the East, the British Isles are centrally situated in the Land Hemisphere of the globe, New Zealand is on the margin of the habitable world, and so on. These situations have profound influence on the national economy of all these countries. Great Britain's pre-eminence is largely traced to the ideal position she holds; she can easily exercise control over oceanic commerce passing through the Atlantic and the North Sea; hence her plantations in America thrived quite well, whereas those of France and Spain steadily declined: it was British sea-power that made possible the United States of America. In the past India

Location as absolute fact.

Location as relative fact.

Influence of location on national economy.

Britain.

India.

[1] See, for example, E. C. Semple, *Geographical Location as a Factor in History*, p. 65.

similarly was in more or less effective control of trade and commerce passing through the Indian Ocean, the Arabian Sea and the Bay of Bengal. The fabulous wealth of Ind was not a little due to that factor. On the other hand, New Zealand is distinctly handicapped in her national economy owing largely to her peripheral situation. Much of her trade is with Great Britain, but since she is far off from the Mother Country she must specialize in commodities that can stand the long voyage and yet pay the enormous cost of transport.[1]

New Zealand.

Location also determines the climatic condition of a country. A country may be situated near the equator or any of the poles, and its climatic conditions will vary accordingly. And with this will there be seen a corresponding variation in the flora and fauna of the country. This in turn cannot but have profound effect on the agriculture and industry of the region. Thus location has an indirect and yet unmistakable effect on the trade and commerce of a place. The United States of America, despite her enormous territory, must always be dependent on foreign supplies for the equatorial and tropical products like rubber, cane-sugar, cocoa, tea and the like; Canada must maintain the closest possible trade relations with the British West Indies for a similar consideration; Russia cannot let her hold on Turkestan go without serious consequences to her own cotton industry.[2]

Influence of location on climate, flora and fauna.

Influence of location on trade and commerce.

Now-a-days, however, the ill effects of a marginal position can be largely mitigated by means of railways, auto tracks, steam ships, aeroplanes, the telephone, the radio etc.[3] But they cannot be totally obliterated. Position or location is an environmental factor, which can be modified but

Man's influence on location.

[1] Stamp, *A Commercial Geography*, p. 5.
[2] Stamp, *Modern Geographical Ideas*, pp. 33—34.
[3] Case & Bergsmark, *College Geography*, p. 45.

not altered materially.[1] In the past it took about six months to come to India from Great Britain, and nearly a year to reach Australia from the British Isles; to-day barely a week is required for a flight to India from England, but it takes no less than two weeks to reach Australia. Although distance has greatly been minimized to-day by the development of modern means of travel, its relativity still remains. India will always be nearer to England than Australia.

2. **Physical Features.**—The second of these factors, according to Stamp[2], is the surface relief or physical features of a country. The influence of this factor both on the life of the individual and that of a country is quite obvious. Perhaps no other factor, except climate, has played so large a part in the distribution of population all the world over. Even in the most densely populated country—China—the mountainous regions are so thinly peopled as to appear desolate and forlorn, while the flat plains below teem with people. Many families there prefer to live in boats rather than find out a home on the bare and rugged mountains. The plains occupy less than two-fifths of the earth's surface, but they are the home of more than four-fifths of the world's population.[3] Topography or the physical features of a country thus play a permanent and leading part in human life and activity. It is difficult to build towns and villages on the mountains; so in a mountainous country like Nepal, for example, these are restricted to the valleys affording comparatively flat land. Nepal is a fairly large country with a total area of about 55,000 square miles,

Physical features and distribution of people.

China.

Nepal.

[1] Stamp, *A Commercial Geography*, p. 6.

[2] See, for example, *A Commercial Geography*. It is, however, doubtful whether a gradation as suggested by Stamp of the environmental factors is possible.

[3] Case & Bergsmark, *College Geography*, p. 101-2. Plains here mean lands below the 1,500-foot contour.

and yet her life centres round the celebrated valley of Nepal, which is only about 15 miles long and 7 miles wide.[1] As mountains generally repel settlement, so on the other hand plains invite occupancy, and unless the latter are thickly forested or deficient in rainfall, they become densely populated.[2] Of the enormous population of India nearly one-third are found in the deltas of the Ganges and the Indus. Holland, Belgium, the plains of France, Germany and the British Isles, the Nile Valley etc., are the great centres of population in the world, because of the levelness of the land and the greater facilities for carrying on agricultural and industrial work.

India and other countries.

Man's influence on the topography or physical features of the earth's surface is, however, comparatively small. It is true that he can mitigate the ill effects, for example, of a mountain barrier by cutting a tunnel across it, or reclaim submerged lands from shallow seas or establish contact between oceans separated by narrow isthmuses, yet he can by no means materially alter the topography of a country by blowing up mountains so as to reduce it to a level plain, or erecting a mountain barrier where there is none. Switzerland will always be a mountainous country and Holland a level plain, and man must always modify his life according to the topography of the place he lives in.

Man's influence on topography.

3. Geological Structure.—The surface features of a country are really the reflection of its underlying geological structure,—its outward and visible result.[3] The geological structure of a country has great bearing on its trade and commerce. The areas of old hard rocks are comparatively

Geological structure and mineral wealth and agricultural possibilities.

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[1] Stamp, *Asia*, pp. 354-5.

[2] J. F. Chamberlain, Geography, p. 117.

[3] Stamp, *A Commercial Geography*, pp. 6-7.

barren from the point of view of agriculture, but are generally associated with metalliferous minerals. The areas of young soft rocks, on the other hand, are commonly suitable for agriculture, and are generally associated with non-metallic minerals like coal and oil. To the former class belong the major plateau regions of the world—the Brazilian plateau, the Guiana Highlands, the greater part of Africa, Arabia, Peninsular India, Indo-China, the great plateau of Australia, Central Siberia, Scandinavia, the Highlands of Scotland and North-Western Ireland. The great Laurentian Shield of Canada and the vast Russian platform belong to another subdivision of this group of ancient rocks. To the second group belong the Central Plains of North America, the plains of the Orinoco, Amazon and Paraguay in South America, the North European Plain, the lowlands of Western Siberia, the valleys of the Tigris, the Euphrates, the Indus, the Ganges, the Brahmaputra, the Hwang Ho, the Yangtze Kiang, the Si Kiang, and the central plains of Australia. The great fold mountains—the Alps, the Himalayas, the Rockies and the Andes—belong to this second group.

Ancient rocks seats of metallic minerals, and barrenness.

Young rocks seats of non-metallic minerals and fertility.

Areas of ancient rocks.

Areas of young rocks.

The influence of man on his geological environment is even smaller than that on the surface features. He can, of course, modify the natural barrenness of the soil by the use of suitable manure, plant stout trees for the prevention of soil erosion and do other things of a like nature; but even in these things he can at best be only partially successful. But can he ever put a gold field where there is none?

Man's influence on geology.

4. Climate and Weather.—Climate is the great uncertain factor of our physical environment,[1] and its influence is manifest everywhere and patent to everybody. Almost at every step our activity is governed by the weather of the moment. Climate and weather are basically the same, the

Climate and weather distinguished.

[1] Case & Bergsmark, *College Geography*, pp. 4—7.

one being the average state of the atmospheric conditions, the other a fluctuation from that average state for a short period of time. It is needless to dwell on the influence of climate and weather on our everyday life, on our dress, games, holidays and the like. But perhaps we are a stay-at-home people and do not know how climatic conditions determine the very form of man's dwelling-places in different lands. In the northern latitudes they build steep-roofed houses so that the snow may easily slide away; in arid lands, again, people erect flat-roofed houses, and sometimes these roofs are seen to have a slope towards the centre and a tank below for the collection of rain-water as in the Punjab and the adjacent areas. In Bengal and Assam where there is abundant precipitation during the rains and no scarcity of river water throughout the year generally, we do not collect rain-water except for sport; our houses are so contrived as to shoot it off our roofs to the vicinity of our neighbours' homes.

Instances of climatic influence on man's every-day life.

But the effect of climate is even more marked on the natural vegetation of different lands. Even in a single country like India or in a single province like Bengal it is well illustrated. No passerby can ever ignore the light green of a paddy field in the rural areas of Bengal; but how often does one come across fields of wheat here? The moist climate of the province is not at all suitable for the latter crop. Again, a tea garden is quite conspicuous by its absence throughout the greater part of Bengal to a visitor from the distant Nilgiris or even to one from the neighbouring province of Assam, and a man from the Duars may well doubt whether it is his own province Bengal.

Climate and Vegetation.

Climate also has profound influence on the soil; in fact it is much more important for the formation of soil than even the underlying geological structure. Thus in the Tropics,

Climate and Soil.

for example, a cellular-shaped red-brown type of soil is produced owing to the alternation of dry and wet seasons, independently of the character of the underlying rocks. And it has also been discovered that in regions where precipitation takes place in the hot season soil formation is rapid, but where the rains coincide with the cold season, as in the Mediterranean regions, the formation of soil goes on very slowly.[1]

Man's influence on climate.

The reciprocal influence of man on his climatic environment may superficially appear to be more marked than his influence on either topography or geology. Our clothes and garments, our houses, our summer holidays, all are but different adaptations to our climatic environment. Not only that: man has also invented 'sun-trap' houses, air-cooled houses, refrigerators, glass-houses for flowers and vegetables; he has elaborated the system of drainage to combat too much moisture in the soil, and that of irrigation to overcome the deficiencies of moisture. But we do not know yet how to prevent rain when necessary or how to force rain out of the sailing cloudlets to drench the perched lips of cracked agricultural lands. In fact, man has as yet no control over climate and weather.

Dependence of vegetation on other factors.

5. Vegetation and Soil.—Of the factors hitherto enumerated location, in fact, is an independent factor, and physical features are the products largely of the underlying geological structure. Climate and weather, though dependent on location and physical features, are essentially extra-terrestrial in origin. But vegetation is "an index of the interaction of the foregoing factors."[2] It reflects the particular location of the area in which it grows, the physical conditions of that area, as well as the climate of the place. Of course

Dependence of soil on other factors.

[1] Stamp, *Modern Geographical Ideas*, p. 9.

[2] Stamp, *A Commercial Geography*, p. 8.

Natural vegetation belts.

vegetation springs directly from the soil and thus must reflect the character of the soil. But soil itself is a product of the following three factors—(1) the geological structure of the underlying rocks, (2) the climatic conditions of the place, and (3) the type of vegetation which has been growing there. It has been found that each of the major climatic regions of the world has its own characteristic type of natural vegetation.

Introduction of crops does not interfere much with the natural vegetation belts of the earth.

But it is also a fact that man has largely rooted out the natural vegetation of several regions. Yet it is possible to divide the surface of the earth into at least twelve belts of natural vegetation, because the character of the artificial vegetation which man has substituted in these areas is also largely governed by the factors of soil and climate. Thus where natural vegetation has been rooted out, we come across a characteristic crop suited to that region. It is possible, no doubt, to extend the range of crops; but this obviously has its limits,—we cannot yet grow rubber, cocoa, banana in the temperate or polar regions; nor is it yet possible to grow grapes and apples in the Tropical Rain Forests.

Man's influence on vegetation and soil.

It must not, therefore, be supposed that vegetation no longer plays a part in influencing man's activities. The reverse is rather the case; for despite all the efforts of science man has still not been able to emerge from the thraldom of Nature. Not only that much of the natural vegetation still covers the surface of the earth, but also because of the limits imposed on him in the raising of crops that he is a slave of Nature. Moreover, the 'artificial' vegetation he has introduced in various countries governs to a large extent his economic and commercial activities. Often, again, he directly invites on his head the curse of Nature by thoroughly upsetting the balance of the plant world, and this imposes fresh fetters on him. This is very well exemplified by the disastrous results brought about by the notorious water-hyacinth in Bengal which was introduced first by some un-

known European for adding grace to the artificial lake attached to his stately mansion.

6. Animal Life.—And just as the combined influence of location, physical features, geological structure, soil and climate is reflected in the natural vegetation of a country, so is animal life largely governed by the vegetation of the place. The monkey, for instance, is an arboreal creature living for the most part in the Tropical Rain Forests; the antelope is chiefly associated with the wide and open grassy plains, the white bear is adapted to a life in the Arctic wastes, and so on. But this is true not only of wild animals, but of those domesticated by man as well. Since the wide grassy plains are especially capable of supporting wild grass-eating animals, man is also able in those regions to raise and tend great herds of cattle; it also explains the enormous concentration of sheep in the Temperate Grasslands of Australia and New Zealand. And if vegetation plays so large a part in the life of animals, does it not affect human life in much the same way since man himself is also an animal like the rest? Surely it does. But man is the only animal capable of thought and foresight, and that is why he can modify his environment in a way totally different from what even the cleverest chimpanzee is ever capable of doing. Yet he cannot ignore the characteristics of the animal life of his region; he cannot rear up cattle in the desert or the polar regions; the cattle farmer must find out suitable pasture; the apiarist (one who keeps bees) would do well to have buckwheat and white clover for his bees if he is to get an abundant supply of honey and wax; the oyster farmer must cover his fishing grounds well for the protection of his oysters from starfish, black drum, stingray etc. And though man is far from conquering the animal world yet, his influence on animal life appears to be much greater than on any other factor of the physical environment.

Vegetation and Animal life.

Man's influence on animal life.

Summary

The influence exerted on man by his physical environment is sometimes called *'Geographical Control'*. But it ought to be substituted by the conception of *'Geographical Influence'*, because man's life and activities are only influenced by his environment, not thoroughly determined or controlled by it.

The main factors of the environment are (1) Location or Position, (2) Physical Features, (3) Geological Structure, (4) Climate and Weather, (5) Vegetation and Soil, and (6) Animal Life. Location is both absolute and relative; it is comparatively an independent factor of the environment; its influence on national economy is profound; it also influences climate directly, and the flora and fauna indirectly, and thus exercises a great influence on trade and commerce. Man can greatly modify the influence of location by means of rapid transport, but cannot wholly counteract it. Physical features are greatly responsible for the distribution of population and many other things; man can modify their influence only to a limited extent. Geological structure is mainly responsible for the character of the soil and the distribution of minerals; man's influence on it is quite insignificant. Climate and weather has the most marked influence on human activity, soil and vegetation; man's influence on this is not very great. Vegetation and Soil are greatly dependent on the other factors; the earth may be divided into natural vegetation belts despite human activity; man is still a slave to these factors. Animal life is closely dependent on vegetation, and man's influence on this factor is the most marked.

STUDIES AND QUESTIONS

1. Give a brief description of the chief factors of the physical environment, and indicate the influence of each on man and of man on each of these factors.

2. What do you mean by 'Geographical Control' and 'Geographical Influence' respectively? Which appears to you to be the more appropriate conception, and why?

3. What may be the general commercial value of the areas of ancient rocks and those of young rocks respectively?

in a particular category means that they have more resemblances than differences in common. In naming these regions geographers, however, try generally to keep close to the dominant character of the climate in each. But since the influence of climate on vegetation is most intimate, a specified region is sometimes named after its prevailing vegetation. Thus, for instance, we have such names as Temperate Grassland or Prairie and Coniferous Forest Belt for regions having a Temperate Continental Climate and a Cold Temperate Climate respectively. Sometimes, again, natural regions are named after a place held to have quite typical climatic conditions. Thus there are regions with a China type of Climate or the Sudan type. But we must always remember that the climate—not place—is the chief factor here; vegetation though important is largely dependent on it. So it is desirable to use climatic names. And if still natural regions must have 'regional' names, it is better to christen them after the climatic zones of the earth than after place-names having little, if any, real geographical value.

Perplexities in naming natural regions.

1. REGIONS OF LOW LATITUDES

1. **The Equatorial Regions.**—The Equatorial Regions, as the name implies, stretch almost as a continuous belt on both sides of the Equator between *5° N. and 5° S.*, and occupy an area of about *600 miles* in width encircling nearly the entire land surface of the earth.[1] The range, how-

Extent

[1] To be logically consistent one ought to say perhaps that, the equatorial regions also cover the intervening waters, and in a sense Moreover, it must also be borne in mind that climatic conditions on on equatorial lands and waters are much the same. But we are here concerned not so much with oceans and seas as with lands. Moreover, it must also be borne in mind that climatic conditions on oceans and seas differ considerably in point of detail from those prevailing even in adjacent lands. To include the intervening marine areas is to give rise to unnecessary complications here.

ever, is often wider; but the extreme limits rarely exceed 10° *N.* and 10°*S.* We can easily distinguish three main regions within this belt:

Divisions.

(1) *The Amazon Basin of South America;*

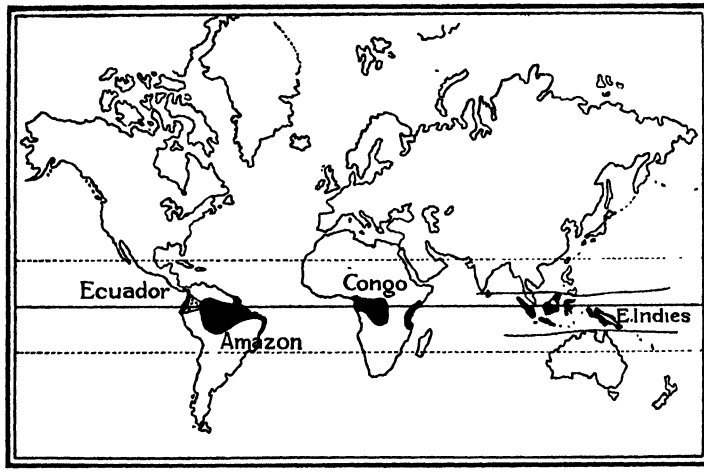
(2) *The Congo Basin of Central Africa; and*

(3) *The islands of South-Eastern Asia together with the adjacent areas of the mainland.*

Parts of Ecuador to the west of the Amazon Basin and the narrow coastal plain adjacent to Mombasa, Zanzibar and Dar-es-Salaam in East Africa also belong to this group.

Basis of classification —climate and vegetation.

But what is the basis of this classification? That, of course, is climate—and natural vegetation. The climate



THE EQUATORIAL REGIONS.

Often also called Tropical Rain Forest Regions. The transitional nature of some of the adjacent areas should be borne in mind. Some writers would include the Guniea Coast of West Africa as well as the West Coast of India in the Equatorial Regions because the forests are much similar.

prevailing throughout this wide area is characteristically known as the *Equatorial Climate*. It is typical, however, in the basin of the Amazon; hence the name '*Amazon type of Climate*'. It is also described as the climate of the hot wet selvas, because the Amazon forests are locally known as the selvas, a name given to it by the early Spanish settlers in South America. The temperature of this region is high all through the year; the average range, especially in the typical areas, is extremely constant, fluctuating only between 78°F. and 80°F.; and the seasonal range is usually only 5°F., and often less. The coldest month can, thus, scarcely be distinguished from the hottest. The diurnal range is also small, —usually less than 20°F., often even less than 10°F. But we should not suppose that these are really the hottest parts of the world; for although the temperature is uniformly high all the year, it seldom rises above 100°F., and mostly does not rise above 90°F.; and on the other hand it does not, as a rule, fall below 70°F.[1] These are the regions of 'rain-at-all-seasons'; hence there is no typically 'dry season' except in a relative sense. Since the Equatorial lands lie, in the main, in the Belt of Calms or Doldrums, the rains are mostly convectional. As the sun shines almost vertically overhead

Equatorial climate or Amazon type.

Characteristics.

(*a*) Temperature.

(*b*) Rainfall

[1] Stamp, *A Commercial Geography*, p. 13. "The Equatorial regions are popularly, but erroneously, regarded as the hottest in the world. The average temperature, it is true, is uniformly high, and the constantly damp, steamy atmosphere may be enervating, but the Equatorial climate is far from being the most trying in the world. The absence of really high temperatures—the thermometer rarely rises above 100°F.—and the pleasantly cool rains which accompany the sea breezes impart a welcome movement to the air. The climate is particularly the case in maritime situations . . . . where the land and breezes import a welcome movement to the air. The climate is found at its worst in the interior of the great Equatorial forests where the air is absolutely still. The effect of elevation is to lower the average temperature and, sometimes, to result in a slightly greater range."—Stamp, *Asia*, p. 25.

it brings about, in the early part of the day, rapid evaporation and an upward current of air; thus clouds form easily, and frequently there is a heavy downpour in the evening, accompanied by thunder; by the late evening the sky is clear again.

(*c*) Seasons. But although rain falls all the year round in these regions, there are periods of maximum precipitation: areas bordering on the Equator usually have two seasons wetter than the rest; those lying on the fringes of the Equatorial Belt usually have one such period. This is mainly due to the annual shift of the earth's thermal equator; the wettest season or seasons occur, as a rule, shortly after the sun crosses the Equator. The average rainfall for the year ranges from 70 to 80 inches, often it is higher. But regions cut off from maritime influences usually have less rain. Although the Trade Winds and the Monsoon originate in areas north and south of the Equator, the whole of the Equatorial Belt is not cut off from their influence. The fringes of the Belt as well as maritime stations within it enjoy cool breezes, but the interior forest areas are deprived of their beneficial effects. "Typical of the equatorial lands is the Belt of Calms or Doldrums where there is no marked wind or wind direction."[1]

(*d*) Winds.

(*e*) Vegetation. Vegetation is typical. Uniform heat and abundant moisture induce a luxuriant growth of plants; vegetation is much more profuse in the Equatorial Regions than in any other part of the world. "All lowland regions, watered by daily showers during most of the year, are covered with a dense, broadleaf, evergreen forest which becomes an impenetrable forest jungle along the streams. Crowded in among the trees and sometimes almost concealing them in a riotous profusion of smaller vegetation, including shrubs, flowers, vines and creepers. Parasitical growth . . . . is especially common, and ferns hang like feathered ribbons from many

[1] Stamp, *A Commercial Geography*, p. 13.

of the branches. Lianas creep along the ground or climb to the tops of the highest trees, passing from one to another and forming an interlacing network. So intricate is the web of growth that the explorer has difficulty in distinguishing the various parts of a plant, often confusing leaves, flowers, and fruits of different species. Where the lowlands are rain-soaked throughout the year, the earth is often so smothered by growing vegetation that the sunlight scarcely reaches the forest floor."[1] There is, thus, a 'fierce competition' for light and air, resulting in the growth of giant trees, with tall unbranched boles and enormous crowns of leaves at the tops. This is particularly well marked in the Equatorial Forest regions of South America—the celebrated Amazon Basin; those of Asia and Africa are comparatively open. Most of these trees, no doubt, have periods for shedding their leaves; but these are of short duration, and the shedding periods of different species come at different seasons of the year; so no forest is ever appreciably bare of leaves, and hence the name 'Hot Wet Evergreen Forests.' The trees are—nearly all of them—of the hard-wooded species. And two major difficulties prevent their thorough exploitation,—(*a*) the great variety of the trees, and (*b*) the character of the timber. A casual reconnaissance undertaken by a forest service of the U. S. A. some years back in the more accessive forest zones of South America and the Philippines revealed the existence of "some 2,500 to 3,000 tree species, and as many as 900 species on one tract of 18 square miles."[2] And so hard is the timber of these forests that Manaos, in the heart of South America where the greatest existing forest of the world stands, is obliged to import its building timber from New England in the temperate regions of North America.

Human adjustment.

Difficulties in exploiting forest products.

[1] Case and Bergsmark, *College Geography*, p. 146.

[2] G. P. Ahern, *Tropical Hardwoods*, Bulletin of the Pan American Union, March 1927, pp. 223 ff.

It is extremely difficult and expensive to extract a particular type of wood from these forests owing to the great variety of tree species, and it is almost equally costly to work them because of their hardness. Yet when worked they furnish magnificent 'cabinet' wood. These forests are also difficult to penetrate and the climate is extremely debilitating, especially in the interior of the denser forests. Animal life, particularly in the denser parts, is almost wholly restricted to the tree-tops; monkeys are typical; tree-frogs and tree-lizards as well as birds are numerous, and, of course, a wealth of insect-life characterizes these regions.[1] Since not a blade of grass is to be seen in the denser parts of the Rain Forests, the ground being thoroughly covered with a mass of decaying vegetation, grazing animals are rare. The wild hog and the tapir, who can easily subsist on nuts and fruits, are sometimes seen; and the carnivorous group is represented mainly by the jaguar and the puma who prey upon the wild hog and the monkey. Birds are generally abundant and they vary from almost the tiniest to the largest sizes, often with gorgeous plumage.

Animal life.

Considerable difference of opinion is found among geographers and the students of Sociology as to the degree of civilization evolved by the races living in the Equatorial Regions. The popular idea is that the natives of these 'regions of debilitation' are very backward and stunted both physically and mentally. Thus according to Stamp, the American-Indian tribes of the Amazon and the pigmies of the Congo Basin are typical of these areas, especially of the

Man.

American Indians and Pigmies.

[1] Stamp, *The World*, p. 124. But many travellers speak of the desolateness and the oppressive silence of the denser equatorial forests —"a silence unbroken for long periods except for an occasional splash in the streams or the humming of insects." It seems probable, therefore, that in parts of these regions at least neither animal nor bird life is abundant.

denser equatorial forests which, be it noted, are very sparsely inhabited. They are said to be hunters, living on the fruits, nuts and game of the forest. The pigmies, it is also interesting to learn, "emulate the other denizens of the forest by building their primitive homes high up in the trees, away from the damp and unhealthly ground." This uncandid view is only partially true. Although there are still found races in these regions who subsist on fruits and nuts and games, the majority of the peoples living even in the Amazon and the Congo Basins are primarily farmers;—"they may fish at times, and gather fruit and nuts, primarily to supplement the agricultural products."[2] Even Stamp himself admits that, "the more open Equatorial forests, where clearing is easier and Nature is bountiful in gifts, are the home of many sturdy if somewhat lazy races. Of these the Malays, the Javanese, and the Dyaks of Borneo are good instances."

Hunting, gathering and cultivation.

Malays, Javanese and Dyaks.

Despite all their luxuriant vegetation there are formidable difficulties in exploiting the Equatorial Regions. Reference has already been made to the extreme hardness of the forest timber.[3] If, however, these forests are once cleared the trees do not easily recover, and the ground rapidly becomes covered with thorny growths and rank vegetation. Thus, as pointed out by Stamp, thousands of square miles of

Difficulties of exploitation.

[1] See Stamp, *Modern Geographical Ideas* and *A Commercial Geography*.

[2] See Case and Bergsmark, *College Geography*, p. 153-156. The remark of W. Vandercook that "the African jungle dweller of 1926 is the result of just as many eons of steady change and development as the contemporary citizens of Manhattan" is well worth quoting here. We should never forget that "to-day in the West African interior one finds a society almost as complicated, in its elusive way, as ours."

[3] But we should not suppose, however, that soft wood is entirely absent in these regions. Balsa, the lightest wood yet known to man, is found in these areas.

valuable forest were set alight for clearing by the natives of Africa and Asia, and they are now full of bamboo and thorny thickets that are a serious menace to crops. Another handicap lies in the fact that if once these forests are cleared, especially on hillsides, the heavy showers almost completely wash away the soil, leaving the bare unfertile rock: indeed soil erosion is a serious danger in the Equatorial Regions generally. It has often been said that 'the equatorial climate is a good servant but a bad master.' Those who depend on it for livelihood, as do some of the races in the Amazon and the Congo, cannot but be backward; but those who, like the European and American planters, try to obtain mastery over Nature there are frequently rewarded with valuable returns.

Typical Products.

There being no definite seasons, seed-time depends upon the will and convenience of the cultivator himself. Thus one may, for instance, reap several harvests of rice in one year. The chief products of these regions are rubber, palm oil, cocoa and sugar. Plantations of rubber are entirely confined to countries enjoying an equatorial type of climate, and indeed the belt along which rubber cultivation can be profitably carried on is, with good reasons, said to be the limit of the Equatorial Belt as well. Rubber was originally a native of the Amazon, whence it was introduced into India and Malaya in the latter part of the last century (about

Rubber.

1876). The bulk of the world's supply of this commodity now comes from the plantations of Southern India, Ceylon, Malaya and the Dutch East Indies. The crude rubber of Brazil and the Belgian Congo is not as important as it formerly used to be. Rubber is now chiefly obtained from

Cocoa.

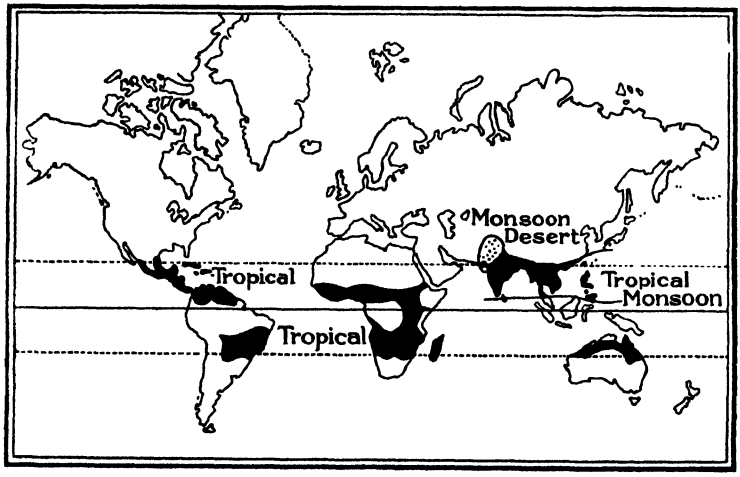
the Para rubber tree. Cocoa is another, if a little less typical, product of the Equatorial Regions. The bulk of the world's supply of this commodity used to come formerly from Central and South America; now about half the world's production is obtained from the Gold Coast region of Africa.

2. The Tropical Regions.—The Tropical Regions, as the name implies, lie within the Tropics of Cancer and Capricorn on both sides of the Equatorial Belt. The Sudan of Africa is commonly said to be typical of them; hence the name '*Sudan type of Climate*'. And since the typical vegetation is grass interpersed with scattered trees, it is often called '*Tropical Grassland Climate*'. It is very interesting to note that the vast stretches of tropical grassland lie between the Equatorial Forests on the one hand and the Hot Deserts on the other. The word 'tropical' usually conveys the idea of almost unbearable heat, and in fact it is not a much mistaken idea. The temperature of these regions during

Extent.

Sudan type.

Temperature.



The Tropical and Tropical Monsoon Regions. Compare the map with that of p. 20, and note the 'transitional' areas. The areas like the Guinea Coast and the West Coast of India with their 'equatorial rain forests' belong to sub-division (*a*) of p. 2.

the summer months often even exceed that of the regions lying within the Equatorial Belt. But the chief point of contrast lies in the great seasonal range of tempera-

ture. Areas lying close to the Equatorial Belt as well as maritime stations, where precipitation is naturally heavy, experience small variation of temperature between the hottest and the coldest months; but in the drier parts of the Tropical Belt there is frequently a seasonal variation of 30°F. or even 40°F. Correspondingly the diurnal range of temperature in these drier regions is also appreciably large. But these variations admit of several gradations because of differences in local conditions; hence any attempt at giving an average figure for the whole area would be misleading.[1] Rainfall also shows a corresponding variation. In some of the wettest parts it may be as much as 200 inches a year, sometimes even considerably more; others have an average of 70 to 80 inches; whereas on desert borders it may be 15 inches or less. What especially distinguishes the Tropical Belt from the Equatorial Belt in respect of rainfall is the presence in the former of a distinctly dry and a distinctly wet season. Geographers and climatologists generally distinguish three seasons—(*a*) a cool dry season, (*b*) a hot dry season, and (*c*) a rainy season. The cool dry season is followed invariably by the hot dry season, when generally unbearable heat reigns supreme and some of the highest temperatures of the world are recorded; then set in the rains, which result in considerable cooling of the atmosphere; as soon as the rains are about to be over it becomes a trifle hot again, but the heat never reaches its maximum owing to the advent of the cool season. The spring and the summer are the seasons of precipitation, and the winter is almost wholly rainless. The hot season in the Northern Hemisphere terminates about April or May to be followed

Rainfall.

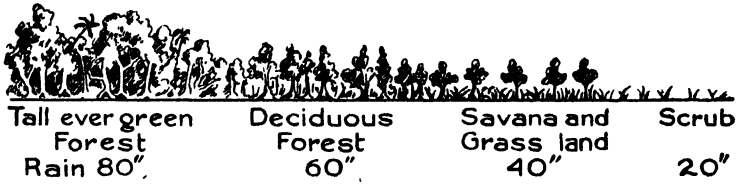
Seasons.

[1] In the Indo-Gangetic plains an average of 85°F. to 95°F. is frequently recorded in the summer months, and along the margins of the Steppe even 115°F has been recorded as an average. See G. W. Kendrew, *The Climates of the Continents*, p. 103 & 127.

by the wet season. Rains begin to be scarce by the end of August, sometimes even earlier, and about the middle of the following month they have generally ceased altogether. Winter then follows close upon the heels of the rainy season. The typical vegetation, as already mentioned, is grass interspersed with scattered trees. This is because grass springs up easily where there is a fairly good supply of rain-water, and it has a resting period during the dry seasons (winter and summer). But trees generally require a fairly constant supply of water all the year, and very many species cannot flourish during the dry seasons. Several types of vegetation can, however, be distinguished in the Tropical Regions: Vegetation.

(*a*) In areas close to the Equatorial Belt and having abundant supply of moisture during the greater part of the year, dense forests closely similar to those of the neighbouring Equatorial Regions are always found. Tropical Rain Forests.

(*b*) But regions where the normal precipitation is below 80 inches Deciduous Forests naturally spring up; these trees shed their leaves in the dry hot season. The forests of Burma and parts of India as well as those of many parts of Western Africa belong to this type. Teak, Sal and allied timbers are the characteristic products of these forests. Deciduous Forests.



TROPICAL AND TROPICAL MONSOON REGIONS.
GRADATION OF RAINFALL AND VEGETATION IN TROPICAL LANDS.

(*c*) Where, again, the rainfall is considerably below 60 inches, we find extensive grasslands with occasional

Savana.

trees at long intervals. This is said to be typical of the Tropical Regions, and often called the savana or parkland.

Semi-desert regions.

(*d*) Where the rainfall drops below 15 inches as in areas close to the desert borders, vegetation is considerably sparse, grass is coarse and stunted, trees merely spring bushes, and farther up the entire landscape fades into the uncharitable barrenness of a great hot desert.

Famine Belts.

Precipitation in the drier parts is extremely unreliable, sometimes causing fairly rich harvests, sometimes giving rise to famines. Some of the great Famine Belts are, thus, to be found in the drier parts of the Tropical Grasslands.[1]

Animal life.

The animal life of the Tropical Regions may be divided into two main groups: (*a*) the swift-footed harbivorous animals represented typically by the giraffe and the antelope, and (*b*) the carnivores, great members of the cat family, like the lion and the tiger, who prey upon the vegetable-eating animals. Monkeys are also found in considerable numbers in certain areas, especially in regions where tall trees abound. Bird life is also fairly abundant, and locusts are a serious menace to crops.

Man.

Corresponding to the variety of natural vegetation human responses also are various. Hunting and cattle farming are said to be the dominant occupations of the savana people. But agriculture is by no means of lesser importance, since "the natural grass which flourishes in the savana may be replaced by the cereal grasses . . . . "[2] Maize and millets amongst the cereals as well as cotton, sugar, groundnuts and various oilseeds may be widely cultivated in these regions generally. But at present there are formidable difficulties in the way of the development of many of those regions.

[1] Stamp, *A Commercial Geography*, p. 18.

[2] *op. cit.*, p. 19.

Of these the shortage of labour probably comes to the forefront; the grasslands are mostly very thinly populated; those of Australia are practically uninhabited, and in many parts of the African savanas the population is scarcely 20 to the square mile; in the South American grasslands, again, the density is only four persons per square mile. Other difficulties generally are the poor transportation facilities, distance from the markets, and, especially in South America, frequent political unrest and the consequent revolutions.[1] These are detrimental not only to agriculture, but also to pastoral activities.

Characterization and Extent.

3. **Tropical Monsoon Regions.**—There is more similarity than difference between a Tropical Climate and a Tropical Monsoon Climate, except in respect of precipitation. Both the types are restricted, in the main, to the Tropics, and both are characterized by wet summers and dry winters. But rainfall in the Tropical Regions as such is caused by the Trade Winds blowing in a more or less uniform way; whereas that in the Tropical Monsoon lands is brought about by 'a complete reversal of the normal wind during the rainy season.' Just as the Sudan is the typical Tropical land, so the typical Monsoon lands are India, Indo-China and Southern China. Central and Northern China as well as Japan may be grouped with them, as the rainfall of those countries too is caused primarily by the Monsoon Winds; but in another respect these countries form an exception,—they lie beyond the Tropics. Moreover, winter in the Tropical Monsoon lands is, on the whole, warm; whereas Central and Northern China and Japan have distinctly cold winters; so it is more logical to treat them separately. India, however, is the most typical of the Tropical Monsoon lands; even the areas falling strictly

[1] H. J. Mozans, *Up the Orinoco and Down the Magdelena*, p. 128.

outside the Tropic of Cancer are governed almost wholly by the Tropical Monsoon Climate.[1] Besides India, Indo-China and South China, the Monsoon Climate is found in a part of the East African coast just south of the Equatorial Region there, in Madagascar and in the north-west coast of Australia. In a lesser degree it is found also in the coastal regions of the north-west of South America and Central America. The Monsoon lands may be divided, after Stamp, in the following four groups:—

Divisions.

(a) *Regions with more than 80 inches of rain annually.*—These are the regions of the evergreen forests closely similar to those of the Equatorial Rain Forests. Rice is the chief food crop of these areas.

(b) *Regions with an annual rainfall of anything between 40 and 80 inches.*—These are notably the areas of the Deciduous Monsoon Forests. Here also rice is the main food crop; but maize, sugar and oilseeds are important.

(c) *Regions with an annual rainfall varying between 20 and 40 inches.*—These are usually the areas where thorny thickets and scrub flourish. Millet is the chief food crop in these regions; but where conditions are favourable wheat and barley are cultivated as winter crops. Sesamum and oilseeds are important, and cotton is another characteristic agricultural product.

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[1] It is not that India does not at all experience winter rain brought by factors other than the Monsoon Winds. Thus during the period between December and March cyclones, originating in the Mediterranean region, travel eastward across Persia, Beluchistan and Afghanistan, and subsequently reach the plains of the Punjab and Sind, bringing in an appreciable rainfall. Usually they die out before reaching the lower valley of the Ganges. The bulk of snowfall in the north-west and in Kashmir may also be traced to these cyclonic disturbances. But the rainfall compared with that caused by the Monsoon is quite small. In certain areas of the Madras Presidency as well as in Ceylon winter rain is caused by the North-East Monsoon. See Stamp, *Asia*, pp. 183—193.

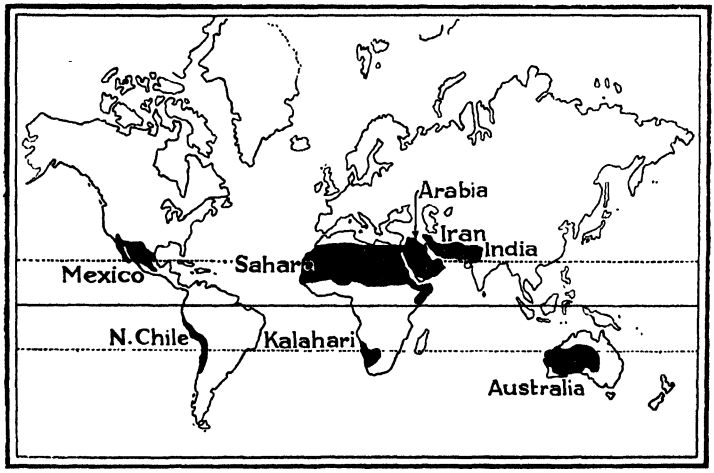
(d) *Areas with less than 20 inches of rain.*—These are the desert and semi-desert regions. In the semi-desert areas succulent plants are sometimes seen.

The Monsoon lands are amongst the most densely peopled in the world. This is due to a variety of causes, the chief among which are the ease with which jungles can be cleared, the greater facilities for cultivation and the easier and richer conditions of living. Where the soil is the richest the land may be said to be 'saturated' with people as it is in the Gangetic plains of India. Agriculture forms the major occupation of the people. Man.

4. Hot Desert Regions.—A moment's glance at a map of the world would at once reveal that "more than one-half of all the land lying between the parallels of 15 and 30° latitudes is classified as desert, and much of the remainder receives light or unreliable rainfall."[1] The Hot Deserts are situated on the poleward margin of Tropical lands. The location is extremely significant. They lie within the high pressure belts and on the western side of the continental land masses—the region of 'Dry Trade Winds'. Hence rain-bearing winds generally fail to reach them; on the contrary, currents of air descend on them so as to cause the wind to blow outwards. The eastern side of the land masses in the same latitudes are not, however, deprived of some rain brought by the 'moist' Trade Winds. The deserts of Mexico and Northern Chile in America, the great Sahara, the Kalahari and the desert of Somaliland in Africa, the plateaus of Arabia, Iran (Persia), Afganistan, Baluchistan, the north-western parts of India including Sind, the Thar and Rajputana, and the great desert of Western Australia fall within this group. Extent.

[1] Case and Bergsmark, *College Geography*, p. 232.

It is interesting to note—and the fact is highly significant too—that almost a continuous stretch of desert extends



THE HOT DESERTS OF THE WORLD.
Note the poleward and equatorward margins.

from north-western India to the west coast of Africa,—an area considerably larger than the U. S. A.: it is broken only by the intervening narrow waters, the total extent of which is quite insignificant in comparison with the vastness of the desert land. The great Sahara has induced many to denominate the climate as of the *'Sahara type'*. The Australian desert covers nearly two-fifths of the continent. These are naturally the regions of maximum heat and aridity. But the most characteristic thing about the climate of these deserts is perhaps the extreme ranges of temperature—both diurnal and seasonal: the diurnal range at times exceeds even 60°F.—a phenomenon to be experienced nowhere else. This is so because the dry air as well as the sparseness of vegetation favours rapid heating by day and

"Sahara type".

Temperature.

almost an equally rapid radiation by night. The seasonal range is also characteristically well marked: El Golea in the Sahara has an average temperature of 93°F. in the hottest month (July), but only of 39°F. in the coldest (January)[1]—nearly the same as that of London in January. Jacobabad in north-western India likewise has an average of 98°F. in June, but of 57°F. in January. The annual maximum range is frequently over 100°F., and temperatures of 115°F., are not uncommon. In Bagdad a maximum of 123°F., was once recorded, and in the Death Valley, California, the maximum shade temperature of even 134°F., has been recorded. Yet that is not the whole story. Coastal areas, bathed by air currents, are much cooler: Callao on the west coast of Peru has a mean annual range of merely 8·5°F., and Swakopmund on the west coast of the Kalahari has 8·4°F. Like cool air currents from the sea the cold currents of the ocean has marked influence in minimising temperature. Another thing to be noted about the Hot Deserts is that many of them are low-lying, and consequently the tempering effects of altitude on temperature are conspicuously

[1] It must be borne in mind that although the sun is nearest the zenith in June throughout the Northern Hemisphere, the highest temperatures there are commonly recorded not in June, but in the following month, because despite the sun's comparatively slanting position in July the temperature of the atmosphere soars higher up than in June owing to continuous absorption of a greater amount of solar energy since the Vernal Equinox. This is partly due to the sun's increasing altitude and partly to the increasing length of the day throughout the summer months. The slightly slanting position of the sun in July with the consequent fall in the amount of absorption of solar energy and the slight fall in the duration of the day have little effect by way of decreasing the temperature, whereas the total amount of energy hitherto absorbed still remains considerable. The reverse is the case in January when the lowest temperatures are recorded throughout the Northern Hemisphere; for although the sun is lowest in December and slightly higher in January, the continuous radiation of heat throughout the winter months reaches its maximum just after December, the slightly higher position of the sun having no appreciable effect.

absent. The continental land masses are broader in the Northern Hemisphere; hence the deserts here are larger than in the Southern Hemisphere. The desert gradually fades into semi-desert towards the Equator where the annual precipitation is 9 or 10 inches; such a region is really transitional, and may as well be classed with the dry areas of Tropical Grassland. A gradual transition is generally very well marked. Where, however, the average rainfall is 20 inches a year, definitely Tropical savana is found. On the poleward margin, on the other hand, a desert gradually loses itself into a Mediterranean scrubland. In the transitional regions between a desert and the Equator rainfall is governed by tropical conditions, and hence there is rain in the summer months. Similar areas lying between a desert and a Mediterranean region receive their scanty share of moisture during the winter. Cairo with an average rainfall of 1·3 inches a year is typical of the transitional areas between a desert and a Mediterranean land.

Rainfall.

Vegetation.

It is a popular fallacy to associate deserts with complete absence of vegetation. Actually they are not, as a rule, as completely barren as we habitually think them to be; on the contrary, many a desert is potentially very fertile, and desert plants have solved the problem of storing up water by special means. Some species have extremely long roots which penetrate to quite abnormal depths in order to reach water; others store up water in special stems and leaves. Another point of interest about these plants is that nearly all of them are well protected by means of sharp pines and thorns,—a feature which is supposed to have evolved for preventing the animals from eating them up. These Hot Deserts are generally divided into two groups according to the characteristic vegetation of each:

(a) *Dry Grasslands,*—which intervene between the desert proper and tropical grasslands;

(b) *Scrublands,*—intervening likewise between the desert proper and the Mediterranean regions.

The *Oases* may loosely be earmarked as another class. These are fertile areas scattered here and there throughout desert regions, and are usually situated in hollows where the underground supply of water reaches the levels immediately below the surface and is, therefore easily accessible to vegetation. The date palm is typical of these regions. But from the point of view of natural vegetation proper, the oases are not a class apart. An oasis may be a small patch of land with a pool or well, or may be a fairly extensive area.

The deserts, as can easily be imagined, are very sparsely populated; but an oasis often contains a large population because, no doubt, of its fertility. The desert people are commonly divided into three groups according to their occupations and habits: Man.

(a) *The Nomads,* who are almost perpetually on the move with their camels and scanty belongings. They are —most of them—robbers, hunters and tenders of flocks and herds, all in one. But they are traders too; they often act as carriers of goods from one desert region to another, and thus work as middlemen between peoples living in different oases, or as it is put by some, these nomads have much the same relation to the oases as the country folk have to the cities. The nomad is primarily a hunter in Australia and a tender of flocks and herds in the Sahara and the neighbouring areas. The animals generally tended—sheep, goats, mules, camels, llamas—can live on the scanty vegetation of the desert areas, but they must be perpetually kept moving from one pasture to another. But Australia and North America did not, as a rule, supply the conditions necessary for this type of human response: sheep, goats and camels were not found in those places. Hence the tending of flocks and herds was developed

only where animals suitable for domestication and adapted to the grasslands were found. And consequently these 'pastoral nomads' have reached a higher state of economic and commercial development as well as of culture.[1] The nomads who possess no cattle are very backward. Formerly they used to range widely over the Mexican and the Atacama deserts; they are still found in the Australian and the Kalahari deserts. They subsist on seeds, roots, locusts, rats, lizards, snakes, etc., wear little clothing and live in crude primitive houses better described as shelters than houses. Untanned skins are widely used as garments. Although cooking is not unknown "everything is eaten in the half-cooked state. The process of preparing a meal is simple in the extreme; the rats are plucked and thrown on the hot ashes with no further preparation, and are greedily devoured red and bloody, and barely warm."[2]

(b) *The Settled Peoples*,—who are restricted to the oases, which are of various kinds. They are mainly agriculturists. But an oasis may be an area surrounding deep wells, or a moist depression of sand dunes or a land watered from perennial streams. The celebrated Nile Valley is, in fact, an oasis of the last type, and so are the valleys of the Tigris and the Euphrates. Many of the large oases receive their water supply from highlands adjacent or remote. Numerous streams are, thus, found in the desert of Peru and Chile, and their sources have been traced to the Andes. Even the annual rise of the Nile is due, in the main, to the heavy rains in the highlands of Central Africa. The lower

[1] Many of these 'pastoral nomads' possess large numbers of sheep, camels and goats. A particular group of only 273 men and women in the northern parts of the Sahara was found to have, some years back, 868 camels, 1,083 goats and 1,265 sheep. See Jean Brunhes, *Human Geography*, p. 429.

[2] D. W. Carneigie, "Explorations in the Interior of Western Australia," *Geographical Journal*, Vol. II, p. 263.

Indus valley, also a desert area, derives its moisture similarly from the streams flowing from the mighty Himalayas. Hence the oases peoples are often obliged to introduce elaborate systems of irrigation,—systems which markedly differ from one region to another. In the Mzab, situated on the northern fringe of the Sahara, where the underground supply of water does not come quite sufficiently near the surface, they dig deep wells, and draw the water either by manpower or by the use of camels and donkeys for the purpose of irrigation. In Sind, in the Nile Valley and in the valleys of the Tigris and the Euphrates more scientific methods are in use.

(c) *The Miners,* who are another set of the settled population of certain desert regions,—men attracted solely by the prospects of mining. The nitrate fields of Chile, the copper mines and the diamond mines at Kimberley in South Africa, and the gold fields of Western Australia have, thus, experienced great mining rushes; these 'rushes' are almost entirely independent of climatic conditions. Mining in the tropical deserts is, however, fraught with various difficulties like scarcity of water, lack of timber, shortage of herbage for animals used as beasts of burden, want of transportation facilities, etc. And yet man loves to brave these dangers, and has actually done his utmost to overcome them. Thus "at Central Lagunas (N. Chile) water is brought in pipe lines from Pigue, 18 miles north-eastward; fruit from Pica and Matille, 55 miles in the same direction, and fish from the sea at Iquique, 90 miles by rail. Except for these slender resources locally supplied, all the food and clothing, the building material, machinery, work animals, labourers, everything must be drawn from more favored lands."[1] And many such mines are being exploited with incalculable profit.

[1] Bowman, "Regional Population Groups of the Atacama," *Geographical Society Bulletin,* 41, p. 153.

Character and outlook of Desert peoples.

Something must be said here about the general character and outlook of the desert peoples. The Beduin, as everybody knows, is a most elusive character; to many he is a romatic figure par excellence; to others a very unpleasant fellow, dirty in his habits, far from chivalrous in his treatment of enemies, and despicably cruel to his horses and camels. But 'the man of the desert,' as his name implies, is neither of these any more than what the grim necessities of life would compel any one to be. But why are we concerned here only with the Beduin to the exclusion of other peoples of the desert? This is because he represents them all better than any other: the desert peoples are all compelled to take to a nomadic life and even to resort to robbery, pillage and conquest in order to survive, because circumstances even under normal conditions change more rapidly in desert regions than in any other place. Springs and streams from which the oases peoples derive their water supply often fail, and they are faced with the gloomy prospect of starvation. Then they are compelled to leave the land, never to return again, but to force their way into hospitable territories teeming with unsympathetic people. Thus "the arrival of the Shepherd Kings in Egypt, the wanderings of Abraham which led him to the Promised Land", the migrations of the Arabs in the Middle Ages, the present day troubled politics of their country, have all been traced to these conditions.[1] It has also been pointed out that the desert peoples generally have a tendency to increase more rapidly than the food supply. This is due to various causes, of which only a few can be enumerated here for reasons of space: the climate of desert regions is often quite wholesome, because disease germs cannot breed freely in the exceptionally dry atmosphere, and get easily destroyed

[1] Chisholm's *Handbook of Commercial Geography*, p. 38.

by the scorching sunlight. Hence despite the unhygienic habits prevalent among them, infant mortality is rare. The scanty food obtained in desert areas is very wholesome. The extremes of temperature as well as the rigors of obtaining a livelihood mould the physique, within certain limits, for enduring all sorts of hardship. Since, therefore, population increases by leaps and bounds, resulting in a shortage of the food supply, the desert peoples are obliged at intervals to migrate to other places. From time immemorial, therefore, the deserts as well as the steppes have given birth to tribes of wandering herdsmen, and sent out invading hordes in successive waves of conquest,—men who have easily overwhelmed the neighbouring river valleys of Eurasia and Africa. Indo-Aryans, Scythians, Avars, Huns, Saracens and Turks, as well as the Tuareg tribes of the Sahara, the Sudanese, and the Bantu folk of the African grasslands were originally conquering nomadic hordes from the desert and the steppe.[1] But conquest is not the sole thing to their credit. The deserts have made notable contribution to human culture as well. They have "often produced people with a philosophical outlook, such as the ancient Egyptians and the Arabs, learned in Mathematics and Astronomy."[2] This has been traced to the "monotony of the scenery, the clearness of the sky, and the need for guidance when travelling by night" with the consequent necessity for concentrating attention on the heavens rather than the earth. But perhaps this is going much farther than the facts at our disposal at present permit.

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[1] E. C. Semple, *Influence of Geographical Environment*, p. 7.

[2] Chisholm's *Handbook of Commercial Geography*, p. 38. Some writers have even gone so far as to attribute the growth of monotheistic doctrines as well as that of society on the military and ecclesiastic lines to the sameness of natural scenery, the phenomenon of the mirage, etc. See G. A. Smith, *Historical Geography of the Holy Land.*

Desert as barrier.

Notwithstanding the inveterate tendency of the desert peoples to migrate and conquer, the desert as such acts as a formidable barrier to human intercourse. But this is not really so surprising as it seems at first sight ; for, as Haddon has so aptly put it, "movements of men, like those of fluids, take the line of least resistance, flowing, as it were, in channels or open areas bounded by barriers," and "a migration induced by an attraction is rare as compared with that produced by expulsion."[1] The Sahara, for example, still separates 'the white and coloured races of mankind.'

I. THE REGIONS OF MIDDLE LATITUDES

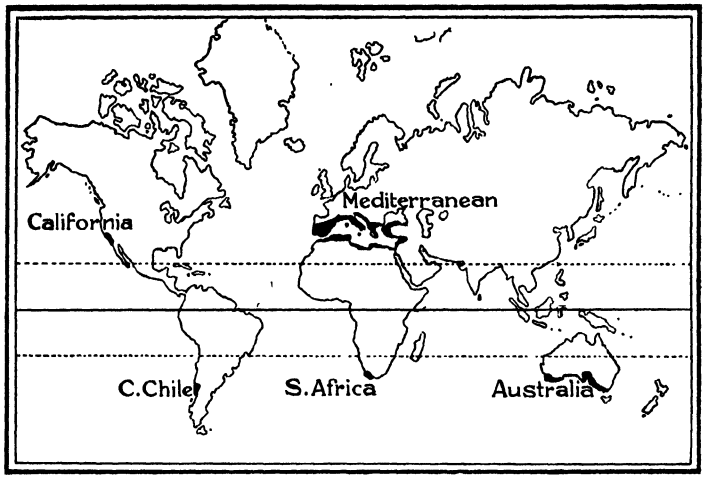
Regions of Low and Middle Latitudes.—The regions of Low Latitudes, as we have seen, include a number of natural and climatic areas, of which the Equatorial and the Tropical lands extend almost right round the globe. But as soon as we emerge out of the Tropics we find that the case is no longer so simple; for a considerable difference between the eastern and the western margins of the continental land masses at once engages our attention. Thus we are led to abandon the method of surveying the world as a whole.

Extent and characteristics.

5. The Mediterranean Regions.—The Mediterranean Regions are not restricted to the lands surrounding the Mediterranean Sea alone. The name is a literary accident as so many names are, and should no longer be used in an adjectival sense, but rather as a substantive. The lands surrounding the Mediterranean Sea is the largest and most typical of the regions where the characteristic climate and vegetation occur. The Mediterranean regions lie outside the Tropics of course, and are situated on the western

[1] A. C. Haddon, *The Wanderings of Peoples,* pp. 2—5.

margins of the continental land masses roughly between the latitudes of 30° and 45° both north and south. They are



THE MEDITERRANEAN REGIONS.

Note that these regions are situated on the Western margins of the continental land masses. Compare them with the regions lying on the eastern side of the continents in the same latitudes. (p. 57).

fringed on the side of the Equator by the Hot Deserts, and like the latter are hot and dry in the summer months, because the Trade Winds throughout that season blow off-shore. In winter, however, the scale is turned, and these regions come under the influence of the Westerlies, because of the shift in the earth's thermal equator, and thus receive moisture. The Mediterranean lands are, therefore, known as the 'winter rain' regions.[1] Dry summer and wet winter are the chief charac-

[1] It needs hardly to be pointed out that since the Mediterranean Regions lie in both hemispheres, when it is dry in the Northern Hemisphere it is just the reverse in the Southern Hemisphere, and *vice versa*. That explains why we can have typical Mediterranean products throughout the year.

teristics of these regions. Besides the lands surrounding the Mediterranean Sea, California in North America, Central Chile in South America, the south-western parts of the Cape Province in South Africa, and the south-west of Western Australia, South Australia and a part of Victoria (Australia) belong to this group. The position of these regions is also significant: the Mediterranean Climate cannot prevail but on the western margins of the continents, because the eastern margins receive their rain mainly in summer from the Trade Winds blowing from the oceans; but the Westerlies blowing from the land are moistureless. Although the Mediterranean Regions are fringed by Hot Deserts on the side of the Equator, and agree in being dry throughout the summer, they lie within the Temperate Zones; hence despite their bright sunshine they are considerably cooler. But they exhibit also great local diversities. Even within the region around the Mediterranean Sea the winter is generally progressively severe in the east, the average temperature being over 40°F. in some areas and over 50°.F in others. The mean temperature in July is over 70°F. in certain areas and over 80°F. in others. Precipitation also shows a corresponding variation, the typical average being between 10 and 40 inches annually; on exposed uplands the rainfall is often heavier than 40″. The vegetation is also characteristic. Since the plants must protect themselves from lack of moisture during the summer months by utilizing the water which accumulates underground after the winter showers, shallow rooted species, requiring light rains in the spring and early summer, do not, as a rule, flourish. Trees and shrubs capable of retaining moisture for utilization in the dry season do, therefore, prevail, and the Mediterranean Regions are, thus, clothed naturally by evergreen trees and shrubs. Most of these have developed ingenious devices for holding moisture. The olive has leaves provided with fine silky hairs

Temperature

Rainfall.

Vegetation.

to prevent excessive evaporation; the vine has developed enormously long roots; a few other species of trees have leaves with a coating of wax to prevent rapid transpiration. Typical ground vegetation of the Mediterranean lands are the various species of flowering shrubs and herbs which generally take the place of grasses. Where the supply of moisture is sufficiently abundant, fine forests grow, and the chestnut and the cork oak trees occur in large numbers. The fairly long dry summer with bright sunshine for the greater part of each period of twenty-four hours is said to be ideal for the ripening of fruits, and the Mediterranean Regions are commonly very suitable for the production of a variety of them: thus oranges, lemons and the grape-fruit among the citrous variety are abundant; peach, pear, apple, apricot and nectarine belonging to the deciduous type are also equally plentiful; the olive, almond, fig, mulberry and vine are by no means less important. Of grains certain types of wheat and barley are important; but these are not indigenous, and do by no means challenge any comparison with those of regions more suitable for their production. Irrigation has played a large part in the commercial history of these regions, because precipitation is not generally sufficient for the raising of as much crop and fruit as is deemed essential by the modern man for economic and commercial purposes, though the bright sunshine chiefly of the summer months is considered ideal for their ripening. The Mediterranean lands of Europe were the cradles of the civilisations of Greece, Rome, Crete and Carthage.

6. The Temperate Desert Regions.—These occupy enormous tracts of land in the interior of Asia, Europe, and North America, as well as in the Patagonian Desert region of South America, and are situated, generally speaking, within the belts where high atmospheric pressure is formed in winter

Exter

and low pressure is generated in summer. These regions are flanked, especially in the Northern Hemisphere, by lofty mountain barriers which cut them off from oceanic influences, and their distance from the great oceans of the world is, as a rule, sufficiently vast to prevent any such influence from entering them. High ranges of temperature and low rainfall generally characterize these desert regions. Rainfall occurs commonly in the summer, except in regions bordering on the Mediterranean lands which, of course, receive winter rain. The enormous stretch of land falling within this division naturally presents a marked variety of topographical features; and since topography has profound influence on climate, these regions may be easily subdivided into various types, of which the chief ones have thus been enumerated:

Temperature and Rainfall.

(*a*) *The Iran Type*,—which really forms a transition between regions enjoying a Mediterranean Climate on the one hand and the Hot Desert Climate on the other. In winter it is intensely cold; the mean January temperature is only slightly above the freezing-point; at night sharp frosts occur, and the temperature often sinks below the freezing-point. In summer the sky is generally brightly clear, the atmosphere dry, and sunshine almost unbearable. The average July temperature in Tehran is 85°F., sometimes even 110°F. Precipitation is almost wholly restricted to the winter months; the annual average rarely exceeds 13 or 14 inches, especially on the plateau region. Often there is a snowfall instead of rain. This type of climate occurs in a few other places, as well, notably in the Salt Lake areas of North America.

(*b*) *The Tibet Type*,—found on the highest plateaus. The climate is terribly severe; violent winds blow during the greater part of the year. But what probably is the most characteristic feature of the climate is the enormous difference

between the sun and shade temperatures: rocks in the sun are often hot to the touch, while in the shade it may be quite freezing. This has been attributed mainly to the exceptional rarity of the atmosphere. Precipitation is extremely small, and keen frosts are common in autumn and winter. Gyangtse which is not very far from Sikkim and Darjeeling has an annual rainfall of only about 8 inches; Lhasa farther north has something like 18 or 20 inches. The precisely Tibetan type of Climate, it should be noted, does not prevail all over Tibet, it being restricted, in the main, to the highest plateaus —regions of 11,000 feet above sea-level. Besides the high plateaus of Central Asia, this type occurs in the Bolivian plateaus of South America at and over similar heights.

(*c*) *The Gobi or Mongolian Type,*—which, as the name suggests, is the characteristic climate of the Gobi or Shamo desert occupying roughly the central parts of Mongolia. It is the climate pre-eminently of "lower elevations farther away from the equator,"—a climate characterized by very short summers and long chilly winters. The average winter temperature sinks often to 40°F. below the freezing-point and sometimes even to 50°F. below zero. The higher peaks of mountains, such as the Altai, remain covered up by a blanket of snow, except for a few weeks in summer which starts very late and passes away almost as soon as it starts. Precipitation is practically nil, and even in the immediate vicinities "it is frequently concentrated in six weeks of the summer half year. Sometimes there is absolute dryness until the end of June" in the more fortunate regions around.[1] Besides the Gobi region, the basins of Northern Tibet also fall under this group.

(*d*) *The Turkestan Type,*—occurring mainly on the lowlands of South-West Siberia. The summers are very hot,

[1] Case & Bergsmark, *College Geography,* pp. 459-60.

the usual July temperature being over 80°F.; but the winters are cold for the latitude, the mean temperature in January usually dropping below zero. Precipitation ranges from about 3 or 4 inches to about 6, and a progressive variation is marked towards the east till in the hills it comes up to about 14 inches or more as the figures obtained at Samarqand and Tashkent show.[1] The maximum rainfall is commonly witnessed in the spring. The predominance of winds is a noteworthy feature of the climate; except in the mountain valleys where strong local winds prevail, the whole area is almost swept over by northerly, north-easterly, and north-westerly winds. It is not exactly a desert type of climate, but one of a very dry steppeland. The typical instance is said to be furnished by the climatological figures obtained at Petro-Alexandrovsk, which records an annual range of 60·5 for temperature and 2·1 inches of average yearly rainfall at an altitude of 295 feet in the latitude of 41°20′ N.

Man in Temperate Deserts.

These Temperate Desert Regions, like the Hot Deserts, have been aptly described as 'regions of lasting difficulty'. Not that the soil, as a rule, is barren; it is rather often potentially quite fertile. But the climatic conditions are unfavourable for crop production and similar pursuits; in many parts even grazing is a difficult proposition. Extreme temperature fluctuations, dessicating winds, destructive hail-storms, and scant and uncertain rainfall, all combine to frustrate human efforts even in the adjoining areas, where conditions are said to be comparatively favourable. These regions, therefore, remain sparsely populated. The greater part of them is used

[1] It must be noted that in determining aridity or humidity, evaporation is also to be taken into account. Climatologically the same amount of rainfall in areas widely separated from one another does not bring about identical or similar conditions, since where the temperature is high and evaporation rapid there will prevail a relatively dry atmosphere than that of a place with the same amount of rainfall if the temperature and the rate of evaporation differ.

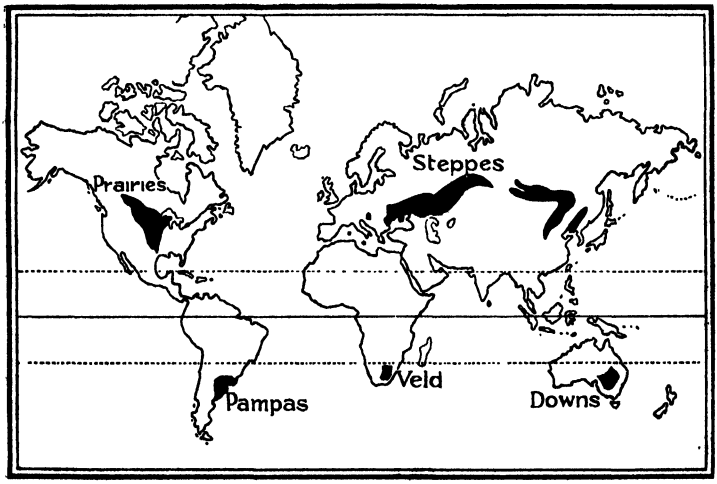
for grazing, and men and animals are continually on the move from one pasturage to another. This is especially the case in the vast tracts of arid land in Inner Asia. The thin straggling herbage of summer is all that can support the flocks and herds of the nomadic peoples. Where conditions are suitable or have been made to suit the requirements of man, as in the arid regions of North America, animal husbandry has been started. As in certain parts of the Hot Deserts, so in these Temperate Deserts irrigation sometimes makes the raising of crops possible. Thus a fairly good record of yields per acre of potatoes, sugar beets and alfalfa in the western parts of the U. S. A. has been established. Oases, again, are not restricted to the Hot Deserts alone; the Temperate Deserts, especially in Asia, are dotted about with a large number of oases; Kashgar and Yarkand are really two age-old oasis towns that have been functioning all these centuries as important centres of trade in the 'dead heart of Asia'. And, as in Hot Deserts, so even in these regions people have performed wonders by irrigating the soil in various ways; the water supply is derived from the adjacent highlands. Wheat, maize, melons and fodder for sheep and cattle are fairly largely grown in the irrigated areas.[1] In the irrigated parts of arid South America both the vine and the sugar-cane are important.[2] In more favoured lands like Iran (Persia) wheat, barley and millets are grown throughout the country; rice is also cultivated in areas suitable for tropical products; and since the country's climate has resemblances to both the Mediterranean and the Tropical types, it is suitable for various fruits of both regions.[3] But the desert areas proper have large tracts of land either too rugged or too high in salt content to make agriculture by means of

[1] E. H. Carrier, *The Thirsty Earth*, p. 108.
[2] *Op. cit.*, p. 175.
[3] Stamp, *Asia*, pp. 150-51.

irrigation quite profitable an enterprise. Thus the complicated topography of Inner Asia, where valleys, basins and highlands interlock to form an infinitely tangled mass of enormous territory, is a formidable handicap to irrigation, and the salinity of the streams from which the oasis people of the Tarim Basin in the interior of Asia derive their water supply, often seriously interfere with the production of crops. Temperate Deserts sometimes contain various minerals; and where these occur man has responded in his characteristic way.

Extent.

7. **Mid-latitude Grassland Regions.**—Theoretically these would occur in the heart of the continents where a Temperate Continental type of Climate prevails; and the more extensive Temperate Grasslands of the world actually do occur in the mid-latitude interior of North America and Eura-



MID-LATITUDE GRASSLANDS.
Note their position in relation to that of the Temperate Deserts.

sia. The Prairies of North Ameria and the Steppes of southern Europe and southern Siberia are the outstanding examples. In the Southern Hemisphere we would not normally expect to find similar grasslands, because the land masses are so much narrower as to permit oceanic influences to enter them. Yet this is far from being the case: the Pampas of South America, the Veld of South Africa, and the Downs of the Murray-Darling basin of Australia also belong to this group. What may the explanation be? In South America the Pampas, though not far removed from the seas, are effectively cut off by the High Andes from the Westerly Winds of the South Pacific. The South African Veld owes its origin largely to the high elevation of the plateau—a factor that greatly modifies the oceanic influences brought about by the South-East Trade Winds. The Great Dividing Range of Australia, again, interferes with the oceanic influences penetrating into the Downs. But these Temperate Grasslands of the Southern Hemisphere exhibit certain well marked differences from those of the Northern Hemisphere, owing chiefly to their proximity to the seas. The name 'Temperate Grasslands' should not, however, lead us to think that the climate prevailing in these regions is pleasant and mild. These are temperate lands not so much for the general mildness of the temperature as for being situated in the Temperate Zones of the earth—in the Middle Latitudes. A Continental type of Climate, we should never forget, is characterized by sharp contrasts, especially between the summer and winter temperatures. Enormous tracts in the heart of North America and Eurasia are deprived of the moderating influence of the sea owing to distance. Summers are, therefore, exceedingly hot; no cooling breezes from the sea penetrate them. Consequently the average summer temperature rises over 60°F., often it is above 70°F, and sometimes even higher. But the summer is usually short,

Temperature.

rarely exceeding three months in the year. Winters are long and tortuous; neither warm Westerly Winds not warm ocean currents are there to counteract their severity. The average winter temperature falls below zero. This extreme continental type of climate does not, however, occur in the Southern Hemisphere because of the narrower land masses. Thus the South American Pampas enjoy a moderate type of the Continental Climate. So it is in the African Veld, where the average temperature is appreciably higher, and snow is a rarity even in winter. The Australian Downs are also warmer in winter and cooler in summer. Rainfall comes mainly in the spring and summer, because as the land

Rainfall.

gradually begins to be heated in spring, low-pressure centres are formed, and winds begin to rush in from the ocean, laden with moisture, causing a moderate rainfall. Since various local factors govern the actual amount of rainfall in each region, it is difficult to give exact figures that would hold good for all the regions; nor will such figures be profitable, since these regions stand widely apart from one another. The North American Prairies have an average precipitation ranging from below 20″ to even 40″, and where they touch the fringe of Warm Temperate Forests it may be considerably above 40″. The Pampas similarly have an annual precipitation ranging from 20″ to 40″. The Eurasian Steppes may be said to have an average of 10″. The African Veld has an annual average of less than 10″, while in the Downs it varies from 20″ to 40″. These figures, however, speak little by themselves. In North America the Prairies gradually fade into Coniferous Forests in the north and west, into Deserts and semi-deserts in the south and south-west, and into Cool and Warm Tem-

Vegetation.

perate Forests on the east and south-east, thus roughly forming a triangle with its apex touching the Gulf of Mexico. The Pampas of South America are flanked on the north

by Warm Temperate Forests and on the south and west by the Temperate Desert of Patagonia, while the Atlantic washes the entire eastern flank. The Steppes of Southern Europe are bordered on the north and west by Deciduous Forests, and stretch from the northern boundaries of the Black Sea in a general north-easterly direction in between the vast Coniferous Forests on the north and the Hot and the Temperate Deserts on the south till the northern Conifers drive an wedge between them about the 90th east longitude so as to separate them from the Steppes farther east; these latter Steppes, covering the eastern parts of Southern Siberia, run in a general south-westerly direction along the Mongolian Plateau, flanked on the west by the Gobi Desert and on the east by the mixed forests of Manchuria and China. The African Veld occurs in Natal in the south-east, and is closely bordered on the west, north and east by the extensive Savana; but on its south-east occur Warm Temperate Forests, and the narrow coastal desert of the south-west comes right up to its south-western flanks. The Australian Downs are bordered on the west by the great Hot Desert, on the south-west by the Mediterranean regions, on the south-east and east by the eucalypt forests, on the north and north-east by tropical forests and tropical grasslands. These Temperate Grasslands, are, as a rule, treeless, because the characteristic light rain is not suitable to trees; and the grass is usually softer and less coarse than that of the Tropical Grasslands.

Animal life.

The animals, as in the latter, are of two kinds—swift-footed grass-eating animals, represented by the antelope, the horse, the bactrian (two-humped) camel, the bison, the kangaroo etc., and the carnivores such as the wolf, the coyote, wild dogs, etc., "amongst which man must really be classed."[1]

[1] Chisholm's *Handbook of Commercial Geography*, p. 41.

Man.

And this inclusion of man in the list of the carnivores is not really a whimsical statement; "primitive man, as a native of the grasslands," we are told, "is primarily a hunter, as were the Red Indians of the Prairies."[1] The next stage, we are further assured, is characterized by the domestication of the sheep and the goat, the ox and the horse. This is shortly followed by the development of the pastoral industry, and man takes to nomandism and moves from one pasturage to another. And what perhaps is meant to complete the picture is the information that, droughts and a consequent shortage of pasture have often led the grassland folk to force their way into more favoured lands.[2] But whether this is a true picture we cannot say; all that can be said of it is that it seems plausible enough at first sight. But it is also quite significant that Anthropologists are yet far from being in complete agreement as to the relative priority of the different stages commonly attributed to human progress from barbarism to civilisation, and be it also noted that some of the most acute thinkers have really called in question the absolute validity of the hypothesis that barbarism is an essential precondition of civilisation. We are not concerned in Geography with tracing the course of man's progress from a socalled barbaric state to that of civilisation; we shall do well to confine our remarks to the facts available, and to note how man has responded to his physical environment. Thus turning to the facts from the geographer's point of view we find that the mid-latitude grasslands have been chiefly devoted to grazing, and in most parts of these regions live-stock and their by-products constitute the main source of wealth. Of all domesticated animals the sheep is the most important, because having been provided

Sheep rearing.

with cleft lips and covered by bushy fleeces they can live on short grasses so as to survive periods of drought and withstand the long and tortuous winters better than cattle. Thus the Pampas, the Veld, the Downs, the European Steppes (as well as some other places not falling within this group of regions) contain large numbers of sheep. The Canadian and Russian Prairies are not, however, suitable for quite successful sheep rearing, though in and about the Prairie region of the U.S.A. a good number of sheep are well tended. The Steppes of Asia as well as of some adjacent areas contain large number of sheep, but the figures are relatively small per square mile. The sheep, however, is said to have been a native originally of the dry plateaus of Eurasia. Cattle are also important, particularly in the Argentine and Uruguay, though far less distributed than sheep. Their number is also smaller than in the humid parts of the Middle Latitudes, and even in the grasslands they are distributed mainly in the wetter regions, because it is difficult for them to subsist on short and hard-fibred grasses. The cattle are said to have been the natives originally of the warm humid regions to the south of the Himalayas. Although the Temperate Grasslands, particularly of the Southern Hemisphere, are still primarily sheep-rearing areas, agriculture is fast increasing in importance. Many of these regions are well irrigated, and are under crops; excepting the dry grasslands of Mongolia and Manchuria all these regions—the Prairies, the Pampas, the Veld, the Downs—are now fairly well developed; the chief crop is wheat, except in South Africa where maize is of prime importance; barely, oats and rye are also important. Thus "the Temperate Grasslands have become the world's granaries, from which the deficiencies of the industrial countries are made up."[1] With this development of crop

Cattle rearing.

Agriculture.

production has also come a revolution in the meat industry of these regions, because the huge ranches are steadily being broken up in order to make room for wheat farming.[1] A distinctive feature of these semi-arid regions of the Middle Latitudes is their frontier character; human settlements thus penetrate gradually along the fringes. Thus in all these regions settlement is still in progress. Along the margins of the dry grassland regions of Mongolia and Manchuria Chinese farmers are steadily pushing inland; special colonizing offices have been set up by the Chinese Government in the cities of Kalgan and Suiyan for fecilitating the process.[2]

Human settlement.

8. Mid-latitude East Coast Margins.—The lands of the Mid-latitude East Coast Margins lie in the same latitudes generally as the regions having a Mediterranean type of Climate, but on the eastern side of the continents. These bear certain resemblances in temperature to the Mediterranean regions, but an important point of difference is that the rainfall in these eastern lands comes mainly in summer. The climate is often called Warm Temperate and the lands Warm Temperate Regions. But as in the socalled Temperate Grasslands so even in these regions the climate is often characterized by sharp seasonal contrasts. Moreover, these regions do not possess a single type of climate in the sense in which the Mediterranean regions have a single type.[3] But of course these different types agree in the fundamentals as do the various types prevailing in the Temperate Desert Regions. That is why they are generally grouped together under a common name. The Gulf States of the U. S. A., Southeastern Brazil, Natal in Africa, the eastern half of China,

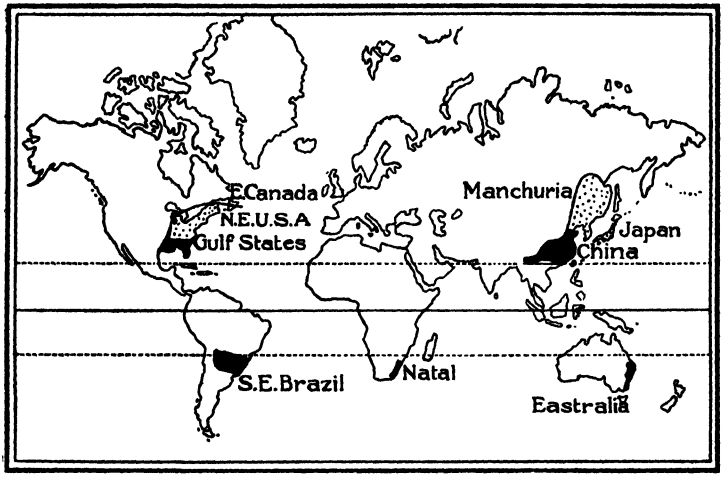
Extent.

[1] *Ibid.*

[2] Case & Bergsmark, *College Geography*, p. 436.

[3] Stamp, *A Commercial Geography*, p. 29.

and the southern parts of the East-Australian coasts are typical of these regions; whereas the north-eastern parts of



LANDS OF THE MID-LATITUDE EAST COAST MARGINS.
Compare with the map on p. 43.

the U. S. A., parts of the eastern coastlands of Canada, Manchuria and Japan belong to different sub-types of the main group. And yet there are considerable regional variation even in the typical lands. These Mid-latitude East Coast Margins have been thus divided by Stamp[1]:

(*a*) *The South-Eastern States of the U. S. A.*—These are the celebrated cotton-lands of the States, and have a moderate rainfall all the year, though the summer months experience a maximum because of the low-pressure centres formed by the heat in the heart of the continent.

(*b*) *Northern and Central China,*—which really fall within the great Monsoon region of Asia as does India.

[1] Stamp, *A Commercial Geography*, pp. 29—32.

But there is so marked a difference in climate as to merit a separate name—the China type of Climate.[1] The rainfall of course is due to the formation of low-pressure centres which attract moisture laden winds from the ocean as it is the case in India and other Monsoon lands. And it is summer rain, too. But the winter is terribly severe in Northern and Central China, because of the dessicating winds issuing from the heart of Asia. Snow is quite common in winter even on the plains. In Northern China even the greatest rivers often become frozen in winter. Some amount of winter rain also occurs, particularly in the coastal areas. This China type of Climate may, again, be divided into three sub-types:—

(*i*) Northern China type, represented by the climatic conditions of Peking;
(*ii*) Central China type, represented by the conditions prevailing in Shanghai and Hankow;
(*iii*) Japan type, which is mainly due to the insular position of Japan, typified by the climatological figures obtained at Tokyo.

The principal grains of Northern and Central China are wheat and millet, while rice is the all important food crop of the south. Cotton is a leading crop in Central China.

(*c*) *The South-eastern Coastlands of Australia,*—the climate of which has received a new name—the Eastralian type of Climate. The rainfall occurs all the year with, of course, a summer maximum, which is due chiefly to the Trade Winds. In winter some influence of the Westerlies is also felt. It differs from the China type of Climate chiefly in two particulars,—the winter is much milder, and the rainfall

[1] Southern China comes under the Tropical Monsoon Climate like India and Indo-China. See Stamp, *Asia,* p. 27.

is not monsoonal. The normal vegetation is the eucalypt forest.

(*d*) *The Natal region of South Africa*,—where the climatic conditions are somewhat similar to those of the seaboard of New South Wales in Australia (south-eastern coastlands). Rainfall is light, but occurs intermittently at all seasons, with a maximum in summer. It is caused by the Trade Winds. The coast is kept warm in winter by warm currents. Warm Temperate Forests occur.

(*e*) *The region of Uruguay and South-Eastern Brazil*,—where, again, the climatic conditions are somewhat similar to those of the south-eastern coastlands of Australia, but more particularly perhaps to those of the Natal region of South Africa. Rainfall is fairly good, and occurs mainly in summer, due to the Trade Winds. There is an warm ocean current along the east coast, keeping it warmer than the west coast. Warm Temperate Forests occur here also. Thus the climatic conditions of the Mid-latitude East Coast Margins in the Southern Hemisphere are, on the whole, similar.

General character of Vegetation.

It will be clear from a general survey of these regions that the natural vegetation, despite all local variations, is everywhere characterized by the presence of tall trees; and where rainfall is well distributed evergreen forests also occur. These evergreen forests has well been described as 'Warm Temperate Rain Forests,' and are said to rival the Equatorial Forests, though naturally these are much less dense.[1] Palms and tree ferns are characteristic of many of these forests. The outstanding feature in the Gulf States of North America is the presence of both broad-leaved and coniferous forests, and pitch pine is obtained from the latter. The Chinese

[1] Stamp, *A Commercial Geography*, p. 31.

have thoroughly wiped out the natural vegetation of their country with the result that it is difficult to ascertain what type or types of forests originally thrived in China. Japan, as we have already noted, also has this type of climate; but there is some deviation too, because of her insular position. The Japanese archipelago is warmer in winter than the continental land masses within the same latitudes, despite the dessicating winds blowing over her in full force from the interior of Asia, because her west coasts, which experience the full fury of the cold winds, are bathed by the warm Kuro Siwo. Along the east coast, however, the cold Okhotsk Current passes. Thus in winter the western parts of Japan are warmer than the eastern parts. The west coast also receives considerable amount of rain in winter as the north-west winds, in crossing the Japanese Sea, pick up some moisture. The east coast is comparatively rainless in winter. In summer the South-East Monsoon brings rain all over Japan. But the rainfall, curiously enough, does not correspond with the height of the Monsoon,—a feature not fully explained yet. There are, instead, two rainfall maxima, one in June and the other in September. The rain is, on the whole, continuous, and the weather during the season definitely damp.[1] The natural vegetation of Japan is forest; the camphor tree, pines, evergreen oaks, deciduous oaks, chestnuts, maples and coniferous forests occur in different climatic areas. The Mid-latitude East Coast Margins are said to be eminently suited to human occupation and development.[2] Thus Central China is almost saturated with people, and is one of the most densely inhabited agricultural lands of the world with a density of 3,000 or more per square mile. Rice, cotton, tea and silk are the principal products. The Gulf States of the U. S. A. have been aptly described as 'the

[1] Stamp, *Asia*, pp. 545—547.

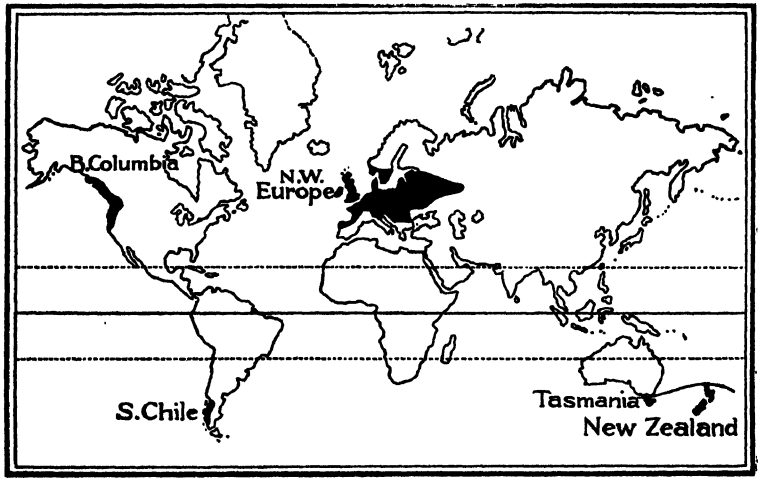
[2] Chisholm's *Handbook of Commercial Geography*, p. 43.

world's storehouse of cotton'; and the famous Maize Belt of North America lies immediately to the north. The seaboard of Eastern Australia as well as the coastal region of Natal in Africa has witnessed the migration of large numbers of people in recent years. In the heart of South America, however, large tracts of these forest lands yet remain to be penetrated because mainly of their swampy and unhealthy character.[1]

III. THE REGIONS OF HIGH LATITUDES

9. The Deciduous Forest Regions.—These occur mainly on the western margins of the continental land masses like the Mediterranean lands, but on the poleward side of the latter. Another significant fact about the location of these

Extent.



DECIDUOUS FOREST REGIONS.

[1] *Ibid.*

regions is their situation within the Westerly Wind Belt. As the lands surrounding the Mediterranean Sea constitute the largest and most typical of the Mediterranean regions of the world, so the largest area belonging to the Deciduous Forest group is North-Western Europe. The north-western coastlands including British Columbia form such a region in North America. In the Southern Hemisphere a small tract in southern Chile, and the islands of Tasmania and New Zealand in Australasia belong to this group. Since the regions lie in the poleward sections of the Temperate Zones, and are in the closest possible proximity to the oceans, the climate prevailing in them is often called 'The Cool Temperate Oceanic Climate.' Since these regions lie in the belt of the Westerlies, rainfall throughout the year and small seasonal range of temperature are the chief characteristics of the climate. But rain throughout the year does not mean that these Deciduous Forest Regions are comparable with the Equatorial Regions. The Westerlies are extremely variable and capricious—by no means as steady as the Trade Winds. Hence cyclones and anti-cyclones are a distinguishing feature of the weather. These are par excellence the oceanic or marine lands of the world. In Europe this marine type of climate reaches far to the north, mainly because of the drift of warm waters—a continuation of the famous Gulf Stream—which is not retarded by land barriers. Thus the shores of the British Isles and North-Western Europe are kept warm and free from ice even in winter. Eastwards, however, the winters are, in the main, progressively colder and summers correspondingly warmer, because of the relative distance of the regions from the sea. That is why geographers frequently distinguish two sub-types of the climate in Europe:

Temperature and Rainfall.

(*a*) *The North-West European Type,*—characterized by conditions almost typical of the Cool Temperate Oceanic Climate. Summers are cool, winters mild, and rainfall fairly

abundant all the year. The average temperature of January is above the freezing-point, making an average of about 40°F. for the whole year. The whole of the British Isles, Northern Spain, roughly the Western half of France, Belgium, Holland, most of Denmark, and the narrow western fringe of Norway come under this sub-division. But conditions in Denmark and the Norwegian fringe referred to are slightly different because of their more northerly location. Denmark, though not farther north actually than the British Isles, is farther east, and less fortunate, therefore, to benefit from the warm North Atlantic Drift which flows along the west coasts of the British Isles towards the North Pole.

(*b*) *The Central European Type,*—with a January temperature about or below the freezing point. Winters are colder, summers warmer, and rainfall, generally speaking, comparatively light. Thus while some parts of the British Isles, particularly on the west, have a rainfall of over 80″, it is as low as 18″ in Eastern Germany. Roughly the eastern half of France, Switzerland, Germany, some parts of Northern Italy, practically the whole of the Balkans, the southern parts of Norway and Sweden, etc., fall within this sub-group.

The northern parts of the North American west coast get a good rainfall all the year round from the South-West Anti-Trades (South-Westerlies). It is 80″ in the wetter parts, but progressively less eastwards. The warm North Pacific Drift keeps the west coast warm in winter, and when in summer New York on the east is nearly as hot as Bombay, the west coast is kept cool by the influence of the sea. Southern Chile similarly receives its moisture from the N. W. Anti-Trades (North-Westerly) all the year round, and is kept cool by the cold Peruvian and the Antarctic Currents. Tasmania and New Zealand also fall within the

Westerly Wind Belt; only the extreme northern end of New Zealand, lying in the same latitude as Spain, has a climate somewhat comparable with that of the Mediterranean lands. Rainfall, of course, varies from a maximum of well over 40″ in the western parts to about 20″ in the east. The maximum in Tasmania is usually over 40″, while that of New Zealand is over 70″. The climate is oceanic and hence equable.

Vegetation.

The natural vegetation of these Cool Temperate Regions, like that of the Monsoon lands, is said to be the Deciduous Forest. But the Deciduous Forests of the two climatic regions differ; in the Monsoon lands trees shed their leaves in the hot season as a means of protection against the drought; in the Cool Temperate Regions this resting period comes in the cold season for protection against the oncoming frosts. These Temperate Deciduous Forests generally provide good timbers of the hardwood variety; the timber is of course softer and much more easily worked than that of the Equatorial forests. The oak, elm, maple, beech and birch are the typical varieties. But this picture is truer of Europe than of other places: most of North-Western and Central Europe was formerly covered by Temperate Deciduous Forests; but in North America they are a rarity; several types of evergreen conifers reign supreme even in the Cool Temperate Oceanic areas. In Southern Chile, again, Cool Temperate Deciduous Forests occur; but conditions are somewhat different in Tasmania and New Zealand, of which little is definitely known yet.

Man.

The Cool Temperate Climate is said to be the most conducive to human progress, because it is cold enough to induce man to take to manual work for maintaining bodily warmth in winter, nor are the summers so hot as to render outdoor work unpleasant and irksome. Both individuals and races appear to mature slowly but surely, and once maturity is attained it proves to be more permanent. Most of the great

industrial countries of the world—Britain, France, Germany, Belgium and Czechoslovakia—are located in this region.[1] We are also told that the marine regions have the most invigorating type of climate; and so far as human energy is concerned, North-West Europe, Western U. S. A., and Canada rank the highest. Man is said to be most active when the atmosphere is moist, the weather variable, and temperatures range from 40°F. to 70°F. These conditions are all found in the marine regions lying within the Westerly Wind Belts; there the atmosphere is moist all the year round, weather varies frequently but moderately, and temperature generally ranges from 40°F. to 70°F. Man is said to be most active physically under temperature conditions ranging from 55° to 70°F,—conditions obtaining in summer in the marine regions we are considering here; and he is mentally most alert when it is about 40°F. out-of-doors,—a condition often found to exist in marine regions, especially in the equatorward half of them, as the average winter temperature.[2] But to theorize thus is perhaps going too far on dubious grounds. The enormous industrial development of Western Europe and the U. S. A., no doubt, give plausibility to such theories; but what about the growth and development of civilisation in countries which do not furnish these physical conditions? To turn, however, to facts, the Temperate Forests—both Cool Temperate and Warm Temperate—have been rapidly depleted to make room for agricultural, pastoral and industrial development. This depletion of the Temperate Zone Forests has given rise to serious problems: already there is a shortage of softwood in many countries, especially in the U. S. A., and many experts are of opinion that there will be a similar shortage of hardwood within a generation.

[1] Chisholm's *Handbook of Commercial Geography*, p. 45.

[2] See E. Huntington, *Civilization and Climate*, pp. 82—147.

Ways and means are, therefore, being devised now for the development of tropical forestry.[1] Most of the areas formerly covered by Cool Temperate Forests, particularly in Europe, are now under temperate cereals like wheat, barley, oats and rye; in the warmer parts we find maize. Fruits are also abundant, and include apples and pears. The Cool Temperate Regions of North America are also said to be equally suited for similar development; but considerable areas of British Columbia are too mountainous for settlement, and the deep valleys separating the mountain ranges are often very thirsty, precipitation in certain areas mounting no higher than 5″ a year. New Zealand is also being rapidly developed. Southern Chile, however, still remains quite undeveloped, because rainfall is too much and the region is too mountainous to be developed with profit and ease.[2]

Location.

10. High Latitude East Coast Margins.—These regions are confined to the Northern Hemisphere, because the land masses of the Southern Hemisphere are too narrow for the development of the climatic conditions peculiar to the East Coast Margins of the High Latitudes. These regions are located generally in the same latitudes as the Deciduous Forest Regions, but are on the eastern side of the continental land masses. The north-eastern parts of the U. S. A., the Maritime Provinces and the St. Lawrence Valley of Canada comprise this group in North America. In Asia the group is comprised by Manchuria, Amuria,—and probably by those parts of North China which border on them. Though these regions occur in the same latitudes as the Deciduous Forest Regions, these east coasts are not located in the Westerly Wind Belt; so despite the moderating influence of the ocean,

[1] Case & Bergsmark, *College Geography*, pp. 147—151.
[2] Chisholm's *Handbook of Commerical Geography*, p. 45.

which, no doubt, greatly modifies the extremes of heat and cold, these are regions of far lower temperature in winter than are the corresponding areas on the western margins of the northern continents—the Deciduous Forest Regions. Summers are, again, hotter. The two regions may best be considered separately: General character.

(*a*) *The Laurentian Type of Climate,*—is found around the mouth of the St. Lawrence in North America, but may be held to extend farther so as to include north-eastern U. S. A., the Maritime Provinces and the St. Lawrence Valley of Canada. Rainfall occurs all the year round because mainly of the N. E. Trades, and is well distributed. The natural vegetation is woodland or forest consisting of a mixture of deciduous and coniferous trees. Oats, wheat, barley and rye, as well as much potato, are grown, and the people practise mixed farming as in England. But dairy farming is the most important industry; more than half the cows of Canada, as well as two-thirds of the sheep, pigs and poultry, are found in the St. Lawrence basin and the Martime Provinces. Nearly three-fourths of the people of Canada also live there. The New England States occupying the extreme north-east of the U. S. A., still comprise a similar region of mixed farming. But the moist climate being suitable for cotton manufacture, nearly two-thirds of the cotton goods of the U. S. A. are made in this region. Woollen manufactures are also important. Various other industries are also carried on. The climate, though less severe than that of the Prairies owing to the proximity of the sea, is extremely cold in winter because of the cold Labrador Current. The St. Lawrence becomes ice-bound for three or four months of the year, and the ports of Montreal and Quebec cannot be used in winter. The ports of St. John and Halifax, on the Atlantic seaboard, however, remain open all the year.

(*b*) *The Manchurian Type of Climate,*—is often regarded as a sub-type of the China Type. It exhibits close resemblances to the Laurentian Type, but differs from the latter in respect of rainfall, which is essentially monsoonal. It is, moreover, characterized by sharper contrasts because of the greater size of the land mass of Asia. Dairen on the shores of the Yellow Sea has an average January temperature of 24°F., while the temperature rises up to an average of 76°F. in July or August. Harbin farther north has a January average of about zero and a July average of about 72°F. Rainfall, being monsoonal, is restricted to the summer; but the total rainfall is much less than it is in Japan: Moukden has an annual average of 26·1″ and Harbin of 18·7″. Like Montreal and Quebec of Canada the port of Vladivostok remains ice-bound in winter. The climate, though severe, is healthy, and suited particularly to cereal farming. Valuable forests grow; the most important of the timbers is the Manchurian pine; spruce, silver fir, red pine, larch and oak are also obtained in large numbers. As yet forestry has not advanced up to normal expectations. Manchuria is said to be one of the most favoured agricultural spots in the Far East. The chief crops are soya beans, kaoliang, millet, maize, wheat and rice; of these the soya bean is the typical crop, occupying, as it does, nearly a quarter of the total area under cultivation. Manchuria has been witnessing a steady immigration of peoples from the neighbouring lands, particularly from China and Japan, for some time; of the immigrants the Chinese, however, form the majority. It has well been described as a "Land of Opportunities."[1]

[1] See *Manchuria, Land of Opportunities,* published by the South Manchuria Railway Co. (New York, 1922), and the *Report on Progress in Manchuria,* 1907-28, published by the same company at Dairen, 1929.

A comparison of the two regions—the Laurentian tracts of America and the Manchurian tracts of Asia—would at once reveal that the latter still remain to be developed—both agriculturally and industrially, and Manchuria, in fact, has great possibilities in the future. But the enormous industrial development of those parts of the U. S. A. which fall in this tract and of the corresponding parts of Canada has given rise to a new economic problem as they are "no longer self-supporting in the matter of food-stuffs."[1] In the American tract, however, no national rivalry is seen; but Manchuria has become a cockpit of the Far East, because of the rivalry of the Chinese, the Japanese and the Russians. Both China and Japan are over-populated, and are bent on migration into Manchuria. Japan, moreover, is an industrialised country, depending on foreign supplies for raw materials and foodstuffs. The interest of the Chinese farmer is much the same though; for he is equally in need of obtaining foodstuffs from Manchuria; but his outlook is different; he is scarcely interested as yet in obtaining raw materials for large-scale industries. The outlook of Russia, again, is different; she is not interested in immigration at all; but Manchuria is practically the only outlet for her vast territories on the Pacific. Thus, although all these three nations have deep interest in the development of Manchuria, their ideas and modes of activity are often at variance, and hence the conflict. The development of Manchuria at present is, however, being carried on chiefly by these Chinese settlers, but it is made possible mainly because of Japanese capital. Russia, on her part, has practically nothing to do by way of helping this process of economic development as her attention is engrossed with the development of the vast Siberian territories; her outlook, so far as Manchuria is

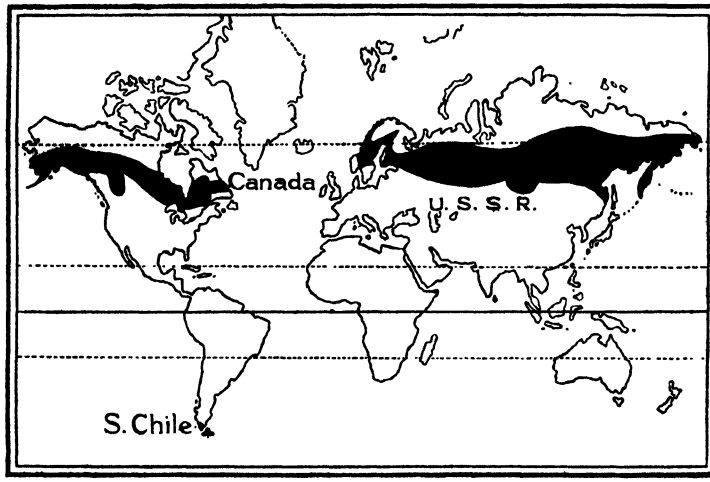
A Comparison of the two tracts.

[1] Chisholm's *Handbook of Commercial Geography,* pp. 45-46.

concerned, is more political than economic. It still remains to be seen, owing to this conflict of interests, whether or not Manchuria is developed in the future after the American model.

Location and Extent.

11. The Coniferous Forest Regions.—Located northward beyond the Deciduous Forests and the High Latitude East Coast Margins are the vast Coniferous Forest Regions of the world, forming almost a continuous sub-Arctic belt from the north-western confines of Europe to the north-eastern shores of America, broken only in the midway by the narrow Behring Strait. In America this belt includes the forested interiors of Alaska and Canada nearly as far south as the St. Lawrence river, and, though farther off



THE CONIFEROUS FOREST REGIONS.

from the Arctic Circle towards the east, it touches the southern limits of the Frigid Zone westwards. In Eurasia

this belt of conifers embraces the forested areas of Norway, Sweden, Finland, North and Central Russia, and Siberia. In various places it penetrates beyond the Arctic Circle. But the Coniferous Forest Regions are not wholly confined to the Northern Hemisphere alone, although the extent of similar forest regions in the Southern Hemisphere is unimportant and negligible. Only the extreme south of South America and the mountains of New Zealand have a climate comparable with that of the coniferous forests of the north. It is well to admit here, however, that thousands upon thousands of square miles of these forest regions remain as yet practically unexplored and unmapped. The average temperature in most places is low, with an annual average of less than 40°F. The seasonal range in places near the ocean is comparatively small; but in the heart of the forest region the climate is of the Continental sub-Arctic type—often called the Cold Temperate Climate, which, like all other types of the Continental Climate, is characterized by an extreme seasonal range. Midsummer temperatures of 80°F. are common, and in many places reading of 90°F. or over have been obtained. In some places a seasonal range of over 100°F. has actually been recorded,—the greatest range in the world. Thus in the town of Dawson on the Yukon temperatures of 95°F. and —68° F. have been registered. A drop of 40° within 24 hours is not also uncommon. The Cold Pole of the earth, as far as our present knowledge goes, really belongs to this region; at Verkhoyansk in Siberia a temperature of —93·6°F. has been registered; this is said to be 20° or 30° lower than the estimated minimum at the North Pole.[1] Winters are very long,—nowhere less than of

Temperature.

[1] But probably the continent of Antarctica has the lowest temperatures; there temperatures as low as —24°F. in midsummer and —75°F. in late spring have been recorded. See Roald Amundsen, *The South Pole* (1929).

seven months' duration; and summers correspondingly short, being confined to a period of three months where they are the longest, and connected by a month of spring and another of autumn. Winter generally commences in September,—on the poleward margins even earlier,—accompanied by severe frosts and a rapid fall of temperature. Along the Yukon in Canada and Alaska, as well as along the Amur in Siberia, sharp frosts occur before the third week of August has elapsed. Snow-storms are common. Thus before the month of November slips away, the forests are covered with the first layer of snow. The advent of spring is heralded by the break-up of the ice on the northern rivers. It is in April that the snow generally begins to disappear; but the growth of vegetation does not commence till May; yet as late as June snow is frequently seen on the wooded northern slopes in North Russia. With the extreme range of temperature there is a corresponding seasonal range in the length of day and night. During the winter nights are long and days correspondingly short. The brief summer again, is characterized by days as long as eighteen or twenty hours or more, with the result that the land warms up to a remarkable degree. Precipitation is small, varying generally from 7 to 15 inches annually, and but for the low rate of evaporation most of these forest regions would be semi-desert. A little less than half the total annual precipitation comes as rain during the three summer months of June, July and August; the greater part of the precipitation comes in the form of snow; this snowfall, though by no means wholly restricted to winter, occurs mainly in the cold season. There is a progressive decrease of both summer rainfall and winter snow from south to north. The rivers of these regions in the Northern Hemisphere flow in a general northerly direction towards the Arctic Ocean because of the general slope of the land in that direction, and remain ice-

Precipitation.

bound throughout the winter. In the spring the upper courses in the warm south melt, while towards the Arctic Ocean it is still winter, with the result that flood waters spread far and wide so as to turn the coniferous forests into a vast forested morass. This is particularly true of Siberia. The land surface of these regions reflect the effects of glaciation; continental glaciers moving southwards have scraped off the soil and carved out many a glacial lake basin. Thousands of lakes, as well as swampy lands, are seen in Northern Canada, Sweden, Finland and Siberia. Finland, it is interesting to know, is said to have more than 50,000 lakes of various size, and 12 per cent of her total area is said to be covered by inland waters.[1] The natural vegetation everywhere is the evergreen Coniferous Forest or Taiga—"the world's great storehouse of soft-wood timber, such as pine, fir, and deal."[2] The thick-skinned resinous leaves of these trees are said to be a protection against both cold and unusual loss of moisture. The finest trees are found in the warmer southern parts; farther south the forests pass into mixed hardwood and softwood forests—deciduous and coniferous trees; polewards they pass into the stunted trees peculiar to the Tundra region. In the southern margins it takes fifty or sixty years for a timber forest to regenerate, while in the northern tracts this would normally require a period of two hundred years.[3] In the Tundra margin trees as old as fifty years may be only a few inches in diameter and less than ten feet high.[4] The great Coniferous Forest Belt of North America is the most important in the world; the Scandinavian and Russian forests of Europe are less extensive; the timber of the vast

Vegetation.

[1] Case & Bergsmark, *College Geography*, p. 474.

[2] Chisholm's *Handbook of Commerical Geography*, p. 46.

[3] *Ibid.*

[4] Case & Bergsmark, *College Geography*, p. 475.

Siberian forests is often of a poor quality because of their swampy conditions.

Animal.

Man.

Fur trade.

Soft wood industry.

The animals of these regions are protected from the cold by thick and multi-coloured fur; the silver fox, the patch fox, the Chinchilla rabbit, the mink, and a host of other furred animals were abundant in the past. The primitive man, who knew little of fibre-textiles, was primarily a hunter and trapper; when he slew an animal he obtained at one stroke both food and clothing. And even in the modern world furs are highly prized, especially by women, because of their beauty, style, costliness and warmth. The main fur-producing regions are round the Hudson Bay in Canada and the forest regions of Siberia.[1] But as pointed out by H. F. Osborn of the American Museum of Natural History, the pace with which man is sweeping away the mammals of the earth would result in almost total extinction of most of the species by the middle of the present century. In Canada and Alaska a number of regulatory measures have been adopted for the preservation of the fur-bearing animals. A pair of high-grade silver foxes in Canada, we are told, is now worth several thousand dollars.[2] Another important industry in these regions is, of course, the soft-wood industry. The timber is required for a variety of uses like building, fuel, mine props, etc., but the produc-

[1] Fur is not wholly a product of the Coniferous Forest Regions; it is found in the Tropics as well. The port of Bombay, for instance, exports large shipments of fur every year; these are obtained mainly from the mountainous tracts of Asia. Many of the best tropical pelts are, however, collected in high altitudes where the atmosphere is much similar to that of the cold north. Argentina, Paraguay and Uruguay also export furs through Buenos Aires. Best furs are, however, obtained from the colder latitudes.

[2] Case & Bergsmark, *College Geography*, p. 479.

tion of wood-pulp for paper is rapidly outweighing all. The trees are felled in the winter, and are dragged over the snow to the rivers, whence they are carried to the saw-mills when the snow melts. Many of the soft-wood forests of the world have been depleted; large reserves now exist only in Canada and Russia. These forest regions are generally good sources of water power. The land surface, being dotted about with innumerable glacial lakes, provides natural catchments and storage basins for the rivers, most of which run along the slopes in a series of rapids and falls. These conditions make possible the construction of hydro-electric plants, and with them the growth of manufacture. Another factor contributing to the growth of industries is the abundance of raw materials—especially wood and minerals. Northern Canada has valuable deposits of gold, silver, copper, nickel, zinc, cobalt and asbestos. Northern Scandinavia is celebrated for high-grade iron ore, some of which contain as much as 60 per cent pure iron. The extreme shortness of summer conditions in these regions is insufficient for the ripening of cereals; nor is the glaciated soil fertile enough for crop production. But since the loss of moisture is small the production of some of the hardier crops is possible in certain areas. Thus some oats and barley are grown in specially favoured spots; but agriculture in these regions will always remain a minor industry.

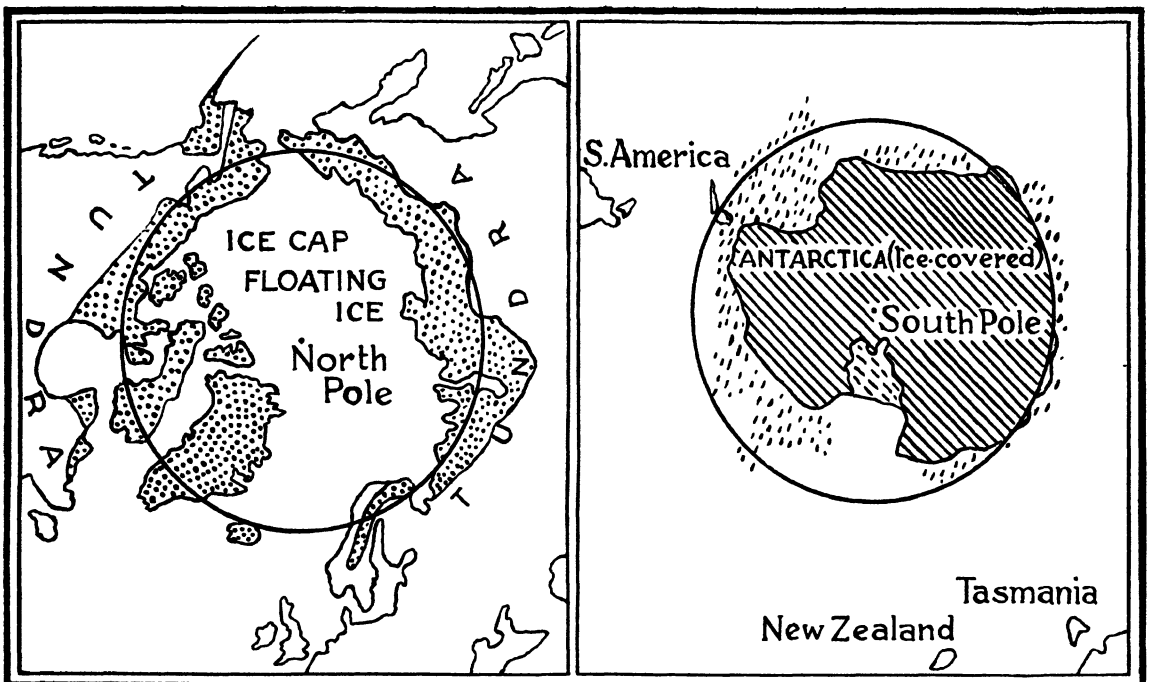
Power and Manufacturing.

Minerals.

Agriculture.

12. The Tundra or Cold Desert Regions.—These are located roughly within the Arctic and the Antarctic Circles. The curvature of the earth in the two polar regions is, however, not similar. The North Pole is pretty closely surrounded by land, while the South Pole is located within a small continental landmass thickly covered with ice. Within the Arctic Circle is located the cold Arctic Ocean, within the Antarctic Circle the ice-covered continent of

Location and Extent.



TUNDRA AND COLD DESERT REGIONS.

Antarctica surrounded on all sides by vast stretches of water and ice. Nearly the whole of Greenland and the adjacent islands, as well as the northern fringes of Canada, Alaska, Scandinavia and Siberia enter into the Arctic Circle, and thus constitute the Tundra or Cold Desert Regions of the Northern Hemisphere. The continent of Antarctica falls almost entirely within the Antarctic Circle. In these high latitudes the winters are naturally very long and summers correspondingly short. The sun never sets for some months during the summer and never rises in winter. But even in midsummer the sun never rises far above the horizon, although the effects of its low altitude are somewhat balanced by its continuous presence for months on end. Such pronounced seasonal conditions naturally result in a corresponding range of temperature. The summers are warm for the latitude except on snow fields and high lands; winters are cold everywhere. And although the records obtained as yet show that the 'cold pole' of the earth (Verkhoyansk) does not fall within the Arctic region, there is good reason to believe that the winter temperatures of Antarctica are lower still. There is, however, considerable variation of temperature in these regions. Thus in the Arctic areas of North America the lowest temperature yet recorded is —68°F.; in regions near the sea it is not so cold, the lowest figure obtained in the northern coast of Canada and Alaska is —54°F. in mid-winter. The Arctic regions of east central Siberia are, however, colder; but the coastal regions of Norway in the same latitude are 40° to 60° warmer than the east central regions of Siberia, owing, no doubt, to the warm winds and ocean currents from the Atlantic. Though the sun is never very high above the horizon in summer, it shines for many days together, with the result that the land has scarcely any time to radiate the accumulating heat in course of the exceedingly short nights.

Temperature.

The atmosphere consequently is extremely hot for the latitude: a temperature of 90°F. is not uncommon in the lower Tundra, and in some places a shade temperature of even 100°F. has been recorded. Not much is known yet about the temperature conditions of Antarctica, although it is quite probable that the lowest temperatures prevail there in winter. Naturally we might think of a greater seasonal range obtaining there as the continent is a fairly big land mass. But it is a fairly high plateau, too, where it may be considerably above 100°F. in the sun but quite or even below freezing in the shade, if actually shade there be,—a characteristic similar in this respect to that of Tibet. Amundsen, writing of this region, speaks bitterly of the "terrific intensity of the gales which blow almost incessantly" over Antarctica.[1] Precipitation, as in the Hot and Temperate Deserts, is almost non-existent except for occasional snowfalls which at times assume the proportion of snow storms. The Westerlies (Anti-Trade Winds), it is interesting to note, acquire a spiral movement as they sweep poleward; this movement about either pole is known as the 'circumpolar whirl;' and since the whirling wind has an inevitable tendency to rise the polar regions are, contrary to our expectation, area of low barometric pressure although the temperature is very low. The air, thus rising above the poles, moves equatorward, and settles to the surface in the Horse Latitude Belts. From the Horse Latitudes it moves to the Equator so as to merge into the regular Trade Winds, thus establishing a perfect circulation.[2] The Polar Regions are too cold for forests. The natural vegetation in the Arctic Tundras is moss and lichen, with small bushes and stunted trees near about the Coniferous Forest Belts. Grass

Precipitation.

Vegetation.

[1] Roald Amundsen, *My Life as an Explorer*, p. 67.

[2] J. F. Chamberlain, *Geography*, p. 56.

and herbs are also not rare; in fact, these have earned for certain regions the descriptive name of 'Arctic Prairies.' The remarkable growth of vegetation during the brief summer is actually quite amazing; indeed the Arctic plants and flowers leap through the different stages of growth to maturity in no time, as it were. Orchids, violets, lilies, poppies, buttercups and many other species are found in abundance; for every ton of mosses and lichens, we are told, there are at least ten tons of flowering plants.[1] But the soil, as well as the climate, is almost totally unfit for the raising of crops. The richness of summer vegetation, too, has little economic value. The most notable animals of this Tundra Region are the musk ox and the caribou or rein-deer. Hares and lemings are also important. Among the carnivores the celebrated polar bear reigns supreme despite his numerical weakness; wolves and foxes are found in larger numbers. During the brief summer swarms of mosquitoes, flies, gnats and other insects make life pretty nearly impossible for man and beast alike. The seal, the walrus, the whale, as well as several kinds of fish and birds, are found in the adjoining seas and the coastal lands of both the polar regions. Life in the polar regions, it needs no mention, is as hard as it can be. And yet man has braved the hardships as well as the dangers. The Eskimos, the Lapps, the Samoyedes, the Yakuts, are the actual inhabitants of the Arctic regions. But the population is naturally very small. Thus it has been estimated that the Canadian Tundras, which cover roughly a million square miles, has much less than 5,000 permanent inhabitants; Greenland probably has 14,500; and Alaska with all its mining, fishing, and pastoral fecilities has about 10,000 people. The chief occupations of the people are hunting, fishing, and tending

Animal Life.

Man.

[1] V. Stefansson, *The Northward Course of Empire*, p. 52.

the reindeer. The white man has introduced mining and reindeer farming in some places, especially in Alaska. Most of the Eskimos are a coastal people, living on the sea sides of Canada, Labrador and Greenland. Their food is obtained by hunting the polar bear, the seal, the duck, goose, gull etc., and by fishing. Eskimos living in the interior tend the reindeer. Some trade is also carried on with the white men. The Lapps are a semi-nomadic people depending mainly on the reindeer as do the nomadic hordes of the Hot Deserts on the camel. They also hunt and fish, and carry on a kind of primitive trade with the white men in the neighbouring areas of Norway and Sweden. The Yakuts and Samoyedes live in the Arctic regions of Siberia, and are mainly pastoral peoples. The Government of the U.S.A., have done much for the development of the Arctic region of Alaska, and the Second Five Year Plan (1933-37) of the U. S. S. R. has also done much to develop the possibilities of the Siberian Tundras. It seems not unlikely, therefore, that these regions have fairly good possibilities in the future. Yet they must remain relatively undeveloped for an indefinite period hence, if not for all time to come.

IV. HIGHLAND REGIONS

Various Climatic Zones on highlands.

Regions of Diversity.—A poleward march from the Equator may be likened to a slow but steady ascent along the precipice of a plateau or a mountain. As in the former we pass through a variety of climatic or natural regions, so in the latter we cannot fail to behold a somewhat similar change of climatic conditions with a corresponding variation of flora and fauna. Thus at the foot of the mighty Himalayas we come across vegetation belts broadly comparable with the Equatorial or Tropical Forests. As we ascend higher tropical shrubs and 'Alpine pastures' unfold themselves before

our gaze. Farther up come into our view Coniferous Forests which gradually fade into Arctic conditions near about the snowline, beyond which is eternal snow rivalling and even surpassing the thick blanket of snow over the plateau of Antarctica. Yet the conditions are nowhere exactly the same on the mountains as they are on the plain surface of the earth; for the elevation and the consequent rarefaction of the atmosphere cannot fail to make much difference. What is, however, most important for commerce is the fact that, highlands afford conditions for the growth and production of a wider variety of products than would otherwise be possible: the limitations imposed by the latitude are matched to a great extent by the altitude. Thus crops specially suited to a temperate climate can be grown with sufficient care on a tropical plateau or mountain, other things being favourable. Sheep and cattle may well be tended, as in Switzerland, on the 'Alpine pastures' of the great Himalayas. Wood-pulp even for newsprint, which was so long supplied from Scandinavia, Finland and Canada, and is now practically cut off owing to the War, may be obtained from the Himalayas, particularly in Kashmir, and India may reasonably hope to be self-sufficient as regards this important commodity.

STUDIES AND QUESTIONS

1. Define a natural region and give an illustration with a description of an area that may be so described (C. U. Inter., '23).

2. What do you mean by a 'natural region'? Into how many natural regions can the world be divided? Name them and indicate their position in a map. (I. P. S., '31, '32).

3. Describe the climatic regions with special reference to the animal and plant life to be found in each of them. (C. U. Inter., '24).

4. What do you mean by a Mediterranean type of Climate, and in what parts of the world other than the Mediterranean region this climate is found? (C. U. Inter., '27, B. Com., '25).

5. Account for the Mediterranean type of Climate, and compare it with the monsoonal type. Also give the chief products in each of them. (C. U. Inter., '25, '30, '33, '35, '40; B. Com., '29, '33.)

6. What are the chief conditions which determine the position of deserts both cold and hot? Do you know any desert of commercial value? (C. U. Inter., '27).

7. Explain the following phenomena:

(*i*) In the Mediterranean region most of the rain falls in winter months.

(*ii*) Civilised man is found mostly in the lowland regions of the Temperate Zone. (I. P. S., '32).

CHAPTER IV

THE SOIL AND THE MAJOR SOIL GROUPS OF THE WORLD

The Soil.—The importance of soil cannot be overstated; on it we depend, directly or indirectly, for our food, clothing, and shelter. It is, in fact, an essential condition for the existence of all forms of life. Its importance.

Soil is chiefly ground-up rock, containing sometimes as much as 95 per cent mineral besides some organic matter derived from the decay of plant and animal life. The virgin soil is a product of a variety of factors, of which the following are more important than others,—(*a*) the type of the parent rock material, (*b*) drainage, (*c*) climate, and (*d*) natural vegetation. We are, as it were, instinctively prone to suppose that the nature of the soil of any place is determined chiefly by that of the parent material, and actually the belief was current till lately among the students of pedology. But there is overwhelming evidence to show that this is not the case; climate has a more important effect on the formation of soil than the influence of the parent rock material.[1] Thus a lateritic soil is formed in the Tropics, where the dry and wet seasons alternate, almost independently of the underlying rocks. The celebrated 'black earth' of the North American plains is a type to be found almost solely in the semi-arid grasslands of the Temperate Zones. The typical Russian 'black earth' or chernozem is derived from various materials, from volcanic Nature of soil

[1] Shantz & Marbut, *The Vegetation and Soils of Africa*, p. 120. See also Stamp, *Modern Geographical Ideas*, p. 9., and Glinka, *The Great Soil Groups of the World and their Development*, p. 19.

lava, loess, granite, and boulder clay; throughout the whole region the climate and vegetation are very nearly the same. Where the rainy season coincides with the hot season soil formation goes on rapidly; but in the Mediterranean regions, where the wet season coincides with winter conditions, the process is very much slower.

Types of soils.

Like climate soil may also be classified into a number of types, and indeed there are, we are told, nearly fifteen hundred kinds of soil,—an astounding number which, we are further informed, is ever on the increase with each advance in the field of soil investigation.[1] Soils differ from one another in two particulars,—*mechanical* or *physical properties* and *chemical constituents*. Physically they differ in *texture* or the condition of their particles. Thus soils may be coarse or fine, porous or compact and tenacious. On the basis of texture they may be classified as *sands, silts,* and *clay*. A sandy soil is light, a clayey soil is heavy, and when a soil contains a relative abundance of vegetable matter in its mould it is called loamy (silts). Actually these characteristics are more or less indeterminate. A sandy soil is not all sand, but contains a proportionately large amount of sand and small quantities of silt and clay. Silt loam soils contain much clay, less silt and yet lesser sand. Again a soil may be termed a *residual soil,* thus emphasizing not its texture or chemical constituents, but merely stressing the fact that the soil is that part of the weathered rock which has not been transported elsewhere. And contrarily a soil found in a place far from its origin is called *transported soil.* Winds, rivers, glaciers, etc., are the agents of such transportation. When a soil is transported by a glacier it is called a *'drift soil,'* and the terms *'alluvial'* and *'eolian'* are applied to

[1] C. F. Shaw, *The Soil Series Names,* pp. 85-101.

soils transported or deposited by running water and wind respectively.

The texture of soil is scarcely less important than its other properties for crop production. Certain crops thrive well on sandy coarse-textured soils, others on silt loams, and still others on a clayey soil. Potato, for example, does not grow as well on a heavy clayey soil as on porous sand and sand-loams. A sandy soil is relatively easily worked and easily permeated by water when there is rain or when water is supplied by means of irrigation; it also allows moisture to rise from great depths by the action of capillarity.[1] This is an advantage to plants which do not require the retention of much moisture about the roots, and in regions having frequent and abundant rainfall during the growing season. Plants with contrary requirements and cultivated in regions of relative dryness cannot thrive on a sandy soil. Another interesting thing about porous soils is that, in moist climates they are warmer than heavy and compact soils because of the superior dryness of their outer layers. So light porous soils are commonly described as dry and warm in contrast to clays, etc., which are called wet and cold. Sometimes a soil is too compact to allow the access of air to the roots, and so is infertile.[2] Fine-textured soils are, however, generally more fertile than coarse-textured soils, because other things being equal the former provide more food to the plants than the latter as finer particles are more readily

Soil texture

[1] Chisholm's *Handbook of Commercial Geography*, p. 52. Capillarity is the power of exerting capillary attraction or repulsion. A capillary is a minute hair-like hollow tube, as one of the ramified blood-vessels intervening in the human body between arteries and veins, exerting the forces of attraction and repulsion on the blood coursing through the intricate network of veins and arteries. The action by which liquid diffuses itself through a lump of sugar is also due to capillarity.

[2] *Ibid.*

dissolved in moisture and enter the small rootlets more easily. This is one of the chief reasons why alluvial soils are almost invariably the most fertile.

Soil structure.

But it is inadequate to classify soils only on the basis of texture, which is purely a mechanical or physical property. Soils differ from one another as much in *structure* as in texture, and what is perhaps more important, structure is essentially due to the presence of certain chemical substances like calcium, magnesium, potassium etc., as well as of organic matter, or, as it is often called, humus, which is the product of vegetable and animal decay. Soils closely similar in texture are often found scattered over regions widely different in general climatic conditions; but this is scarcely the case so far as structure is concerned, because structure, being a reflection mainly of the chemical and organic constituents of the soil, must differ from one climatic region to another. Alluvial lands, especially large deltas, are commonly remarkable for their fertility because, in addition to the fine texture of the soil, they contain chemical substances, as well as organic matter, derived from the whole basin of the rivers forming them. The almost inexhaustible fertility of the Ganges delta is an outstanding example. So also are the beds of dried up lakes. The areas of heavy rainfall all the year round are generally much less fertile than we would normally expect them to be, because the rains carry away either into the subsoil or away in the drainage waters huge quantities of mineral plant foods from the soil, and combined with uniformly high temperature the abundant precipitation results in a most rapid chemical weathering of the rocks. The comparative infertility of the Equatorial Regions is a case in point.

Soils also differ in colour, and colour as a fairly faithful reflection of the inner chemical and organic composition of

the soil is an important characteristic and index. A red colour ordinarily indicates the presence of iron oxide, a reddish-brown colour that of iron oxide and organic matter, a light colour is an index of a lack of important ingredients, whereas a black soil is almost always found to be extremely rich in plant foods and humus.

Colour of soils.

Soils may also be very broadly classified as (a) *lime-accumulating* and (b) *non-lime-accumulating* soils. The lime-accumulating soils are, on the whole, alkaline, and suitable to crops. It is said that the presence of lime usually "indicates an abundance of some or all of the essential mineral fertilizers."[1] Non-lime-accumulating soils cause the formation of acid humus which are generally destructive to crops. There are acid tolerant plants, however; but they are mostly useless for man and his domestic animals, and the weeds that thrive under acid conditions are often a serious menace to agriculture and transport.

Lime-accumulating and Non-lime-accumulating soils.

I. NON-LIME-ACCUMULATING SOILS

The Laterite of the Tropical Rain Forest.—The laterite is a type of soil, commonly red in colour and with an open honeycombed structure. It is characteristic of the tropical and the sub-tropical climates, being due to rapid decomposition of the rock because of "rapid changes in temperature, and the alteration of wet and dry seasons." The red colour is due to the presence of iron, which rusts as it comes in contact with air and water; and iron and alumina form its chief constituents.[2] It is poor in humus and mineral plant food, because the lime, potash and magnesia are all dissolved by the high humidity and temperatures,

A poor soil.

[1] Case and Bergsmark, *College Geography*, pp. 76-77.

[2] Chisholm's *Handbook of Commercial Geography*, p. 55.

and washed away by the abundant rainfall. Even the silica gets dissolved in the high temperature of the Tropics, and is thus washed away by rain-water, and deposited as a cementing substance in underlying sands. In addition, excessive leaching, which is a direct result of the heavy showers, also make the soil poor. But this general infertility of the soil is partly offset by the action of such creatures as the earthworm and the termite, aiding in a marked degree the decomposition and disintegration of organic matter.[1] The climatic conditions are also a balancing factor. Thus these soils, when cleared of the forests, are suitable for plantation crops like bananas, oil palms, spices, rubber etc. But since the characteristic heavy showers interfere again with the fertility of the soil, the inhabitants are obliged to move from one place to another from time to time in pursuit of fresh lands to be cleared for crop production. This is especially the case in the Equatorial Regions or the Tropical Rain Forests.[2]

Red and Yellow Soils of Tropical and Subtropical Regions.—On the poleward side of the laterites are found the red and yellow soils. In these regions rainfall is less uniform, and temperatures lower than in the Equatorial Rain Forests. The climate usually has long dry spells, and the winter temperature is low. These red and yellow soils are, like laterites, poor in humus, phosphates, nitrates and potash. But the process of leaching is definitely low. So these soils are generally of a more compact structure, and consequently more fertile. But they require a

Comparatively fertile.

[1] Glinka, *The Great Soil Groups of the World and Their Development*, p. 50.

[2] As pointed out by Stamp, "the term 'laterite' is freely applied to many red earths in which the solvent action has not gone so far." These may, therefore, be fairly fertile. See Chisholm's *Handbook*.

good deal of fertilizing ingredients from time to time for crop production. Where fertilizers are not in use cultivated areas are abandoned for a period and new areas are cleared for agriculture.

Grey Soils of the Coniferous Forests.—Podsol is typical of these soils. It is extremely low in black humus and soluble mineral salts. The ash colour is due mainly to the bleaching of the surface soil. Under the ash-coloured surface there is found a horizon of coffee-brown, an indication of some decomposed organic matter. Materials like iron, alumina etc., are sometimes found in this horizon.[1] Since these soils are located in the regions of low temperature, where, unlike in the tropical areas, evaporation is low, ground water easily accumulates in large quantities, and the land is subjected to abundant percolation of water, with the result that the surface horizon is rapidly leached of iron and alumina and other minerals. The soil seems to contain much acid, and is generally unfit for crops unless an abundance of lime be applied. Infertile.

Grey-Brown Soils.—These are generally found between the red and yellow soils of sub-tropical regions and the grey soils of the conifers, and cover considerable areas of mixed Coniferous and Deciduous Forests. These are generally less leached than are laterites, red soils and podsols, and are of greater fertility. Of medium fertility.

The Black and Dark-Brown Soils of the Prairies.— These are generally of a well-knit granular structure, and, though non-lime-accumulating because of moderately abundant rainfall, are deep and rich in humus owing to their Fertile.

[1] Shantz & Marbut, *Vegetation and Soils of Africa*, p. 121.

thick grass cover. Rainfall, however, is not as heavy as to wash away plant food, and temperatures are not generally high enough to cause excessive decomposition of rocks. These soils constitute, therefore, excellent areas of crop production.

LIME-ACCUMULATING SOILS

Very fertile.

Black Soils of the Grassy Plains.—These are, generally speaking, the most fertile soils on earth, with an excellent structure, an abundance of humus, and a large storage of mineral plant food and lime. These are found in the extensive plains of the Middle Latitudes, and are covered with grass. In North America the 'Black Earth Region' lies west of the Prairies which also contain black and dark-brown soils. Russia also has a vast tract of 'Black Earth' or Chernozem, lying in a general east-to-west trend across a considerable portion of the territory. The lime-accumulating black soils have developed in regions where rainfall is moderate—approximately 15 to 20 inches annually; it is sufficient for a rapid decomposition of organic matter, but insufficient for washing it away. Since the soil is deep and rich it is excellent for a variety of crops. But rainfall being strictly limited, only those crops that thrive well in a relatively dry atmosphere can actually be cultivated. Of these wheat, of course, is the chief crop.

Fertile.

Chestnut-Brown and Brown Soils.—These are found generally between 'Black Earths' and brown soils in areas where precipitation is comparatively low, and grass cover less luxuriant. The structure is good, lime and the essential mineral foods are fairly abundant, and, though comparatively poor in humus content, these soils by no means lack organic matter. Hence they are well suited for crops. As yet, however, these regions are mainly used for grazing, agri-

culture being of secondary importance. Wheat, again, is the chief crop; but failures often result mainly because of drought.

Grey Soils of the Desert.—The soil of arid regions, we are told, are in many cases chemically very rich.[1] But chemical weathering is at a minimum because of the meagre rainfall and sparse vegetation. But mechanical disintegration is high owing to extremes of temperature and frost. Hence the soil at the top horizon at any rate shows fine grains. The humus content cannot but be low owing to a lack of vegetation, and soil is easily blown about by strong desert winds. But it is not enough to note this blowing about of soil; for desert regions are also supplied with fine soils borne aloft by winds from neighbouring regions. These wind-borne soils collected from wide areas frequently add to the potential fertility of the desert soil because of a great variety of ingredients. Desert plants, though generally stunted, almost invariably possess enormously long roots, and these parts of vegetation being rich in nitrogen tend to add to the potential fertility of the soil. These are the reasons why, when water is available, rich harvests are reaped in desert regions.

Potentially fertile.

Soil Conservation and Soil Treatment.—Soil erosion is caused by various factors, the most important of which is running water. No sooner rocks decompose rain water begins to wash away the particles along the slopes towards the oceans. Soil erosion, we are told, has assumed alarming proportions in the U.S.A., whence nearly 513 million tons of silt and 270 million tons of dissolved matter are annually carried to the sea by the rivers of that country. It

Soil erosion hazard.

[1] Chisholm's *Handbook of Commercial Geography*, p. 55.

has been estimated that this is a loss of mineral plant food approximately twenty-one times as great as that caused by plants by way of the absorption of food. Soil thus removed is said to have totalled that of an area of 13 million acres, nearly double the area of Belgium.[1] Such may well be the history of soil erosion in all lands. But the rate of erosion is by no means even approximately the same everywhere. Even in North America it is widely different. Thus it was once shown by actual measurement that 7 inches of the surface soil was removed from a Missouri farm land in 24 hours, whereas in bluegrass sod the same type of soil is carried away at the rate of only 7 inches in 3,547 years.[2]

Prevention of erosion.

Methods of preventing soil erosion must be based on the principle that if all the rain water be completely soaked into the ground where it falls, soil erosion would be reduced to a minimum. Hence methods are to be devised for the storage of as much rain water as possible, as well as to reduce its velocity in order to reduce its power of transportation. But soil cannot be made to store up water indefinitely, because that capacity depends upon its porosity. Hence methods are to be employed for increasing the porosity of the soil. How can this be done? It can be achieved by deep plowing, thorough incorporation of organic substances in the soil, seeding land to pasture, growing timber, planting cover crops, contour plowing, hillside ditching, and terracing.[3]

Waning of fertility.

It has been aptly said that, though the soil may be made to yield indefinitely, it is by no means indestructible. In China thousands upon thousands of acres of land have been cultivated for more than forty centuries, and yet the soil remains fertile. In the Nile Valley they have been

[1] Case & Bergsmark, *College Geography*, p. 85.
[2] *Ibid.*
[3] *Op. cit.*, p. 86.

raising crops for fifty centuries, and the soil does not yet show any sign of exhaustion because of its yearly rejuvenation by the sediments borne thither by flood waters. On the contrary, the valleys of the Tigris and the Euphrates, once the granaries of the Middle East, are now barren land. Enormous tracts in India, southern Europe, southern U.S.A., are now lying waste, thoroughly depleted.[1] The fact is that however rich a particular type of soil may be, its fertility will be on the wane, sooner or later, as a result of cultivation, unless, of course, adequate steps are taken for its rejuvenation, because plants by subsisting on the soil take away its food materials. To offset this two methods are generally employed. One is to vary the crops on the same plot of land. Since different plants live on different food materials or at any rate on the same materials in different proportions, this varying of crops prolongs the youth of the soil by drawing out its substances slowly one by one, and yet the cultivator is not obliged to sit idle all the while. Moreover, when a particular type of crop is drawing away a particular type of substance the soil finds some time to replenish other types of materials by the natural processes of soil formation. Further, it is not necessary always to root out a plant entirely from the land, and so the residual parts of the plants help to restore to the soil much plant food. But this method of varying the crops does not always give the expected results as it is, in essence, a method only of prolonging the youth of the soil by drawing away from it as little material as possible; it acts, on the whole, in a negative way. Hence the necessity for adopting a positive method which would replenish the lost materials. This can only be done by fertilizers. And what might seem rather strange is the fact that the quantity of materials restored to

Rejuvenation of soil.

[1] *Op. Cit.*, pp. 68-69.

the soil by fertilizers need not be equal to that withdrawn by the plants; it may be considerably less, and yet the best results are obtained. Strange as it may seem, this is due to the fact that the food absorbed and hence taken away by the plant does not come entirely from the soil, but much of it is derived from air and water as well. A plant containing, say, one ounce of nitrogen might have derived only a fraction of it from the soil, and when fertilizing we are to replenish the soil with only that part of the material which the plant has taken away from it, or even a lesser quantity may be replenished, because the soil also is perpetually replenishing its lost properties by natural means. And just as by the use of manure we replenish the deficiencies of the soil, so by means of irrigation we can remedy the deficiencies of rainfall. But, again, irrigation has its limits, too; and in many arid or semi-arid lands 'dry farming' is practised. This consists in various ingenious means devised for conserving the moisture contained in the soil. Often stones are spread thickly over the surface in order to prevent evaporation from the soil by the direct rays of the sun. This is a characteristic practice in many of the drier parts of the Mediterranean region. Such an arrangement of stones, straw, leaves, manure etc., is called a mulch.

STUDIES AND QUESTIONS

1. What is the nature of the soil in your locality?

2. Give a short description of the major soil groups of the world.

3. Enumerate briefly the steps that may be taken to prevent soil erosion and to restore its fertility.

4. Compare sandstone and limestone soils as to fertility.

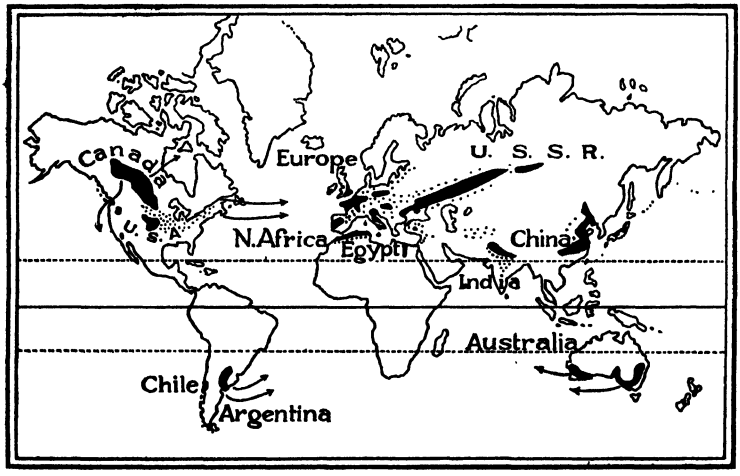
5. Was there a time when there was no soil upon the earth?

CHAPTER V.

COMMODITIES OF VEGETABLE AND ANIMAL ORIGIN

I. Cereals

Wheat.—Wheat like barley, oat, and rye is believed to be essentially a crop of the Cool Temperate lands.[1] Some two decades ago there was discovered in Palestine a wild wheat which, according to the botanists, is the ancestor of Varieties.



WHEATLANDS OF THE WORLD.

the present-day cultivated varieties. This wild wheat has been found to be resistant to both drought and smut, and it is, therefore, thought possible to derive from it varieties which

[1] Stamp, *A Commercial Geography*, p. 43.

will stand semi-arid conditions as well as moisture. In fact it does. The range of wheat is great; it is cultivated from Alaska and Siberia to the Argentine Republic, and from sea level to altitudes of several thousand feet in the tropical areas.[1] Consequently it has developed such a large number of varieties as are very nearly countless, and most of these varieties are so well acclimatized to local conditions that they would not flourish except in particular regions. Indian wheat does not thrive on English soil, nor English wheat in an Indian habitat. There has of late been developed a few varieties of wheat which ripen in the short summer of Alaska, north-west Canada and Siberia. And all these varieties differ in the composition of the grain as well, having been developed under different climatic conditions.

Conditions of growth.

The climate for the production of wheat must, of course, be temperate, and the weather, during the seeding and germinating periods as well as during the early growth, must be moist and cool; but warm bright weather is essential when the heads of the stalks are being formed, and a little sprinkling rain immediately before the grain begins to ripen; for the ripening, however, a warm dry weather is absolutely essential. Of all the important cereals of the Temperate Zone, except maize, wheat requires a higher temperature, and that is why its northern limits lie south of the belts of oats, rye and barely.[2] Most of the great wheat lands have three months with an average temperature of 60°F, and a rainfall varying from 15 to 35 inches a year; but in Australia the rainfall is only 8 inches and dry farming is the rule. The best soils for wheat are light clays or heavy loams. But very heavy clays have also been known to produce large yields of the very best quality of wheat. On lighter soils also the quality

[1] J. F. Chamberlain, *Geography*, p. 190.

[2] Chisholm's *Handbook of Commercial Geography*, p. 120.

may be as good, but the quantity is smaller. The best crops are derived from moderately stiff soils; but it has been observed that other conditions being favourable any type of fertile soil is quite suitable for wheat. The best wheat lands are to be gently undulating for the use of field machinery, as well as for ensuring good drainage.[1] The chernozems or black earths of Russia and the American prairies are the two most outstanding examples of the best wheat lands of the world.

Groups of wheat

Wheat has been classified into two main groups:

(*a*) *Winter Wheat,* which is sown in the autumn or 'fall', and hence the name 'Fall Wheat'. Throughout the winter the seeds lie covered in the ground by a layer of snow, and then begin to grow in the spring. In countries where the ground is frozen hard owing to intense cold in the winter, as in the Canadian prairies, winter wheat is a failure. In tropical lands like India wheat is sown in autumn as a winter crop when the rains have ceased, and the crop grows during the winter so as to be ready for harvest before the summer, still rather dry, appears with its scorching rays.

(*b*) *Spring Wheat,* sown in the spring, do, however, ripen at the same time as winter wheat. Countries like Siberia or the Canadian prairies where winters are intensely cold produce this type of wheat. In Canada and Russia they have developed a few varieties which ripen during a growing period of 90 days between the last frost of spring and the first frost of autumn.

Character and Quality.

Since the different varieties of wheat are highly acclimatized, it is only natural that they should differ from one an-

[1] "Tenth Census of the U.S.A.", quoted in Chisholm's *Handbook.*

other in both character and quality. Thus Australian wheats are of a white colour, the American varieties bright red, those of the Mediterranean and Monsoon lands hard, and so on. In order to obtain the best flour different varieties of wheat are blended in varying proportions.[1]

Wheat producing countries.

A moment's glance at the map will at once reveal the location of the great wheat belts of the world; nearly all the important areas, it will be seen, are located outside the Tropics, and even in India most of the wheatlands lie actually beyond the Tropic of Cancer; another fact to be noted is that none of the important wheat belts reach the 60th parallels. From the point of view of production Europe, even excluding Russia, heads the list with a little more than a third of the total production of the world; North America comes next with a little less than one-third; about a quarter is grown in Asia including Russia; Australia, Africa and South America produce comparatively small quantities of wheat. The position of the different countries in respect of wheat production may be better understood from the table on page 99.

The most noteworthy feature there is perhaps the phenomenal decline in Russia's large output in the years immediately following the Bolshevik Revolution. Under the Soviet Government, however, she has again been restored to her former level; this is due to her planned economy. A similar decline was also visible in post-war Germany; under the present Nazi regime she has increased her output much above the pre-war level. A word or two may, however, be added here: the figures for 1935 definitely show the U.S.S.R. to top the list, if the production of a single year be deemed

[1] Stamp, *A Commercial Geography*, p. 45.

enough for such a comparison. The total annual output of the world at present has been estimated at 120 million tons or 4,450,000,000 bushes of 60 lbs. each,[1] and the total acreage has been estimated at 330 millions of acre.[2]

The World's Wheat Production[3]

1909-13		1921-25		1931-34	
Countries & States	Percentage	Countries & States	Percentage	Countries & States	Percentage
U. S. A.	18	U. S. A.	21	U. S. A.	17
Russia	18	Canada	10	U. S. S. R.	17
India	9	**India**	9	Canada	10
France	9	France	9	France	8
Canada	6	U. S. S. R.	8	**India**	7
Argentine	5	Italy	6	Germany	6
Italy	5	Argentine	5	Italy	4
Germany	4	Australia	4	Spain	4
Australia	2	Germany	2	Argentine	4
Others	24	Others	26	Australia	3
				Others	20
Total	100	Total	100	Total	100

Wheat-growing countries of the world may be roughly classified into two groups,—those cultivating the crop mainly for home consumption, and those from which large quantities are annually exported. Although Europe, even when Russia is excluded, is still the greatest wheat-producing continent, most of her countries belong to the first group; not to speak of export, these countries are to make up the deficiency by imports. Of these only Russia is a notable exception.

Two groups of wheat-producing countries.

[1] Chisholm's *Handbook of Commercial Geography*, p. 127.

[2] Stamp, *A Commercial Geography*, p. 43.

[3] This table has been adapted from Stamp's *A Commercial Geography*, p. 46, where he makes use of diagrams instead of a table.

Why Europe imports wheat?

Countries and states like the U.S.A., Canada, Argentina, Australia etc., export large quantities of wheat every year, and hence belong to the second group. But there are countries, again, which formerly used to export wheat, but now require most of their produce for home consumption. India is the outstanding example among such countries; Russia is another example, and the U.S.A. of late has been coming into the line. But why does Europe, albeit her large production, import wheat? This is simply because her entire production, more than a third of the world's total, is not sufficient to meet her needs; Europe consumes over half the world's total.[1]

A comparison of yields of different countries

Of all the European countries, excluding Russia, France is the largest, and correspondingly has a larger acreage under wheat than any other of these countries or states. But the yield per acre[2] is only moderate, being only 24 bushels an acre. The Mediterranean lands have a still lower yield; the average in Italy is 21 bushels per acre, in Spain it is as low as about 13 bushels. The countries of North-Western Europe, however, rank very high in this respect; the average for the United Kingdom has been estimated at 33·5 bushels, for Belgium 40, for Denmark 43, and it is as much as 45 bushels per acre in Holland. Germany gets a return of 32 bushels for every acre of land. It is, again, 21 in Hungary, 17 in Bulgaria, 13 in Rumania; and although Russia is one of the largest producers of this cereal, if not actually the largest, her out-turn per acre comes as low as 11 bushels on the average. The wheat belt of Russia almost completely

Europe

[1] Stamp, *A Commercial Geography*, p. 47.

[2] Figures relating to the yield per acre of different countries have been obtained from *The International Year Book of Agricultural Statistics* quoted in Chisholm's *Handbook*, p. 121.

overlaps with the famous chernozem or black earth which runs right across the south from the borders of Rumania into southern Siberia so as to touch the Chinese borders on the east. The severity of winter obliges the Russian peasant to cultivate spring wheat over most of the region; all through the rest of Europe the cultivation of winter wheat is the general rule. North America is another important continent for the production of wheat, and the Canadian prairies together with the adjacent areas of the United States form an enormous wheat belt. But the cereal is also cultivated in the comparatively fertile areas of the plateaus within the Rocky Mountain folds. There are thus quite extensive wheat lands in the north-western states. And as in the Mediterranean lands of Europe so also in the Mediterranean land of California this cereal is grown. And yet the average yield per acre in North America is not impressive, being 19 bushels in Canada and only 15 in the United States. The last Great War (1914-18) acted as a fillip to Canada's output; Canada nearly doubled her out-turn within the rather brief span of four years, and she has been maintaining that standard all these years, if not actually increasing her output steadily since the standard was reached. The present Great War is quite likely to accclerate her pace. Canada is now the world's largest exporter of wheat. As in Siberia so in Canada most of it is spring wheat. In South America the wheat-growing centres are the Argentine, Uruguay and Central Chile. Of these the Argentine now occupies the second place among the wheat exporters of the world. In Asia the important wheat-growing countries are India, China, Japan and Manchuria. In China very little wheat is grown in the south, but in the central and northern parts of that great sub-continent, and particularly in the latter, it is the dominant crop. It has been rather vaguely estimated that a total of about 37 million acres in China is under wheat, and the

North America

South America

Asia

annual production may be something like 15 million tons.[1] The yield per acre is, therefore, not impressive, although the quantity is quite large. So far as the amount of absolute output is concerned, China ranks second in the world, as the figures for 1935 show, the first place, according to the same figures, is occupied by the U.S.S.R. China does not export wheat. Japan also grows a fairly large amount of wheat, over one million acres being under it; but it is there only a secondary crop used entirely for home consumption. The average yield per acre is fairly good—28 bushels. Manchuria, especially the northern part of it, is said to be an ideal wheat country; but at present about 7¼ million acres, or a little more, are under this cereal, and it is still of lesser importance, although some amount of it is annually exported. The most important wheat fields of India lie in the United Provinces, the Punjab and the North-Western Frontier Province; but there are wheat fields of some importance on the plateau of Peninsular India as far south as the Dharwar district of the Bombay Presidency. Some amount of wheat is also grown in northern Bihar, particularly in the north-western tracts of the province; but it disappears gradually down the Ganges Valley with increasing heat, moisture and rainfall, although not entirely before entering the middle-west parts of Bengal. The Punjab, however, is the chief wheat-producing region of India. Nearly 30 million acres in India are under this crop; but the average yield per acre is very low—only 10 bushels an acre annually. Figures for 1935, however, show that from the point of view of absolute production India ranks fourth in the world, the third place being occupied by the U.S.A. India used to export wheat formerly, but now the surplus is too small to be exported, and in some years she even imports some

[1] Stamp, *Asia*, p. 464-465.

wheat. The wheat fields of Africa are small, and confined almost entirely to the Mediterranean regions like Morocco, Algeria, Tunis, and above all Egypt. The Cape Town region on the south-western coastal fringe of Africa has also a Mediterranean type of climate, and produces small quantities of wheat. There are two wheat belts in Australia,—the one in the south-east where there is rainfall all the year round, the other in the south-west where a Mediterranean type of climate prevails. Of these the former is by far the more important belt, and though there is rain at all seasons the amount of precipitation is not heavy, varying as it does from 10″ to 40″ annually, and the production of wheat is concentrated more especially in the areas where rainfall ranges from 20″ to 30″. The Mediterranean region which receives its heavenly moisture during the winter has an average rainfall of 20″ to 40″.

Africa

Australia

Wheat is of course a natural food crop, and ranks the highest amongst the food grains in respect of the total acreage under it. From the point of view of world production, however, it can be bracketted with maize and rice. But it is by far the most important of the food grains from the point of view of international trade.[1]

Position of wheat as regards production and trade

[1]The Relative Importance of Chief Food Grains

Crop	Acreage in millions of acres	Annual production in millions of metric tons	Percentage of total export
Wheat ..	330	125	20
Maize ..	200	125	6
Rice ..	200	125	4
Oats ..	150	75	2
Rye ..	120	35	3
Barley ..	100	40	7

This table has been taken from Stamp, *A Commercial Geography*. It may be noted here that the figures are only approximate, and that "grains form an important part of the diet of over 99 per cent. of mankind."

Preparations of wheat

The chief use of wheat is of course for food; by far the greatest portion of the world's total output is milled into flour, and, as already mentioned, different varieties are often blended for obtaining the best flour. Of the various sorts of food prepared from wheat may be named, besides loaves and bread, the Italian delicacies called macaroni and vermicelli. Large quantities of starch are also obtained from wheat, while the straw is extensively used for fodder, for stable mattresses, straw boards and the cheaper grades of wrapping paper.

World trade in wheat

The quantity of wheat entering into the world trade was, it has been estimated, something like 17·4 millions of tons on the average annually during 1909-13; during 1921-25 it was about 17 millions, and in 1931-33 something like 17·7 million tons. Since the trade is on the increase the total at present is about 20 million tons a year, and with this we are to add another 4 million tons of flour. The chief exporters, as it can be seen, are Canada, Argentina, the U.S.A., and Australia. The chief importers are the United Kingdom, Italy, Germany, France, Belgium, Holland and Switzerland, —and also both Japan and Brazil.

The Export of Wheat[1]

1909-13		1921-25		1931-33	
Countries & States	Percentage	Countries & States	Percentage	Countries & States	Percentage
Russia	24·5	Canada	35	Canada	31
Argentine	14	U. S. A.	25	Argentine	20
Canada	11·5	Argentine	20	Australia	19
Netherlands	8·5	Australia	12	U. S. A.	7
U. S. A.	8·25	India	3	U. S. S. R.	7
Rumania	7·5	Others	5	Rumania	2
India	7·25			Hungary	2
Australia	6·75			Germany	2
Others	11·75			Others	10
Total	100	Total	100	Total	100

[1] The table which has been adapted from Stamp, who uses diagrams instead of a table, is only approximate.

The Import of Wheat[1]

1909-13		1921-25		1931-33	
Countries	Percentage	Countries	Percentage	Countries	Percentage
Gr. Britain	32	G. Britain	31	Gr. Britain	32
Germany	14	Italy	16	France	10
Belgium	12	France	8	Belgium	7
Netherlands	11	Germany	8	Italy	6
Italy	9	Belgium	7	China	6
France	6	U. S. A.	3·75	Germany	5
Switzerland	3	Netherlands	3	Brazil	4·5
Brazil	2	Switzerland	3	Netherlands	4
Others	11	Japan	2·5	Japan	4
		Brazil	2·75	Greece	3·5
		Others	15	Switzerland	3
				Others	15
Total	100	Total	100	Total	100

Industrialization of W. Europe and wheat import.

Europe, though still the greatest producer of wheat, has been steadily growing more and more dependent on foreign supplies of this commodity; this is mainly due to her industrialization. The chief wheat-importing countries are those of the west of Europe, where manufacturing industries have largely supplanted agriculture. There are only six countries in Europe, showing an excess of exports over imports, and they are Russia, Rumania, Hungary, Yugoslavia, Bulgaria and Poland. Formerly France and Spain also exported some amount of wheat, especially in the years of plenty; now both of these are wheat-importing countries. England in the eighteenth century was not only self-supporting in respect of this commodity, but could even sometimes afford to export more than a quarter of a million bushels of wheat. But with the development of her cotton manufacture the scale began to be turned till at last she came to be wholly

Self-supporting countries of Europe

Present position of France, Spain, and B. Isles.

[1] Adapted from Stamp's *A Commercial Geography.*

dependent on foreign supplies. She is now the largest importer of wheat in the world. It has been estimated that even shortly after the middle of the last century the United Kingdom could grow on an average between 70 and 80 per cent of all the wheat required for home consumption; whereas the average of recent years has sunk down to less than 15 per cent. The institution of a wheat quota and the removal of the free-trade policy by the National Government in 1932 has, it is said, stimulated home production to some extent.[1] The present European War is quite likely to act as a fillip to her production.

Barley.—Barley is now the most widely distributed cereal, and many writers are of opinion that it is the oldest of the cultivated grains.[2] It matures in Norway as far north of the Arctic Circle as 70°N., and in Liberia within 10° of the Equator.[3] Any soil or any climate that is good enough for wheat is also good for barley, and it is in such climate and soil that the best barley is grown. But its range is wider than that of any other cereal. It can also mature very quickly, and thus flourish in the short northern summers or in "the brief warm spells of high mountain valleys." It also flourishes in most of the Mediterranean lands. But it is decidedly less tolerant of moisture than wheat, and does not, therefore, grow in the moist parts of cool temperate lands like Britain. On the whole the wheat-growing regions and the barley-growing regions coalesce rather intimately, especially in the southern countries of Europe as well as in lands surrounding the Mediterranean, which are too dry in summer for maize; but barley is commonly restricted to the drier and colder and hotter parts,

Conditions of growth

[1] Chisholm's *Handbook of Commercial Geography*, pp. 123-127.
[2] *Op. Cit.*, p. 130.
[3] J. F. Chamberlain, *Geography*, p. 199.

as well as to a poorer soil. In the northern countries of Europe the barley-growing regions coalesce with those of oats, because these lands are generally too cold for wheat. Europe is the largest producer of barley, growing about half the world's total,[1] and Russia is by far the most important barley-producing country in the world, with nearly one-third of the world's total produce.[2] The whole of the Southern Hemisphere produces only about 2 per cent of the world's total. Generally speaking, the yield per acre of barley is larger than that of wheat.

Production

The chief use of barley, like that of wheat, is for food. Barley-bread is an important article of food in Japan, Scandinavia, India and North Africa. But the bread is rather heavy, and with the rapid extension of commerce barley has come largely to be replaced by wheat. It now forms part of the ration for horses, cattle and pigs in many countries. One of its chief uses for man now is in the form of drink, not food, since it is extensively used in the preparation of alcoholic drinks like beer and whisky. Large quantities of starch and malt are obtained from the grain.

Preparations of Barley

Russia was by far the biggest exporter of barley before the World War of 1914-18, and Germany the biggest importer. Since the War Canada and the United States usurped Russia's place as exporter, but the chief importers remained the same. The importers, it is interesting to learn, are the big beer-drinking countries of Europe. Recently, again, Canada and the U.S.A. are falling into relative unimportance.

World Trade in Barley

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[1] Stamp, *A Commercial Geography*, p. 51.

[2] J. F. Chamberlain, *Geography*, p. 199.

Export of Barley

1909-13		1921-25		1931-33	
Countries	Percentage	Countries	Percentage	Countries	Percentage
Russia	65·5	U. S. A.	23	Rumania	24
Netherlands	10	Rumania	22	U. S. S. R.	21
Rumania	6	Canada	21	Argentine	10
Hungary	4·5	U. S. S. R.	9	Canada	8
India	3·5	India	7	U. S. A.	5
N. Africa	3·5	N. Africa	4	Poland	4
Austria	3	Others	14	Others	28
U. S. A.	3				
Others	1				
Total	100	Total	100	Total	100

The total annual export during 1909-23 was 5·7 million tons, during 1921-25 it sank down to only 2 million tons, rising subsequently in 1931-33 to 3·1 million.

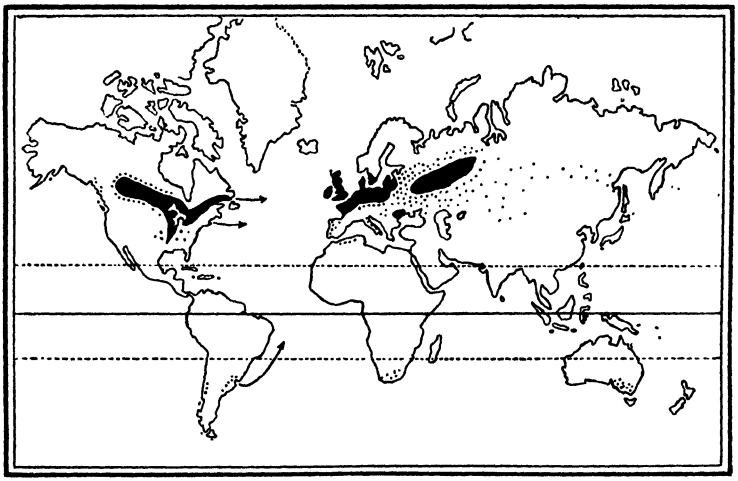
Import of Barley

1909-13		1921-25		1931-33	
Countries	Percentage	Countries	Percentage	Countries	Percentage
Germany	53	Gr. Britain & Ireland	41	Gr. Britain & Ireland	22
Gr. Britain & Ireland	19	Germany	23	Germany	16
Netherlands	14	Belgium	12	Netherlands	15
Belgium	7	Netherlands	11	Belgium	14
France	3	Others	13	France	12
Norway	2			Others	21
Others	2				
Total	100	Total	100	Total	100

The average annual production of barley is said to be 40 millions of metric tons, of which only 7 per cent enters into world trade.

Oats.—The conditions best suited for the production of this crop are basically the same as those for the cultivation of wheat and barley; but oats require, on the whole, a more moist and cool climate. It has a wider latitudinal range than wheat, and thrives well on a greater variety of soils.[1] But it is equally right to say that it has, from another viewpoint, a more limited range than both wheat and barley. Indeed it would

Conditions of growth



THE OATLANDS OF THE WORLD

be quite a fascinating study to compare the relative distribution of these three cereals, all of which are pre-eminently Temperate Region crops. Oats have a wider range than both wheat and barley, because they grow in regions which may be a trifle too dry for wheat, but not at all so for barley, as well as in regions which are too wet for both. Moreover,

A comparison

[1] Chisholm's *Handbook*, p. 129.

oats thrive well in areas too cool for wheat, but not at all too cool for barley. But wheat and barley easily flourish in climes too hot for oats. Thus it happens that in the northern countries of Europe oats are the associates of barley, not of wheat; but in the southern countries of Europe, which are too hot for oats, barley and wheat go together, the former generally penetrating farther south just as it pushes beyond the oat belts in the cold north; whereas in the wetter parts of the Temperate Zone oats only predominate. Thus in the western parts of the British Isles, which are damper, oats grow in abundance, but not a stalk of barley is to be seen. So it is in Newfoundland with a cool moist climate. The hotter parts of the Mediterranean lands, where wheat and barley are grown, are also devoid of this crop, and as for the tropical and semi-tropical countries like India and China, oats never grow at all.

Production

The great oat-producing countries of the world are: the U.S.A., Russia, Germany, Canada, France, Austria, Hungary and the United Kingdom. Whether it is Russia or the United States of America that heads the list as the greatest oat-producing country in the world we cannot definitely say, because different writers, relying on different figures, are at variance with one another on this point.[1] Europe, excluding Russia, produces about 40 per cent of the world's total production. It is a very important crop in

[1] Thus Stamp writes: "Russia is the largest producer and the largest exporter . . . . " Chamberlain writes: "As a producer of oats, the United States holds first place, our yield being about one-third of the world's crop." Figures for 1913-17 show that the U.S.A. produced 30·18 per cent. of the world's total, while Russia came up with only 18·84 p.c. In 1925-30 the U.S.A. produced 1300 millions of bushels of oats, while the U.S.S.R. (Russia) produced a little more than 1000 millions of bushels.

Ireland and Scotland, and if we take the British Isles as a whole we find that it is the leading cereal there. Large quantities of it are also grown in Denmark, Holland, Belgium and the lands surrounding the Baltic Sea. Besides the United States, Canada is an important producer of oats. The Argentine and Chile, however, are practically the only oat-producing countries south of the Equator.

Oats usually are used as food for horses and cattle, and that is one of the reasons why it is imported in large quantities into countries engaged in the dairying industry. But it is also—though rarely—used for human consumption. Oatcakes, oatmeal porridge and some other like delicacies are well appreciated in Scotland and some of the Scandinavian countries. In the former place these delicacies formed the staple food of the people as late as the end of the eighteenth century.

Uses of Oats.

The quantity of oats entering into world trade is, however, meagre; only about 4 per cent of the total production comes to the international market. This is because, with the exception of one or two countries like the Argentine and Chile, for example, most of the countries produce it for home consumption. Before the European War of 1914-18 nearly half the quantity entering into world trade used to come from Russia, and the remainder used to be supplied by Canada, the U.S.A., and the Argentine. The chief importer still is Great Britain; of the other countries importing oats Switzerland, Belgium, Holland, Austria and Denmark are important,—countries engaged extensively in dairy farming.

World trade in oats

Rye.—Rye has been well described as a "poor relation" of wheat;[1] it grows, therefore, under conditions similar to

Conditions of growth

[1] Stamp, *A Commercial Geography*, p. 54.

the growth of the latter crop. But it is a hardier plant than its 'aristocratic relation', and has no such exclusive choice of soil; it will flourish at a lower temperature and in much poorer soils, and is, therefore, cultivated in both high latitudes and high altitudes. In Russia a large quantity of rye is grown far to the north of the celebrated 'Black Earth' Zone, and in Norway, because of the moderating influence of the warm ocean current, it is cultivated as far north as the Arctic Circle.[1] It is grown extensively on the marshy and sandy tracts of the Great European Plain, as well as on the Central Plateau of France and the North-Western highlands of Spain.

Production

Europe is the leading producer of rye, and of all countries Russia ranks the highest in this respect. The bulk of the world's rye—nearly 95 per cent—is grown on the mainland of Europe and Asiatic Russia. The highest concentrations are found in the areas lying east of the Rhine and north of the Alpine ranges; almost a continuous stretch of rye fields extends from Northern Belgium across Germany into Poland, flanked on the north by the lesser fields of Holland, Denmark, Southern Sweden, East Prussia, Lithuania, Latvia, Esthonia and Southern Finland, and on the south by those of South Germany, Austria, Czechoslovakia, Hungary and Southern Poland. Towards Eastern Poland the fields grow somewhat less concentrated till they reach the western borders of the U.S.S.R.; here again we notice another enormous belt of rye, far surpassing the other, lying in a general north-easterly direction, flanked on all sides by innumerable fields of lesser concentration. Russia produces more than 50 per cent of the world's total; Germany ranks second among the rye-producing countries, and Poland pro-

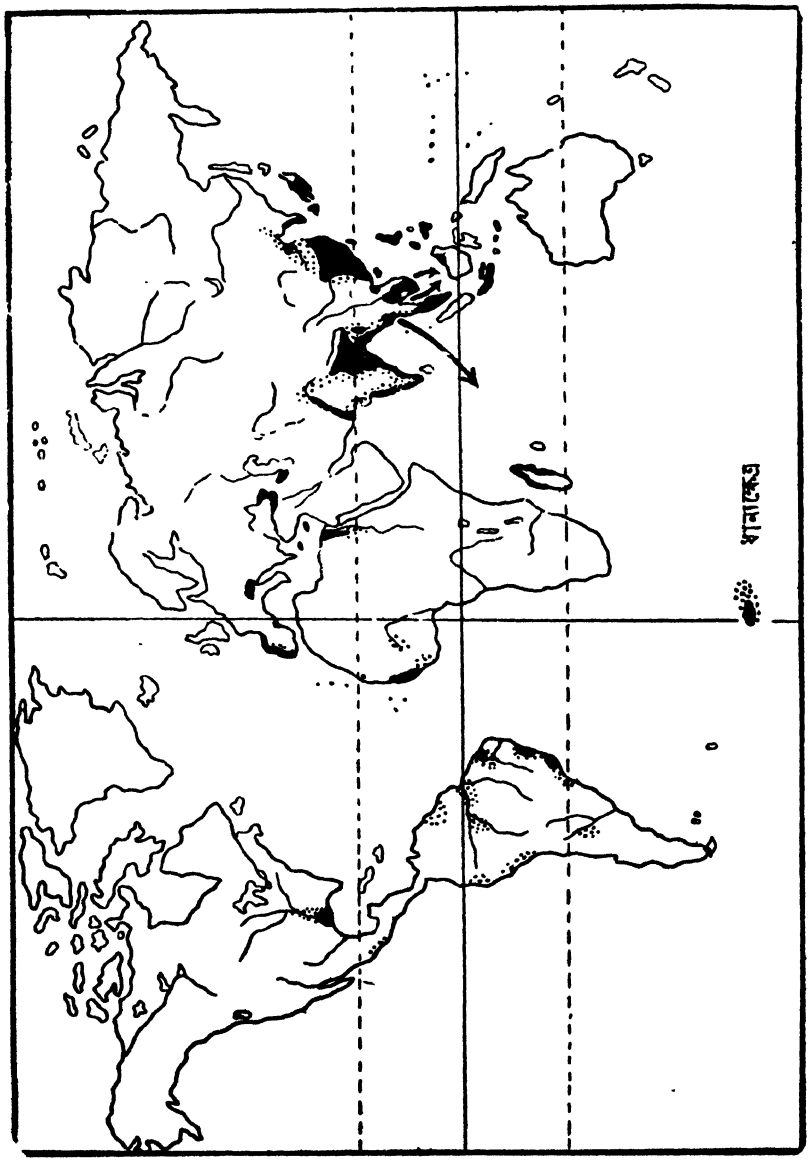
[1] J. F. Chamberlain, *Geography*, p. 197.

fields are first roughly ploughed under water, which is prevented from draining away by means of carefully raised embankments on all sides of the field, and the seeds are sown as in nurseries. Then the tiny plants begin to grow under the water till they shoot out their fine stalks about six inches above the water level, when the cultivator transplants them by hand in several rows in the flooded fields. As the plants begin to grow the water is allowed to drain away gradually, and by the time the paddy ripens the fields are dry. For the ripening of paddy a temperature between 75°F. and 80°F. is needed. Rainfall must be abundant during the sowing season as well as in the earlier part of the growing period. But excessive showers during the ripening season is extremely injurious, sometimes even causing a total failure of the crop. That is why rice is best grown in the Tropical Monsoon lands. Where the annual rainfall is below 45″ it is seldom raised. If the temperature be uniformly 80°F. or a little higher during the ripening period, the grain matures with almost incredible rapidity and under like conditions as many as five crops a year have actually been harvested.[1] Usually, however, two crops are obtained annually. In more temperate regions rice is a summer crop, wheat or another temperate cereal being the winter crop. It has an average growing period of 135 days. Cultivation.

It is, again, difficult to say definitely whether India or China is the largest producer of rice in the world. Even the leading geographers are not quite definite on the question. Thus we are told in one place that the total rice production of China is something like 40 million tons a year[2]; and in another place precisely the same quantity has been credited to India, obviously excluding Burma, and yet China Production.

[1] Stamp, *A Commerical Geography*, p. 56.

[2] Stamp, *Asia*, p. 464.



RICELANDS OF THE WORLD.

is said to produce a larger quantity.[1] Still again we are told that India is the largest producer of rice.[2] The anomaly is not wholly explained by saying that the figures for India have so long been mixed up with those for Burma. China proper exclusive of Manchuria is of the same size as, if not actually a little less than, India exclusive of Burma (India 1,575,187 sq. miles, China 1,532,800 sq. miles). A third of the total area devoted to food-grains in India is said to be under rice; whereas the corresponding figure for China has been estimated at 'rather more than a quarter' of the total area under food-grains. In both the countries rice, though most important, is not the sole staple food. But, again, three rice crops a year are said to be China's average; whereas the corresponding average for India is said to be only one crop a year. The actual fact is that no definitely reliable figures are available. But it is absolutely certain that India and China are the two leading rice-growing countries of the world, and may well be bracketted together, without even a close second. The next largest producer is Japan with less than a fifth of the production of either China or India. The other important rice-growing countries of Asia are Indo-China (both British Indo-China which is Burma and French Indo-China) and Siam (Thailand); Ceylon, Malaya, and the East Indies do not grow as much rice as is needed for home consumption. In Europe rice is somewhat important only in Italy and Spain. In Africa Egypt is an important producer, with Sierra Leon a close second. In North America fairly large quantities of rice are grown on the coastal region of the Gulf States near the Mississippi delta and in the Sacramento valley of California. It has also been introduced in British Guiana. The coastal regions of Brazil

India *vs.* China.

Other countries.

[1] Stamp, *A Commercial Geography*, pp. 56-57.

[2] Case & Bergsmark, *College Geography*, p. 214; J. F. Chamberlain, *Geography*, p. 202.

and Guiana in South America are fairly important in this respect.

Preparation and Use of rice.

As is quite well-known, the first operation after harvesting is the threshing of the paddy, which is then put through the hulling machine. The grain is next screened and the kernels polished. Rice is thus given a white look and rice flour is obtained through this operation of polishing. The straw is used in making mats, ropes, bags, hats, raincoats, sandals, and even houses are sometimes thatched with it. The husk is used for filling mattresses and in packing goods. A number of distilled liqueur and other intoxicating drinks are made from the germinated grain. Rice being richer in carbo-hydrates than wheat, considerable amount of starch is also made from it. Rice is the staple food of nearly one-third of the world's population. The whole of the enormous quantities grown in India and China is consumed at home. So it is in Japan, which, in addition, imports large quantities from other places in order to meet her internal needs. Rice is also the staple food in Burma, Siam and French Indo-China; but these countries, thinly peopled that they are, produce a larger quantity than is needed for home consumption, and can, therefore, spare a good deal to carry on an export trade. Ceylon, Malaya and the East Indies, on the other hand, cannot produce enough to meet the internal demand, and are, therefore, obliged, like Japan, to import some amount of rice. In Europe and America highly polished rice and rice milk-puddings occasionally enter into the menu of the well-to-do people more as delicacies than as food.

World Trade in Rice.

Since most of this crop is produced for home consumption, the amount entering into world trade is but small,—only just over 6 million tons a year. The principal part of

the trade—from about a half to two-thirds—is between the Asiatic countries, and the remainder between the rice-exporting countries of Asia and rice-importing countries of Europe. Indeed as pointed out by Stamp, the world trade in rice is of two types. The first type consists in exporting the surplus rice from one rice-eating country of the Orient to another for the purpose of making up the deficiencies of the latter. This trade, as is quite inevitable, varies from year to year as the harvests in these countries fluctuate. If there is a marked scarcity in China in any year the bulk of the surplus will go to that country; next year Ceylon or India may import a greater amount than previously, and so on. The second type consists in exporting rice from the Orient to Europe and other countries. This aspect of the trade remains fairly constant, although it too fluctuates markedly if there is a famine in any of the larger rice-eating countries. The U.S.A. grows about half the quantity required for home use, and imports the remainder from the Far East. Yet it is said that "there is no satisfactory reason why the United States should not grow and mill all of its own rice and become an exporter."[1]

Two types of trade.

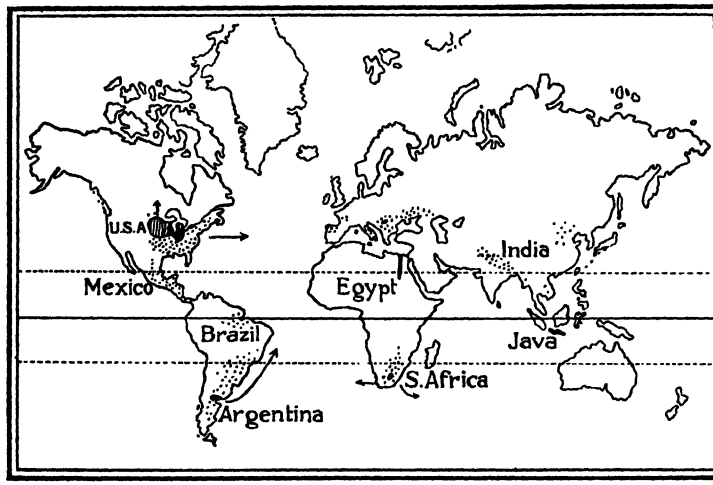
Maize or Corn.—Another name of this crop is Indian Corn, and it is said to be the only cereal brought from the New World to the Old. Columbus was the first to bring it to Europe.[2] It was probably a native of Mexico or Central America. But in America it is now concentrated in the U. S. A. It is essentially a sub-tropical grain, but may easily be grown in the warmer areas of the Temperate Zone, as well as in the Tropics, but not generally in the Monsoon

Conditions of growth.

[1] *Farmers' Bulletin, No. 110,* U. S. Department of Agriculture, quoted by J. F. Chamberlain.

[2] Chamberlain, *Geography,* p. 187. See also Chisholm's p. 127.

lands. A fertile, well-watered, loamy soil is essential for its production; during the early part of the growing period it must have frequent and fairly heavy showers, and where rainfall is not abundant water must be supplied by irrigation; but on no account should the ground be drenched



THE MAIZE-PRODUCING COUNTRIES OF THE WORLD.

through and through. Thus it agrees with rice in some respects, and also differs from the latter in others. The average life of the plant is from 135 days to 210 days; and all through this long period there must be plenty of sunshine and an uniformly high temperature with as little variation as possible. In the middle period of its growth even a moderately marked variation in the diurnal range of temperature causes almost a total failure. Hence it is very nearly impossible to grow maize in such a fickle-weathered country as England.

Production.

The bulk of the world's maize—about two-thirds—is grown in the U. S. A., where the crop is almost wholly concentrated in the south and east and the famous Corn Belt, an area twice as large as that under wheat in that country. It is also grown in Mexico in fairly large quantities. But Canada, though she produces a little, is too far north for the Indian corn. In South America, Brazil and the Argentine grow much corn. In Europe it is grown in the warmer and wetter regions like Rumania, Yugoslavia, Hungary and Italy, as well as in the U. S. S. R. south of the great Wheat Belt. Small quantities are grown also in the sunnier and moister parts of France and Spain. In Africa, the Union and Rhodesia are impotrant maize-producing countries. It is said to be the most important of the cereals in that continent, though the total yield is not quite appreciably high. In Asia it is a subsidiary, though not quite an unimportant, crop, particularly in India and China. Australia also produces a small quantity.

Production of Maize

1909-13		1921-25		1931-33	
Country	Percentage	Country	Percentage	Country	Percentage
U. S. A.	69	U. S. A.	68	U. S. A.	64
Brazil	4	Argentine	5	Argentine	6
Argentine	4	Brazil	4	Brazil	6
Mexico	3	Rumania	3	Rumania	5
Italy	3	Italy	3	Jugoslavia	3
Rumania	2	Mexico	2	Hungary	2
India	2	Others	15	Italy	2
Others	13			Mexico	2
				India	2
				Others	8
TOTAL	100	TOTAL	100	TOTAL	100

Maize is a productive crop like rice. The total acreage under it all over the world has been estimated at 200 million acres with a total yield of 125 million metric tons; both figures agree completely with the corresponding figures for rice. Compare the acreage and yield of wheat. In 1909-13 the world's total annual yield of maize was 104 million tons, in 1921-25 it was 106 million tons, and in 1931-33 the figure rose to be 113 million.

Preparation and Use of Maize.

Maize has various uses. It is used chiefly as food for animals, particularly for hogs and pigs, and that is the reason why great numbers of hogs are kept in the famous Corn Belt of the U. S. A., and its absence in the British Isles is one reason why so few hogs are raised there, and most of the pork consumed by the Britishers are imported from elsewhere. But maize forms an important article of human food as well. Though it does not make good bread, the well-known 'mealie pap' or maize gruel is extensively used in South Africa. In England cornflour, which is made by grinding the grains of maize or corn, is fairly extensively used. Corn bread and corn cakes are extensively consumed in America and Southern Europe. The unripe corn is a favourite vegetable in America. Starch, beer, alcohol, and glucose are other important products of maize. Some kinds of cheap paper are manufactured from its leaves; the cobs are made into pipes and the husks are used into mattresses. Another use of the cobs is in the form of fuel. The young juicy stalks as well as the ripened grains are used as food for cattle and stock.

World Trade.

Though the production is quite large, only a small percentage of the total produce enters into world trade; yet the amount is greater than that of rice coming into the international market; for while only 4 per cent of rice enters into world

trade, the corresponding percentage of maize is 6. The United States albeit its enormous production exports a very limited quantity; more than half of the commodity exported comes from the Argentine. Other exporters, besides these two, are South Africa and the countries of South-eastern Europe like Hungary, Rumania, Bulgaria, and the U.S.S.R. The chief importers are the countries of north-western Europe, because the cool climate of these regions does not allow the cultivation of this crop.

Millet.—Millet is one of the most important of the small grains used as human food. It is characteristic of the drier parts of the Tropics, and has many varieties, some of which flourish in the drier and warmer parts of sub-tropical lands. It grows well in regions having less than 40 inches of rainfall, and even where precipitation is as low as 20 inches it can be grown without irrigation. Conditions of Growth.

Both in India and China it is an important food crop. In India it occupies a fifth of the total cultivated area and more than a quarter of the area under food-grains. It is the staple food of the people in nearly all the drier regions of this country, and ranks an easy second to rice among Indian crops. There are three main varieties of this crop in India—(*a*) *cholum* or *jowar,* which in English parlance is called 'Great Millet', (*b*) *cumbu* or *bajra,* called in English 'Spiked Millet', and (*c*) *ragi* or *marua.* In China millet is concentrated in the north-east, where the rainfall is usually below 40″ a year. Throughout North China it is a close second to wheat. *Sorghum* and *kaoliang* are the two chief varieties. Millet is also extensively grown in Manchuria and Japan, and the varieties raised are similar to those of China. In the Uganda region of Africa millet is the most widely cultivated crop, and throughout the continent becomes an easy rival of Production and Use.

maize, if it does not actually outweigh the latter in importance as a food grain. The chief variety is the 'Great Millet' known there by the name of *durrah;* often it is also called 'Guinea Corn'. Besides being raised for food, millet is grown also for forage and fuel. A particular type of sorghum is cultivated in the U. S. A. for green fodder. Fairly large acreages in the poorer lands of Europe are also devoted to this crop. Its importance from the point of view of world trade is next to nothing, since almost the entire yield is raised for domestic use.

Trade.

II. OTHER VEGETABLE FOOD-STUFFS

Three main varieties.

Sugar.—Sugar is of three main varieties,—(a) *Cane Sugar,* (b) *Beet Sugar,* and (c) *Maple Sugar.* Cane sugar is the product of the juice of the sugar-cane; beet sugar is obtained from the 'roots' of the sugar-beet; and maple sugar is maufactured from the sap of the maple tree.

Production of Cane Sugar.

The sugar-cane, originally a native of Eastern Asia,—perhaps of the Ganges Valley and Indo-China—is essentially a tropical or sub-tropical plant. It flourishes in a warm moist climate, and requires a soil rich in phosphates; wholesome sea-breezes are also essential, and that is why all the great cane-growing regions are located near about the sea. But the moisture has its limits, too; an annual rainfall of 40 inches or a little more is ideal for the plant; too much moisture reduces the sugar content in the juice. The leading countries from the point of view of production are India, Cuba and Java; of these India is now the largest producer so far as absolute production is concerned; but she is far behind in relative production, *i.e.,* in regard to the yield per acre or per ton of cane. In this Java easily leads,

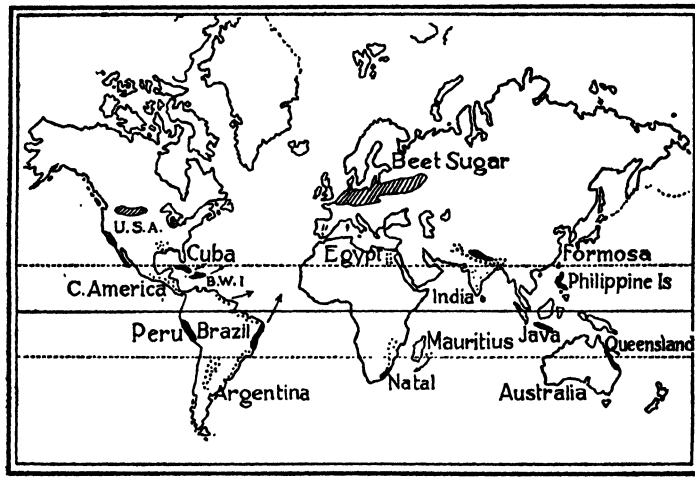
India, Cuba & Java.

and Cuba comes second, while India still remains far behind.[1] America. In America the important producers are Louisiana in the U. S. A., and the Brazilian and the Peruvian coastal tracts; in the latter area cane-culture is carried on by means of irrigation. There are plantations also in Central America, Argentina, and British Guiana. The smaller islands of the British West Indies are largely dependent on this industry alone. The U. S. A. obtains large supplies from the Hawaiian Islands. In Africa by far the most important Africa. cane-growing region is on the east coast of Natal; small plantations are found elsewhere, chiefly in the narrow coastal region of Portugese East Africa, Egypt, and the island of Mauritius. In Australia sugar-cane is grown in Queensland Australia. on the north-east coast. The Philippine Islands, China and Formosa are also important producers in Asia. In Europe Asia. there are small plantations only in the southern parts of Spain as far north as 37°. In the Southern Hemisphere its Europe. farthest poleward extent is said to be marked roughly by the 30th parallel.

The sugar-cane, like the cereals, is botanically a member Preparation of Cane Sugar. of the grass family; but it is a giant member of that genus, its stalks sometimes attaining a height of twenty feet. Amongst the better known cereals it resembles the 'Indian Corn' (maize), having joints with a spongy substance between, in which juice is held. But its seed or grain is of little or no value. The stalks of the cane are cut every year on the eve of flowering, but the roots are allowed to remain, and from these new shoots grow each year for a period of about thirty years or more, although for commercial purposes the plants are usually completely rooted out at the fifth year, and new

[1] Stamp, *A Commercial Geography*, p. 62. But see Chisholm's *Handbook of Commercial Geography*, p. 196, where it is definitely stated that "the largest producer is now Cuba . . . ."

plants raised. The stalks mature in about ten months, when they are cut by hand and hauled to the mill for squeezing out the juice. The juice is then clarified and sterilized by boiling at a temperature of 130°F, and by mixing some



SUGAR-PRODUCING COUNTRIES OF THE WORLD.

lime with it. This sterilizing prevents fermentation. Again it is boiled until it reaches the point of crystallizing. Crystalline raw sugar is then made to separate out by being placed in centrifugal separators. Thus is obtained brown sugar which is of a lusty golden hue, and the residual thick syrup goes to form molasses. The crude brown sugar then is transported to the refineries, where it is dissolved in hot water and filtered, and the liquid then evaporated in vacuum pans, and the sugar naturally crystallizes. Molasses are consumed by men as well as cattle, and used in preparing certain alcoholic drinks like rum. After the extraction of the juice the canes are used as fuel for the mills. Various types of cardboard are also made of sugar-canes.

Although India is now the largest producer[1] of cane sugar she does not export any, but consumes her entire pro- World Trade in Cane Sugar.

Export of Cane Sugar

1909-13		1921-25		1931-35	
Countries	Percentage	Countries	Percentage	Countries	Percentage
Cuba	33	Cuba	34	Cuba	26
Dutch East Indies (including Java)	24	Dutch East Indies (with Java) ..	18	Dutch East Indies (with Java) ..	18
Hawaii	9	Hawaii	5	Hawaii ..	9
Porto Rico ..	5	Porto Rico ..	3	Philippines ..	8
Mauritius ..	4	Peru	3	Formosa ..	8
Philippines ..	3	Philippines ..	3	Porto Rico ..	7
Formosa	3	Formosa ..	2	Sto. Dominigo ..	4
Peru	2	Mauritius ..	2	Peru	3
British Guiana ..	2	Others	30	Mauritius ..	2
Others	15			Australia ..	2
				Others	13
TOTAL	100	TOTAL	100	TOTAL	100

duction. She used to import large quantities of sugar from Java till very recently, and ranked third in the world as an importer; now her imports have very nearly ceased.

The chief importers are the United States and the United Kingdom. The U. S. A., besides having a large proportion of home production, obtains her considerable quantities from Cuba, Dominica, Porto Rico and Hawaii. Great Britain imports her sugar mainly from the Empire countries like British Guiana, Mauritius and the British West Indies, as well as from Cuba and Java.

[1] The fact seems to be that till lately—as late as 1936-37—Cuba was the largest producer. The production in India has increased only recently. This is shown by the steady decrease of her imports from Java.

Production of Beet Sugar.

The sugar beet is said to have found its way into Europe from Southern Asia. It is an annual plant belonging to the beet species. The seed is sown in the spring, and the roots of the plant are dug out in the autumn. It requires a lower temperature and less water than does the sugar-cane; but the soil must be well-drained, and a fairly good supply of moisture is essential during the growing period, although too much moisture gives a juice poor in sugar content. A fertile, loamy, lime-accumulating soil is ideal for the cultivation of this plant; it does not thrive on non-lime-accumulating soils. The important sugarbeet-producing countries are Germany, Russia, France, Czechoslovakia and Poland in Europe, and the United States of America. There is, broadly speaking, a continuous sugar beet belt in Central Europe, stretching from France across Belgium, Holland, Germany, Czechoslovakia and Poland to Rumania and the Ukraine in South-Western Russia. The sugar beet area of Spain is also considerable. In the U. S. A., many states, especially those in the north and west, cultivate this plant in large numbers. Fairly large quantities are now being produced in England also.

Preparation of Beet Sugar.

The 'roots' of the sugar beet mature much earlier—in from four to six months—than the stalks of the sugar-cane. The beets are dug by machinery, and after cutting the leaves in order to leave aside the superfluous mineral matter, they are carried to the factory, where these 'roots' are sliced and soaked in warm water for extracting the juice. The preparation of sugar from the beets then is much the same as that of sugar from the sugar-cane. The pulp is used as a food for stock.

Before the Great War of 1914-18 Germany was the largest producer with about a third of the world's supply.

World Trade in Beet Sugar.

Now the U. S. S. R. is the leading producer of beet sugar with a little less than one-fourth of the world's total. But the trade suffered a setback owing to the War, and has not yet recovered completely. Most of the countries now grow sugar beet mainly for home consumption; world trade in this commodity is, therefore, comparatively much small.

Production of Maple Sugar.

The maple tree is of many varieties, many of which yield a juice from which sugar is manufactured. Of these the sugar maple is the most important. In the eastern parts of Canada, the U. S. A., and the north-eastern states of the Union of South Africa sugar is obtained from these trees. The process is rather simple: the trees are tapped and the juice collected, which then goes through the processes of evaporation and crystallization for the extraction of sugar. But the production of maple sugar has steadily decreased owing to various causes; it does not pay enough for encouraging the producer to undertake vast scale production, because of the cheaper price and far greater output of the other two varieties of sugar, and maple sugar is extensively adulterated. Moreover, the number of maple trees both in Canada and the U. S. A. has also steadily decreased owing to extensive cutting for lumber. It is now used almost exclusively as a luxury rather than as food; for its present-day demand is entirely due to its peculiar flavour.[1] It has ceased to have any commercial importance in the international market.

Present position of maple sugar.

Other sources of sugar.

Other sources of sugar are the various species of the palm tree, particularly in the tropical countries. The Indian date palm, the Palmyra palm, the cocoanut palm, the toddy palm, and the sago palm are exploited for sugar in India.[2]

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[1] Chamberlain, *Geography*, pp. 248—251.

[2] Chisholm's *Handbook*, p. 201.

Nevertheless the sugar-cane and the sugar beet are now the two most important sources of sugar all over the world.

The Sugar Industry.

It would be both interesting and instructive to study the viccissitudes through which the sugar industry has been passing for a long time. Sugar, as we now know it, is said to have been unknown in antiquity, and it was only about the end of the fifteenth or beginning of the sixteenth century that the process of refining sugar came to be invented in Europe. And yet as late as the earlier part of the eighteenth century it was a rarity there. With the rapid growth of commercialism since the Industrial Revolution it began to

Brief History.

come more and more into prominence as an article of food, and is now an indispensable necessary of life even to the very poorest. Down to the last century sugar-cane was practically the only source of sugar consumed in Europe. But by the end of the eighteenth century a method of extracting sugar from the beet was invented in Germany. Napoleon, it is said, later began to encourage the production of beet sugar with a view to break the British monopoly in cane sugar from the British Dominions overseas. Thus the new industry began to develop, and shortly after his downfall it extended to various countries in Europe. Every year it became a more powerful rival of cane sugar, and in 1913 the world's total supply of sugar was obtained almost equally from both the sources. Then came the World War of 1914-18, with the result that the production of beet sugar in the belligerant countries as well as in the neighbourhood dropped phenomenally, and cane sugar again came into prominence. Even now cane sugar supplies about two-thirds of the world's total requirement of sugar. After the War was over beet sugar also began to recover, and at present a little more than a third of the world's supply of sugar comes from beet.[1]

[1] Chisholm's *Handbook*, pp. 197—200.

Cane Sugar *vs.* Beet Sugar.

Both sugar-cane and sugar-beet have certain characteristic advantages each over the other. Sugar-cane is easy to cultivate; it is grown mainly in the tropical and sub-tropical countries, where labour is very cheap; sugar-cane also is naturally richer in sugar content. Beet, on the other hand, is an exhausting crop, requiring a richer soil and a plentiful supply of potash manures; it must be sown every year and is restricted to regions where labour is by no means so cheap as in the Tropics or thereabouts. But beet has its advantages too: it is grown in areas of dense population, and hence, near local markets, whence the raw materials used in the refineries are easily and relatively cheaply obtained, and where at the same time the finished product can be readily sold without entailing enormous freight charges for transportation. This density of population has other advantages also; a regular and abundant supply of manures can be readily obtained; capital can easily be raised and on a lower rate of interest; machinery can be more cheaply installed and readily repaired or replaced. The methods of selection as employed now-a-days has also successfully combated the natural disadvantage of less sugar content in the beet; under the scientific technique of selection, a given weight of sugar-beet has a greater amount of sugar than the same weight of the sugar-cane. Furthermore, the refuse material and by-products of beet are of a much higher value than those of the cane. The beet-pulp is good fodder for animals as well as a useful manure for the soil; whereas the residual matter of the sugar-cane is used mainly for fuel. Yet all these advantages are scarcely enough for successful competition of beet with sugar-cane, and in the opinion of many experts there would hardly be any beet sugar production if it were not for an artificial stimulus in the shape of bounties, protective tariffs and the

Advantages of Cane Sugar.

Advantages of Beet Sugar.

Government help in production of Beet Sugar.

like.[1] Many countries like France and Germany have grown wiser after the last war, and feel that it is dangerous to depend on foreign supply of this indispensable commodity; moreover, the development of the beet sugar industry at home would provide employment for many. So they have taken to the way of encouraging and protecting their beet sugar industries—to the detriment, of course, of the virtual British monopoly of trade in cane sugar. The present war is likely to act as a fillip to the beet sugar industry of Europe.

Conditions of Growth.

Cocoa.—Cocoa is a product of the cacao tree, which is essentially an equatorial plant of the pod-bearing genus. It is rather a small evergreen tree. The pods vary from six inches to a foot in length, and instead of being attached to the ends of twigs they grow directly from the stem or larger branches. These pods vary in colour from green to a dark purple. The seeds or beans lie embedded in a soft white pulp within the pods in regular rows of often as many as fifty, and are about the size of almonds. Cocoa is obtained from these seeds or beans. The cacao tree is said to be a native of South America, whence it has been transplanted to other parts of the Equatorial Regions. It requires uniformly high temperatures and an abundance of moisture; but, curiously enough, exposure to the direct rays of the sun is harmful to it, especially in the growing period, and hence it is grown in the shade of taller trees. Like direct sunshine, strong winds are also injurious, especially to the pods; hence the Belt of Calms or Doldrums is the ideal situation. Valleys well protected from dessicating winds, and clearings in the dense Equatorial Rain Forests are good situations, since in the latter case the surrounding forest acts as a check to the inblowing winds. The tree develops a long

[1] *Ibid.*

root, and hence requires a deep moist well-drained soil. The cacao tree can stand no frost.

Preparation of Cocoa.

The pods are cut from the trees at harvest time, split open on the ground, and the pulp is allowed to ferment and ooze out; the seeds are then dried in the sun, roasted, and the husk removed; then comes in the operation of removing the fat or 'cocoa butter' from the seeds by applying pressure; when as much fat has been pressed away as is deemed essential, the seeds go through the process of grinding. Thus at last we have the cocoa with which we are familiar. Another well-known product is chocolate, which is made by retaining some of the fat and adding sugar. The name chocolate, it is quite interesting to learn, is a variation of *'Chocolatl'*, which was the name of a drink popular among the natives of Mexico and South America. Before the War of 1914-18 the bulk of the world's supply of cocoa—about two-thirds of the total—used to come from Central and South America. Now the coveted position has shifted to the British West African possessions, and the plantations in the Gold Coast and Nigeria supply more than a half of the world's total. In recent years the output has increased, and it may be very near to two-thirds of the total.

World Trade in Cocoa.

Production of Cocoa[1]

1909-13		1921-25		1931-34	
Countries	Percentage	Countries	Percentage	Countries	Percentage
Ecuador ..	17	Gold Coast ..	43	Gold Coast ..	40
Brazil ..	16	Brazil ..	11	Brazil ..	15
Gold Coast ..	15	Ecuador ..	9	Nigeria ..	10
St. Thome ..	13	Nigeria ..	7	Ivory Coast ..	5
Trinidad ..	8	Venezuela ..	5	Dominica ..	4
Dominica ..	6	Trinidad ..	5	Venezuela ..	3
Venezuela ..	5	Dominica ..	4	Trinidad ..	3
Others	20	St. Thome ..	3	Ecuador	2
		Others	13	Others	18
	TOTAL 100		TOTAL 100		TOTAL 100

[1] Adapted from Stamp.

Exporters and Importers.

The leading exporters now are the Gold Coast, Brazil, Nigeria and the Ivory Coast, Dominica, Trinidad and the West Indies and Central American states. The leading importers are the U. S. A., Germany, the United Kingdom, Holland, France, and other European countries.

Conditions of Growth.

Coffee.—Coffee is a product essentially of the tropical or sub-tropical lands. The coffee tree, said to be a native of the Far East, is also an evergreen plant with shiny leaves. Left to itself the tree will grow to be twenty-five or thirty feet in height, but on the plantations they are usually kept pruned down to a height of three to eight feet. It requires a moderately high temperature and an abundant rainfall; but more important still is perhaps an equability of temperature, and protection from the direct rays of the sun. But unlike the cacao tree it can stand mild frost. A fertile, well-drained soil is also highly important, and clearings in forest lands are said to be ideal because of their richness of vegetable remains. The tree comes into full bearing in six years, and continues to flower and bear fruit with almost undiminished vigour till the thirty-fifth or forty-fifth year, after which the soil becomes thoroughly exhausted and must be abandoned. Many of the coffee plantations of forty or even thirty years ago, having thus been abandoned, are now practically indistinguishable from the rest of the forest.[1] It is a peculiarity of the coffee tree to flower for several months so that fruits and flowers are found on it at the same time, and hence two or three gatherings a year are needed. Coffee is obtained from the seeds or beans of the tree. Commonly two beans, with their flat sides together, are enclosed by the pulp, which, after the picking is over,

Preparation of Coffee.

[1] James Bryce, *South America*, p. 390. See also Chisholm's, p. 180.

is removed by soaking the berries in water or by hulling. The beans are then dried in the open air on floors of brick or tile.

World Trade in Coffee.

The bulk of the world's coffee comes from Central and South America. In Brazil it is the leading crop; in fact, the only developed part of that enormous republic is the strip along the Atlantic coast from the mouth of the Amazon to the region of Sao Paulo, which alone produces half the world's total of coffee; "this city, being its heart and centre, has risen in sixty years from a small country town to be a place of four hundred thonsand inhabitants."[1] Santos, which is the natural outlet for the coffee of Sao Paulo has thus been described: "In Santos coffee absolutely dominates the lives of the people. Coffee is everywhere—on the streets, in the warehouses, on the trains. Every one is busy with coffee . . . "[2] This enormous development of the coffee industry has been put down, among other factors, to the richness of the volcanic soils around Sao Paulo. Other important coffee-producing states of South America are Colombia, Venezuela, Ecuador and the Guianas. More than three-fourths of the world's coffee comes from South America. Costa Rica in Central America and the islands of Jamaica produce high grade coffee. In Africa coffee has not yet made much headway, though Kenya has made a name for her excellent coffee. In Asia there were large plantations in Ceylon and Southern India; but most of these have long been destroyed because of a virulent disease attacking the coffee plants; at present there are small plantations in those regions, and of these the plantations in

[1] *Op. cit.*, p. 375.

[2] R. De, C. Ward, "Brazilian Country", *National Geographic Magazine* (of America), Vol. xxii, p. 931.

Mysore are the most important. Java still has a fairly large production to her credit—about 1/32 of the world's total. On the seaward slopes of Southern Arabia the famous Mocha Coffee is grown in small quantities.

Production of Coffee[1]

1909-13		1921-25		1931-34	
Countries	Percentage	Countries	Percentage	Countries	Percentage
Brazil	66	Brazil	69	Brazil	64
Colombia ..	6	Colombia ..	4	Colombia ..	10
Venezuela ..	2	Venezuela ..	2	Dutch East Indies	5
Others	26	Dutch East Indies	2	Venezuela ..	3
		Others	23	Salvador ..	2
				Guatemala ..	2
				Others	14
	Total 100		Total 100		Total 100

Importers.

The chief importers are the U. S. A., and the European countries, the former easily leading the rest in its consumption. Most of her supply is derived from the South American states, particularly Brazil. France, Holland, Sweden and Belgium are also great coffee-drinking countries, as the annual consumption per head in these countries show.[2] In the United Kingdom tea is more popular than coffee. Countries having colonies elsewhere generally import their coffee from their dependencies; thus there is considerable

[1] Adapted from Stamp.

[2] Consumption per head in Holland is 19 lbs. annually, in Belgium it is 13 lbs., in Sweden 13, in the U. S. A., 12, in France 10, and in the United Kingdom only 2½ lbs. (See Chisholm's).

trade in this commodity between the Netherlands and the Dutch East Indies. This also is another reason why tea is a greater favourite in the U. K. than coffee.

Tea.—There is an interesting progressive specialization in respect of the localization of cocoa, coffee and tea—the three chief beverages of the world. Cocoa, as we have already seen, is essentially an equatorial product, coffee a tropical or sub-tropical plant, while tea can be grown both in the Tropics and in Warm Temperate Regions. The tea plant is said to be a native of south-east Asia, having originated somewhere in the uplands of South China, Indo-China, or India.[1] It is sometimes classed definitely with the sub-tropical plants.[2] But climatically it is said to belong "to low latitude areas where high temperatures, long growing season, and heavy, well-distributed rainfall favour a rich, continuous, and rapid growth of new tender shoots. Such conditions are found in southern India, Ceylon, and the Dutch East Indies where there is no dormant season for the tea bush and picking continues throughout the entire year."[3] The fact seems to be that it is essentially a sub-tropical plant, requiring abundant seasonal moisture and an uniformity of relatively high temperature. These conditions are found in areas just outside the Tropics and governed by the Monsoon, *i.e.,* in Assam, Indo-China and South China. Moreover, it is one of the hardiest of the sub-tropical plants, and can, therefore, be acclimatized in relatively unfavourable climes. It has a far greater capacity to stand frost than has the coffee plant; even the severe frosts of

Conditions of growth.

[1] Case and Bergsmark, *College Geography,* p. 225.

[2] Chisholm's *Handbok,* p. 183.

[3] T. T. Glenn, "The Tea Crop", *Journal of Geography* (American), vol. XXVIII, 1929, p. 1.

North China cannot kill it, though its yield is greatly diminished thereby. The plant has, therefore, easily spread out of its original home. But it would not grow in countries where the summer is short and cool. The tea plant requires a deep, fertile, well-drained soil, rich in humus. Virgin forest soil with light, friable loam containing a good supply of organic matter is ideal for it. The presence of iron in the soil is believed to be beneficial, and curiously enough most of the tea plantations are on soils remarkably poor in lime content.[1] Good drainage is essential, as stagnant water spoils the roots and yet there must be abundant rainfall. That is why hill slopes are always preferred for the cultivation of the tea plant. Left to itself the plant would sometimes attain a height of twenty-five feet, but in plantations they are kept down to a height varying from three to six feet by frequent pruning. It comes into full bearing in about 25 years. It is, like the cacao and the coffee trees, an evergreen.

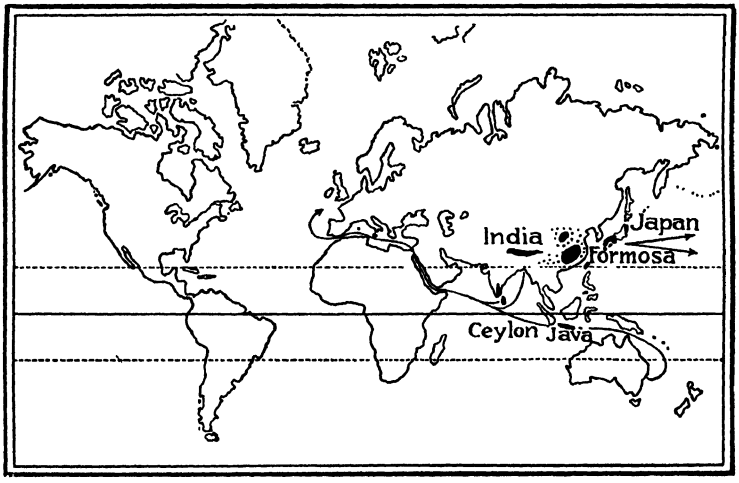
Preparation of Tea.

Tea, the finished product we call by that name, is not a seed or fruit, but is the dried leaf of the tree. The trees are pruned in the spring, and shortly after that operation young shoots appear; when these attain a certain size they are picked by hand. When the gathering is over, the leaves are spread over mats or trays and turned at short intervals so that they wither. The next operation is to roast them, or, as the say in the garderns, to 'fire' them in pans or kettles over charcoal fires. This causes the leaves to soften, and then they are rolled on tables by hand. Then they are given a second or even a third roasting. But the Japanese and the Yankees consume much green tea, which is merely dried over charcoal fires.

[1] Chisholm's *Handbook*, p. 184.

The leading producers are China, Assam, Ceylon, Southern India, Java and Japan. Natal, Jamaica, Brazil and California also grow some tea, but the output is quite

World Trade in Tea.



THE TEA-GROWING COUNTRIES OF THE WORLD.

small. The huge production of the East is due largely to the cheapness as well as regular supplies of labour, and the meagre output of the latter countries has been put down to the shortage and consequent dearness of labour. China is the biggest producer of tea, but the largest exporter is India; Ceylon and the Dutch East Indies rank respectively second and third in export. Japanese tea is mainly green tea, and is grown chiefly for home consumption, although some of it is exported to the U.S.A. There are several varieties of tea; those grown in China are generally of rich flavour, but rather weak; many of these varieties now actually come from India. About four-fifths of India's output is grown in north-eastern

India—the Brahmaputra Valley in Assam and the Duars region of Bengal; the remainder is grown in the Nilgiris in the southern part of Peninsular India. The development of the tea industry in Ceylon is partly due to the destruction of her once important coffee plantations. In recent years the Dutch East Indies have become a serious rival of Ceylon both in production and export.

Export.

Great Britain is the principal importer of tea, taking nearly half the amount brought into the international market;

Export of Tea[1]

1909-13		1921-25		1931-33	
Countries	Percentage	Countries	Percentage	Countries	Percentage
India	32	India	45	India	31
China	23	Ceylon	21	Ceylon	24
Ceylon	22	Dutch East Indies	12	Dutch East Indies	17
Dutch East Indies	7	China	11	China	9
Others	16	Others	11	Others	19
	Total 100		Total 100		Total 100

she also re-exports some to other countries. The chief customer of India and Ceylon is, of course, Great Britain; other consumers are Russia, France, the U.S.A., Canada and Australia. Russia takes nearly one-quarter of the tea exported from Asia. She is seriously endeavouring to find out a variety that can be grown in her territories, and if the attempt comes out successful Asia's export trade will receive a great setback.

[1] Adapted from Stamp.

In South America is grown the maté tea, also known as yerba or Paraguay tea. It grows wild in the forests of Paraguay, and is now being cultivated in the plantations of Paraguay, Uruguay, Brazil and Argentina. Actually it is a species of the holly plant, and contains caffeine which is also the stimulating agent found in tea and coffee. But it has not yet entered into the international market; the trade is restricted to the South American states. Maté Tea.

Fruits and Wine.—Fruits which now have entered into the international market may be roughly classified into the following four types:[1] Classification

(*a*) *Tropical and Sub-tropical fruits,* represented by bananas, pine-apples and dates;

(*b*) *Citrus fruits* like oranges, lemons, grapefruits and lime;

(*c*) *Grapes and Wine;*

(*d*) *Deciduous fruits,* such as apples, pears, almonds, peaches, apricots, nectarines, figs, plums and cherries.

(a) **Tropical and Sub-Tropical Fruits.**—The banana tree is a soft-stemmed plant with characteristically large leaves, and attain a height of eight to twelve feet. It is a tropical plant par excellence, and grows in humid climates. It has several varieties, most of which are rather large plants, though there is a dwarf variety which it is possible to cultivate in the Temperate Zone.[2] This dwarf variety is now largely grown in the Canary Islands. Other varieties are grown in the Tropics. High temperature, an abundant supply of moisture, and a deep soil are essential for all the varieties. Banana.

[1] Stamp, *A Commercial Geography,* pp. 70-75.

[2] Chisholm's *Handbook,* pp. 204-205.

Where rainfall is not sufficient water must be supplied by means of irrigation. The plant is annual, but the root perrennial. Bananas are grown almost everywhere in the Tropics. But the chief centres of commercial production are Central America (particularly, Costa Rica), Colombia, the Canaries, the West Indies and the Hawaiian Islands. The chief importers are the United States, the United Kingdom, and some of the European countries. Great care is needed to export the commodity overseas. The bunches are cut when the fruits are about three-quarters ripe, and are stored without delay in the specially constructed chambers of the fruit vessel; throughout the voyage they are kept at a constant temperature of 52°F.; even a slight rise or fall of the temperature by 2° is liable to render them wholly useless. Even after reaching the port of destination they are readily deposited in specially prepared vehicles if the commodity is to be sent any distance inland, and finally they are kept in artificial ripening chambers after reaching the centres of consumption.

Pineapple. The pineapple plant is said to be a native of America. A moist, fertile, but light soil is essential for it; it thrives quite well on sandy soils as well on or near about seaboards. A warm tropical or sub-tropical climate is, of course, needed. It is a low-lying plant, very nearly stemless, and has long, stiff, sharp-pointed, fleshy leaves with the pine in the middle. From the point of view of international commerce it is far less important than banana. Fresh friuts are rare in the overseas trade. California, Hawaii and Singapore are the principal centres of export, and Europe is the principal customer mainly of canned pineapple.

Dates. Dates, as is well-known, are the characteristic product of the Hot Deserts. The date-palm has, however, been

introduced into California and the drier regions of Spain. Iraq is the chief exporter, and Europe as always is the chief importer. Some dates are exported from Tunis in North Africa as well.

(b) **Citrus Fruits**—As has already been said, the citrus fruits are essentially a product of the Mediterranean Regions; but some of these thrive well in Warm Temperate and Tropical Regions also.

Orange.

The orange is perhaps the typical of these fruits, or, at any rate, the best known of them. The orange tree is an evergreen with beautiful shiny leaves. Originally a native of China it has spread out in the Mediterranean lands, as well as in many of the Tropical and sub-tropical regions. It was introduced in Europe by the Portuguese about the middle of the sixteenth century. The bulk of North America's production comes from California and Florida. In South America the chief producers are Brazil and Tucuman (Argentina). The West Indies also have a fairly large output to their credit. Mexico in Central America may also be mentioned. In Europe the leading producers are Spain and Italy, with which Malta, Sicily and Portugal may also be mentioned. South Africa and Australia have also recently come into the line. In Asia, Iran, Palestine, India—and, of course, China are the leading producers. The oranges of Nagpur and the Khasi Hills have great reputation abroad. Those of Malta and the West Indies as well as of Tucuman are also well-known for their quality. Until recently Spain and Italy together with Palestine held a sort of monopoly in the orange trade. Now the United States leads the overseas trade with Brazil as the second largest exporter. But oranges can now be had at all seasons, mainly because of the production in the Southern Hemisphere.

Lemons are grown in all the continents, but the production is largest naturally in the Mediterranean Regions. Europe derives her supply mainly from Sicily. Grapefruit, hitherto restricted to the Mediterranean lands of Europe, is now cultivated in Florida, California, South Africa and Palestine. Limes require a slightly warmer climate, and are now largely grown in the West Indies.

Lemons.

Grape-fruit.

Lime.

(c) **Grapes and Wine.**—The grape vine is said to be a native of the region to the south of the Caspian Sea where "in the woods the vine, thick as a man's arm, still climbs into the loftiest trees, hanging in wreaths from summit to summit."[1] From this area, once luxuriant in plants and creepers, it seems to have spread naturally as far west as the Carpathians on the one hand and as far east as Afghanistan on the other. But though the European settlers introduced the European species into America, the vine was no novelty there; for certain species of the vine plant are said to be indigenous in the New World. It requires a good supply of rain but no excess of moisture, a well-drained or dry land, and a warm spell of dry summer for the ripening of the fruit. But though eminently suited to the Mediterranean type of Climate, its cultivation has spread to regions having warm dry summers but not exactly a Mediterranean Climate. Thus the vine is extensively cultivated in France far to the north of the Mediterranean lands of Europe, in the Rhine Valley in Germany and as far as the Carpathians in Central Europe. This has been possible mainly because the grape has developed, or, has been made to develop, several varieties. Raisins are a variety of partially dried grapes; so are also muscatels. These commodities are very important articles of international trade, and the chief produ-

Grape.

Raisins and Muscatels.

[1] Hehn, *Wanderings of Plants and Animals*, p. 73.

cers are Spain, California and Asia Minor; the Mediterranean regions of South Africa and Australia have also entered the market recently. Sultanas are also a kind of seedless dried grape, produced in large quantities in Turkey and the Ægean Islands; these form one of the chief exports of the port of Smyrna or Ismir. Currants are another variety of seedless dried grape produced mainly in the Levant; formerly the export of this commodity was practically a Greek monopoly.

Sultanas.

Currants.

Wine is actually fermented grape juice. It, too, has many varieties. For the preparation of the so-called 'sweet wines' the grapes are collected when about three-quarters ripe, and the sugar is allowed to ferment only partially. For the preparation of the 'dry wines' the whole of the sugar content is made to ferment. There are various processes of wine manufacture, —each more or less a commercial secret; moreover, the character of wine is said to differ markedly owing even to slight differences of soil and climate. That is why the various types of wine show unmistakable local preferences. Thus the manufacture of Port is localised in the upper Douro Valley in Portugal; Sherry in the Jarez region of Spain; Champagne in the dry chalk hills of the Champagne district in France; Burgundy comes from the slopes of the Côte d'Or, France; Claret from the Bordeaux region in France; the Moselles are localised in the Moselle Valley; the White Hocks in the Rhine Valley; Chianti is an Italian wine; and so on. France is the largest producer of wine in the world, and yet she has to import large quantities from abroad, particularly from North Africa. This is mainly due to the great demand of French wines in other countries. Italy is the second largest producer, but Italian wines are said to be 'sharp'. Spain and Portugal rank third and fourth respectively in production, and the Spanish Sherry and the Portu-

Wine.

Port, Sherry, Champagne, Burgundy, Claret, Moselles.

White Hocks, Chianti.

Producers and Consumers.

gese Port are said to be of the very best quality. Wine has aptly been called 'the national drink' of France, Spain, Portugal, Switzerland and Italy, as well as of Latin America.[1]

Olive.

(d) **Deciduous Fruits.**—These are the fruits of the deciduous trees, and include figs, apricots, peaches, nectarines, almonds, olives, etc. Of these olive is an evergreen. It is said to be a native of Asia Minor, and is practically restricted to the Mediterranean lands. It is valued both as a fruit and for obtaining olive oil. The chief olive-producing countries are Spain, Portugal, Italy, Greece and Tunis. Olive-oil, besides being used in cooking, lighting and medicine, is used in the manufacture of soaps. Italy, Greece, Tunis and Algeria are the chief exporters. Nuts are exported from the wetter parts of Mediterranean lands as well as from Brazil. Fruits of all sorts are coming more and more into the international market.

Nuts.

Uses.

Oil-seeds and Vegetable Oils.—Vegetable oils have many uses; for human consumption margarine or artificial butter is made from them; they are required in the manufacture of soaps, candles and various other toilet preparations. Of these olive oil is perhaps the most important. In the countries of Southern Europe it is extensively used as a substitute for butter and animal fat. Where, again, olive oil is difficult or more expensive to obtain ground-nut oil is used

Olive oil.

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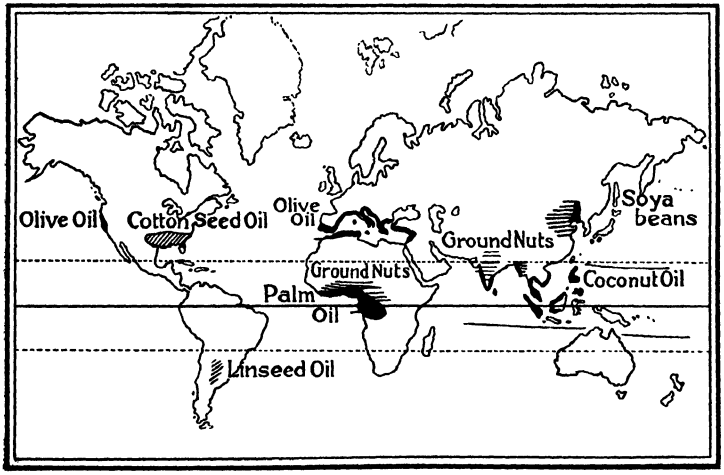
[1] Stamp, *A Commercial Geography*, p. 74. It may be interesting to compare the wine-drinking countries with the beer-drinking countries. To the latter group belong Germany, United Kingdom with Ireland, Netherlands and Belgium. Roughly speaking, wine is popular among the Latin races, and beer among the Teutonic races. Brandy and whisky are also popular in Great Britain.

as a substitute of that substitute. This is especially the case in the drier regions of China, India and West Africa, where various ground-nuts are largely grown. These nuts thrive well on sandy soils with scanty rainfall, unsuitable for any other crop of commercial value. The oil-palm, which grows in the Equatorial Regions and their neighbourhood, yield an abundant supply of palm oil. It is extensively used in the

Ground-nut oil.

Palm oil.



VEGETABLE OILS.

manufacture of soap and candle, as well as of artificial butter. It is cultivated in Malaya, Sumatra, and Equatorial Africa. Nigeria is the leading exporter. The coconut palm is a tropical plant, thriving well on a sandy soil, particularly in maritime regions. From it is obtained coconut oil and copra. Both the products are commercially very important. Besides, the fibre is used in making mattresses. The principal exporters are the Dutch East Indies, Malaya,

Coconut oil and Copra.

Philippines, Pacific Islands, Ceylon and India. The chief importers are the U. S. A., the U. K., the U. S. S. R., Germany and France. The soya bean, which is almost a Manchurian novelty, is also an important source of vegetable oil. Manchuria is practically the sole exporter, and the U. S. A., and Japan are the chief importers. It is widely believed now that Germany has recently obtained large supplies of soya bean through the U. S. S. R. both for food and for extracting its valuable oil. The U. S. A., has also been trying to produce it at home for some time. Of various other vegetable oils those obtained from rape-seed, sesamum, linseed and cotton-seed may be mentioned here. India at present holds a sort of monopoly in rape-seed oil; sesamum oil is exported chiefly from India and China. Linseed comes from Argentina and India; it is obtained from the flax plant, but in Northern Europe the plant is grown mainly for the fibre, not so much for the seed or oil. Cotton seed and its oil is obtained from the great cotton-growing countries like the U. S. A., Egypt, India, China and the U. S. S. R.

Soya bean oil.

Other oil and seeds.

Pepper, Ginger, Cinnamon, Cloves, Chewing-gum.

Spices.—Most of the spices are equatorial and tropical products. Pepper is shipped to Europe mainly from Malaya and the East Indies; ginger from south-eastern Asia including China, as well as from Jamaica; cinnamon from Ceylon; cloves from Zanzibar; vanilla from Java, Madagascar and Reunion; chewing-gum from Mexico.

Conditions of growth.

Tobacco.—The tobacco plant is a native of tropical America; but it has a very wide range; it flourishes at the Equator, within the Tropics and even at the fringes of the Temperate Zones. And yet the plant is very sensitive to frost. It requires a light soil rich in humus, lime and potash, and is an extremely exhausting plant. It exhausts

the fertility of the soil in three or four years, and formerly plantations had to be abandoned frequently for new areas; now-a-days the use of fertilizers has appreciably minimized this drawback. Tobacco is prepared from the leaves of the plant. The leading producers are the U. S. A., India, China, the U. S. S. R., and Japan; while Philippines, Dutch East Indies, Brazil and most of the European countries as well as certain African states produce quite large quantities; it is grown also in Canada, Scotland, and the Baltic states. Majority of the countries grow it mainly for home consumption, and yet large quantities come into the international market. The chief exporters are the U. S. A., Cuba, the Dutch East Indies, Brazil, Greece, Bulgaria and Turkey. The chief importers are the United Kingdom, France and Germany.

Production.

World Trade.

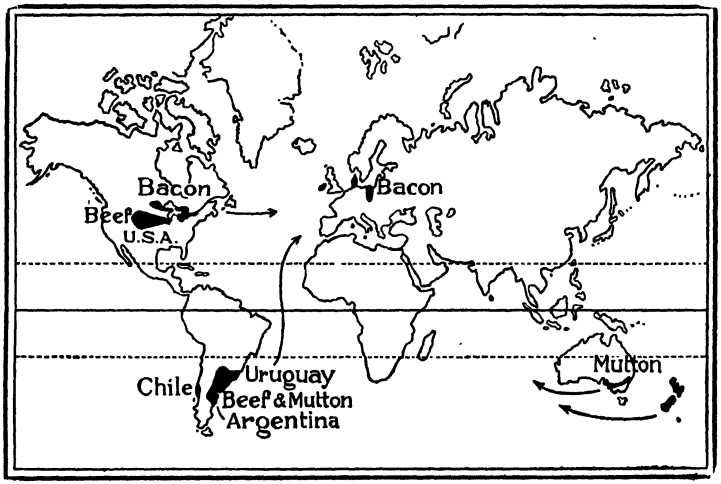
III. Foodstuffs of Animal Origin

Meat.—We Indians do not quite realize the importance of meat as a food, and yet in most parts of the world it is actually an important—and often an indispensable—article for human consumption. Of the meats thus used beef, mutton and pork are of chief importance, although the flesh of many other animals is also utilized in greater or lesser extent. It is, however, of little use here to take into account the number and distribution of cattle, sheep and pigs as that is no sure indication of meat production. In India, for instance, cattle are kept in large numbers, not for meat, but mainly for ploughing, dairing and draught purposes. In many other countries they are kept not at all for draught purposes, but for meat and the dairy products. 'Beef cattle', requiring much less attention and care than their more aristocratic and lucky brethren, the 'dairy cattle', are

Beef, mutton and pork.

Beef.

concentrated in the great Mid-latitude Grasslands of the world. In the drier western parts of Central Plain of North America, too dry for crops, there are enormous cattle



THE MEAT-PRODUCING COUNTRIES OF THE WORLD

ranches; thence the cattle are sent to the Corn Belt where they are fattened on maize before being sent to the slaughter-
N. America. ing houses of Chicago. Here the meat is packed for the market. Though one of the biggest of the meat producers, the U. S. A. does not export much beef or any other meat.
S. America. Another big beef-producing area is in South America; it is the River Plate region comprising much of Argentina, Uruguay, Paraguay and a small area of Brazil. Cattle is also reared in Chile. But the Plate region, particularly Argentina, is the largest beef-exporting area in the world. But in both the Americas the steady extension of agriculture, mainly of wheat, has been restricting the cattle ranches. The

chief importers are the countries of north-western Europe, particularly the United Kingdom, because local supplies there are not sufficient. N. W. Europe.

As there are 'beef-cattle' and 'dairy cattle' so also sheep are either 'mutton sheep', or 'wool sheep' or even 'milk sheep'. Sheep can subsist on pasturage too small for cattle; hence they are the most widespread of all the animals raised in the semi-arid regions of the world. The greatest concentrations of sheep are in New Zealand, South-eastern Australia including Tasmania, South Africa, South-eastern Europe and Italy, Great Britain, and Argentina. The United States and Russia, as well as Spain, France, Central Europe, Northern Africa, East Africa, India, Central Asia, though they contain large numbers of sheep, are relatively unimportant in number per square mile. In the international market New Zealand easily ranks as the chief exporter; the South American states like Argentina, Uruguay and Chile together rank second, and Australia comes third. By far the greatest importer is Great Britain, although mutton sheep are said to be best raised there. Mutton. Distribution of sheep. Trade.

Swine do not require the range that is essential for cattle and sheep, and are, therefore, easily raised in large numbers in densely populated areas. In Europe they are often fed on nuts, acorns, sugar-beet residue, etc.; in America corn or maize and alfalfa are their chief food. Swine are omnivorous. The chief hog-raising countries are China, the U. S. A., North-Western and Central Europe, Brazil and Argentina. The meat is exported in various forms, particularly as bacon and ham. The largest exporters of bacon are Denmark, Canada, Poland and Ireland. As usual Great Britain is the principal importer. The U. S. A. exports a large amount of lard (melted pig-fat) to Britain. Pork. Distribution of hogs. Trade.

Milk.

Dairy Produce.—Milk, butter and cheese are the three principal dairy products. Milk is obtained from various animals like goats, sheep, buffaloes, camels, reindeer and asses, besides the cow; but that of the cow is by far the most important. There is no international trade in fresh milk, and even in inland trade the centres of supply are in close proximity to the areas of consumption. The possibilities of cold storage have, however, recently made it possible to carry on international trade in fresh milk within limited areas, and some quantities are now coming to Britain from the European continent. Another method is to trade in spray-dried milk, which is said to be exactly like fresh milk when prepared at home for consumption. The best known method is, however, to export condensed milk.

Butter.

Butter is kept fresh much more easily, and the international trade in it is consequently much more extensive. The chief exporters of butter are Denmark, New Zealand and Australia. The principal importer is Britain.

Cheese.

Cheese, which has many varieties, is also easy of export. The leading exporters are New Zealand, Holland, Canada and Italy; the principal importers are the British Isles and the states of north-eastern Europe.

Poultry.

Poultry.—The poultry trade is not of much international importance yet; but the trade in eggs has a larger field. China is the largest exporter. Denmark and Ireland also export large numbers of fresh eggs. Over long distances eggs are sometimes sent in an extracted condition.

Eggs.

Sources.

Fish.—The two sources of fish are (a) fresh water, and (b) the sea. Fresh-water fish is found in rivers, lakes and artificial water like ponds. They are important only for local consumption and inland trade over comparatively small distances. Sea-fish only are important in inter-

national commerce. It is very interesting to note that all *the major fishing grounds are located in the Temperate Zone of the Northern Hemisphere.* Why is this so? The tropical waters are by no means devoid of fish; on the contrary the tropical fish are noted for their variety and beauty. But they are mostly unpalatable and softer, and they are said to spoil much more easily than do those found in middle and higher latitudes. Moreover, there are varieties of tropical fish that are said to be more or less poisonous. In the temperate waters there are fewer varieties, but most of them are said to be edible and wholesome. That the major fishing grounds are in the Northern Hemisphere is explained by the fact that the land masses here are far greater than those of the Southern Hemisphere. It is important to note that *the fishing grounds are within a few hundred miles from the coasts.* They lie partly on the shore-belt of shallow waters covering the continental shelf or submerged continental platforms; others are located in the elevated parts of the sea floor some distance from the shore, as the famous Dogger Bank in the North Sea. Fish live upon the plant life and tiny insects of the sea. The plant life of the sea is distributed mainly in (*a*) shallow coastal waters, and (*b*) the surface waters. Rooted plants are almost entirely restricted to the shallow coastal waters, as sunlight does not penetrate to great depths in the sea. The plants which float on surface waters are of microscopic types; these have the power to transform the salt of the sea and the air into organic substances by the help of sunlight. Upon these live myriads of minute sea animals and fish spawn, and the whole forms a sort of reservoir of fish food.'[1] Moreover, in the shallow waters are

Location.

Tropical *vs.* Temperate fish.

Shallow waters are chief fishing grounds.

Reasons therefor.

[1] Rodwell Jones, "The British Fisheries", *Economic Geography,* Vol. II, p. 71.

deposited the waste of the land by the rivers, and these also supply abundant fish food. Again, the shallow waters are excellent spawning grounds for fish. No plant life has yet been found in the abyssal deeps; yet they are by no means devoid of animal life, and certain creatures caught in the net from those great depths are certainly fish. But they are by no means edible. Used to the enormous pressure of the ocean waters many of them explode as soon as brought to surface waters or the land. The location of the major fisheries in the North Temperate Zone has also been ascribed to economic and commercial factors; they are found along the coasts of densely populated regions where there is great demand for the commodity and hence ready markets are available. Moreover, it is less difficult to preserve fish in the temperate lands than in warmer countries. The major fishing grounds of the world are:[1]

Reasons for location in N. Temperate Zone.

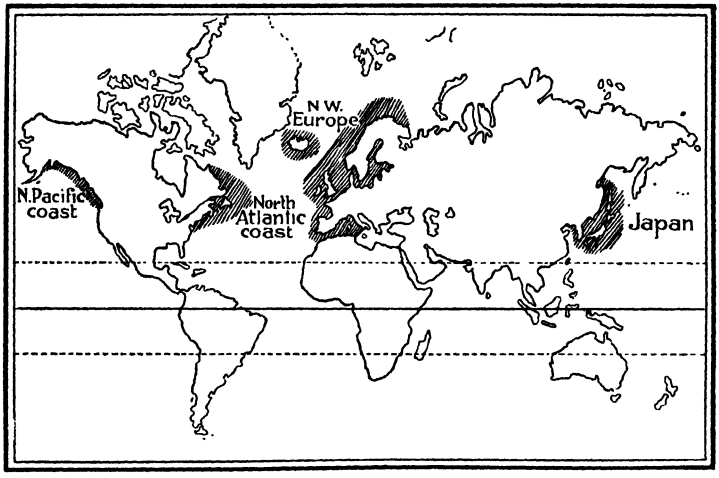
Major Fishing grounds.

(1) **The North Pacific Coast** of Canada and the U. S. A.The principal catch are salmon, cod, halibut and herring. The salmon comes up the river mouths and creeks during the spawning season, and large numbers are then easily caught in Alaska, British Columbia and the adjacent areas of the United States. Despite the enormous number of fish in the sea, long-continued and destructive methods of fishing have considerably reduced the numbers, especially of those that come up the rivers to spawn. The U. S. A. government has, therefore, established departments for the scientific study of the fishing industry and to encourage breeding.

(2) **The North Atlantic Coast** of Labrador and Newfoundland, including the Great Banks, Canada and the New

[1] Stamp, *A Commercial Geography*, pp. 81-83.

England states of the U. S. A. The principal catch . haddock and herring; there are also large fisheries along coast (in-shore) for lobsters and shell-fish. This is topo-



THE MAJOR FISHING GROUNDS OF THE WORLD.

graphically an ideal fishing ground, based, as it is, on a splendid combination of rivers, bays and shallow off-shore banks.

(3) **The Coasts of North-Western Europe,** which extend from the North Cape along the North Sea and round the British Isles to the northern parts of Africa. The fisheries round Iceland may also be included into this area. It is in all probability the largest fishing ground in the world.

(4) **The Coasts of Japan,** where the principal catch are herring, haddock and sardine, as well as several other species of fish not to be found elsewhere.

.nese the fisheries of Japan easily rank first in the .ber and value of catch per year; this industry in Japan gives employment to nearly 1½ million people. But the Japanese fishing products are mainly for home consumption; export trade is, therefore, small and relatively unimportant. The United Kingdom is sometimes given the second place as regards her annual catch, though the place is contested for by the United States with Alaska. The fisheries of the United Kingdom are said to employ above eighty thousand men, and it has been estimated that the whole fishing industry gives actual employment to about double the number all told.[1] She is one of the biggest exporters of fish, especially of herring. Norway is another great fishing country, employing about a hundred thousand men for at least a part of each year.[2] She is a great exporter, too. The importance of the fishing industry to the U. S. A. may easily be appreciated from the following quotation: "So thoroughly did the colonists recognize the importance of the fishing industry that the legislature of Massachusetts hung in the hall of representatives of their state capital a wooden representation of a codfish; moreover, they hung it where the eyes of the Speaker could always see it, so that he might keep in mind the most important interest of the people of the community."[3] The U. S. A. with Alaska and Canada with Newfoundland are also great exporters of canned fish. Canned salmon is said to represent more than half the value of the total output of canned fish. By far the greatest fish-exporting region in the world is, however, North-Western Europe, and the greatest importer is Southern Europe, especially of dried fish. In exchange for the fish from

U. K.

Norway.

U. S. A.

Canada.

Export and import between N. W. Europe and South Europe.

[1] Chisholm's *Handbook*, p. 235.

[2] Case and Bergsmark, *College Geography*, p. 533.

[3] Moore, *Industrial History of the American People*, p. 33.

N. W. Europe wines, citrus fruits, olive oil and other Mediterranean products are supplied by Southern Europe. Spain, France, Germany, Russia, East Indies, Australia and other places are also fishing countries; but in these countries the industry is of much less importance. In the export trade dried and cured cod and herrings are of foremost importance. Other Countries.

Apart from fish the fishing of oysters is a very important industry. In this North America leads, with France following immediately behind. They are obtained from both natural and cultivated beds. But China has been cultivating oysters for thousands of years. Oysters.

IV. THE RAW MATERIALS OF THE TEXTILE INDUSTRIES

Cotton.—Logically speaking, the clothing of man comes immediately after food, although in actuality both are co-eval. Of the various raw materials used in clothing man cotton is by far the most important.[1] It is a fibre obtained from the seed of a plant of the pod-bearing genus or order. When the pod or boll ripens it bursts open, revealing the fibres or hairs which encompass the seeds Origin.

[1] The relative importance of each of the clothing materials (excepting skins etc.) may be realized from the following table which shows the production in thousands of metric tons for the year 1937-38:

Cotton	8,800
Wool	1,670
Jute	1,575
Flax	770
Artificial Silk ..	510
Hemp	410
Silk	200

From Stamp's *A Commercial Geography*, p. 83.

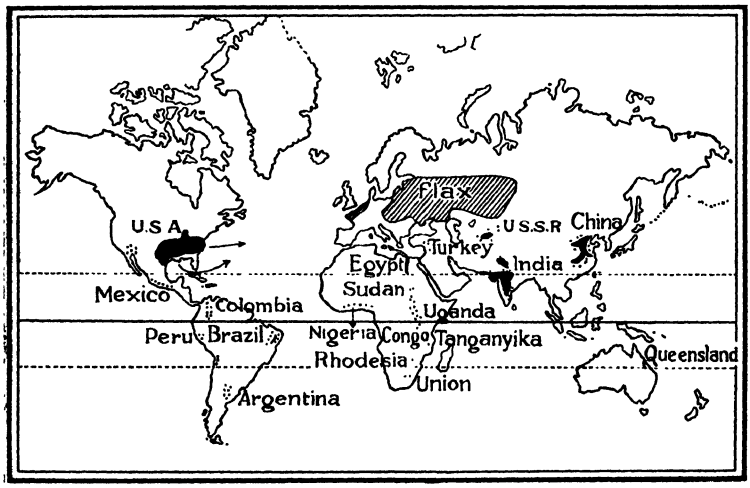
therein. Raw cotton is obtained by 'ginning' *i.e.,* by separating the hairs from the seeds. How early man discovered the use of cotton it is difficult to say; it was mentioned by Herodotus as early as the fifth century before Christ, and there are unmistakable references to its use in India at least as early as 800 B.C. It might have been a native of India.

Conditions of Growth. The cotton plant has a remarkable climatic range. A rich, light, well-drained salty soil capable of retaining moisture is ideal for it; but it thrives surprisingly well on moderately poor soil also. Plenty of moisture is essential during the growing season, and a hot, moist, but not saturated atmosphere until the buds appear; this must be followed by a dry sunny season till the pods are fully ripe. When the pods burst open rain is harmful to the seed fibres. Sea breezes are extremely wholesome to the cotton plant. It is basically a dry-zone plant that tolerates moisture in the soil but not in the atmosphere. It does not flourish in areas having a rainfall of over 40 inches a year. But in many places water is to be supplied to its soil by irrigation as in Egypt, Peru, the U. S. A., and parts of India. Most of the Indian cotton is, however, grown in areas having a rainfall between 20″ and 40″. It can never grow in Equatorial Regions. Stamp locates the potential cotton lands of the world between 43°N and 30°S. It is grown as an annual in most places.

Varieties Raw cotton has several varieties; fibres vary from ½ inch to 2¼ inches. It is, however, difficult to differentiate these as short-stapled and long-stapled, because there is no uniformity of measurement; in India and America any variety that is ⅞ inch in length or more is called 'long-stapled'; whereas in Egypt all are short-stapled that are not above 1⅛ inches.

Production. The important cotton-producing countries are the U. S. A., India, China, the U. S. S. R. and Egypt;

lesser producers are many—Mexico, Colombia, Brazil, Peru, Argentina, Sudan, Nigeria, Uganda, Congo, Rhodesia, Union of S. Africa, Tanganyika, Queensland (Australia) etc. This is not at all surprising because it is so im-



THE COTTON LANDS OF THE WORLD.

portant a necessary of mankind. The United States is, however, by far the greatest producer of cotton, with about half the world's toal output. Nearly all its cotton is grown in the great and famous Cotton Belt of the south-east. India ranks second in order of production; the bulk of her output is from the Deccan lavas region, that fertile tract of volcanic black earths, and the adjoining territories; another 'cotton belt' of India extends roughly from the western half of the so-called U. P. to the Punjab; this is seen on the map to touch the cotton fields of Central India on the left flank, and may be regarded as continuous with the great fields of the Deccan lavas region. The cotton fields of the

U. S. A.

India.

Deccan stretch right up to the southernmost seaboard in almost a continuous line through the heart of Peninsular India. There are lesser fields in various other places like Cutch, Sindh, Rajputana and the so-called Northern Circars region of the Madras Presidency, and still lesser fields in Bihar and the south-eastern borders of Bengal adjoining the Lushai hills region of Assam. But Indian cotton is of poor quality—coarse and short-stapled. Egyptian and Sudanese cotton is the best, but the output in the narrow Nile Valley and the relatively undeveloped Sudan is small.

Egypt and Sudan.

Raw cotton is usually classified into the following four grades[1]:

Grades of cotton.

Grade I, distinguished by staples above 1⅜ inches long and a very fine silky texture. This is the famous *'Sea Island Cotton'* grown in the West Indies. It is pre-eminently a *long-stapled cotton.* Attempts are now being made to introduce this variety in the mainland of North America, particularly in Georgia and Florida. This variety is grown on lowlands. The seeds of this cotton were originally brought from Egypt, and the best varieties of Egyptian cotton as well as those of the Sudan and Arizona belong to this group.

Grade II, with staples above 1⅛ inches. This is sometimes (as in the U. S. A.) styled long-stapled, but should better be described as *medium-stapled.* The bulk of the Egyptian, Peruvian, North Brazilian and East African (Uganda and Tanganyika) cotton belong to this group. It is wrong to style it precisely as 'Upland cotton,' as some writers are inclined to do. If, however, such an indefinite name is at all to be used in this connection, one must look

[1] From Stamp.

upon this type as well as that belonging to grade III as a variety of the *'Upland Cotton'*.

Grade III, with staples varying from 7/8 inch to 1 1/8 inches. To this group belong the bulk of the world's total output of cotton, including most of the cotton grown in the U. S. A., Brazil (especially in the Sao Paulo region), Argentina, the U. S. S. R., and part of the Chinese and African crops as well as a third of India's output. These are decidedly short-stapled, but there are varieties even shorter than these. In the U. S. A. these varieties are also known as *'Upland Cotton'*.

Grade IV, below 7/8 inch, to which belong the bulk of the Chinese and other Eastern and Near Eastern crops, as well as the remainder of American and Indian cotton. These are certainly *short-stapled,* and commonly of poor quality.

Export of Cotton[1]

1909-13		1921-25		1931-33		
Countries	Percentage	Countries	Percentage	Countries	Percentage	World Trade
U. S. A.	.. 52	U. S. A.	.. 55	U. S. A.	.. 61	
India	.. 11	India	.. 20	India	.. 15	
Egypt	.. 8	Egypt	.. 10	Egypt	.. 9	
Others	.. 29	Others	.. 15	Peru	.. 2	
				China	.. 2	
				Others	.. 11	
Total	100	Total	100	Total	100	

More than half the world's total output of raw cotton enters into the international market. The trade is mainly

[1] Adapted from Stamp.

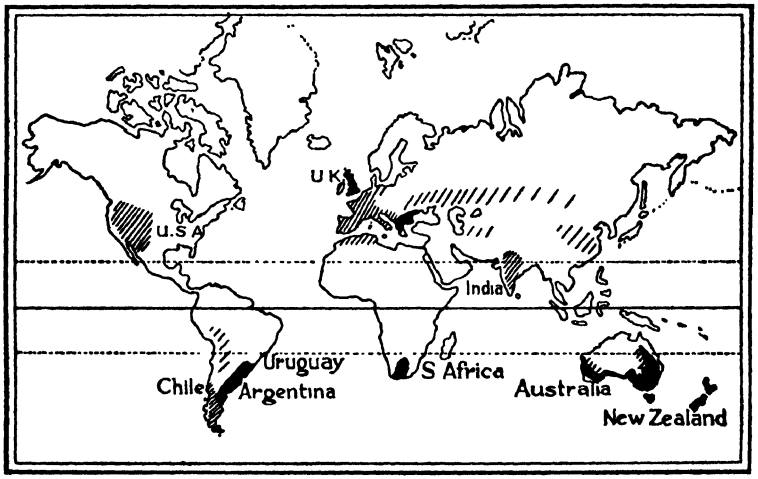
between the tropical and warm temperate countries which grow it and the manufacturing countries of Europe, America (U.S.A.) and Japan. The U. S. A. grows much more cotton than is required for its own manufacture, and the principal part of the export of raw cotton goes to Britain. But there has been an increasing tendency for some decades in the U. S. A. to use its own cotton for expanding its own manufacturing business. This augurs ill for the British manufacturing industry, and steps are being taken to ensure a far larger output within the Empire. This is the root cause of the extension of cotton-growing in the Sudan, Uganda, Tanganyika, Nigeria, Rhodesia and Australia. Still the British Empire is far from being self-supporting in the production of raw cotton. India has an output far larger than she can at present manufacture, although it is far from being true that her output is greater than she would need if her manufacturing capacity were equal to her actual requirements. Moreover, as pointed out by Mahatma Gandhi, cotton growing in India has hitherto been dictated entirely by capitalistic interests. Since we are yet a long way off from establishing manufacturing centres sufficient for our actual requirements of piece goods, cotton growing should be de-centralized *i.e.*, should be spread all over the country instead of concentrating it in a few specified areas. This is especially a condition precedent to the revival of the dying and dead home industries in cotton piece goods. Russia has been fast expanding her cotton-growing industry so as to become throughly self-sufficient in the matter. China does not export her raw cotton.

Conditions of Production.

Wool.—Wool is of animal origin, obtained mainly from sheep. The animals reared in a cool dry climate give the best wool; but the climate must not be too severe in winter. That is why the largest wool-producing regions are in the

Temperate Grasslands of the Southern Hemisphere; for the Temperate Zone Grasslands of the Northern Hemisphere suffer from too severe a cold in the winter because of the greater extent of the land masses there. Sheep kept in moist regions are very liable to suffer from certain diseases. This can, however, be prevented by providing suitable drainage conditions. The yield, as is only natural, varies from one type of sheep to another. There are also several grades of wool, varying chiefly according to the age of the animals. Thus the wool obtained from lambs seven months old are the finest.

The leading wool producers are New Zealand, Australia, South Africa, the Black Sea region of Europe, United Kingdom and Argentina, Uruguay and Chile; the U. S. A. ,Spain, **Output.**



The Wool-producing countries.

France, Northern Africa, Asia Minor, Russia, India and China are lesser producers of various grades. The grasslands

of the Southern Hemisphere together contribute nearly two-thirds of the world's output; in this Australia ranks first, with New Zealand and Argentina closely following as second and third respectively; South Africa comes to occupy the fourth place, and the contribution of Uruguay is by no means quite small. There are large numbers of sheep in the United Kingdom and Ireland, and the production of wool is not inconsiderable, although the British Isles are rather damp and the production of mutton is nearly as important there as that of wool. This is due to two reasons: many of the wool sheep are reared there in areas of comparative aridity, and where rainfall is abundant good drainage is not rare. Russia's output of wool is quite large, but it is used almost entirely for home consumption. The U. S. A., though possessing a large number of sheep, is behind Russia both in the number of sheep and in wool production. India and China possess numerous sheep, but the wools are poorer in quality and are used mainly for the manufacture of carpets.

Other wools

Other animals providing man with wool are goats, camels, the alpaca, the llama and the vicuna. Mohair is goat's hair, supplied largely from South Africa and Turkey. Another species of goats, ranging over the mountainous regions of the Himalayas, Tibet and Southern China, provide a fleece known as the Cashmere wool; it is of very fine quality. Alpaca, a type of wool obtained from the animal of that name, is a nice shiny type of wool, supplied from the Andes region of S. America. So are also the wools gathered from the llama and the vicuna. The vicuna wool is said to be the finest of all textile materials.

Silk.—The silkworm is not really a full-grown worm, but the caterpillar stage of several types of moths. It feeds

upon the leaves of the mulberry tree, though sometimes other leaves, such as those of the oak and osage-orange, are sparingly used. When nearing the chrysalis stage the caterpillar sends out some soft material from the two minute apertures in its head, and this material hardens after coming in contact with air. The caterpillar then lies in a torpid state completely enveloped in the cocoon thus made. It is then that the cocoon is to be picked up and the poor worm destroyed by being dipped into warm water, and the silk obtained from the cocoon; otherwise it would on waking up cut through the cocoon as the imago or butterfly. The silk moth seems to be a tropical or sub-tropical insect. The average cocoon is about an inch long and contains from 300 to 500 yards of silk thread. Conditions of Production.

Sericulture was first practised in China probably four thousand years ago, and as a producer of silk that country still ranks highest with nearly 2½ times as much silk as the rest of the world put together. But as an exporter her share is relatively small. Japan is the leading exporter; silk is her most valuable export, and sericulture is second only to rice culture among her industries; of all the silk of commerce Japan alone contributes four-fifths or a little more. Other important silk-producing countries are India, French Indo-China, Korea, Syria, Turkey, Italy and France. Much smaller quantities are produced in Turkistan, Spain, South-Central Europe and the U. S. A. Italy also has a fair share in the export trade. The principal importers are the U.S.A., France, Italy and Switzerland. The U. S. A. now manufactures more silk than does any other country, but also imports large numbers of silk goods from the important manufacturing countries, particularly from France. Production and Trade

Artificial Silk.—In recent years rayon or artificial silk has become much more important than raw silk. It is pro- Source.

Production. duced from cellulos—wood pulp, sawdust, cotton waste etc. Even in this Japan leads with the U. S. A. as a close second, while England, Germany and Italy contest for the third place.

Production of Artificial Silk[1]

1924-25		1934-35	
Countries	Percentage	Countries	Percentage
U. S. A. ..	.. 29	U. S. A. ..	.. 29
Gr. Britain ..	.. 17	Italy ..	.. 13
Germany ..	.. 16	Gr. Britain ..	.. 12
Italy ..	.. 14	Germany ..	.. 11
France ..	.. 8	Japan ..	.. 10·75
Belgium ..	.. 6	France ..	.. 8
Others ..	.. 10	Netherlands ..	.. 3
		Belgium ..	.. 1·25
		Others ..	.. 12
	Total 100		Total 100

Artificial silk was virtually unknown before the World War of 1914-18. In 1924-25 the total production was 150 million lbs only, whereas in 1934-35 it rose to be 1,000 million lbs. In 1937 Japan surpassed even the U. S. A. in the production of artificial silk.

Flax.—The flax plant seems to have originated in the region lying between the Caspian Sea and the Persian Gulf, and its importance as a source of clothing material was known to the ancient Egyptians, Babylonians, Chaldeans and Phœnicians. The plant has now been made to spread out to other regions because of its importance, and has, therefore, a wide range. It is a simple little plant attaining a

[1] Adapted from Stamp.

height of about 2 feet only. But it is a very exhausting plant for all that, requiring a clean, well-drained heavy soil and successive crops of flax cannot profitably be grown on the same field. The plant is an annual, and in many places the same fields are planted only once in eight or ten years. Though the plant is grown in the Tropics, it is best cultivated in the cooler parts of the Temperate Zone. In the Tropics it is grown mainly for seed, in the cool Temperate Lands almost exclusively for its fibres. When the seed is in the dough and the leaves are just beginning to turn yellow, the plants are pulled up by the roots. The fibres are found in bundles around a central, woody core, and the outside of the plant has a soft cellular sheath. Conditions of Growth.

By far the greatest flax-growing region of the world is in the plains of Northern Europe, forming almost a continuous 'belt' from Northern France through Belgium, Germany and the Baltic States to Russia. Russia, with the Baltic States, produces about four-fifths of the world's total flax. But Belgium grows the best fibre. Lesser producers are Northern Ireland, Northern Italy, Japan and Canada. Production.

Jute.—Jute is the cheapest of all fibres, and ranks third so far as fibre production of all sorts is concerned; it is a close competitor of wool, but both wool and jute fall far behind cotton is this respect. Jute is used not so much for clothing as for the manufacture of cord, twine, canvas and wrappings. The jute plant is essentially a tropical fibre crop; but it is restricted almost entirely to the Lower Gangetic plain of India. It requires a rich alluvial soil, high temperature and heavy rainfall. The plant, like flax, is an annual. An well-drained soil is ideal for its cultivation, but the plant thrives well in muddy swamps, too. The quality of the fibre and the yield per acre depend in large Use. Conditions of Growth.

measure upon the preparation of the soil; the ground should be ploughed about four times and all weeds removed before the seeds are sown.

Production. Besides the Gangetic delta which is the jute land of the world par excellence, it is grown to some extent in Ceylon, Southern China, Formosa and Malaya. But the output of all these countries put together is only one-tenth of the total jute of the world, and the huge remainder is the contribution almost entirely of the Gangetic delta. Small quantities are grown in the adjoining areas of Assam and Behar.

Trade. Indian jute is exported mainly to the United Kingdom, Germany, U. S. A. and France. Lesser importers are Canada, Japan, Italy and Argentina. In Bengal the jute manufacturing industry is localized on the banks of the Hooghly, although the bulk of the commodity comes from

Manufacture Eastern and Northern Bengal. This centralization is mainly due to the nearness to the port of Calcutta and the navigability of the rivers. The principal jute manufactures are (*a*) gunny bags for the packing of rice, wheat, oil-seeds etc., (*b*) gunny cloths or hessians, (*c*) coarse carpets and rugs, and (*d*) cordage. Outside India the most important jute manufacturing centre is Dundee in Scotland. Calcutta and Dundee supply the bulk of the world's manufactured jute, and there is keen competition between the two centres. At present Calcutta leads. But unfortunately most of the jute concerns in India are British-owned.

Hemp. **Other Fibres.**—Jute has several rivals, the chief of which are the different varieties of hemp. Of these Russian hemp is perhaps the best, though nothing like jute has yet been discovered or invented. Russian hemp is, however, not wholly Russian, but is grown in other parts of Europe as well. It is largely used in the manufacture of cordage.

Manila hemp, exported mainly from the Philippines, is also extensively used in rope making. Its fibres are, however, harder than those of Russian hemp. Sisal hemp, another hard fibre, is grown in Kenya, Tanganyika and Mexico. New Zealand hemp, which, in fact, is a kind of flax, can be used for textiles. 'China Grass' is another type of fibre, grown extensively in China, and can be woven into the socalled 'grass linen' fabrics. Kapok is a light and waterproof fibre; though difficult to weave, it seems to have a fairly prosperous future.

China Grass.

Kapok.

V. OTHER VEGETABLE MATERIALS

Timber.—After food and clothing the universal need of man is for shelter. And as soon as these needs are met —actually earlier—he plunges headlong into all sorts of activity—fair, foul and indifferent. But he cannot work in the vacuum; so raw materials again are essential. Moreover, most of his activities are guided by these three primary needs. and though one of these may be assigned a logical priority over another, actually all of these needs run parallel courses.

Timber may conveniently (though not scientifically) be classified into three groups: (i) *Coniferous Softwoods,* (i) *Temperate or Deciduous Hardwoods,* and (iii) *Tropical or Evergreen Hardwoods.* The principal varieties or species of coniferous softwoods are pine, firs, spruces, larches, cypresses and junipers. Temperate Hardwoods are represented by oak, birch, beech, maple, ash, walnut and elm. Tropical Hardwoods are teak, mahogany, ebony, rose wood, dye wood etc. The sources of these woods have already been indicated in a previous chapter.

Types of timber.

Of the total timber used by man nearly 80 per cent is softwood from the great Coniferous Forests, while of the

Output and use.

remaining 20 per cent of hardwood about 18 per cent is obtained from the Temperate Forests and only 2 per cent from the Tropics including the enormous Equatorial Rain Forests. This disproportionate use, dictated, no doubt, by the primary needs and conveniences of mankind, has, however, led to serious complications; it has resulted in a rapid depletion of the Coniferous Forests of several regions, and an attendant shortage of softwoods in many countries. Canada and the United States once had vast stretches of Coniferous Forests, especially the former which was noted as 'the Empire's storehouse of softwood supplies.' Consequently lumber industry was enormously developed in the regions of British Columbia, Ontario, Qubec, Northern Prairie provinces and New Brunswick. The U. S. A. has two important softwood belts,—one in the east including New England, the Appalachian Highlands and the Atlantic coastal plain; the other in the west located in the Rocky mountains and the Pacific slopes. The lumbering industry in eastern Canada centres round Ottawa, but there the rapid depletion of the giant trees has necessitated a change of forestry in the shape of the exploitation of the smaller trees for the wood-pulp industry, and hence the logging industry has naturally shifted to the west, particularly to British Columbia. The same story has also been repeated in the United States. The larger trees and forests in the Lake States, New England and the Gulf States have very nearly been wiped out, and the logging industry has gone over to the north-western Pacific States. Already there exists a shortage of soft-woods in Canada and the U.S.A., and steps are now being taken to study the possibilities of tropical forestry and the conservation of forests. The story is much the same in Europe as well, where the larger trees from most of the forests have disappeared. The existing forests of Norway are now a poor apology for what they were in the past. These alarming

Result.

Soft-woods.

Canada.

U. S. A.

Europe.

prospects have led the Scandinavian countries to guard this important source of national wealth quite zealously. The supplies of softwoods from Sweden and the Baltic States are, therefore, regulated by law and are consequently strictly limited. It has now been recognized that forests are not to be used as mines but rather as natural crops. France, Germany and other countries of Central Europe are now carrying on scientific forestry in order to ensure a steady supply, and recently Great Britain has also come into the line. The largest reserves of softwood conifers now are those of Northern Russia in Europe and Siberia in Asia. As already explained in a previous chapter, the countries of the Southern Hemisphere are very poor in softwoods of the coniferous type; only New Zealand has a limited supply of Kauri and Rimu pines, while Southern Brazil and Southern Chile have a still lesser supply of indigenous softwoods. Recently, however, pines have been introduced in South Africa and Australia.

Russia.

New Zealand.

Brazil and Chile. Australia.

Temperate Hard woods.

The important centres of temperate hardwoods are in the Appalachian region of the U. S. A., Patagonia, Chile, the Alps, the Pyrenees, Central Russia, the Middle region of Siberia, Japan and Australia. The oak is the most important of these woods; but several of the encalyptus trees of Australia yield excellent timber. These latter have been introduced in many parts of the Northern Hemisphere. China certainly was an important centre of temperate hardwoods; but the Chinese have completely wiped out the forests from the plains.

Tropical Hard-woods.

The Tropical Forests here include those found within the entire Torrid Zone, and can, therefore, be grouped as (*a*) Equatorial Forests and (*b*) Tropical Forests proper. The extent and other peculiarities of both the regions have

Tropical Hard woods.

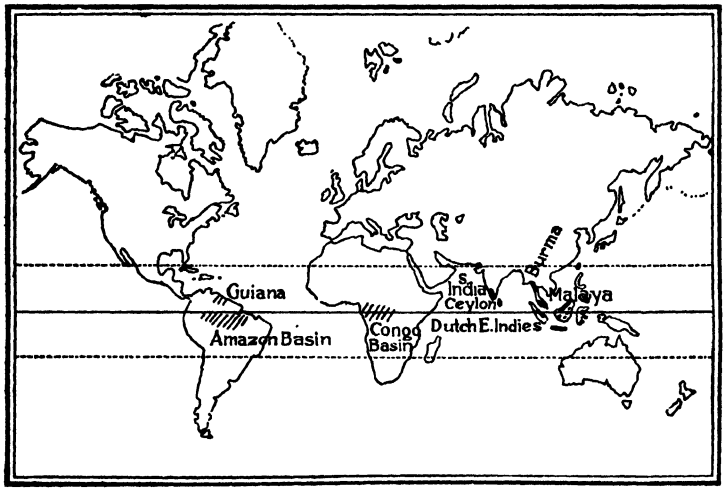
been described in a previous chapter. Of the principal forest products teak comes almost entirely from Burma and Siam, and mahogony from Central America and West Africa.

Wood pulp and paper.

Wood Pulp.—The timber industry goes almost hand to hand, in the Coniferous Forests especially, with the wood pulp industry. Of the total output of paper about nine-tenths is made from wood pulp, and the rest from a variety of vegetable products already mentioned in appropriate pages of the book. All these products are reduced to pulp and then bleached white by chloride of lime. Paper can, however, be made from the pulp of various types of wood; but softwood or conifers are essential for the best grades of paper. Of these softwoods spruce, fir and pine are of principal importance. Another essential requisite for the paper industry is a large supply of cheap power. This is easily available in Eastern Canada where there is a large supply of cheap hydro-electric power; so the pulp industry has flourished there. A third essential requisite is cheap and efficient transport. This too is easily available in Eastern Canada; where the pulp mills are mostly located near tidal waters. About 24 per cent of Canada's total export is in paper, pulp and wood. Other great exporters of these things are Norway, Sweden, Finland and also Russia. About 34 per cent of Norway's export is in timber and paper, while paper and pulp form 32 per cent and timber 15 per cent of Swedish export. Russia supplies little of pulp or paper, but timber forms 22 per cent of her total export. Finland also supplies large quantities of softwood and paper,—nearly 80 per cent of her total export. The U.S.A. is by far the largest market for Canadian wood pulp. There is already a shortage of this commodity in Europe, and various substitutes like rags and linens and esparto grass are now being tried and used.

Rubber.—Rubber is a typical equatorial product, and the tree is said to be a native of the Amazon Forests. The product is obtained from the juice of the tree. Although

Conditions of Growth.



THE RUBBER-PRODUCING COUNTRIES OF THE WORLD.

there are indigenous species of the rubber tree in India, the 'Para Rubber Tree' has been introduced in India, Ceylon and Malaya. It requires a rich, well drained soil, a heavy rainfall (between 50 to 200 inches) and a moist humid climate throughout. Plantations are mostly on hill slopes because of good drainage, but special care must be taken to prevent rapid soil erosion due to excessive rain. Bulk of the product is now obtained from Malaya, the Dutch East Indies, Ceylon and Southern India; but Brazil also continues to supply some. The chief importers are the United States, the United Kingdom, other European countries, Japan and Russia. The demand, as well as the consequent production, for rubber has been growing by leaps and bounds; the average annual

Trade.

production during 1909-13 was 90,000 tons, in 1925 it rose to be 525,000 tons, and subsequently to 1,160,000 tons in 1934-35. This phenomenal growth has been attributed mainly to the development and extension of the manufacture of cycles, motor cars, etc.

Other Raw Materials.—Of the various other raw materials of vegetable and animal origin gums, lac, leather and ivory may be mentioned here. Gum is obtained from the juice of certain trees, found particularly in the African savanas. Lac is obtained almost exclusively from the forests of North Eastern India (Bengal & Assam). It is not exactly a vegetable product, but a sticky exudation of certain insects that feed upon the branches of some particular type of trees. The sources of leather are the hides of animals, particularly cattle, sheep and goats. Ivory comes mainly from Central Africa.

Gums.

Lac.

Leather.

STUDIES AND QUESTIONS

1. Discuss the conditions favouring the growth of (*a*) rice, (*b*) wheat, (*c*) tea, and (*d*) cotton. Name the places where they are grown in India. (C. U. B. Com., '26, '27).

2. What climatic and physical conditions are necessary for the production of the following, (*a*) wheat, (*b*) maize, (*c*) cotton, (*d*) tea and (*e*) jute? (C. U. Inter. '24).

3. What are the natural conditions required for the cultivation of cotton? What countries export cotton and to what destination? (C. U. Inter. '25).

4. Name the places where the following are grown: (*a*) sugar, (*b*) coffee, (*c*) flax, (*d*) India rubber and (*e*) tobacco. (C. U. Inter., '24).

5. Compare and contrast the physical and economic factors associated with the production of rice and wheat. Mention the chief countries and ports engaged in the foreign trade in these commodities. (I. P. S., '34).

6. Name the most important rice-importing countries of the world. From what sources is rice imported into Great Britain and to countries of Northern Europe? What is the present position of India including Burma in this export trade? (C. U. B. Com., '30).

7. Into how many classes is cotton divided? Give a short account of the chief sources of supply of the principal varieties of cotton. (C. U. Inter., '36).

8. What are the climatic conditions favouring the growth of coffee and tea? What are the principal countries of production and export? (C. U. Inter., '34).

9. Discuss the conditions favouring the growth of (*a*) jute, (*b*) oil seeds, (*c*) coffee and (*d*) sugar-cane. (C. U. Inter., '35).

10. What climatic conditions are favourable or unfavourable to the cultivation of rice, cotton and sugar-cane? Explain the reasons. (C. U. Inter., '40).

11. What conditions are necessary for the successful cultivation of beet and sugar-cane? State accurately the areas in which sugar is manufactured. India produces large quantities of sugar-cane, but still imports sugar from other countries. Why? (I. P. S., '30).

12. What are the necessary conditions for the production of the following: (*a*) rubber and (*b*) beet? Name the principal countries in which these are produced. (C. U. Inter., '27).

13. Describe the geographical circumstances favouring the growth and the world distribution of sugar beet and sugar-cane. (C. U. Inter., '31, '33).

14. What are the most important countries of the world exporting cotton in considerable quantities? Describe fully the conditions of production and quality of cotton produced in each. (C. U. Inter., '32).

CHAPTER VI

MINERAL PRODUCTS

Rocks and Minerals.

Minerals.—The lithosphere or the crust of the earth consists of a variety of rocks, and a rock itself is a mineral, igneous or stratified, constituting the solid crust of the earth. This rather circular description is not of much avail except for calling attention to the fact that minerals are not only hidden from our view deep down into the bowels of the earth, but also lie scattered all about us. A mineral may briefly be defined as a "naturally occurring chemical compound either constant in its composition or varying within narrow limits."[1] But all this should not lead us to suppose that the lithosphere is the only storehouse of minerals; the central nucleus of the earth or the barysphere is probably made up almost entirely of pure iron with a certain admixture of nickel and other metals. But it is far too deep for us to penetrate, and, besides, hot beyond comprehension. Our entire mineral resources are derived from the lithosphere alone. Rocks mostly are mixtures of various minerals, though sometimes they may represent only one or two of them. Minerals may be broadly divided into two categories —(a) *metallic* and (b) *non-metallic*. Among the metallic minerals are iron, copper, lead, tin, mercury, gold and silver. These are not, however, found in a pure state, but are usually mixed up with other elements or substances; that is what is meant by saying that the metals occur in 'ores'. In order to obtain a pure metal, it has to be separated from its ore. Sometimes the important metallic minerals are found in

Mineral defined.

Sources of minerals.

Metallic and Non-metallic minerals.

Metallic ores.

[1] Stamp, *A Commercial Geography*, p. 104-5.

'veins', which, in reality, are the faults or cracks in the earth's crust along which molten rock, vapours etc., once made their way from the interior strata of the earth's crust towards the surface, but became solidified in the cracks on the way. Non-metallic minerals are represented by coal, petroleum, salt, sulphur, clay, building stones etc. They are more numerous than are the metals.

Metallic veins.

I. THE METALLIC MINERALS

Iron.—Iron, though not a 'precious metal', is the most valuable and useful of all the metallic minerals, and has perhaps the widest distribution. The place it holds in the life of modern man needs no elucidation, and it has been said that there are few rocks which do not contain a certain percentage of iron. The familiar red hue of many of the rocks is most often due to the presence of iron oxide, which is a compound of oxygen with iron. But such a metallic content in the rocks is not, or, has not yet been made, economically useful. Iron ores obtained from mines are the only useful source. But ores differ considerably in their iron content, as well as in other materials. Four chemical groups have thus been distinguished:

(*a*) *The Iron Oxides,* which may be of several varieties; but *hæmatite* (Fe_2O_3) or red ore and *magnetite* (Fe_3O_4) are the chief variations of this group. Hæmatite is usually red—'blood-like', and hence the name; but it may also be a brown or blackish iron ore. Magnetite is magnetic iron oxide, and of a decidedly black hue; it, too, has certain variations. These are said to be the purest form of iron. The ores of Sweden are of this type.

Chemical groups of iron ore.

(*b*) *The Hydrated Oxides,* of which *limonite* ($2FeO_3 3H_3O$) is the chief sub-type. It is a brown ore; but the whole group is distinguished by the hydrate content, which is a compound of water with the radical.

(*c*) *The Sulphide Ores,* including iron pyrites and copper pyrites. Pyrides are sulphides, *i.e.,* compounds of sulphur with some radical—here iron or copper.

(*d*) *Iron Carbonates,* which are compounds of iron and some carbonaceous matter.

Preparation of Iron and Steel.

Ores containing much impurities are first heated in a furnace for evaporating the unwanted elements; then having added a definite proportion of limestone or some other flux in order to promote fusion, they are smelted in a blast furnace. Coal or coke is used in smelting iron. Thus is obtained what is commonly called 'pig iron'. This may again be smelted and we get 'cast iron'. But pig iron—and, of course, cast iron—may be given a thorough smelting so as to burn out the carbon, and then we have what is called 'wrought iron', from which steel may be made. But steel is generally made from pig iron direct by removing all carbon, sulphur and phosphorus, and adding ferro-manganese. Special types of steel are produced by adding various other metals in different proportions such as manganese, nickel, chromium, tungsten etc. Hæmatite, which contains least of harmful elements like phosphorus, carbon etc., is regarded as the most valuable of all iron ores for the production of steel.

Production of Iron and Steel.

The leading iron-producing countries of the world are the United States, the United Kingdom, Germany, France, Russia and Belgium. More than three-quarters of all the pig iron of the world are produced in these six countries, and among them the U.S.A. easily ranks first with, till very recently, more than half the world's total to her credit. Japan has steadily been producing more and more pig iron,

Iron Production

1913		1925		1933	
Countries	Percentage	Countries	Percentage	Countries	Percentage
U. S. A.	.. 40	U. S. A.	.. 52	U. S. A.	.. 27
Germany	.. 22	Germany	.. 14	Russia	.. 14
U. K.	.. 13	France	.. 10	France	.. 12
France	.. 6	U. K.	.. 8	Germany	.. 10
Russia	.. 5	Belgium	.. 3	U. K.	.. 8
Belgium	.. 4	Russia	.. 2	Belgium	.. 6
Others	.. 10	Others	.. 11	Luxemburg	.. 4
				Saar	.. 3
				Others	.. 16
	TOTAL 100		TOTAL 100		TOTAL 100

although her reserves are not quite imposing. India is also another fairly important producer and so is also Australia. There are vast undeveloped stores of iron in the Amazon Valley in South America and in China. The Amazon reserves are said to comprise the largest iron field yet discovered. The total production in 1913 was 78 million tons; in 1925 it came down to 72 million tons, and in 1933 sank as low as 49 million tons; but again in 1937 it rose to be 104,000,000 tons. Among the principal producers of pig iron all the countries except Russia (*i.e.*, U.S.A., Gr. Britain, Germany, Belgium and France) have a surplus for export, and even in the export of steel these countries rank high. The chief importers of both pig iron and steel are India, China, Japan, South America and Canada. India imports iron and steel from the U.K., the U.S.A., Germany, France, Belgium and Japan. The United Kingdom is the biggest exporter, supplying nearly half the total requirement; next in order comes Belgium. Trade.

Copper.—Copper, unlike iron, is often found native in nature, but the bulk of the world's production is mined from Source.

ores. It has a very wide distribution, and it entered into human civilization long before iron. Although it has long been replaced by various other metals for many of its former uses, its demand, far from being on the wane, is increasing. This is mainly due to the rapid increase in the use of electricity and the development of the automobile industry. It is the best known conductor of electricity except silver, and has thus become a 'key metal' once again.

Use.

Output.

Till very recently the United States was by far the biggest producer of copper, with nearly 70 per cent of the world's production to its credit. Next comes Chile with an annual output of a little above 200 thousand tons, about one-third of what the U. S. A. produced in 1930. A close third is Central Africa with an annual output in the same year of about 170 thousand tons, followed by Canada with a total production of nearly 150 thousand tons. Japan, which is usually rather poor in mineral reserves, is an important producer of this 'red metal' (about 80 thousand tons in 1930). Mexico is hardly inferior to Japan. Other important producers are Russia, Peru, and the Iberian Peninsula (Spain-Portugal). Many are of opinion that, the richest reserves of copper, however, lie in Central Africa, partly in the territory of Rhodesia and partly in the neighbouring parts of the Belgian Congo. The U.S.A., although still ranking highest in the scale of production, has, however, got to import large quantities of copper from other countries for its electrical and automobile industries.

Source and Uses.

Lead.—Lead ranks third among metals in the scale of production and second in the diversity of usefulness.[1] It

[1]Iron comes first both in production and usefulness; the figures for 1929 show that it comprised about 95 per cent of all the metals used. Copper is second in output, but preceded by lead in point of usefulness. See Case & Bergsmark, *College Geography*, pp. 541—'63 & pp. 610—'23.

is used in the manufacture of automobiles, airplanes, locomotives, typewriters, calculating machines, printing materials, musical instruments, rifles, shots, bullets, electrical equipment like batteries and cable covering, paints and a host of other things. Like copper it is obtained chiefly from ores, and is commonly found associated with igneous and metamorphic rocks. It is often found along with a small percentage of silver and zinc, and that is why sometimes these three metals —lead, silver and zinc—are mined from the same source.

Production

North America is the world's greatest storehouse of lead as of many other metals. The U.S.A. is the largest producer, and along with Canada and Mexico supplies half the world's total. Individually Mexico is the second largest producer of lead, with about 250 thousand metric tons to her credit; this is a little less than half of what the U.S.A. produced in 1930. Australia and Canada are the closest rivals for the third place, each with an annual output of more than 150 thousand metric tons. Other important producers are Spain and Germany, both close rivals for the fourth place with more than 100 thousand metric tons each, and Burma with about 80 thousands and Belgium with about 60 thousands of metric tons respectively. Italy and France are of comparatively lesser importance. The U.S.A., although the largest producer, has again to import large quantities of lead from Mexico, Canada, Spain and Australia for domestic consumption.

Production

Zinc.—Zinc ores are often found in countries where lead is abundant. The leading producers are the U.S.A., Belgium, Poland, Canada, Germany, and France, and with them may also be named Australia and Great Britain. Norway, Holland and Italy are lesser producers. The U.S.A. is easily the biggest producer; it total production in 1930

was about 450 thousands of metric tons. Belgium and Poland may be bracketted together as second; each produced about 180 thousand metric tons. Canada and Germany, again, are close rivals for the third place, with an output of a little more and a little less respectively than 100 thousand metric tons. The output of France also is not much less than that of Germany. The contributions of Australia and Great Britain are much lower, about 50 thousand metric tons each.

Uses.

Zinc is used chiefly for the galvanizing of iron and steel, —an industry that consumes between 40 and 50 per cent of the total zinc output of the world. Galvanized iron is nothing but iron coated with zinc to prevent rusting. The second great industry consuming about 30 per cent of the total is that of brass-making. Brass is produced by a combination of zinc with copper, and is used for gears, propellers, steam fittings, worm wheels, bearings, tubing, valves, automobile parts and various other things. Zinc is also used in the manufacture of paints.

Uses.

Tin.—Tin is also one of the indispensable base metals or a 'key metal' like iron, copper etc. It has a variety of uses like applying it as a coating for other metals, manufacturing tin containers, making alloys like solder, brass and bronze and a score of other products.

Production.

The largest deposits of tin are found in South-Eastern Asia; the Malaya States, Netherlands East Indies and the neighbouring areas of Burma, Siam and China together produce nearly two-thrids of the world's tin. Outside this area the next biggest producer is Bolivia, contributing a quarter of the world's total production of this metal. The next great producer is Nigeria. Among the lesser producers the name of Australia may be mentioned, but her output is

22·5 fine oz. In 1937 it shot up to as much as 35·5 million fine oz.[1]

Uses of gold.

The uses of gold for coins and jewellery are well-known. Its rarity, its beauty and durability together with the fact that it is easily worked have caused it to be not only highly prized, but also to serve as a standard of evaluation in our economic and commercial transactions. But gold has many essential industrial and medicinal uses as well. And yet the combined value of all the gold the world produces annually together with that of the world's annual production of silver is not enough, in any normal year, to purchase the agricultural products of any of the major provinces of India. The average yearly output of the world's gold may be roughly valued at Rs. 150 crores at the present rate of exchange.

Sources.

Silver.—The bulk of the world's silver, unlike that of gold, is not found 'native' in nature. Native silver is rare; most of it—no less than two-thirds—is found associated with lead, and that is why, generally speaking, the important lead-producing countries are also important silver-producing regions. Besides, much silver is obtained from gold and copper ores. Silver rarely, if at all, occurs as alluvial deposits.

Production.

Mexico is the largest producer of silver in the world, her contribution being a little above a third of the world's

[1] It would be interesting to study the world production of gold, the most prized of the metals, as well as that of silver and to speculate why gold has remained so fairly constant. H. B. Killough and L. W. Killough give the figures for a considerable period from 1493 to 1930. Obviously, however, the estimates relating to recent years seem to be much more accurate than those which deal with the past centuries. See *Raw Materials of Industrialism* and *Mineral Industry*.

total. The U. S. A. comes second and Canada holds the third place. Thus the North American Continent as a whole is by far the largest producer of this metal with about two-thirds of the world's total silver output. Peru and Bolivia in South America are also important producers. In Europe, Germany and Spain are important, and in Asia the two most noteworthy producers are Burma and Japan. Australia is also not an insignificant producer.

World Production of Silver[1]

1909-13		1921-25		1931-35	
Countries	Percentage	Countries	Percentage	Countries	Percentage
N. America—		*N. America*—		*N. America*—	
Mexico	32	Mexico	36	Mexico	42
U. S. A.	24	U. S. A.	27	U. S. A.	15
Canada	13	Canada	8	Canada	10
Central America	1	*Central America*	1	*C. America*	2
S. America—		*S. America*—		*S. America*—	
Peru	3	Peru	6	Peru	4
Others	4	Bolivia	2	Bolivia	3
Asia	3	Others	2	Others	1
Europe—		*Asia*	5	*Asia*—	
Germany	6	*Europe*	4	Japan	2
Others	5	*Australia*	4	Burma	2
Australia	6	Others	5	Others	3
Others	3			*Africa*	3
				Europe—	
				Germany	4
				Spain	2
				Others	1
				Australia	6
TOTAL	100	TOTAL	100	TOTAL	100

[1] Adapted from Stamp.

During 1909-13 the world's annual output was 230 million ounces, during 1921-25 it rose to be 240 and in 1931-35 to 180 million oz. Mexico has been the leading silver-producer since the days of Spanish conquest and yet shows little sign of exhaustion.

Uses of Silver.

Silver is harder and less beautiful than gold; moreover it, unlike gold, turns into sulphide though slowly, and this is what is generally known as the tarnishing of silver. It is also much more widely distributed than is gold, and, of course, much cheaper. Besides being used in coinage and jewellery of lesser value, it is largely and more generally used in industry: tableware and plate of various kinds are made of it.

Platinum.—Platinum, like gold and silver, is a 'precious metal'. It is even much rarer than is gold, and consequently more precious, though not so highly prized by all and sundry. The biggest producer is Russia, particularly the Urals. Rhodesia probably comes next. The U. S. A. is also another important producer. Some amount of the metal is obtained from Colombia as well. It is one of the essential minerals for the manufacture of laboratory utensils, because it is highly resistant to acids and temperature. It is extensively used in photography and electrical business. Like gold and silver it has a demand in dentistry and jewellery business.

Nature.

Quicksilver.—Quicksilver commonly occurs in the form of sulphide of mercury or cinnabar. In order to procure it the ore is heated or 'roasted' and the vapour collected and liquified. Its density is very high—13·6, and it readily changes in volume with the fluctuations of temperature. So mercury is used in thermometers, barometers and hygro-

Uses.

meters. It is also used in separating gold from impurities as it easily forms an amalgam with gold when mixed with the latter. It has many other uses—industrial as well as medicinal. It is combined with tin to coat the backs of mirrors, is used extensively in the manufacture of explosive caps, and so on. The chief producers of mercury or quicksilver are Spain, the United States, Austria, Italy and Russia.

Production.

Tungsten.

Minor Metals.—It is not possible here for reasons of space to give an exhaustive list of all the metals; but the more important of the minor metals may be mentioned. *Tungsten*, for example, is such a one. It is used in the manufacture of steel—for the production of different kinds of steel. The quantity required is, however, small, but nonetheless essential. China is perhaps the leading producer of tungsten, and Burma probably comes next. Other important producers are U. S. A., Malaya and Bolivia.

Chromium.

Another important ingredient of steel is *Chromium*. It is specially noted for rendering steels stainless. Moreover, chromium is extensively used in the manufacture of certain paints. Rhodesia is the leading producer and Yugoslavia comes next. Other important producers are South Africa and India.

Manganese.

Manganese is also important in the steel industry, and its chief producers in order of merit are India, Brazil and Georgia in Russia.

II. NON-METALLIC MINERALS

Non-Metallic Minerals.—Non-metallic minerals are very numerous,—in fact, more numerous than are the metals.

They are generally more abundant and widely distributed in nature, and are consequently cheaper, but not necessarily less important. These non-metallic minerals are represented by coal and petroleum, salt and sulphur, building stones and clays. Of these coal and petroleum are of primary importance; they are the chief sources of industrial power, and on that account merit a more detailed treatment in a separate chapter.

Salt.—Common salt is often chemically known as halite. It is one of the indispensable necessaries of life, and contains 60·6 per cent of sodium and 39·4 per cent of chlorine. It occurs extensively in the crust of the earth in a solid form. This is called rock salt, and is often found in the form of brine. Salt is also obtained from sea water, as well as from the inland waters such as the Dead Sea, the Great Salt Lake, etc. Salt is very widely distributed. It has been estimated that from each 100 pounds of sea-water about three and a half pounds of minerals may be obtained by evaporating the water, and the bulk of this mineral matter is common salt. There are rich deposits of rock salt in various countries. And in many places the salt industry is a government monopoly. Besides being used in food, salt is essential in packing and preserving fish, meat, hides, butter, pickles and hay. It is used also in the manufacture of soda, glass, bleaching powder, pottery and the refining of silver.

Nature.

Distribution.

Uses.

Sulphur.—Sulphur, unlike salt, is not widely distributed, being found generally in the volcanic regions. It is used in medicine, in vulcanizing rubber, manufacturing gunpowder and in drying peaches, apricots and other deciduous fruits. Sulphuric acid is required for the manufacture of glass, matches, alum, kerosene, aniline colours, blue vitriol, green vitrol, etc. Sulphurous acid is used in the production

Distribution and uses.

of paper pulp, in bleaching and in various disinfectants.

Production. The leading producer of sulphur is the island of Sicily; next in order comes Japan, and the third place is occupied by the U. S. A. There are about one thousand sulphur mines in Sicily and Italy put together, yielding more than half a million tons a year.

Mineral Waters.—The waters of certain springs and pools are famed for their medicinal value—real or supposed. Anyway, the reputation of such waters has led to the growth

Some notable centres. of towns and cities in their neighbourhood. Such are the towns of Bath in England, Vichy in France, Baden in Germany, Carlsbad in Austria, Saratoga in New York. We in India, too, have no dearth of such mineral springs and towns associated with them; moreover, most of these in our

Industry. country are looked upon as sacred places and thousands visit them yearly on pilgrimage. Now-a-days great quantities of mineral waters are bottled and shipped for distant places so that it has grown into an industry of considerable importance. It has been estimated that the average annual value of the mineral water sold in the U. S. A. from the springs and pools of that country alone comes up to about 5 million dollars.[1]

Character. **Diamonds.**—Diamonds are the most important of the various precious stones. It is said to be the hardest substance yet known. In composition, however, nothing can be

[1] The term 'mineral water' is to some extent, misleading, because all ground water contains minerals. The amount of mineral matter is determined by the length of time water has remained underground, the temperature of the water and the constituents and character of the rock with which it has come into contact. We speak of 'mineral water' when the mineral content is high and appreciable because of taste, odour or colour.

more simple than this coveted jewel; for it is pure carbon. But not all diamonds are valuable; for there *are* black diamonds which are useless as gems; they are used as tips for rock drills.

The leading producer of diamond is South Africa; the diamond mines near Kimberley are world-famous. Other important producers are Brazil and India. The chief centres for the cutting and polishing of this precious stone were Amsterdam in Holland and Antwerp in Belgium, and the chief market is the U. S. A. The present European War has completely upset the diamond business of Amsterdam and Antwerp; many of the diamond merchants have now migrated to London. Producers and Markets.

Mineral Fertilizers.—Of the various mineral fertilizers found in nature the best known is perhaps *Sodium Nitrate.* It is really a very soluble salt, and is found in large quantities in the temperate desert regions. Northern Chile is the leading producer of this mineral, and formerly it was the main export of that country. The countries practising intensive agriculture like the U. S. A., the countries of Northern Europe and Egypt were her chief customers. But the invention of artificial mineral fertilizers has adversely interfered with this trade. Another natural mineral fertilizer is *Phosphates,* found native in huge deposits in Algeria, Tunis, Florida, the Pacific Islands of Nauru and Ocean Island. But the trade in phosphates has also been affected by a slump owing to the advent in the field of artificial phosphates. Of the various artificial fertilizers may be named *calcium nitrate,* produced in large quantities in Norway, *sulphate of ammonia,* and the various *potash salts.* Sodium Nitrate. Phosphates.

III. BUILDING STONES AND CLAY PRODUCTS

Nature. Uses.

Granite.—Granite is an igneous rock containing, as it does, feldspar, quartz and mica. Its hardness is proverbial, and because of its highly compact structure it is singularly resistant to weathering. It takes a high polish. Thus it is one of the most useful of the building stones. But it is very expensive to quarry and extremely difficult to shape. It is, therefore, used in constructing large and massive edifices, in erecting monuments, curbs and paving blocks. It is also used as a ballast on streets and railroads. Although granite is fairly well distributed throughout the world, its occurrence is less common than that of sandstone and limestone. The transportation of granite, as well as of other kinds of stone, is difficult and expensive. Quarries are, therefore, rarely worked far from the markets.

Nature. Uses.

Basalt.—Basalt is also another class of igneous rock, but comparatively less compact. Of all the basaltic rocks traprock is probably most widely used. Its chief uses are in the construction of roads and concrete. It is also used, though somewhat sparingly, for building purposes. It is rather widely distributed, especially in volcanic regions.

Nature. Uses.

Sandstone.—Sandstone is a sedimentary or stratified rock. It is much more widely distributed than either granite or basalt. Though a sedimentary rock, it is of inorganic origin, being formed from sand grains deposited in the water. The sand grains adhere together because of the presence of a cementing substance naturally formed. This cementing material may be of various kinds, some of which give the sand grains much more coherence than do others. Thus when the grains are bound together by silica, the sandstone becomes highly durable. The occurrence of sandstone being

common in almost every land, it is very widely used for building purposes. Whetstones and grindstones are almost exclusively manufactured from it.

Limestone.—Like sandstone, limestone is also a sedimentary rock, but unlike the former it is of organic origin. When the marine animals die the lime of their skeletons is converted into limestone rock. It is interesting to note that these animals derive their lime from the ocean waters. That is why limestones frequently contain fossils of animals long extinct. Limestone probably has a wider range of use than sandstone. It is extensively used in the construction of buildings, in paving streets, in the manufacture of lime and as a furnace flux. Nature. Uses.

Marble.—Marble is, in fact, metamorphosed limestone. It is formed by the action chiefly of heat and pressure. Like granite it takes a high polish, and is, therefore, highly prized by sculptors. Its occurrence is, however, less common than that of limestone and sandstone. Like granite, again, marble is difficult and expensive to quarry and put into shape. Yet it is extensively used in the making of pillars and other ornamental structures, and that is because of its varied colours and excellent finish. Marble is, however, much more easily damaged in quarrying than granite or limestone. Nature. Uses.

Slate.—Slate is metamorphosed mudstone or shale. Shale, again, is another sedimentary rock containing, as it does, particles of mud hardened and cemented. It is used as a roofing material, in the making of blackboards, school-slates, flooring, table-tops, mantels, vats, wainscotting, laundry-tubs and refrigerator shelves. Nature. Uses.

Clay Products.—It is common knowledge that clay can be moulded when wet and it hardens when dried. This is Bricks.

the principle of fashioning bricks, and it was discovered thousands of years ago. In places where building timber was a rarity bricks came to be of primary use in the construction of houses and dwelling places. Thus the great Chaldean and Assyrian palaces were built almost exclusively of sun-dried bricks. So it was in Egypt and in Mohenjodaro and Harappa in our country. Clay is formed as a result of the decomposition of various minerals, particularly feldspar. It has the capacity to absorb various substances and these substances easily solidify and harden the clay when dried in the sun or baked in the fire. The commonest form of clay used in building purposes is, of course, brick. When clay is combined with brick and dried or baked, the resulting brick takes on great strength and furnishes an excellent building material. From clay we have quite a number of such materials—building brick, fire-brick, paving-brick, as well as pottery, drain-tiles, roofing-tiles, sewer-pipe, and to a small extent it is used in the manufacture of paper.

Uses of bricks.

Kaolin and Pottery.

In the manufacture of pottery, however, the purest form of clay is now more extensively used: this substance is known as *Kaolin*.

Nature.

Cement.—Cement is manufactured primarily from limestone and clay. It, too, is no new novelty; for it has been known in Europe since Roman times. Now-a-days it is reinforced by steel and makes quite a durable structure. The uses of cement are obvious. It is used in the building of bridges, brick edifices and other structures meant to stand high strain or great weight.

Uses.

CHAPTER VII

FUEL AND POWER

Sources.—Fuel and power are inseparable as the one supplies the other. And yet the former is not the only source of power; for wind and moving water, amongst others, are also good sources of power. In the past wood and its derivative, charcoal, were the two great sources of fuel, and hence of power as well. Now-a-days the force of the wind is far less employed than formerly, though that of running water is still harnessed. Industrial alcohol is widely used as fuel in many countries; the Germans particularly have made almost a speciality of it; it is derived from potatoes. In South Africa, again, they obtain motor spirits from sugar. But the present-day sources of power pre-eminently are coal and oil.

Coal.—As has already been noted in the last chapter, both coal and oil (petroleum) are minerals. They are of organic origin and occur in sedimentary rocks. Coal is actually an organic sedimentary rock. It represents the remains of almost primordial vegetation, now fossilized. "We can picture the forest from which the coal has been formed as a huge level swamp with a muddy floor covered perhaps with water. Successive generations of plants, very different from those growing at the present day, but including many that resembled tree ferns, grew, thrived and decayed, and gave rise to a mass of decaying vegetation in the stagnant water. This process of accumulation was terminated by a series of earth movements or earthquakes, and the whole area was overwhelmed by masses of sand or other sediment and so

Nature and Formation.

buried."[1] This, in short, is the age-long history of coal formation. That it is of vegetable origin is amply borne out by several facts: the woody tissue may easily be traced in the coal, sometimes by the naked eye but often by means of the microscope; stumps of trees, now converted into coal, have sometimes been found in the coal measures with roots in the underlying foundation; analysis of coal reveals its vegetable origin; coal in the first stages of formation has actually been seen in the peat bogs of to-day. A coal seam originating from forests of long duration is naturally thick; where, on the contrary, forests were of shorter duration the resulting coal seams are thin. It is interesting to note that the swamp forests which have been changed into coal were very widely spread in a certain period of the earth's history, and consequently the bulk of the world's coal measures was formed at a certain geological age: this period has accordingly been called the 'Carboniferous Age'. But though the Carboniferous was the great coal-forming period in the earth's history as the Tertiary was the great mountain-building age, coal seams of lesser extent generally are found in the rocks of nearly all the geological ages. Coal occurs in layers called seams. Some of the coal seams have as yet been little disturbed by great earth-building movements, while others have been bent and broken to a remarkable degree. The great coalfield of Pennsylvania, U. S. A., is an instance of the former kind; the seams, having been little disturbed, can be followed over an extensive stretch of land and are very nearly horizontal in position. Most of the coalfields of Britain and the European continent are much folded and broken by great faults and can, therefore, be followed for short distances. Many of the Belgian coal seams have been largely crushed by earth movements of unimaginable intensity. Coal is

Carboniferous Age.

[1] Stamp, *A Commercial Geography*, p. 117.

singularly devoid of potash and consequently its ashes are of no value as a fertilizer. This peculiar feature of coal has been ascribed to the fact that during the submergence of the vegetation the salts such as potash were thoroughly dissolved. The seams or layers of coal vary in thickness from a few inches to several feet. They are separated from one another by the intervening layers of sedimentary rock, generally of shale or sandstone and occasionally of limestone.

Coal, however, is of many types:[1]

Types of Coal.

(1) *Brown Coal* or *lignite*: most of the younger coals belong to this type; for in it we find that the vegetation has not been completely changed into coal, and so it contains a proportion of the original fragments of wood or leaves which constituted the parent material. Moreover lignites very often contain a relatively large proportion of moisture, and so these may break up into small fragments after mining. Many countries possess extensive fields of this type of coal. Germany and Australia have such coal measures. In Germany 9 tons of lignite are generally found to be equivalent to 2 tons of good coal.

(2) *Cannel Coals*, said to be a curious type of coal which give a long smoky flame. It is neither important nor abundant.

(3) *Humic or Bituminous Coals,* which include many of coals of commoner use. Those which readily form coke are called 'coking coals', those most suitable for raising steam are known as 'steam coals'. There is a soft variety which gives out a brilliant flame and since this is most suitable for house-

[1] Stamp, *A Commercial Geography*, pp. 118-119.

hold purposes, it is called 'household coal'. There is another variety which is hard and is extensively used in steamers and for export.

(4) *Anthracite*, probably the best type of coal when all things are considered. It is very hard and bright, and does not readily ignite; but since it contains the lowest percentage of volatile matter, it, if once alight, gives out a very intense heat.

This differentiation of the coals probably requires a little more elucidation. Let us recall the process of coal formation. When sediments accumulate in huge quantities, the accumulated mass of material naturally exert great pressure and generate heat; the vegetable matter thus gets greatly compressed and otherwise changed—almost metamorphosed. A given thickness of coal, it has been estimated, represents nearly 7 per cent of the original thickness of the layer of vegetation entering into the formation. Thus about 14 feet of vegetable matter is represented by only one foot of coal. While coal is being formed—obviously a very slow and durable process—hydrogen, oxygen and nitrogen are given off; this results in a relative increase of carbon at each successive stage, and that relative amount of carbon determines the character of the coal. This may be summarized by the folowing table:[1]

Composition of different types of Coal.

	Carbon per cent.	Hydrogen per cent.	Oxygen per cent.	Nitrogen per cent.
Wood ..	.. 50	6	43	1
Peat ..	.. 59	6	33	2
Lignite ..	.. 69	5·5	25	0·8
Bituminous ..	.. 82	5·0	1·3	0·8
Anthracite ..	.. 95	2·5	2·5	Trace

[1] Chamberlain, *Geography*, p. 315. The figures represent average conditions only.

The coal resources of the world have been measured by experts. It has been estimated that within 6,000 feet of the earth's surface there lie hidden approximately 8,000 billion tons of coal,—an amount said to be large enough to last the world roughly 4,000 years if the present rate of consumption remains constant till the advent of that remote age.[1] And this estimate has been conducted on the assumption that one-fourth of the coal will be lost because of defective methods of mining. The distribution of coal measures has thus been estimated:

Coal reserves of the World.

The Coal reserves of the World.[2]

North America—		
U. S. A.	43·5	p.c.
Canada	5·5	,,
Asia (excluding Russia)—		
China	5·75	,,
Others	2·25	,,
U. S. S. R. ..	22	,,
Europe (excluding Russia)—		
Germany	7·75	,,
U. K.	4	,,
Others	3·25	,,
Australia	3	,,
Africa	2·25	,,
South America	·75	,,
Total ..	100	p.c.

Distribution of Coal.

[1] Case & Brgsmark, *College Geography*, p. 571.
[2] Stamp, *A Commercial Geography*, p. 119.

Thus North America has nearly half the world's coal known to exist.[1] Asia with the bulk of her deposits in Siberia and China shares about a quarter of the world's total yet known, and Europe, the cradle of modern industrialism, contains much less than does Asia. Australia, Africa and South America have fared worst in this respect. But again, there is only a limited reserve of high-grade anthracite coal in the world. The great bulk of coal, especially in the U. S. A., is said to be low-rank bituminous, sub-bituminous and lignite.

Coal Production.

About 1,500 million tons of coal on the average are raised annually in all parts of the world. The great bulk of this huge quantity is bituminous, and only a little more than 60 million tons are of the best-grade anthracite, and about 190 million tons are lignite. One-third of the total coal raised is mined in the U. S. A., one-sixth in the U. K., and a little more than one-sixth in Germany. Thus these three countries together produce about two-thirds of the world's total. But although Germany exceeds the United Kingdom by 45 million tons or so annually, more than one-half of her total output of coal is lignite or brown coal. The entire output of the U. K., on the other hand, is bituminous: but neither the one nor the other seems to have reserves of high-grade anthracite. Of the huge production of the U. S. A.—a trifle over 480 million tons a year—only one-eighth is anthracite, the rest bituminous.

[1] But see Case & Bergsmark, *College Geography*, p. 573 where it has been definitely stated that .'North America contains about 67 per cent. of the world's total coal resources, and the United States contains more than half of the total known reserve."

Coal Production of the World.[1]
1930

Country	Type of Coal	Million tons	Total in million tons
U. S. A.	Bituminous	420	480
	Anthracite	60	
Germany	Bituminous	140	290
	Lignite	150	
U. K.	Bituminous	245	245
France	,,	55	55
Poland	,,	40	40
Russia	,,	38	38
Japan	,,	35	35
Czechoslovakia	Bituminous	15	35
	Lignite	20	
Belgium	Bituminous	30	30
China	,,	25	25
India	,,	20	**20**
Netherlands	Bituminous	6	18
	Lignite	12	
Africa	Bituminous	15	15
Australia	,,	6	6
Others	,,	78	78
		Total	1,410

The average production of coal may, however, be studied best in a comparative way as follows:

The total annual output during 1909-13 was 1,215 million tons, in 1921-25 it came down to 1,178 and subsequently in 1931-35 to 1,035 million tons. This steady decline has been ascribed to the great commercial depression through which the civilized world has been passing since 1929 or earlier; for though the depression (slump) first became visible that year, it had set in, according to experts, years before as a natural consequence mainly of the War of 1914-18.

Important coal fields of the World.

It would be well here to review briefly in the passing some of the world's important coal fields.

[1] Adapted from Case & Bergsmark, *College Geography*, p. 573. The figures are only approximate as they have been compiled from a diagram.

The World Production of Coal[1]

1909-13		1921-25		1931-35	
Country	p.c.	Country	p.c.	Country	p.c.
U. S. A. ..	41	U. S. A. ..	47	U. S. A. ..	35
Gr. Britain	24	Gr. Britain ..	21	Gr. Britain ..	21
Germany ..	12	Germany ..	10	Germany ..	11
France ..	4	France ..	4	Russia ..	7
Poland ..	4	Belgium ..	2	France ..	4
Belgium ..	2	Poland ..	2	Poland ..	3
Russia ..	2	Russia ..	2	Belgium ..	2
Rest of Europe	4	*Rest of Europe*	1	*Rest of Europe* ..	6
Japan ..	1·75	Canada ..	2	Japan ..	3
Canada ..	1·25	Japan ..	2	India ..	2
India ..	1	India ..	2	*Rest of Asia* ..	3
Africa ..	1	*Rest of Asia* ..	1	Canada ..	1
Rest of World	2	Africa ..	1	Africa ..	1
		Australia ..	1	Australia ..	1
Total	100	Total	100	Total	100

U. S. A.

I. The Appalachian or Pennsylvanian coalfield, which lies in the eastern part of the United States. It is the largest coalfield of the world yet discovered. Although in reality one continuous field, it is worked in different parts, and hence is commonly referred to in the plural. Taking all these parts together we find that this one field produces nearly three-fourths of the coal output of the U. S. A. The eastern half of the U. S. A. is really the great coal region of that vast territory, being dotted about by various other fields of lesser importance.

[1] Adapted from Stamp. The student will notice the divergences in the accounts put forward by different authorities. What position, it may be asked, are we to assign to Germany regarding her annual output of coal? Even Stamp seems to contradict himself when he says that one-sixth of the world's coal output is raised by Germany. See *A Commercial Geography*, pp. 119 and 122. Compare his statements with those of Case & Bergsmark.

II. The Coalfields of Northern France and Belgium lie generally in a belt which extends from Great Britain through Northern France, Belgium, Holland, Germany and Poland and penetrate right into Russia. This affords a rather sharp contrast to the situation in Southern Europe which has few or no coalfields. But although these fields lie in a belt, they do not constitute one continuous stretch like the vast coal measures of the Appalachian field of the U. S. A. As has already been mentioned in a previous section, the coal seams of Britain and of much of the European continent are highly folded and broken and hence discontinuous. The coalfield of Northern France and Belgium is only a member of the northern group. It is the most important field of France and Belgium, and both these countries owe much of their industrial development to it. But the coal obtained from this field is quite low-grade. Europe.

III. The Campine Coalfield of Northern Belgium and Holland lies, like that of Northern France and Belgium, within two territories. It affords a second source of coal to Belgium; but it is the only resource of that essential commodity to Holland. Europe.

IV. The Ruhr Coalfield which lies in the valley of the Ruhr, a tributary to the Rhine, is the leading coalfield of Germany. Europe.

V. The Saar Coalfield lies on the borders of France and Germany. France under the mandate of the League of Nations held sway over the whole area and worked the mine after the War of 1914-18. This lasted till 1935 when as a result of the plebiscite it was restored to Germany. Europe.

VI. The Upper Silesian Coalfield is peculiarly situated; one part of it falls into Germany, another into Europe.

Poland, and a third into what was Czechoslovakia. When in 1938 a partition of Czechoslovakia was effected as a result of the infamous Munich Agreement, Poland, taking advantage of the unenviable position of her neighbour, grabbed a considerable portion of the upper Silesian field which belonged to Czechoslovakia. One might almost be tempted to think it to be a just retribution since as a result of the conquest of Poland by Germany in September 1939 not only the Silesian field but also a considerable portion of Poland itself has—let us hope, temporarily—passed into German hands.

European Russia.

VII. The Donetz Field lies north-east of the Black Sea. It is one of the two leading coalfields of European Russia.

European Russia.

VIII. The Moscow Field is the other leading coalfield of European Russia. But the coal is lignite.

Other coal-fields of Europe.

Besides these there are many smaller fields in Europe; of these the bituminous fields of Northern Spain and the Central Plateau of France are of first importance. There are important deposits of lignite as well as of bituminous coal here and there throughout Central Europe, especially in Germany (Koln, Saxony), Austria, Czechoslovakia, Hungary, Rumania and even in Italy, Yugoslavia and Bulgaria.

Canada.

Nova Scotia

There are vast stores of semi-bituminous coal in Canada towards the prairies of that country, besides some scattered measures of high-grade coal in the region of British Columbia. In Nova Scotia also fairly large deposits of good coal have been discovered.

Asia.

In Asia, Japan is an important coal-mining country, and has small but fairly important fields, particularly in both the

northern and southern fringes. And yet they are inadequate for her internal needs; for Japan is an industrial country rivalling Great Britain or Germany. Manchuria also possesses fairly good reserves of coal, and that is one reason why Japan evinces so much interest for her. The coalfields of China contain huge reserves, and some of her fields, unworked yet, may be as large as the Appalachian coalfield of the U. S. A., particularly the one of Shansi and Shensi in the north, situated near the celebrated Great Wall of China. India is said to occupy the sixth place among the great coal-raising countries of the world. About 90 per cent of her total output comes from the three provinces of Bengal, Bihar and Orissa. The most important of her coalfields is the one at Raniganj (Bengal) in the valley of the river Damodar about 120 miles from Calcutta. Other important centres are Jherria, Giridih, Rajmahal, Daltonganj and Talcher. The coal of Karanpura, Bokaro, Barakar, etc., are of low-grade. There are coal deposits of lesser importance in Makoom (Assam), Darjeeling (Bengal), Wardha (C.P.), Singareni (Hydrabad), Bikaner (Rajputana) and in the state of Rewa in Central India. Very small coal measures have also been discovered in Baluchistan and the Punjab. India does not export coal, except a small amount occasionally to Ceylon, Sumatra, Hong Kong etc. Siberia contains important coal resources. The great Trans-Siberian Railway, which connects the coal measures of Vladivostok with those of the Moscow basin, actually passes through a number of important coalfields on the way; of these intermediate fields those of the Kuznetzk, Kansk, Irkutsk and Minusinsk basins are actually very important. Besides, there are extensive fields, only partly explored yet, farther north; of these the coalfields of the Tungusk and Yakutia basins are perhaps the most important. There are various other fields of varying importance; but the one in the Pechora basin in the north and

Japan.

Manchuria.

China.

India.

Siberia.

the other in the Ferghana basin in the south are well-worked and important. Other fields of Asia are usually small and the coals frquently of poor quality.

Africa. There is surprising divergence of opinion regarding Africa's share of coal resources. At one time it was supposed that the vast continent was very poor in this respect, and this belief persists even to this day with quite well-informed men. The Union of South Africa, however, has quite large deposits of coal. Rhodesia also has fairly important deposits. Quite recently, however, it has been discovered that Nigeria in West Africa possesses considerable resources of coal.

Australia and New Zealand. The most important coalfield of Australia is in Sydney. Another deposit of lignite is in Victoria. There is no coalfield in the North Island of New Zealand; but two small fields have been discovered on the western side of the South Island.

S. America. Throughout the entire continent of South America only one coalfield of small dimensions has yet been discovered in the south of Chile.

Per Capital Production & Consumption of Coal[1]

(*Figures are only approximate*)

Country &c.	Production in tons	Consumption in tons
Germany ..	.. 6·8	5·9
United Kingdom	.. 5·5	4·7
United States	.. 4·6	4·4
Belgium ..	.. 3·6	3·7

[1] From Case & Bergsmark, *College Geography*, p. 574.

Czechoslovakia ..	2·6	2·6
Australia	2·3	
Poland	1·5	1
Canada	1·5	3·3
France	1·4	1·8
Japan	·6	1
Africa	·2	·2
India	·1	·1
China	·1	·1
South America ..	·1	·1

Uses of Coal.

Coal is one of the most valuable factors in modern civilized life. In countless ways is it related to our daily lives. Its first and foremost use is as a fuel, and hence as a source of power. Railway trains for the most part are drawn by coal-burning engines; it is extensively used in steamships; many of the mills and plants are driven by the power generated by it. In fact, the leading producers of coal are also the leading industrial countries of the present-day world. Coke is produced by partially burning coal, and being harder than the latter it makes a hotter fire. That is why coke is largely used in the smelting of iron. The gases given off at the time of the production of coke are collected and used in the manufacture of coal-tar, dyes and various chemicals and drugs.

World trade in Coal.

Although the United States is by far the biggest coal-producing country in the world, she does not generally export it; for she has had to consume nearly all of her production; and even if she at times exports a comparatively small amount, at others she also imports a small quantity. Speaking in general terms it would be truer of her to say that she habitually imports a small amount of coal than to say that she exports it. Her average annual export of coal during 1923-28 was considerably less than 10 million tons. New York, Philadelphia, and Mobile are the chief coal exporting

U. S. A.

centres of the U. S. A. Europe, considered as a whole, produces as much coal, if not more actually, as North America. She is also the principal exporter of this commodity. In the export trade the United Kingdom easily leads; her average annual export of coal during 1923-28 was a little above 50 million tons. Germany comes next with an annual average for the same period of just short of 30 million tons.

U. K.

Germany.

Coal Exports from the United Kingdom[1]

1929

(*Approximate Figures*)

Country	Amount in millions of tons
France	13
Italy	7·2
Germany	5
South America	4
Belgium	3·5
Netherlands	2·8
Denmark	1·9
Sweden	1·7
Spain	1·6
Portugal	1·3
Norway	1·2
Others	11·7

But the World War of 1914-18 did much to dislocate the world's coal trade. Many of the customers were unable to get their usual supplies, and what they actually got was purchased at very high prices. Hence in order to secure themselves against similar future difficulties they sought to develop their own resources of coal and lignite, as well as to protect their infant industries by high tariff walls. More-

Position of Coal Trade after War, 1914-18.

[1] Adapted from Case & Bergsmark.

over, a search for substitutes was undertaken by many countries. Thus throughout Europe at least the capacity to produce coal and at the same time the use of substitutes were increased. This relative self-sufficiency of many of the European countries has, in its turn, given rise to important changes,—there have been (a) "an actual decrease in the amount of coal produced and consumed in 1929 as compared with 1913, (b) an increase in the production and use of lignite, (c) a decrease in coal production in the leading producing nation and (d) an increase in production in many other nations, most of which formerly imported the greater part of the coal used, a change in international markets and consequently a change in the international movement of coal, and a decline in the exports of the leading exporting nations."[1] Stamp, who with all his vast erudition is an imperialist as his writings so often betray, is of opinion, however, that this is due to "the growth of nationalism and the development of small home fields, and an increasing use of hydro-electric power," and these, according to him, are the reasons why "Britain's customers for coal have all been buying less."[2] There has thus set in a depression in the coal industry of Britain. As pointed out by Bogardus again, Britain alone has not been to suffer for the depression of her coal industry, but "this surplus capacity (of the other nations) in turn has resulted in unemployment and much idle equipment—difficulties that have been increased by improvements in mining methods, which have considerably increased the production per man. Thus in the Ruhr district of Germany the proportion of coal cut by the aid of mechanical power increased from 2 per cent in 1913 to 83 per cent in 1927. Similar improvements have been made in other areas

[1] J. F. Bogardus, "Notes on Recent Production & Movement of Coal in Europe," *Geographical Review*, Oct., 1930, p. 642.

[2] Stamp, *A Commercial Geography*, p. 123.

until today 55 per cent of the coal produced in Scotland, 18 per cent of the coal produced in England, 73 per cent of the coal produced in Belgium, and 60 per cent of the coal produced in France is mechanically mined. Again, surplus capacity has led to a struggle among exporting countries to secure new markets or to maintain old ones in the face of increased competition." [1]

Petroleum.—As has been mentioned in a previous chapter, petroleum or mineral oil occurs in the younger sedimentary rocks. Sometimes, however, it is found in comparatively old rocks which are not quite 'ancient' and are, of course, sedimentary or stratified. It is often called rock-oil, and in fact, that precisely is the meaning of the word petroleum (Latin *petra*=rock, *oleum*=oil). As the bodies of plants and animals begin to decay, hydrogen and carbon are given off. When these decay on the land surface, the gases mix up with the atmosphere. But in case this process of decay takes place under mud or sand beds, the released hydrocarbons, being unable to pass into the atmosphere in the gaseous state, are stored up. This decay, as well as the conversion of the organic matter into oil, takes place as the result of bacterial action. And as a rule, it is where the organic substances were deposited in brackish water *i.e.*, between fresh and salt waters, that the conversion of them into oil seems to have been possible. That is why mineral oil is largely found in old delta deposits. Gas, oil and salt are often found in association. As might be expected, the gas is at the top and salt at the bottom with the oil in between them. The necessary geological conditions for the storage of oil in nature are (*a*) a porous stratum of sandstone or shale to hold the oil, and (*b*) impervious layers both

Sources.

Origin.

Geological condition for storage.

[1] J. F. Bogardus, "Notes on Recent Production and Movement of Coal in Europe," *Geographical Review*, October 1930, p. 642.

above and below to prevent the escape of oil. Like coalfields, these 'oil pools', or more precisely the beds of sand and clay, are folded by earthquakes, and although such movements are generally unfortunate for coalfields, they have ordinarily just the reverse effect on oil pools; for the beds which contain oil also contain water, and oil being lighter than water floats on the latter, and where, as a result of earthquakes, the beds are steeply inclined, the oil naturally rises to the crests of the arches.

Crude petroleum is a complex chemical substance, and varies greatly from one region to another in composition. These may, however, be roughly divided into two types: (1) the oils with a paraffin base and (2) those with a base of petrol. Thus these two products are obtained from the crude oil by distillation. But petrol and paraffin do not exhaust the list of products obtained from the crude oil. Kerosene, gasoline, vaseline, benzine, asphaltum and other things are produced from crude petroleum. The use of kerosene as an illuminant is well-known. As late as the middle of the last century the chief source of illuminants was animal fat; despite the apparent preponderance of electric light kerosene still holds the first place as an illuminant even in America and Western Europe. Railway locomotives in some parts of the world, particularly in the U. S. A., are driven by the power generated by the burning of kerosene. Some of the ships also use it instead of coal. It also provides the source of heat for millions of dwellings in Europe and America. The fact is that petroleum can be readily broken down into a number of fuels easily adaptable to the light combustion engine of motor cars, aeroplanes, and tractors, to the heavier Diesel engine of merchant ships, naval vessels and stationary engines, and the ordinary hot-water or hot-air furnances used in heating buildings. And in most cases petroleum serves as a substitute for coal; it is cleaner and sometimes, though not in all cases,

Uses.

less expensive than coal. And although more petroleum is now burned for fuel than is used for any other purpose, it has been well said that "the whole development of our machine civilization has been made possible only by the use of petroleum lubricants." The lubricants manufactured from vegetable oils and animal fats could meet the needs of the slow-moving machinery of the pre-industrial age; but the high-speed and high-temperature machines of to-day quickly decompose these vegetable and animal oils, and only the lubricants of mineral oils are suited to them.

The production of petroleum, it has been aptly observed, has recently been increasing at an 'alarming rate'. But although more than twenty countries are at present actively engaged in the development of their respective petroleum resources, only seven of them produce more than 90 per cent of the world's total output. This can be seen from the following table:

World Production of Petroleum[1]
1930

Country.	Production in millions of barrels of 42 gallons each.
U. S. A.	890
Venezuela	135
Russia	135
Persia	40
Roumania	40
Netherlands East Indies ..	40
Mexico	40
Others	80
Total	1,400

[1] Adapted from Case & Bergsmark.

The relative importance of the principal producers may be studied from the following table: Production.

The Leading Producers of Petroleum[1]

1921-25		1931-35	
Country	p.c.	Country	p.c.
U. S. A.	65	U. S. A.	59
Mexico	10	U. S. S. R.	12
U. S. S. R.	5	Venezuela	8
Persia	4	Rumania	4
Rumania	2·5	Iran	3
Dutch East Indies ..	2·5	Dutch E. Indies	3
Others	7	Mexico	2
		Others	9
Total	100	Total	100

From all these figures we find that the U. S. A. is by far the most important producer of petroleum with a steady output of nearly two-thirds of the world's total. Of the huge output of the U. S. A. about 70 p.c. comes from the three states of Oklahoma (25%), California (24%) and Texas (21%); other important centres of production in the republic are, in order, Kansas, Louisiana, Wyoming, Illinois and Kentuchy. At one time Mexico was one of the first-rank producers; in 1923 she held the second place in respect of petroleum production with 29 per cent of the world's total. But she has fallen far behind now. South America, so very deficient in coal resources, holds an important place in respect of oil production. Especially important is the output of Venezuela, which has her chief oil centre near about the Gulf of Maracaibo. Other important oilfields of South America are in Colombia, Ecuador, Peru, Trinidad (Br.), and the

U. S. A.

Mexico.

Venezuela and other S. American States.

[1] Adapted from Stamp.

Argentine. Canada in North America is not yet known to
Canada. have any very important oilfield, although she is by no means devoid of small oil pools, and in recent years she has been steadily increasing her output.

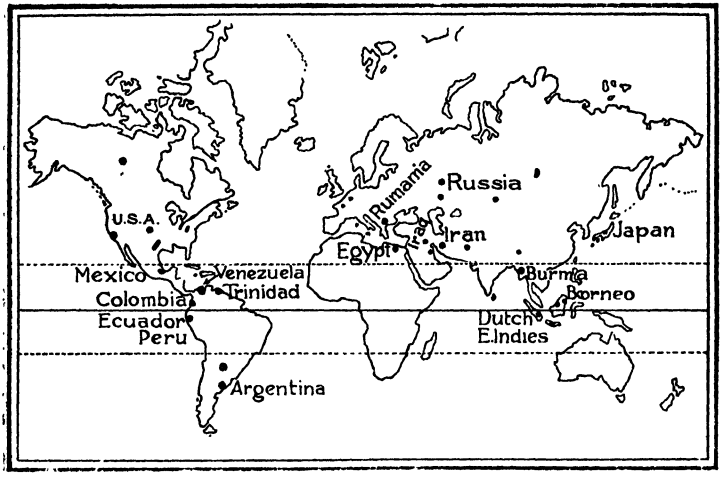
Europe. Europe as a whole is rather deficient in mineral oil resources. Her only important oil centres are in Rumania and Poland, and although the total output of Rumania is
Rumania and Poland. nothing like that of Mexico or of Venezuela in their heyday, she certainly has a place among the leading oil producers of the world. Poland, however, is not so fortunate despite her fairly abundant resources. There are, however, lesser oil pools in Germany in Hanover, and France produces a little
Germany and France. oil from her oil pools at Pechelbronn. Of all the European countries Russia is by far the richest in oil resources. There are big oilfields on both sides of the Caucasus chain, especially in Grozny and Baku. Recently, again, another chain of new
Russia. oilfields, running parallel to the Ural Mountains, has been discovered. These newly discovered fields do not, strictly technically, belong to Asia, because they occur, at least for the most part, on the European (Western) side of the Urals.

In Asia the oilfields of Iran (Persia) are thought to
Asia. be 'enormously important'. Quite near these there are the newly developed fields of Iraq, and still more recently there has been discovered an oilfield on the southern shores of the
Persia and Iraq. Persian Gulf; this was discovered only in 1935. From these
India. oilfields of what the westerners call the Near East we are to proceed eastward till we reach the small oil pools of the
Punjab and Assam. Punjab; again travelling farther east we come to the oilfields of Assam. Proceeding still farther we reach the important
Burma. fields of Burma. We have been travelling from Iran in a general south-easterly direction; from Digboi, Assam, we take a more decidedly southerly turn onward while keeping all the time towards the east, and thus we reach the oilfields of Java, Sumatra and Borneo in the Dutch East Indies

Borneo is, however, partly Dutch and partly British. By the time we reach Borneo our direction has changed northwards, and proceeding along that direction we come to the oilfields of Japan. These are not so big as those of Burma or the Dutch East Indies, and the small output of Japan is quite insufficient for her home requirements .

Dutch East Indies.

Japan.



World Production of Petroleum.

As the map of petroleum production shows, Africa's share of oil is quite insufficient. That huge continent has only a few small fields on the shores of the Red Sea in Egypt. But the continent of Australia is even more unfortunate; no oilfield has yet been discovered there.

Africa.

Egypt.

Australia.

It would be interesting as well as instructive to study the relative output of coal and petroleum. A comparison of the following two tables will show that while the production of coal has remained relatively steady for a considerable period,

Comparison of coal production and oil production.

that of petroleum has been increasing by leaps and bounds. This by itself is not, however, of much significance; but the basic causes are quite significant, and naturally they call for much hard thinking on the part of experts.

World Production of Coal and Petroleum[1]

Year.	Coal. Millions of Metric tons.	Petroleum. 100 millions of barrels.
1909-13	12·3	3·3
1914-17	12·6	4·5
1918	13·6	5
1919	11·2	5·5
1920	13·4	7
1921	11·7	7·7
1922	12·5	8·6
1923	13·7	10·3
1924	13·6	10
1925	13·7	10·6
1926	13·6	10·7
1927	14·8	12·6
1928	14·7	13
1929	15·6	14·6
1930	14·2	14
1931	12·5	13·6
1932	11	12·8
1933	11·6	13·7
1934	12	15·6
1935	12·5	17

[1] Adapted from Stamp.

In 1936 the total reached 1730 million barrels (7 barrels =one ton), and in 1937 it rose to be 1960 million. This is what is meant by an 'alarming rate' of increase. It is not possible to calculate the world's oil reserves although those of coal can fairly well be judged. Many of the great oilfields have been remarkably short-lived, particularly in America, having reached their maximum output in two or three years of their discovery and then declining quickly. Thus the world depends largely upon the continued discovery of new fields for its huge requirements of petroleum. And although the exhaustion of the world's oil reserves is by no means imminent, geologists are fairly well agreed that the exhaustion will come long before any shortage of coal occurs, —indeed it would be no surprise if the production of oil shows a marked decline within a few decades. Actually there was at one time an awful apprehension of a decline. But the fear subsequently proved to have been false, and actually it was followed by an enormous increase. Yet all countries are at present practising a restriction on their output, and many of the countries are trying to produce oil on the present scale by the hydrogenation of coal *i.e.*, by producing oil from coal. The process in theory is simple; it consists in forcing hydrogen gas at high pressure to mix up with one of the constituents of coal and thereby effecting a change in the solid coal by way of its liquefaction into oil. Another way known as low-pressure carbonisation is to convert coal partly into coalite, a kind of smokeless fuel, and partly into oil. Still there are other methods of producing petroleum. One of these is to extract oil from oil shale. This is possible because oil shale contains some amount of oil in the form of minute globules. The shale is heated in a closed vessel usually of glass with long downward-bent neck called a retort, and the oil globules are converted into gas which, when collected and cooled, condenses to be reconverted into oil.

Problem.

Attempts at solution.

But all these processes are as yet more or less expensive, and do not generally pay; the oil obtained from wells is much cheaper. Moreover, it has been calculated by experts that "to produce oil on the present scale by the hydrogenation of coal would mean increasing coal production by about 50 per cent and would involve immense capital investment ..... Therefore, oil will be produced mainly from wells until scarcity forces reliance on higher cost alternatives."[1]

Position of British Empire in Petroleum Industry.

The irregular distribution of the world's oil cannot but have its effects on world politics and on the national economy of individual nations. The British Empire, a cursory glance at the map will reveal, is as a whole deficient in oil resources when judged by modern standards of oil consumption. The whole Empire produces only about 3 per cent of the world's total supply, and the bulk of this small output comes from the three leading oil centres of the Empire—Trinidad, Burma and the British occupied parts of Borneo. But this gloomy prospect is balanced to some extent by the fact that a great proportion of the world's oil is now controlled either by American or by British companies.

Trade in Petroleum.

It is also significant that the U. S. A., despite her enormous output, can spare but little for export. Her production and consumption of oil are very nearly on a par, and actually she does import a considerable amount of crude oil. But this is not so much for home consumption as for the purpose of exporting the oil to other countries after refinement. The general custom hitherto was to export oil from the producing countries to the consuming countries, and the latter used to refine the crude oil before re-exporting a part of it to different places including the country of origin. At

[1] C. K. Leith, *World Minerals and World Politics*, p. 33.

present, however, there is keen rivalry between the producing and the consuming countries as to which shall do the refining, and so in some countries they have set up refineries at the exporting ports and in others at the importing ports.

Natural Gas.—Natural gas, like petroleum, is of organic origin, and is, therefore, found associated with the latter. In the early days of the oil industry little heed was paid to this valuable product of nature, and enormous quantities have thus been allowed to waste. The gas underground is often under great pressure, and any faulty method of drilling is liable to release the gas which then gushes forth with mad violence. Even in the exploitation of an oil well it is essential to keep the gas underground; for it exerts pressure and forces the oil up the well. The gas is generally collected by means of pipelines, and because of the natural pressure it can be easily forced to distant markets. A presure of anything between 450 pounds to 2,000 pounds is not uncommon. Origin.

Natural gas is a perfect fuel, and can, therefore, be harnessed in the service of the various manufacturing industries. At present it is largely used in the glass and the iron and steel industries, besides being used extensively as an illuminant. It seems to be a formidable rival of coal, and may, in near future, set up a great revolution in the coal trade. But again, a steady supply of natural gas on a large scale, like that of petroleum, seems to be only temporary, and certainly the length of life of any given gas field is problematical. At present, however, much more of natural gas is converted into gasoline than is used in the natural form. Uses.

The U. S. A. is naturally the leading producer of natural gas. She is also the chief consumer. In that country there are more than 55,000 gas wells and above 165,000

Production.

miles of pipelines for its distribution. The exploitation of natural gas on an extensive scale is, however, a very recent affair; but the industry has been expanding by leaps and bounds since 1921. Other important producers are Russia, Italy, Canada, the United Kingdom and Hungary.

Water-power.—The conversion of falling water into mechanical energy is one of the earliest achievements of man. It might not have been older than the utilisation of the force of the wind for mechanical purposes; but curiously enough wind-mills are a rarity to-day, whereas the force of the falling water is still being employed fairly extensively in spite of the growing competition of coal and petroleum. When the steam engine had not yet been invented, water-power very nearly pervaded the entire field of the manufacturing industries.

Water-power *vs.* Wind-power, coal and oil.

In the early days, however, the utilisation of water-power was absolutely circumscribed by the geographical location of the site of power. Thus there grew up scores of busy industrial cities around or near about falls and rapids. The early 'Fall line' towns of the U. S. A. have actually been traced out by geographers to-day. So it was in Western Europe as well. The location of the early iron furnaces, for example, in the neighbourhood of Sheffield, Great Britain, was determined by the rapids and falls of the Pennine streams. This, however, led to what is frequently called *'the localisation of industries.'* The early water wheel, owing to its almost 'primitive' simplicity of structure, could be installed and worked as efficiently in small streams, where the water flowed over ledges only a few feet high, as in large rivers with gigantic falls and rapids. That was the reason why, because of certain other contributory factors, regions like New England and the Mohawk Valley in the United States, with their numerous small falls,

Limitations.

Localisation of industries.

could be very rapidly industrialised, while the almost inexhaustible power resources of the Niagara and the St. Lawrence rivers failed to be exploited at all.

Industrial Revolution and Steam power.

With the application of steam power there, however, came about an enormous change in the sphere of industries, —a change that was nothing short of an 'Industrial Revolution.' Industry was freed from its restricted geographical location, and could naturally spread to the centres of population, to the regions whence the bulk of raw materials had previously had to be obtained, and to areas where other environmental conditions were suited to industrial development. Thus steam power has the advantage of freeing industry from the natural limitations imposed upon it by the geographical location of rapids and falls. Again, more electric energy can be derived from steam than from flowing water. But on the other hand, various ingenious devices have been invented for long-distance transmission of electricity, and this has reinstated water-power as a major source of mechanical energy. Water-power is now utilized more in the form of electrical energy than as a mechanical agency pure and simple, and this energy can now be transmitted easily to a distance of 300 miles from is base. The extreme limits to which it can be transported have, however, been calculated at 400 to 600 miles overland. Thus it is an actuality to-day to *export* water-power like any other commodity, although we cannot yet export it over vast stretches of water. New Zealand, for example, cannot at present export her surplus water-power over the sea to Australia, while water-power is now frequently transmitted overland from its source in the U. S. A. The electric turbine, again, renders it possible to utilise the entire energy derived from even the mightiest falls. Moreover, water-power is capable of being much more widely distributed than either coal or oil.

Steam power *vs.* Water power.

Flowing water is very nearly an inexhaustible source of power, whereas coal and oil, though abundant, are strictly limited. The relative importance of steam-electric and hydro-electric energy varies in different regions; countries with abundant fuel resources find it easier to make use of the former, while in regions rich in rapids and falls but poor in fuel it is easier to make use of the latter. Thus in Northern Germany, where coal is fairly abundant, steam is the major source of electric energy; but in Norway, where there is a scarcity of fuel, falling water is practically the only source of electric energy. In the U. S. A. about one-third of the total electric energy is derived from falling water.

Distribution of Water-power: (1) Africa.

Of all the continents Africa ranks first so far as her potential water-power resources are concerned; it has been estimated that she possesses about 190 millions of horse-power, approximating 40 p.c. of the world's total. To employ this huge power is to derive a benefit from the employment of about 1,330 million men, since the power of an ordinary man is supposed to be one-seventh horse-power. But Africa is the most backward of all the continents so far as the exploitation of her potential power resources is concerned. The total actually employed falls far short of even two million horse-power. No device has yet been invented for the carting off of this tremendous power to other continents in order to add to the wealth of the great industrial nations of the earth. The development of these vast water-power reserves of Africa even for the promotion of home industries will, in all probability, take generations. In some not very remote age, however, part of this energy will perhaps be utilized for cooling the homes within the humid lands of Equatorial Africa, just as fuel has been used for centuries on end to heat the homes in the middle and higher latitudes. It will also be used on a large scale for mining and agricultural

purposes. Thus Africa seems to have very great possibilities in the future, and this enables us to understand, to some extent at least, the rivalry of the Western nations for the possession of this 'Dark Continent'. Asia comes next to Africa in her potential water-power resources, with a total of about 75 millions of horse-power. But her developed power scarcely exceeds 5 millions of horse-power, although she contains nearly a third of the land area of the earth and supports more than half the total population of the world. The total turbine installation of Asia is less than that of Norway or Italy. North America is a close rival of Asia so far as potential power reserves of the two continents are concerned; but she ranks first in point of actual development of these resources, with a total well exceeding 20 millions of horse-power. Yet it cannot be said that the turbine installations in North America are uniformly distributed all over the continent. The fourth place in potential power reserves is occupied by Europe, with a total just short of 60 million horse-power. In point of actual development her figure is just short of 20 millions of horse-power. Thus North America and Europe together share more than 95 per cent of the world's total output of hydro-electric power, of which the U. S. A. and Canada account for nearly half. Next comes South America with a total reserve considerably above 40 millions of horse-power; but her actual output is between 2 and 3 millions of horse-power,—a figure that gives her the fourth place in this respect. Last of all comes Oceania with a total reserve of about 18 million horse-power, and, though her actual output of energy does not exceed 2 millions of horse-power, she may be given the fifth place (the sixth place being occupied by Africa) in this respect. To sum up, the countries which have developed their water-power resources are the U. S. A., Canada, Italy, Japan, France, Switzerland, Germany, Sweden, Norway, Spain,

(2) Asia.

(3) North America.

(4) Europe.

(5) South America.

(6) Oceania.

Australia (particularly Tasmania), and New Zealand. It is fairly accurate a generalisation to say that, hilly and mountainous regions, especially those where rainfall is constant or abundant, possess large amount of potential water-power resources, and that since coal and oil are not found in very mountainous tracts, such countries have generally been obliged to develop their water-power resources for industrial purposes. The British Isles as a whole is rather poor in water-power reserves and most of her electricity is derived from the use of coal, although water-power is utilized in the Highlands, the southern uplands of Scotland and Wales; the Irish Free State, where there is a great scarcity of coal, has, however, the largest hydro-electric installations in the British Isles near Limerick on the River Shannon. Tasmania and New Zealand are making use of their water-power reserves at a very high pace, and as late as in 1935 a start was made to utilize the famous Victoria Falls of Africa.

STUDIES AND QUESTIONS

1. Make a list of the principal materials used as fuel. What is the chief fuel in your locality and why? Where does coal and petroleum used in your locality or your vicinity come from?

2. What are the leading countries in (*a*) coal reserves, (*b*) coal production, and (*c*) coal export? Account for your answers.

3. Briefly describe the world distribution of coal with special reference to its economic importance. (I. P. S. '32).

4. In what conditions may a coal mine be of greater value than a gold mine? Illustrate your answer by reference to the coal mines of Great Britain and Germany. (C. U. Inter. '27).

5. Name the countries from which coal and petroleum are exported. (B. Com. '24).

6. Give an account of the world distribution and present production of mineral oil. (Inter. '40).

7. What are the leading countries in (*a*) petroleum reserves, (*b*) petroleum production, and (*c*) petroleum export? Account for your statements.

8. What are the liquid fuel producing countries? (B. Com. 40).

9. Examine and estimate the coal and petroleum resources of the U. S. A. (Inter. '32).

10. What are the essential geographical factors for the development of water-power? Give suitable examples from particular countries.

11. Name any four countries where water-power is principally used. Explain the special circumstances in each country favouring its use in preference to other forms of power. (Inter. '33).

12. Examine and estimate the water-power resources of Africa.

CHAPTER VIII

LABOUR AND PRODUCTION

Measurement of labour in mathematical terms.

The Problem of Measurement.—The influence of labour on production, like that of soil and climate, can scarcely be exaggerated. Economists have, therefore, sought to devise elaborate technicalities for the measurement of labour in terms of production, its quality and quantity, its value, and the time occupied in the furnishing of a given amount of product. But although it is possible to calculate each of these factors separately and some of them conjointly, it is not always possible to determine in precise mathematical terms the relation in which all of them are bound together with the labour factor, because labour is admittedly an elusive object defying a mathematical treatment. Yet certain broad lines for estimating the influence of labour on production can be indicated. Thus, for eample, it has been found that the influence spoken of above varies "with the quantity required and the quality available to furnish a given amount of product." [1] In some of the industries the quantity required to produce a certain value is relatively high, in others low. Thus in the coal-mining industry it may be as high as 64 or even 80 per cent of the total cost, while in the textile industries it may be as low as only 15 per cent. Although it is, thus, possible to measure the quantity of human labour in terms of actual output of any product and its price, it is not always possible to measure its quality. This, where possible, is to be measured 'by the amount of product per head turned

Measurement of the influence of labour on production.

Quantity.

Quality.

[1] Chisholm's *Handbook of Commercial Geography*, p. 63. The figures relate to British industries prior to the Four Years' War of 1914-18..

out in a given time' with or without the help of machinery:[1] where, however, the aid of machinery is indispensable, care ought to be taken to note the fact whether the same type of tools or different types are used for the production of that particular amount of commodity in a given time; in the former case the price of the machinery and the cost of installation are to be taken as relatively constant, subject, of course, to the usual depreciation proviso; in the latter case the price and cost of installation of the new types of machines employed for the purpose are regarded as additional sums to be reckoned with the total cost of production.

Human Labour.—Human labour may be divided into two broad categories:

Human labour: (*a*) Forced and (*b*) Free.

(a) *Forced Labour;*
(b) *Free Labour.*

Forced Labour may, again, be subdivided into (i) *Serfage* and (ii) *Slave Labour.* Serfage is a peculiar social status under which individuals enjoy what little benefits may accrue from separate property and separate rights, and are, at the same time, attached to particular estates, for the owners of which they are to work, generally for a specified number of days every week, without any remuneration save that which they can get by labouring on their own little farms. The principle is feudal; they are to work for the overlord as an inalienable obligation for enjoying the small gifts of land made to them by the overlord, and are usually sold with his estate. This, in effect, is a step away from actual slavery under which the labourer is regarded as a chattel of the owner without even the most elementary rights of a human being. Serfage is quite commonly, but rather erro-

Forced labour: (*a*) Serfage and (*b*) Slave labour.

Serfage.

[1] *Op. cit.*, p. 64.

neously, thought to be a mediæval system. It was, no doubt, a heritage of the Middle Ages, but it persisted in Europe in some form or other down to the latter half of the last century. The abolition of serfage from the civilised world is a story not even full three-quarters of a century old. It subsisted as a full-fledged system in Russia till 1861; the government of the Dutch East Indies are said to have exacted this type of labour from the natives till much later; in Egypt, too, serfage existed until the closing decades of the last century. And though the labour exacted on the indigo and the tea plantations of India by the early Britishers cannot technically be described as such, the labourers were certainly kept in a state of virtual slavery till very recently. Serfage is still being practised by the European settlers in Africa, Australia, New Zealand and Latin America. In the last named place another and a more subtle form of forced labour, known as *peonage*, is employed: under this system the natives are encouraged to contract debts to the employers, and care is taken to prevent them from getting free from these debts so that they may be forced to work all their lives—sometimes for generations—for their money-lending masters.

Peonage.

Slave abour.

Slavery in its technical sense is now a thing of the past. Abyssinia is said to have been its last refuge until the Italian conquest of that country in 1935-36.[1] Slavery, like serfage,

[1] Chisholm's *Handbook*, p. 68. But doubts may reasonably be entertained regarding the truth of this assertion. It is difficult to see how Italy could effectively abolish an age-old system in course of these few years, and that in spite of insurrections every now and then. Moreover, the constant bragging about Italy's 'civilising mission' in Abyssinia is too vivacious to be taken seriously. It is much more reasonable to suppose that Italy, even in spite of her best intentions, is still being forced to work the system already in vogue in the conquered territories.

flourished in Europe and elsewhere down to the nineteenth century; it was abolished in the British Empire by an act of 1833, and its abolition from the New World was staked on the issue of a violent civil war between the two Americas. But it not only persisted but flourished in the tropical colonies of the European settlers till much later. The emancipation of slaves throughout the greater part of the world is, much like the abolition of serfage, a story scarcely fifty or sixty years old. Slave labour was, however, of prime importance in the development of not only the Americas, but of most of the European colonies throughout the world. The immediate effects of the emancipation of slaves are a chapter in the history of European colonisation too recent to be forgotten. In many places the effects are said to have been disastrous: in Jamaica, for example, the exports declined from an average annual value of about three million sterling to less than two million. This was because the liberated slaves in the first flush of emancipation left the plantations almost in a body to live the life of the peasant subsistence farmer. Where, however, free labour was still available or white men came forward to work on plantations, this sort of eventuality did not occur. This was particularly the case in such places as Barbados and Brazil. And thus viewing the scene as a whole instead of directing attention to isolated cases, one gets the impression that much of the lamentations over the immediate effects of the emancipation of slaves, still voiced forth in various history books as well as in treatises on commerce, are much exaggerated: it is sheer distortion of facts to say that the immediate effects of the liberation of slaves were disastrous on the whole. The fact is just the reverse: on the whole it was attended with good results, not only for the emancipated slaves, but for the plantations as well: it left the slaves to exercise their own initiative either as free labourers or as subsistence farmers, and thus opened

Effects of the abolition of slavery.

A distorted picture.

Emancipation of slaves and Industrial Revolution.

up new avenues of economic and commercial development in the countries of their adoption; it also extended a new scope of activity to the free labourers of the 'white stock' of mankind. The fact is that the forces generated by the Industrial Revolution had, for a long time, been paving the way for this supposed 'reform', for which various governments, especially those of Great Britain and the U. S. A., have long been endeavouring to take credit. What these authoritative bodies did, in effect, was but to bow down to the inevitable, and that not quite willingly but after a good deal of usual hesitancy and criminal procrastination.

History of free labour.

Free Labour is said to be a peculiarity of the 'modern age'. Its history can be traced from the downfall of feudalism in Europe; academically speaking, its emergence can be attributed to the decay of serfdom as a result of the Crusades and the subsequent Black Death. Yet 'free labour' as we know it to-day is a very recent development,—particularly free industrial labour, which may be said to have begun with the Industrial Revolution. But it would be quite inadequate to account for its growth merely by reference to the Industrial Revolution, which although far-reaching in its consequences, is a matter of European—and therefore of American—history, rather than of the general history of the world. And that is one of the reasons why there are great diversities in the condition of free labourers in different parts of the world. These diversities may be partly accounted for by the fact that the consequences of the Industrial Revolution have not been everywhere the same, nor can they ever be, because even in Europe—not to speak of any other continent—the social and political conditions of the various peoples have always been widely divergent. But it is also a folly of the first magnitude, though precisely this very thing has been being perpetrated by many a writer long since, to apply

How to account for its diversity.

the lessons learnt in the study of Europe to the interpretation of world affairs at large. The diversities referred to above are to be explained by reference also to local conditions, subsisting in an atmosphere different in many respects from that of Europe or America. Thus, for example, the conditions under which free labour flourishes in caste-ridden India are quite different from those obtaining in the West. Free labour in the West may be a product of the Industrial Revolution or even a remote effect of the breakdown of the feudal system; but it may be none of these in India or in China; in the East it may as well be the product of other factors.

Diverse conditions of free labourers:

Now to the general diversities in the condition of free labourers in different parts of the world. One of these is the diversity of *money wages*. Wages have no uniform standard throughout the world even when the labour and the output per head of a commodity be the same. This is accounted for in various ways. Wages as a rule are intimately connected with what may be called the *cost of living*. A labourer in a favoured region can do away with many of the things that are regarded as indispensable necessaries in regions where the climate is severe. In wintry regions, for example, he is to spend much more for protection against the weather by means of adequate clothing, housing and fuel than in warmer countries. The food required in cold countries is also generally more expensive than that needed in the tropics or in warm temperate latitudes. But to account for the diversity of wages by variations in the cost of living is not always right or just; for it has been found that those countries in which the highest wages are generally paid are also those in which a large number of the most important necessaries of life are comparatively cheap. The highest wages are paid in those countries which, like Canada, the U.S.A., Uruguay, the Argentine Republic and

Wages.

Cost of living.

Australia, are of much recent development. The lowest wages are paid in tropical countries, particularly in those places where population is exceedingly dense and dependent primarily on agriculture. But density of population and comparative freedom from want on the part of the bulk of population do not necessarily ensure a cheapening of the most important articles of consumption. Money wages do not, therefore, depend on the cost of living alone; they are as intimately related to what may be called the *standard of living*. This standard varies in different parts of the world, and care is generally taken by capitalists not to interfere with it in such a way as to help in raising the standard of living of the labour class, often, of course, with dubious success. In Japan, for example, where the climate is much severer than in the east of the Mediterranean region (the two places lie in the same latitude), the labourers' standard of living is much lower; they live almost entirely on rice, barley, wheat, beans, peas and other vegetable food; in summer they wear scant clothing; straw sandals and wooden clogs are all that they can have for foot wear.

Standard of living.

As for efficiency, it has been said that the highest-paid labour is almost invariably the most efficient, where by efficiency is meant the ability to produce more than the average result within a given time. As Stamp puts it, where a Lancashire weaver usually minds four looms by himself, fifty per cent of the Indian weavers only mind one loom, and the statement is made on the authority of an official report published in 1919 that the ratio of efficiency between Lancashire and Indian operatives in the cotton industry is as 2½ to 1. These differences may be attributed to various causes,—to differences of race and climate, food and dwellings, and also to difference in intelligence. The last of these

Efficiency of labour.

differences—that in intelligence—is, however, a dubious factor, and one over which science has not yet achieved any control. But much may be done by raising the standard of living to combat the evils resulting from dwelling in unhygienic houses or surroundings and eating unwholesome food. It has been found that the highest paid labourers can afford to live in good houses and eat the most wholesome and nourishing food. This, in its turn, increases their efficiency. And increased efficiency, again, means a high production per head in a given time,—a factor that renders possible a large surplus of time and labour, which may be employed in other industries in order to earn a larger income or spent in wholesome recreation and leisure, and this, again, may ensure a higher rate of production in working hours. These considerations have led to various sound social legislation, and this is gradually leading to a lessening of the diversities in the condition of free labour all the world over. And since international commerce is based on the fact of national interdependence, the people of the world would, on the whole, derive great benefits from the world-wide spread of such legislation. This would not only equalise, within certain limits, the general condition of the labour factor throughout the world, but would also act as a fillip to the inherent *equalising tendency of commerce*,—a tendency that is ever seeking to manifest itself in such phenomena as the stability of prices (*i.e.*, equality of prices from year to year), their equality in different regions of production, and the development of the resources of different regions to the utmost extent possible. The unequal advantages derived by some countries from low labour costs would, thus, disappear with the raising of the labourers' standard of living; and given proper scope for the operation of natural laws or tendencies, the elimination of such unequal advantages would lead to more efficient international co-operation in the world

Factors responsible for difference in efficiency.

Efficiency and production.

Legislation for increasing labourers' standard of living.

of commerce, if nowhere else. But this must not foster the false hope that, a mere raising of the labourers' standard of living would act as the panacea for all the evils inevitably resulting from a system of competitive commerce. The entire commercial system of the present-day world needs re-organising on a co-operative basis.

Free labour, —what it means.

Free labour is not, however, absolutely free in the sense that it is not subject to any but the restrictions imposed on it by the labourers' own free will. Apart from the more obvious restraints exercised on it by religion and custom, by state interference and the labour unions themselves, its free play has always been curbed more or less effectively by the economic system under which it works. We call it 'free labour' only in a relative sense,—it is freer than slavery or serfage: it is no longer subject to feudal restrictions, and does, therefore, enjoy a relative economic freedom. A labourer now is free to choose his vocation; no one, at least in theory, is going to force him about that. But even from the economic point of view he is not absolutely free; he is, as it were, a wage-slave, working, in return for a guaranteed wage, at the bidding of his employer, and having, as such, no part in the ownership of either the instruments of production or the goods he helps to produce. This divorce between work and ownership is said to be the most characteristic feature of modern capitalist organisation, and many a socialist writer has gone so far as to suggest that under the present capitalistic system the labourer lives and works as a virtual slave of his employer. But even granting much of the force of the argument advanced by the socialist, it seems to be carrying a doctrinaire thesis beyond its logical limits, because slavery or serfage is essentially a different matter. A slave, in theory, has no personal rights; and whatever separate rights to person and property a serf may have are admittedly bound up with

Restrictions imposed by religion, custom, government, labour union and economic system.

Relative economic freedom.

Free labour and present economic system.

Is it virtual slavery under capitalism?

the superior rights of his overlord. But a labourer has no bar to own invested property, and certainly he has all the rights to his own person that the employer has over his own. And in point of fact many a labourer now does possess such property on a small scale and has thus, become a small capitalist in his own way. And if it is possible under the existing system to terrorise the labourer by the threat of dismissal, he, in his own turn, can force the hands of his employer by holding up the threat of strike: with the legalising of Trade Unions the right to strike has grown to be the counterpart to the right to discharge. But even so, the labourer as labourer has no voice in the administration of business: owners and labourers may even come to be the same people, and yet ownership and labour would, under the present system, continue to be two quite distinct and separate functions. Free labour as we know it to-day functions under this grave disability.

Many labourers petty capitalists.

Trade Union and right to strike.

Divorce of ownership and labour under capitalism.

What, then, are the results of labour under these conditions from the point of view of production? The modern workman lives by selling his labour; he cannot sell his product; for as workman he does not own it. Nor can it be said that he has any product at all, because as a producer under modern conditions of industrial organisation he produces nothing, but merely collaborates with a multitude of other workers in creating a product and that primarily for earning a meagre livelihood and secondarily at the bidding of his master. Having no recognised powers or rights in the conduct of business he is not interested in its development, but only in getting as much as he can out of it without often any sense of responsibility for doing his best to increase its ability to pay. Yet the modern workman wields tremendous powers through his Trade Union, and can do incalculable harm to production. Although devoid of any positive authority in the matter of enhancing production, much less in the

Labour's influence on production under modern conditions.

Labourer not responsible for nor interested in production

Labourer's negative authority over production, etc.

actual conduct of business as a whole, he has in fact considerable negative authority, by the exercise of which he can, and frequently does, interfere with all the branches of trade and commerce. But again, if the modern workman has no authority with regard to increasing production or carrying on business, he certainly has the potentiality to produce and even to accelerate commercial activities. The question, therefore, is: *How to enlist the tremendous power lying in the workers' hands on the side of productive efficiency?* This can admittedly be done by recognizing the workman's claim to a voice in the administration of business. Various schemes, such as the introduction of a system of *profit-sharing* or *co-partnership*, adoption of some sort of *sliding scales* for balancing the rate of wages with fluctuations in price of commodities, establishment of *works councils* as consultative machinery for ascertaining the views of workmen as regards the actual conduct of business, have been suggested by way of solution of this knotty problem. But while these schemes have, when put into operation, led to occasional clearing of misunderstanding between employers and the employed, all of them have signally failed to bring about any kind of lasting peace, because of the fatal defect, inherent in them all, that none of these 'agencies for industrial peace' really concede to the workman any power at all. Prospects of profit-sharing always work under the grave disability that there is no necessary relation between the amount of profit made by a business from year to year and the amount, as well as the quality, of the work done by its employees. All the best efforts of the workers may be effectively counteracted by an inefficient sales department or by faulty management; on the other hand, good management may yield profits out of all proportion to the workers' efforts. Profit-sharing thus entails 'highly unequal rewards for equal efforts'. Moreover, it naturally involves the gloomy prospect of sharing in the

The problem.

Attempts at solution:

(1) Profit sharing.

loss as well, and under this system the workman does not necessarily have any say in the management of the business. Co-partnership seeks to remedy this last defect by conceding to the worker not only a share in the profits, but also in the management. But the shares issued to workers have seldom, if ever, been enough to confer any real control; and even if they ever come to be an appreciable part of the total capital in the business, the wise workman might legitimately seek to invest them elsewhere with a view to spreading his risks rather than in the business from which he draws his wages. The essence of sliding scales is that "the rate of wages should vary with the changes in the price of the product in accordance with a previously stipulated ratio."[1] But it has been criticised on the ground that "there seems no valid reason why the wage-earner should voluntarily put himself in a position in which any improvement of productive methods, any cheapening of cost of carriage, any advance in commercial organisation, any lessening of the risks of business, any lightening of the taxes or other burdens upon industry, and any fall in the rate of interest—all of which are calculated to lower price—should automatically cause a shrinking of his wage."[2] Works Councils are, however, merely consultative bodies: they can work by mutual consent; as organized in Great Britain after the scheme outlined by the famous Whitley Committee, such a council could carry no proposal against opposition from either side. And so long as industry is conducted on capitalist lines, the employer or his agent, the manager, must have the final say on what should be done, not the worker. No '*joint control*' is really workable under this system, because, as matters stand under capitalism, some one must have the final word as regards the conduct of busi-

(2) Co-partnership.

(3) Sliding scales.

(4) Works Councils.

Limitation of capitalist system.

[1] Sen & Das, *An Introduction to Economic Theory*, p. 552.

[2] *Op. cit., p.* 553.

ness, and many people regard this as inevitable, if not quite essential, a limitation for the success of the capitalist system.

Whether capitalism is to survive or not.

But even if this divorce between ownership and work, this exclusion of workers from a share in the business policy, be an inevitable limitation of the capitalist system, one cannot grant that it is exactly *essential* for the success of capitalism, because obviously it engenders a constant friction that can by no means be conducive to efficient production. And the question has seriously been raised by many whether under modern forms of industrial organisation the capitalist system of production—in fact, the entire body of capitalist economic organisation—is to survive or not. Although we are here not directly concerned with the more technical side of the question, it is, however, important to note that socialists of all schools of thought are ranged decidedly against the continuance of the present system of production. Most of these schools are, however, evolutionary in their ideas, and if the majority of the socialists believe themselves to be working for a reasonably rapid transformation of the economic system, they do not, like the communists, envisage a sudden or immediate overthrow of the capitalist organisation by invoking the forces of revolution. It is, of course, difficult to put forward a definition of socialism to which all socialists would agree; for socialism, like most of our fundamental notions, is more a tendency than a clear-cut concept.[1] The greatest common measure of agreement among the socialists may perhaps be found in the doctrine that the direction and control of industrial policy—whether for production or for profit and exchange—should be in the hands, not of private individuals (owners of capital or their agents), but of the community itself. One of the chief points of socialist attack

The Socialist alternative.

Direction and control of industrial policy by the community.

[1] Bertrand Russell, *Roads to Freedom*, pp. 1 sq.

against capitalism is concerned with what is supposed to be the economic waste and inefficiency inherent in capitalism. Socialism seeks to remedy this defect by organising industry as a whole in accordance with an ordered plan, so that the supply may be forthcoming in the right relation to demand. This *co-ordinated control* over different industries or undertakings must naturally exercise a profound influence on the actual production of commodities. But where does the workman stand in this imagined structure of socialism? We have already seen that what is commonly called 'joint control' is really unworkable in the capitalist system of organisation. But is it workable in a socialist system? So long as management and production remain two separate functions—and under modern conditions of large-scale business they are bound to remain separate—'joint control' is impossible; some one must be the final authority as regards the actual conduct of business, and that some one has the real control, which can by no means be divided between two groups. But if, therefore, socialism cannot liberate the worker from the obvious necessity of obeying orders, it can make these orders emanate from the representatives of the workers themselves, and thus bring about a complete reversal of the workers' status. The management to-day is the representative of the share-holders, it shall be, under socialism, the representative of the workers, "under the authority of a higher direction of industry representing the community as a whole."

Co-ordinated control of industry and production according to demand.

Labour under socialism.

Representation of labourers in particular industries and the community in industry as a whole.

Coolie Labour.—It is said to be a peculiar form of free labour, largely employed on plantations in European tropical and subtropical colonies.[1] The labourers are mostly emigrants from India and China, working on the contract system on these plantations for a specified number of years.

Indentured labour on contract system.

[1] Chisholm's *Handbook*, p. 67.

It is in fact indentured labour. The system is now on the wane because of a variety of factors: owing to the generally inhuman treatment meted out to the coolies on plantations, such contracts are now allowed under stricter regulations than formerly; and the colonists are now depending more and more on native labour. Moreover, with the steady development of plantations and the consequent substitution of routine work in place of the severe strain of initial activities, the necessity of enlisting the services of more efficient workers has gradually been ceasing to be quite imperative; the natives, on the other hand, are slowly learning to work on plantations; finally, with the passing away of the pioneering stage of colonisation and the more or less successful development of a great number of colonies, the stage of settlement has arrived, and a consequent supply of 'white' labour on these plantations, though small, cannot be lost sight of.

The system on the wane with gradual development of colonies and introduction of legislation.

The labour of white men is also sometimes enlisted in such colonies on a contract basis, particularly for the execution of some technical piece of engineering like the construction of roads, railways, bridges etc. The United States, for example, owe much to such indentured labour; but this system of importation and migration of aliens under contract was prohibited by an Act of Congress in 1885. The system was in vogue in Australia also, and even there it has now been made illegal except in some special circumstances. The fact is that, in the early stages of colonisation immigrants are generally welcomed, because the need of enlisting labour is acutely felt; but with the gradual development of the colonies and the enlistment of labour the urgency wears out, and a tendency to restrict immigration begins to take the field. Another and a more elaborate system of enlisting labour on big plantations and colonies is to effect contracts between

Enlistment of 'white' labour on contract basis.

Tendency to welcome immigrants in early stages of colonisation and prohibit immigration in later stages.

various countries for land settlement by families: the countries which are over-populated and consequently suffer from the acute malady of unemployment readily agree to send immigrants to those countries where there is an acute shortage of labour and thus get relieved of the surplus population. Many Italian and German families have thus settled in recent years in different states of South America; Canada has similarly been peopled with British families.

Arrangements for land settlement by families between different countries.

Factors affecting Labour Supply.—The factors affecting the supply of labour in particular and the trend of commerce in general may be broadly classified into two categories: *physical* (geographical) and *non-physical.* The physical factors include the whole assemblage of geographical conditions influencing human life and activity; these, as enumerated and discussed in earlier chapters, are location, size, topography etc. of different regions. Non-physical factors include such things as religion and custom, race and civilization, economic system and government, and the like. We have already discussed in some detail the organisation, significance and influence of the present capitalist system, and have also broadly hinted at the socialist alternative. Other factors like religion and custom, however, require a little more elucidation.

Physical and non-physical factors.

Religion and custom, by prohibiting certain activities and restricting others, affect labour and commerce to a great extent. In all Christian countries the Sunday is a day of rest and thus it interrupts the even flow of labour in these countries every week. Friday is likewise a day of meditation and prayer in all Muhammadan countries. Numerous religious festivals are observed on various specified days a year not only by the Hindus but more or less by all peoples. Again, Buddhism, by placing an almost uncompromising emphasis

Influence of religion and custom.

on the protection of animals, have made the Chinese and also the Japanese averse to stock raising for the purposes of meat industry. The acceptance of interest being forbidden in Islam, banking institutions have not developed to any appreciable degree among the Muhammadans, and to this may perhaps be attributed much of the bad blood that now exists between the Hindu money-lenders of Bengal and the predominantly Muhammadan peasantry of the province. The Eastern Mediterranean regions are well suited to the vine, but have not developed the wine industry because wine is forbidden in Islam, and consequently there is, in these provinces, a great demand for coffee instead of any kind of alcoholic drink.

Races of mankind and their distribution.

Race is also said to have profound economic importance Mankind has been classified into six primary races: the Nordic, the Alpine and the Mediterranean, all of whom are said to belong to the race of the so-called Caucasian Man, and the Mongol, the Negro and the Australian races. The

Nordic.

Nordic race includes the North Europeans generally such as the Scandinavians, Dutch, Flemings, North Germans and some Russians; most of the aristocratic type of Englishman and Scotch are also said to belong to this type. The Alpine

Alpine.

race includes the Swiss, South Germans, Slavs, French and North Italians of Europe as well as the Turks, Persian Tajiks, the mountain peoples of the Pamirs, and the various Armenoids like the Armenians, Mesopotamians, Southern Arabians etc. The Mediterranean race is said to constitute

Mediterranean.

the basic population of the Mediterranean peninsulas and islands, the Semites of Arabia, the Berbers (Northern Hamites) of Libya in Africa, the Egyptians, Abyssinians, Somali, Galla, Beja, Berberines and probably the Tamils of India. These Caucasians are said to constitute the so-called 'White race' of mankind though their colour be anything

between pink white and dark brown. The Mongol or Yellow race live in Eastern Asia, particularly in China and adjacent territories; the ruling races of Japan are certainly Mongolians, but the primitive Ainu folk there belong to the Alpine race. The Negro race has branched out in two great divisions—the African or Negro proper and the Oceanic or Melanesian. The true Negro is an inhabitant of West Africa, being confined to the neighbourhood of the Guinea coast. But several half-breeds, born of various sorts of intermingling of races, such as the Bantu, Nilotes and half-Hamites, live in Africa south of the Sahara. The Oceanic Negroes are represented by the Papuans of New Guinea, and by the other primitive races of Melanesia. The Negrito people are the Pygmies of Africa, and with certain variations include the Andamanese, the Semang of the Malay Peninsula, the Aeta of the Philippines and several other less known peoples. The Bushmen and the Hottentot are supposed to be related to the Pygmies. The Australian race includes the primitive Australians generally and the pre-Dravidian tribes of Southern India and Ceylon. These races are said to differ markedly in intelligence and vigour; the world's commerce is shared very unequally by these peoples, not only because of the different surroundings they live in, but also because of their inherent characteristics. The commercial and political supremacy of the world at present is owned by the Caucasian, and to a lesser degree by the Mongol, races, particularly by the Europeans, Americans and Japanese. We shall have occasion to discuss in detail the influence of racial characteristics on labour supply and commerce in subsequent chapters.

Mongol.

Negro.

Australian.

Influence of race.

As for *government*, it may be said in general that bad government is always a handicap on the supply of labour and, therefore, on the development of trade and commerce. Mexico,

Influence of government.

for example, is fairly rich in natural resources, and so are also many of the South American States. But the absence of any stable form of government in these countries and the frequent revolutions to which they are subjected, interfere with the even flow of commerce. China despite her vast natural resources has not yet made much headway in commerce primarily because she lacks a strong central government, capable of organising her vast population as a single unit and controlling foreigners from exploiting her own resources at their will. The case of India is not much unlike; she too is being exploited by a foreign government and is finding it hard to concentrate upon constructive work. In all free countries government help people organise for various pursuits and often take a direct hand in the matter. Sometimes they enact laws for the regulation of labour and trade. We shall have occasion to note governmental interference and governmental help with regard to these things as we proceed.

Extent and density of population.

The extent and density of population is another such factor. Sparsely populated regions are not, as a rule, marked for intense commercial activity; the supply of labour is meagre; people have very few wants, and need very little to buy and have very little to sell. The largest volume of commerce generally flourish in densely peopled areas, and labour is easily recruited in and from such places.

Trade Unions.

Trade Union and like labour organisations naturally have profound influence on labour supply and, therefore, on trade and commerce. Their main efforts are directed to the securing of high wages and short working hours for the workmen. This they seek to obtain through the organising of strikes and meditation. Trade Unions are most highly developed in the West—in those countries where manufacturing industries are

highly advanced. But labour unions and trade guilds have never been unknown in the East. *Trade guilds* in China, organised by the labourers, have been wielding appreciable power since very long times. In India the *caste system* acts to some extent as a trade union, each caste insisting "on the proper training of the youth of its craft, regulates the wages of its members, deals with trade delinquents, and promotes good fellowship by social gathering." [1]

Machinery and Labour.—Although the use of tools is as old as the existence of man, the introduction of machinery for large-scale manufacturing industry is an event a little more than a hundred and fifty years old; it was the precursor of the famous Industrial Revolution (1760—1820). The utilisation of machinery for production depends on two things in the main,—physical conditions and the supply and attitude of labour. Agricultural machinery, for example, cannot properly be employed on rugged surfaces; great level plains are best suited to its use, although, if the climate be highly moist and the soil consequently soft and wet, they prove to be very great hindrances to the working of the machines. The coal-cutting machinery, again, is useless where the seams are thin and discontinuous. That is a reason why the use of coal-cutting machinery has spread much more rapidly in the U. S. A. than in Great Britain. Moreover, where labour is cheap and abundant, as in the Far East, it is more economical to employ men equipped with low-priced hand implements than to introduce costly high-grade machinery. Labourers, again, not infrequently oppose the introduction of new machinery for fear of unemployment, and it should be conceded that often their fears prove to be justified. The advantages of the use of machinery may be roughly set forth as follows: [2]

Use of machinery dependent on physical conditions and the supply and attitude of labour.

[1] Hunter's 'Gazetteer', vi-197, quoted in Chisholm's.

[2] Sen & Das, *An Introduction to Economic Theory*, pp. 101 ff.

Advantages of use of machinery.

(*a*) It is absolutely beyond human strength to perform a number of things without the help of machinery. Man cannot move loads that require a crane to move.

(*b*) In many cases machinery work faster and are much more productive than human beings.

(*c*) In some cases machines work much more accurately and uniformly.

(*d*) The component parts of machines are generally standardised, and it is possible, therefore, to replace a wrong part and get on to work a machine.

(*e*) Machinery in most cases reduce cost of production, and hence machine-made articles are generally cheaper than hand-made ones.

Disadvantages of machinery.

But there are certain grave disadvantages of the utilisation of machinery:

(*a*) Machinery, being labour-saving devices, are apt to throw men out of employment. This was nowhere more evident than in Great Britain in the days of the Industrial Revolution.

(*b*) They tend to embitter the relations between the employers and the employed by creating an unfathomable gulf between their opposed interests.

(*c*) They tend to break down the home atmosphere prevailing under the domestic system of production, and thus sow the seeds of class-war.

(*d*) Machinery have extremely injurious effects on the health and morals of the workers.

But it may be said in reply to these charges that all the evils enumerated above are not necessarily the result of the

utilisation of machinery, but of their maladjustment at the initial stages of industrialisation. Probing deeper it may perhaps be said that, the commerce and industry of the world, viewed broadly, have for more than a century been passing through a transion stage 'the like of which has never been known before'.[1] Maladjustment is but natural in such a state.

Effects of machinery on labour.

As for the effects of machinery on labour, it may be said that—

(*a*) They relieve strain on human beings, and perhaps save them the drudgery and monotony of strenuous work to some extent.

(*b*) The handling of modern complicated machinery requires understanding, intelligence and patience, and this engenders some sense of responsibility among workers. Machinery thus is said to improve the quality of labour.

(*c*) Machinery tends to break down the barriers between trades and thus make labour more mobile.

(*d*) Machinery is often supposed to increase the efficiency of labour and thus to raise its wages. "The more capitalistic the system of production, the greater the use of machinery, the lower will be the cost of production, profits will be higher and with them the wages."

Machinery and Unemployment.

But it would be wrong to suppose that machines are always labour-saving devices, for that is true only at the earliest stages of the introduction of machinery. As soon as some new type of machinery is installed there comes about

[1] Chisholm's *Handbook*, p. 7.

Unemployment in the short run.

a general displacement of labour leading to unemployment for a certain percentage of the workmen formerly employed in the same trade. Labour and capital thus appear to be mutually competitive. But in the long run the problem will automatically tend to solution in different ways: (*a*) with the introduction of machinery and the consequent low cost of production a certain commodity will tend to be cheaper, and consumers will then naturally buy more of such articles. Increased consumption will, in its turn, lead to the expansion of the industry, and some of the workers will naturally be re-employed in the expanded industry. Of course, this process cannot go on indefinitely; nevertheless it will, within certain limits, solve the problem of unemployment. (*b*) If, however, the consumers do not buy more of the article in question, they will save some money, because of the comparative cheapness of it as a result of machine production, and with the money thus saved they are likely to purchase other articles. Owing then to the increased demand for other articles there will arise the need of supplying them in larger quantities than formerly, and more men will be needed to produce them. (*c*) Some of the unemployed workers will be absorbed in the machine-making industries. (*d*) Since machine-production generally ensures expansion of business and tends to bring about an increase in the wages of the workmen, they are likely to spend more in buying various products, and this, in the long run, is likely to give rise to the necessity of employing an additional number of workers for the production of these articles. Thus in the long run labour and capital do not act as mutually competitive factors, but as complementary to one another: "Capital without labour is dead, and labour without capital is inefficient. If both co-operate, the income of each mounts up."[1]

Re-employment in the long run.

Capital and labour complementary.

[1] Sen & Das, *Economic Theory*, p. 104.

But is it so under capitalism?

But is this true under the present capitalist system of organisation? The typical form of modern capitalist business organisation is admittedly the joint-stock company or corporation. Such a company is composed of three distinctly separate bodies—(1) the stock- or shareholder, (2) the managers and (3) the workers. The stock-or shareholder is the person to own the business and shares a limited liability for its debts. But his active function ends with equipping the business, or a part of it, with capital. For the rest he is a passive recipient of profits. This decline of the shareholder's active partnership in the business has automatically raised the status of the manager. Although, in theory, he is a servant of the shareholder, in actual practice the manager of a modern joint-stock company is less purely an agent of the shareholder or the latter's servant and more properly the servant of the business itself. But what is the workman's status in this scheme? He has no recognized powers or rights in the conduct of the business. He has perforce been led to organise Trade Unions in order to put pressure upon the management when the latter seem to run contrary to his interests. But though the power he wields through his Trade Union be tremendous, he, in organizing strikes, actually works as an external agency and consequently hampers the policy of the management, which, in theory as well as in practice, is the policy of the business itself. The workman under modern capitalist system is not, therefore, regarded as a complementary agency to the capitalist, but as a competitive force. There is no willing co-operation here between capital and labour; in fact the present-day development of capitalism has made such co-operation impossible. Socialism seeks to remedy this defect by recognising the status of the labourer in the business he may be engaged in, and thus to make capital and labour complementary to one another both in theory and practice.

Organisation of modern capitalist industry:

Shareholder..

Manager.

Labourer.

Labourer an external agency under capitalism.

Socialist way of approach.

STUDIES AND QUESTIONS

1. Into how many broad types would your divide human labour?

2. What are the general characteristics of modern 'free labour'? Is it economically free under capitalism?

3. What are the general factors affecting labour supply in the modern world? What is 'coolie labour'?

4. "The race, government and religion influence the commerce of a country to a certain degree." Support this statement by illustrations. (C. U., B. Com., '23).

5. "The employment of machinery . . . . is frequently retarded by the opposition of the workers to its introduction." What may the reasons ordinarily be?

6. Is machinery a device for the displacement of labour? Discuss in this connection the broad features of the problem of machinery and unemployment.

7. Analyse briefly the organisation of modern joint-stock companies.

8. "The tendency of modern industry is to sacrifice the producer to product."—Discuss. (C. U., B. Com., '27).

9. Point out the limitation of the joint-stock type of business organisation. (C. U., B. Com.. '27).

10. What are the various factors determining the rate of wages? What influence does the standard of living exercise in the determination of such a rate? Describe the relation between wages and efficiency of labour. Account for the differences of wages. (C. U., B. Com., '23, '28, '31, '35, '39).

CHAPTER IX

THE EXCHANGE OF COMMODITIES

Transport against the background of commerce.

Transport.—The basic geographical fact underlying the entire commercial superstructure of the world is that different climatic or natural regions yield different kinds of product, or provide the same products 'under unequally favourable conditions'. This, we have seen, results in two more or less opposed tendencies of commerce: the first, which relates primarily to production, is to increase the variety as well as the quantity of products in a particular region; the second, relating likewise to the exchange of commodities, seeks to equalise, as far as practicable, the advantages for obtaining a particular commodity in different regions. This latter tendency is naturally bound up with transport facilities for its proper development.[1] Transport of commodities may, therefore, be regarded as a fundamental feature of commerce, and with it may also be considered the transport of human beings, which is not only an indispensable factor of commercial development, but also a fundamental feature of life itself.[2]

Its influence on commerce.

(1) Enhancement of production.

The influence of transportation on the expansion of the commercial world can hardly be overstated. It has acted as a *fillip to production.* Several commodities formerly considered luxuries are now regarded as necessaries in the daily lives of men and women all over the civilized world. In the past people lived mainly unto themselves; they produced their

[1] Chisholm's *Handbook,* p. 1.

[2] *Op. cit.,* p. 77.

own food and clothing and manufactured their own implements, and thus strove, as far as was practicable, to be self-sufficient within their respective communities. In many cases, however, such articles could be made more economically elsewhere; but there scarcely existed any efficient and cheap system of transportation to facilitate economical production and distribution. Consequently nothing like the geographical division of labour we see to-day was then in evidence. With the development of modern forms of transportation it has now been possible to deliver the necessary raw materials cheaply and easily at the plants for production, and the finished products can also be as easily and cheaply distributed to the consumers abroad. Transportation has thus favoured the *geographical division of labour*. Thus in our own country, which is by no means commercially much advanced, cotton growing has developed mostly in the south-central regions, jute growing in Bengal and the neighbouring parts of Bihar, Assam, and Orissa, tea production in Assam, Northern Bengal and the Nilgiris. In the U.S.A., admittedly a most progressive commercial country in the world, cotton growing developed in the south, the citrus fruit industry in the Mediterranean regions of California and Florida, wheat production in the Great Plains and the Spring Wheat Belt. This geographical division of labour, given proper scope, naturally leads to *commercial co-operation and co-ordination* among different peoples. This is particularly the case in countries following some sort of planned economy under state direction as in the U.S.S.R. But even in capitalist countries large-scale trade and commerce cannot proceed without a measure of willing co-operation among the traders or without some sort of co-ordination of the various industries. In Great Britain, for example, there has been of late years a rapid development of the system of linking up several big businesses into a single

(2) Geographical division of labour.

(3) Commercial co-operation and co-ordination.

group following a common policy. The interstate trade of the U.S.A. flows freely from state to state without being hampered in its operations by high tariff walls like the international trade of Europe. And whatever be the ultimate drawbacks of the method of 'rationalisation' of industries, or of the consumers' co-operative movement, these are aimed, among other things, at commercial co-operation and co-ordination in one way or another.[1]

Nature of Transportation.

Judged from the economic viewpoint, transportation is a part of production. For the latter consists in producting or creating, not material things, but utilities; that is to say, production consists in making matter useful for consumption, in imparting to it the ability to satisfy wants. To do this two things are essential: matter must be given form or qualities suitable to satisfy some want, and the article or commodity thus produced must be taken to the user. Agriculture, manufacture and the various industries by which things are grown and shaped impart to matter the form and intrinsic qualities which make it useful. Methods of transportation bring the commodity to the place where it can be used. The usefulness of a thing depends not only on the intrinsic utilities of form or quality, but also on its location—its *'place utilities'*. These 'place utilities' are created by the transportation services. Transportation is thus a part of the general process of production.[2]

Transportation as part of production; it creates place utilities.

[1] But it must not be forgotten that the co-operation and co-ordination spoken of above are not accomplished facts, but merely general tendencies. They cannot function but as mere tendencies in an essentially competitive system of commerce, if they function at all. Geographical division of labour, again, may, and often actually does, lead to the exploitation of one country by another.

[2] E. R. Johnson & T. W. Van Metre, *Principles of Railway Transportation*, p. 3.

Transportation also helps increase the rent or income derived from the land or other natural resources. Such rent or income depends upon two primary factors—the productivity or intrinsic characteristic of the land or resources of nature, and their location. It is with respect to location that transportation is of such importance.[1]

Transportation and urban development.

A study of the important cities of the world will clearly reveal the importance of transport facilities to urban development. Most of these cities are located on marginal positions between land and sea or inland waterways or land routes, and are, therefore, easily accessible from various parts of the country. Delhi, for example, is situated in the heart of the great Indo-Gangetic plain; from it radiate vast routes to different parts of the Indian subcontinent, and its occupation means easy access to various parts of the country. Calcutta, located on the Hooghly (Ganges), not far from the sea, and connected by railways with all parts of India, has become one of the largest ports of the world. London, New York, Paris, Tokyo, Berlin, Chicago, Shanghai, Buenos Aires, Moscow, Philadelphia, Osaka, Vienna and most of the other leading urban centres of the world hold similar stratagic positions and owe much of their development to transport facilities.

Modes of Transportation.—The modes of transportation are not the same throughout the world. These have been classified by Stamp into seven categories[2]:—

1. Human porterage, including the wheel-barrow and like devices.
2. Animals, used (*a*) as beasts of burden and (*b*) for draught purposes.

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[1] *Op. cit.*, p. 5.

[2] Chisholm's *Handbook*, pp. 77 sq.

3. Roads, and motor cars, lorries &c.

4. Railways, including (*a*) railways proper and (*b*) tramways &c.

5. Inland waterways—rivers and canals.

6. Ocean transport.

7. Air transport.

1. **Human porterage.**—More than half of the world's population still depend upon human energy as the major motive power in the local transportation of goods. This has been attributed to various causes—political, social and industrial backwardness, economic disabilities, density of population, relief and climate and so on. It is, for example, exceedingly difficult to build and maintain modern roads within the vast tropical forests; in some parts of south-eastern Asia and particularly in China, human labour is cheaper than animal labour, because there is not only a scarcity of beasts of burden in these regions, but "every inch of the land (in Northern China) is so precious that the narrowest possible roads are used, such as will accommodate a wheel-barrow but not a two-or four-wheeled cart." In parts of the East African uplands the tsetse fly makes animal transportation impossible, and so man is there the chief carrier. An idea of the prodigious labour expended by the 'coolies' in China may be obtained from the fact that "in the tea traffic between south-west China and Tibet.... the normal load per man is 200 lbs., and two mountain passes more than 7,000 feet above the level of the starting-place have to be scaled, with about 120 miles to be covered in some twenty days."[1] The average carrying capacity of an Asiatic or African porter is, however, said to range between 55 and 66 lbs.; when handling a wheel-barrow it ordinarily mounts up to 250 lbs.[2]

Its importance and causes thereof.

Case of S. E. Asia and E. Africa.

Man's carrying capacity.

[1] Chisholm's *Handbook*, p. 77.

[2] Case & Bergsmark, *College Geography*, p. 646.

Their use.

2. **Animals.**—Where beasts of burden are abundant and the environmental conditions are unfavourable for the mechanisation of overland transport, animals have largely replaced man as carriers. Even so, animal transport is still of great importance in the most mechanized countries of the West, especially in the rural districts, although mechanisation of transport is tending more and more to displace it. In most of the European countries the **horse** is the most useful animal for draught purposes; but the **ox** is said to be more important in central and eastern Europe. In southern Europe, particularly in the Mediterranean regions, the **ass** is the most useful of all animals; he can live better on scanty herbage than the horse. In the mountainous parts of southern Europe, however, the **mule** is the best animal because of its sure-footedness and endurance. In Asia and central Africa the ox is preferred to all other draught animals and beasts of burden; in Asia the **buffalo** comes next. Neither in Asia nor in Africa the horse is a first-rate domestic animal. **Reindeer** are practically the only draught animals in northern Asia, Europe and North America; they are celebrated for drawing sledges over the snow-covered ground. The Esquimaux use the **dog** for the same purpose. The celebrated **yak,** a unique species of ox, characterized by long silky hair, takes the place of the mule in the mountainous parts of Central Asia; **goats** and **sheep** are also sometimes used in these regions, and goat-carts are not unknown in the Alpine region of Europe. The **llama** is the most important beast of burden in the Andes of South America. The **elephant** is largely employed in South-eastern Asia—in India, Burma, Siam, Ceylon, Sumatra, Borneo etc. In Africa they have ceased to train up elephants for labour. In India the government supervise over the catching of elephants for training. Amidst forest and marsh which cannot be traversed by any other domesticated animal, the

Their relative importance in different countries.

lordly elephant is quite indispensable to man. In desert and semi-desert regions, again, the camel is even more indispensable than the elephant in the forest and marsh. No other animal carries so much merchandise than does the camel. The early colonists introduced this useful animal into Australia; but since motor-cars have been replacing him even from his old home, he has now been completely ousted from his adopted country. Animals are used both for carrying loads and drawing carts. Broadly speaking, one animal can pull at least four times the load it can carry. As for the horse it has been estimated that one capable of carrying 30 lbs., can draw a wagon load above 1 ton over a hard-surface road and the drawing capacity of a team of horses over a compacted, snow-covered surface is from 8 to 10 tons.[1] The use of wheeled vehicles, however, involves generally the making of suitable roads.

Carrying capacity of animals.

3. **Roads.**—Road construction nicely illustrates the correlation between and interdependence of the arts of road-making and transportation. Road-making was, until comparatively recent times, dependent upon the local supply of raw materials for construction. With the development of transportation this state of affairs has ceased; road materials are now brought from distant sources. On the other hand, transportation has always been dependent on good roads. Until comparatively recent times most of the roads in clay areas were difficult for dust in the dry season and for mud when rains would set in. This is still the case in many parts of the world such as western Siberia, the plains of Hungary, Australia and the Argentine. Almost simultaneously with the overwhelming transformation of the system of transporta-

A question of interdependence.

Roads in 'clay areas.'

[1] Case & Bergsmark, *College Geography*, pp. 645-46.

tion within the last 150 years, the art of road-making has also been revolutionized. Two Scotsmen, Telford and Macadam, were particularly responsible for this amazing change. Telford first conceived the idea of laying a solid stone foundation for roads and covering it with a layer of small broken stones; this upper layer was made thicker in the middle so as to impart a slightly arched form to the road like the camber of a beam; on each side of the road were provided adequate ditches for drainage. Macadam simplified the method by ignoring the costly stone foundation altogether. He began constructing roads by means of broken stones of uniform size, each piece an inch or two in diameter, and cambering the roads better for drainage. But with the advent of the automobile even this proved inadequate; for the rapidly moving wheels provided with rubber tyres began to disintegrate the road materials by uplifting stones and scattering away the finer particles of dust which formed a natural cement. Then was invented the use of concrete and 'tarmacadam' (broken stones coated with tar). Of the several varieties of stone used in road-making limestones and close-grained igneous rocks like basalt are said to be the most suitable. Granite being coarse-grained, its large crystals tend to crack under heavy pressure; but roads made of such stones are more suitable for horse traffic than for automobiles. Gravel is often used, particularly on the surface. Another common road material is blast-furnace slag. Most up-to-date roads are admittedly unsuitable for horse traffic because of their smoothness: they are essentially motor roads. It is, therefore, quite probable, as Stamp suggests, that in cities horse traffic will, in near future, be greatly restricted, if not prohibited altogether. Motor cars, motor lorries etc., are now being used in the deserts of Sahara, Arabia, Australia and other regions instead of camels. This has revolutionalized desert transport to a large extent.

Modern roads of Telford and Macadam.

Modern automobile roads.

Major road materials.

Modern roads essentially automobile roads.

Future of horse traffic in cities.

Desert transport revolutionized

Road mileage of different countries may be studied from the following table:

Road Mileage in 1930[1]

U. S. A.	3,016,000	miles
Russia	776,700	,,
Japan	575,300	,,
France	390,400	,,
Canada	388,350	,,
Australia	350,000	,,
India	**300,000**	,,
Germany	200,000	,,
U. K.	175,000	,,
Poland	150,000	,,

Different aspects of road mileage question.

The total mileage of the world's highways, as computed in 1930, is said to be some 7,800,000 miles, or about ten times that of double-track railways. Of this total the United States alone (excluding Alaska and other territories) possesses 38·7 per cent, and Russia which ranks second has only 10 per cent. But it is only fair to compare road mileage of a country in proportion to its area and population; the quality of the roads is also to be taken into account in such comparisons. Thus comparing, we find that Japan leads the world with 3 miles of road to the square mile. The U. S. A. occupies the twelfth place in this respect with 1 mile of road per square mile. Other countries having a claim to such distinction are Luxemburg, Northern Ireland, United Kingdom, Denmark, France, the Irish Free State and Belgium. The U. S. A., however, ranks first as the country posses-

[1] Compiled from Case & Bergsmark, *College Geography*, p. 664.

sing the greatest mileage of unimproved roads; in this Japan comes next. But the U. S. A. leads also in possessing the greatest mileage of improved roads without even a close second; for Italy, which ranks second in this respect with her 3,700 miles of bituminous macadam (penetration macadam) roads, challenges no comparison with the 30,000 miles of such roads possessed by the U. S. A. The United States leads also in asphaltic or bituminous concrete roads with a total mileage of 9,000, while Canada comes next in this respect with a total mileage of only 900. Of a total mileage of 300,000 or a little more shared by India, only 75,000 miles are motorable.

Motor traffic and road development.

The development of modern roads has been greatly stimulated by the growth of motor traffic. In 1934 there were in the U. S. A. more than 25,000,000 motor vehicles *i.e.*, roughly one for every 4·5 persons. In Great Britain in the same year there were some 2,500,000, *i.e.*, one for every 20 persons. The U. S. A. alone possesses half the world's total number of motor vehicles; she has not only the largest number of cars and trucks, but also the largest number of cars in proportion to population. It is significant that in some of the sparsely populated countries like Canada, Australia and the Argentine the automobile plays a much more important part than in many of the European countries. The motor-omnibus has played an important part in the spreading of intercourse between urban and rural areas, and motor vehicles are now competing more and more with trams and railway trains. It has been predicted by many that in future motor vehicles will oust railway locomotives and trains altogether. But modern roads are still supplementary to the railways, acting primarily as feeders to the latter; even in spite of the existence of trans-continental highways in the U. S. A., roads still act in that way. The fact is that motor

Motor traffic and urban-rural intercourse.

Motor traffic *vs.* Railway traffic.

traffic is cheaper and more mobile than railway traffic, and is much better for short distance transportation.

4. Railways.—The influence of topography on the construction of railway routes is much more obvious than on that of motor roads. The railway-builder's problem is said to lie 'midway between those of the road engineer and the canal builder'. Railway locomotives are incapable of ascending steep slopes; an ordinary locomotive hauling more than its own weight on a gradient of 1 : 20 fails to work at all, and working becomes difficult if gradients of about 1 : 100 are frequently encountered. It has been found that the cost of running a given train-load over a mile of track on a gradient of 1 : 50 is double that of running it over a mile on the level. But trains can somehow be worked on gradients of 1 : 22. These are the reasons why railways do not generally run parallel to roads already constructed for the same destination. The railroad from Siliguri (Bengal) to Darjeeling has been constructed as a spiral line in order to lessen the gradient of the roadbed; that from Bombay to the Deccan plateau follows a course of a series of zigzags for the same reason. In the hill section of the Assam Bengal Railway the lines have been pierced through the mountains in a number of tunnels. Various novel types of railways have also been invented for running in mountainous regions. Wide stretches of water also often interfere with the construction of railways. These are mostly bridged over; in some cases, again, train-ferries are used for the transfer of whole trains across the intervening water. The train-ferry system has long been in existence over the channel lying between Denmark and Sweden; such communication has also been established between England and the continent *via* Harwich for ferrying goods trains across, and in 1936 the first passenger train from London was thus transferred to Paris *via* Dover-Dunkerque.

Topography and railway.

Railways in mountainous regions.

Train-ferry system.

Some Important Trans-Continental Railways

1. **The Trans-Siberian Railway,** connecting Russia with the Far East. The original line runs from Vladivostok on the Pacific coast to Chelyabinsk in the west. It now connects Moscow and Leningrad with Vladivostok, Dairen, Peiping and Tientsin. The whole line is now a double track system. With the completion of the **Hankow-Canton Railway** in 1936 it has now been possible (?) to travel from Calais to Canton by railway.

2. **The Trans-Caspian Railway,** connecting Central Asia with European Russia. It runs from Krasnovodsk on the eastern shore of the Caspian Sea to the heart of Turkestan, so important for cotton-growing, and thence to Moscow *via* Tashkent. It also throws off a branch towards the Afghan frontier from Merv to Kushk.

3. **The Orient Express Route** runs from Paris to Istanbul (Constantinople), connecting Munich, Linz, Vienna, Bratislava, Budapest, Belgrade, etc. The *'Baghdad Railway'* was destined to connect Baghdad by Mosul with Berlin; at present it runs from Konya on the west to Nisibin on the east, throwing off a branch to Alexandretta and another to Damascus, whence one line runs to Mecca, and a second, crossing the Suez Canal at El Kantara, proceeds to the Nile valley.

4. **The Cape-to-Cairo Route** was destined to connect South Africa with Egypt; the scheme was outlined by Cecil Rhodes; but it could not be worked out. At present one may go to Khartum from the Cape by railways and roads. Khartum is connected by rail with Wadi Haifa, whence one is to reach Shellal by river. From Shellal a train runs to Cairo.

5. **The Canadian Pacific Railway** connects the Pacific sea-board of Canada with the Atlantic sea-board. It runs from Halifax and St. John on the east to Vancouver on the west, connectng Quebec, Ottawa, Montreal, Winnipeg, Regina, etc., on the way. It is the shortest of the trans-continental lines of North America.

6. **The Canadian National Railways,** formed by the amalgamation of the Canadian Northern, Grand Trunk, and Grand Trunk Pacific Railways, run across the North American continent partly through Canada and partly through the United States, connecting various important centres like Prince Rupert, Portland, Moncton, Winnipeg, Quebec, Chicago, Buffalo, etc.

7. **The Union and Central Pacific Railroad,** the first trans-continental system north of the Isthmus of Panama, connects Chicago (and, of course, New York) with San Francisco. It lies entirely within the U. S. A.

8. **Western Pacific Railroad,** also in the U. S. A., is another trans-continental system opened for freight traffic only. It is much longer than the Union and Central Pacific.

9. **The Northern Pacific Railway** runs from St. Paul, some 400 miles north-west of Chicago, to Tacoma on Puget Sound and Portland; it has connections with New York and Philadelphia as well.

10. **The Great Northern Railway** also has St. Paul for its eastern terminus and runs to Seattle on Puget Sound; it, too, has connections with New York and other important centres.

11. **The Southern Pacific Railway,** runs from San Francisco to Washington and New York through the southern states of the U. S. A., throwing off branches towards Mexico.

12. **Atchison, Topeka and Santa Fe Railway has** established connections between New York and San Francisco by way of St. Louis. Like the Southern Pacific it also passes through the southern half of the Valley of California.

13. **The Chile-Argentine Railway** connects Buenos-Aires with Valparaiso. It is the most important of the four trans-continental railways of South America.

The development of **Tramways** began in the last quarter of the nineteenth century. The early tram-cars were mostly horse-drawn vehicles; the use of electric power came later on. At present tramway companies are finding it hard to compete with 'the more flexible motor-omnibuses'. In some countries 'trolley buses' are being used instead of tram-cars; these are driven by electricity, but require no rails. The large number of privately owned motor-cars have rendered the street-car system very nearly useless in America.

Revolution in water transport.

5. Inland Water Transport.—The use of inland waterways given by nature has been known to man since the dawn of history. Even the construction of artificial waterways was not unknown in pre-Christian times. Yet water carriage has been revolutionized only within the last hundred years or so; it began with the introduction of the steamboat in the early years of the last century.

Water carriage *vs.* Land carriage.

In some countries water carriage is much more important than land carriage. The large navigable rivers of the East have always provided splendid means of access to inland regions, and many canals have been cut from them both for irrigation and transport. The intricate network of canals in China would, if spread along in a continuous line, coil round the entire globe seven or eight times. This, coupled with the fact that the earliest civilisations almost invariably

flourished in one or other of the large river valleys of the East, has led many to suppose that water carriage is more advantageous than land carriage. It is certainly cheaper, because large navigable rivers and lakes provide ready-made highways that cost little to maintain. But this is not true even of all kinds of waterways provided by nature; not only canals but canalized rivers also cost a good deal.[1] Water carriage is, moreover, slow and uncertain. Many of the rivers are, again, useless for navigation, and even good navigable rivers mostly flow for long stretches through marshy regions devoid of landing places. Rapids and falls are almost insurmountable barriers to navigation; rivers which are subject to great variations in level, as most of them actually are, do not offer good transport facilities all the year round. In wintry regions, again, the stoppage of river traffic through ice in winter is the rule rather than the exception. Thus nearly all the rivers of Peninsular India become unnavigable in the dry season on account of low water and inadequate draft. Of the three great rivers of China only the Yangtze Kiang is ideal for navigation; the Hwang-ho is too rapid, too shifting and too much obstructed by shallows, and the Si Kiang, though navigable for a long distance from its mouth, has several rapids to impede navigation. The great Mississipi of North America flows for miles at long stretches without landing places. The mouths of the rivers of Siberia, flowing towards

[1] It is often rather erroneously assumed by many that inland water transportation costs less than railway transportation. But when cost of construction and maintenance of canals and canalized rivers are taken into account, the reverse appears to be correct. In the U.S.A. inland water transportation has been found to cost 40 p.c. more on the average than railway transportation. The story is much the same about inland transportation in Europe as well. See H. G. Moulton, "Economic Aspects of Inland Water Transportation," *American Journal of Geography*, Vol. XV, pp. 78 and 112.

the arctic seas, remain icebound in winter. All these considerations inevitably suggest the superiority of railways to inland waterways, especially to rivers. ".....It should now be recognised," writes Stamp, "that nature has generally done more for a country in providing it with facilities for railway construction than with navigable rivers, in so far as these are merely inland waterways....."[1] The most important thing about a river is its accessibility to sea-going vessels; a river that is not directly accessible to these vessels *i.e.*, one that cannot be used as a natural extension of the seaboard is not of any great value for transportation; inland communication can be better served by railways. The only disadvantage about railways is that of costlier haulage; but this is more than well balanced by speed and ease of intercommunication with different parts of a country. A railway is said to have a great advantage over a river even on a parallel course, as the lines running through the Indo-Gangetic Plain well demonstrate. Yet rivers are very useful—indeed almost indispensable—for the transportation of bulk freight at low cost. A train load of 7,000 tons, for example, is generally considered unusual, but barge-trains frequently carry much more without any fuss. This carrying of bulk freight (great quantities at one time) at low cost[2] has been described as the special 'economic mission' of inland waterways. And it is of prime importance in densely populated regions with a super-abundance of raw materials, and "in countries not yet fully opened to modern commerce." Inland waterways often act as feeders to railways as well.

Rivers and railways.

[1] Chisholm's *Handbook*, p. 87.

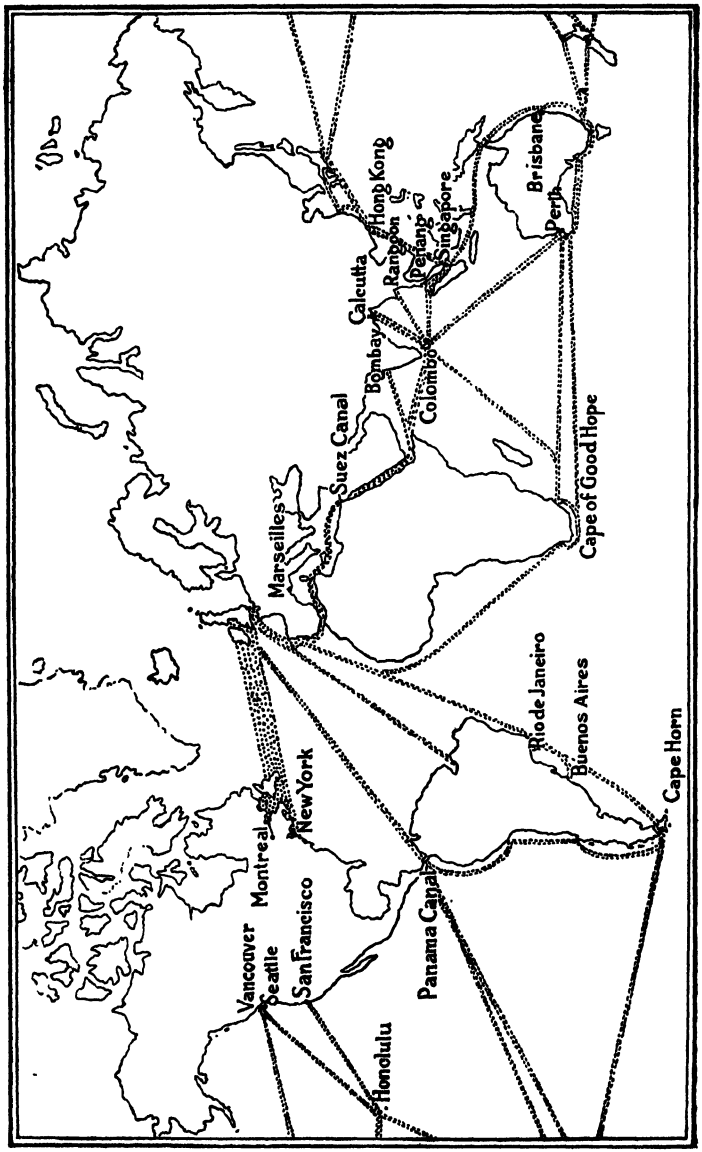
[2] This may be perplexing. But while the railway meets all its own costs by charging high, part of the costs in the case of water transport—such as the cost of construction and maintenance of canals etc.—are met by the government. Its freight charges are, therefore, comparatively low. The balance is paid by taxpayers.

Another use of rivers in to feed navigable canals. With the introduction of railways, however, the importance of canals for navigation has greatly diminished. But the 'ship-canals' have, on the contrary, assumed enormous importance with the expansion of marine navigation. Lakes are, however, very important for inland water transport. Lake waterways are beyond comparison cheaper than either navigable canals or railways. It has been estimated that on the Great Lakes of North America, for instance, a ton of traffic may be transported to a distance of 1,250 miles for a dollar as against only 127 miles on the railway for the same sum.[1] This is not surprising at all, since lakes are ready-made highways costing next to nothing for upkeep. Such is also the case with other great lakes like the Caspian Sea, Lake Geneva, Lake Constance, Lake Titicaca, all of which are more or less important commercial routes. Canals and Lakes.

6. Ocean Transport.—The bulk of modern international trade is sea-borne. Yet ocean transportation is no novelty of the present age; it was well developed by Indians, Chinese, Phœnicians, Greeks, Carthaginians and Genoese long before the beginning of the Christian era. Even the mariner's compass, which among other things, has so repeatedly been made responsible for the inauguration of the socalled 'Modern Age' in European history, was known to the Chinese long before Christ was born. What, however, is particularly new is the introduction of the coal-and oil-consuming giant steamers for ocean transportation in place of the old sailing-vessels. Ocean transport & mariner's compass no novelty.

Nevertheless sailing-vessels and small crafts for the navigation of the sea have not totally died out yet; the islanders of the Pacific Ocean still undertake pretty long voyages in Liners and Tramps.

[1] H. G. Moulton, "Economic Aspects of Inland Water Transportation," *Journal of Geography*, Vol. XV, p. 77.



OCEAN TRADE ROUTES (1)

small boats, and larger sailing vessels owned by Europeans sometimes ply the 'seven seas' even today. But for all that these must now be regarded as exceptional. Modern sea-going vessels are classified as **liners** and **tramps** (unless, of course, they belong to the military marine): a liner is a ship that plies regularly between foreign ports and usually carries certain specified types of products only; a tramp is a drab general cargo ship, lacking in fixed routes and regular sailing schedules, and goes from port to port in response to offers of cargo at what it considers to be sufficiently attractive rates. The liners are adapted to the nature of the trade and make for specialization. Because of their speed and regularity liners now carry 80 per cent of the total ocean traffic, while tramps specialize in the transport of bulk cargoes like grain, coal, fibre, timber etc. Sailing-ships are also used in carrying bulk cargoes, but they are rapidly declining in number.

Advantages of ocean transportation.

Ocean transportation is said to possess the greatest combination of advantages: it shares the advantage of cheap haulage for low speeds with water carriage of all kinds; sea routes, unlike roads, railways and canals, cost nothing to maintain; the ocean is free to navigation (except, of course, the socalled 'territorial waters') and can be traversed in all directions; it imposes no limit to the increase of the size of vessels (although, apart from cost of construction and repair, the size of vessels is limited by accommodation available at ports and the dimension of ship-canals). All these advantages are said to outweigh the great risk of loss at sea than on land from storms and the like.

Ocean Trade Routes.

But though the oceans are traversable in all directions and they cover nearly three-fourths of the earth's surface, definite routes of travel have been established across them;

beyond these 'sea lanes' and 'trade routes', as they are called, the vast expanses are completely deserted. Several factors have naturally played their respective part in determining these lanes and routes. The first principle of ocean navigation is to take the shortest cut between two places as far as practicable. Owing to the sphericity of the earth such a route is always the arc of a great circle, of which the centre of the earth is the inevitable centre. This sounds simple enough, but it is not so simple as it appears at first sight. The earth, we know, is not a sphere, but a spheroid. So, where it is a north-and-south route, the shortest cut lies along a meridian; but where the route is from east to west or the reverse, the shortest cut deviates from the parallels of latitude in proportion to its distance from the equator; it is only on the equator that it lies along a parallel of latitude *i.e.*, along the equator itself. Since these parallels are shorter and shorter towards the poles, the shortest of the east-and-west routes in the Northern Hemisphere deviates most in a curve towards the north from the parallel connecting places at the ends of the route; in the Southern Hemisphere it deviates farthest towards the south. But this principle has to be modified by certain other considerations. There may be land in the way on a great circle route (shortest cut), and this may cause considerable deviation. So also does the climate of a region cause deviation from a great circle course. The circle route from Cape Town to Wellington (New Zealand) lies to the south of the Antarctic Circle, but the actual passage of ships takes a more northerly route. Coaling stations and oiling-bases, again, oblige ocean-going vessels to modify their routes sometimes, but these are situated along the great curve routes as far as practicable. Ocean currents and winds are also important factors in determining sea lanes and trade routes, but these concern the sailing-vessels, modern steamers being practically independent of them.

Factors in determing ocean trade routes.

The Principal Ocean Routes of the World

1. The North Atlantic Route.— Of all the ocean routes this is the busiest, connecting, as it does, the two leading commercial regions of the world—Western Europe and Eastern United States.[1] Various other ocean lines issuing from the numerous ports on the Atlantic coasts of Canada, the U.S.A., Mexico and the islands of the West Indies converge into the North Atlantic Route, and on reaching the European side of the Atlantic Ocean it splits into separate lines to reach the different ports of Western Europe. For European vessels the principal ports of departure are London, Liverpool, Southampton, Glasgow, and Bristol in Great Britain; Dublin, Cork, Waterford and Limerick in Ireland; Marseilles, Le Havre, Rouen, Dunkerque, Bordeaux, La Rochelle, Nantes and Cherbourg in France; Antwerp, Ghent, Ostend and Bruges in Belgium; Amsterdam and Rotterdam in Holland; and Hamburg, Bremen and Emden in Germany. Ports of call are New York, New Orleans, Galveston, Philadelphia, Boston and Baltimore in the U.S.A., and Halifax, St. John, Montreal and Quebec in Canada. Eastbound traffic over this route still consists mainly of raw materials like wheat, paper and pulpwood from Canada and cotton from the U.S.A., whereas westbound traffic consists mainly of manufactures; but this 'unbalanced traffic' is gradually disappearing as more manufactured articles are now being exported to Europe from the U.S.A. instead of an overwhelming proportion of raw materials, especially cotton. In the foreign trade between the U.S.A. and the U.K. on the eve of the present War, the export of the U.S.A. exceeded more than twice as many tons of goods as she used to import from the U.K., and her ex-

Connecting Western Europe with Eastern U.S.A., Canada & Mexico.

Chief ports.

Nature of commerce.

Present revolution.

[1] Half the world's shipping (approximately) is engaged in the North Atlantic.

ports to continental Europe exceeded her imports therefrom by more than a million tons annually. The War has completely turned the balance of this unbalanced trade the other way about.

Suez, the meeting-place of East and West, of North and South.

2. **The Mediterranean Trade Route.**—Next to the North Atlantic Route, this is the most important ocean route in value and volume of traffic. It extends through the Mediterranean Sea, the Suez Canal and the Red Sea. The Suez Canal may well be described as the meeting-place of the East and the West as well of the North and the South: it is where all the European and North Atlantic lines converge with those from East Africa and the Far East and also with most of the lines from Australia and New Zealand. The Mediterranean route, therefore, interconnects such regions as differ markedly from one another in commercial products and economic activities. Westbound traffic over it consist of a rich variety of raw materials and foodstuffs like jute, silk, rubber, skins, leather, tea, coffee, rice, wheat, sugar, meat, spices, indigo, tin, timber etc; eastbound traffic consist almost solely of a great variety of manufactured articles, especially cotton piece-goods and machinery. This is perhaps the most glaring instance of unbalanced international trade. Principal ports to the west of the Suez are London, Liverpool, Southampton, Manchester, Glasgow, Bristol, Rotterdam, Hamburg, Marseilles, Lisbon, Genoa, Naples etc.; to the east the chief ports are Bombay, Calcutta, Rangoon, Singapore, Colombo, Aden, Hongkong, Shanghai, Nagasaki, Yokohama, Manila, Perth, Adelaide, Sydney, Melbourne, Durban, Zanzibar, Mombasa, Mozambique, etc. The chief coaling-stations on the route are Gibraltar, Marseilles, Algiers, Port Said, Colombo, Singapore, Batavia, Hongkong, Shanghai, Nagasaki and Yokohama. Many of the coaling-stations are also important *entrepôts*. Eastbound vessels

Nature of trade.

Chief ports.

land many goods at Gibraltar for ports on the Mediterranean at which they do not call or for ports on the Black Sea; westbound vessels likewise land several goods at Port Said for the same purpose. Aden is another such *entrepôt* for goods destined to reach East Africa. At Colombo, another coaling-station and *entrepôt,* the route branches out in two directions, one of the lines going round the south of Australia, the other to Singapore, where it again branches out into two, one for passing round the north of Australia, the other to China and Japan. Several important branch lines proceed from Singapore to Indo-China, North Borneo and the Philippines.

Importance of Suez Canal.

Before the opening of the Suez Canal in 1869, trans-oceanic commerce between North Atlantic countries and the East had to pass around the Cape of Good Hope, or goods had to be transported by land across South-Western Asia or North-eastern Africa (trans-continental trade). With the opening of the Suez Canal and the development of modern coal-and oil-consuming vessels trade has flourished, the time required for the voyage has been greatly minimized. The Canal has, for instance, reduced the distance between New York and Calcutta by 2,500 miles.[1]

[1] The construction of the Suez Canal was undertaken by Ferdinand de Lesseps, a Frenchman, in 1859 and was completed by him in 1869. The Canal was declared open in November of that year. Its length (from Port Said to Suez) is 100 miles, breadth between banks now varies from 400 feet to 460 feet and its depth now is between 36 and 39 feet; the present bottom width is between 148 and 195 feet. Average duration of transit through it is some 16 hours. It is at sea level throughout. In 1929 the canal was used by no less than 6,274 vessels totalling 33,466,000 tons. But the traffic has been on the wane since. In 1935 the total number of vessels passing through the Suez Canal was 5,992 with a total capacity of 32,811,000 tons. The management of the cana is in the hands of a company in which the British Government has a considerable number of shares.

Old route between East and West.

3. The South African or Cape Route.—Until the opening of the Suez Canal this was the only trans-oceanic route between the North Atlantic countries and the East. It was opened by Vasco da Gama in 1498 when he reached India by way of the Cape of Good Hope. It connects Western Europe not only with the western and southern parts of Africa, but also with Australia and New Zealand. Nearly half the total export of Australia to Britain is transported by way of the Cape. The principal ports in South Africa on this route are Capetown, Port Elizabeth, East London and Durban; those of Australia are Sydney, Melbourne, Adelaide and Fremantle. Durban is the most important coaling-station, and Capetown the chief centre of South African trade. General exports of S. Africa are foodstuffs like maize, fruits and sugar, raw materials like wool and diamonds, and manufactures like gold bullion; general imports, foodstuffs like wheat, raw materials like wood, mineral oils, chemicals and drugs, and manufactures like piece-goods of silk, wool and cotton, jute and cotton bags and machinery. General exports of Australia are raw materials like wool, hides and skins, and lead, foods like wheat, butter, meat, sugar and fruits; general imports, raw materials like silk and cotton goods, yarn and cordage, bags and sacks, chemicals and machinery. The bulk of the trade over this route is carried by freight steamers and sailing-vessels. Mail and passenger steamers betwen N. W. Europe and Australia, however, take the Suez Canal route.. But since the distance saved by the Suez Canal is not much —only 1,000 miles on the average—and in order to avoid the high canal tolls, freight steamers generally take the Cape Route. Sailing-vessels also avoid the Suez Canal on account of the adverse winds over the Red Sea.

Connecting W. Europe with Africa, Australia and New Zealand.

Chief ports.

Nature of trade.

Why Cape Route still used.

4. The Panama Canal Route.—The Panama Canal was opened in August 1914. It connects the Pacific Ocean

with the Atlantic, and has naturally brought about many far-reaching changes in ocean routes: the distance by sea between the eastern (Atlantic) and western (Pacific) coasts of North America has now been reduced by about 7,000 miles,—New York on the Atlantic seaboard is, for instance, 7,873 miles nearer by sea to San Francisco on the Pacific coast than formerly. Prior to the opening of the Panama Canal there was no sea-borne trade between these two coasts of N. America. It has also reduced the distance between the Atlantic coast of N. America and the Pacific coast of S. America by nearly 4,000 miles; thus Valparaiso in Chile (S. America) is roughly 8,500 miles from New York by the Strait of Magellan or Cape Horn, whereas by the Panama Route it is only about 4,600 miles. The Panama Canal has brought Australia and New Zealand closer to the United States; Sydney in Australia is nearly 13,500 miles from New York by the Suez Route, but by the Panama Route it is about 9,700 miles; the distance between New York and Wellington (New Zealand) by the Strait of Magellan is considerably over 11,000 miles, whereas by the Panama Route the distance does not exceed 8,500 miles. Japan has also been brought closer to the U. S. A. by the Panama Canal; the port of Yokohama (Japan) is above 13,000 miles from New York by the Suez Canal, whereas it is considerably less than 10,000 miles from New York by the Panama Canal. The western sea-board of both the Americas has also been brought nearer to Europe by more than 5,000 miles on the average. Yet the Panama Canal is essentially an American highway. It has, doubtless, opened up a new route to Australia and New Zealand from Europe, but this new route has effected practically no reduction of distance; the distance between Sydney (Australia) and Liverpool (Gr. Britain) is some 12,400 miles by the Panama Route and about 12,200 miles by the

Importance of Panama Canal.

Panama essentially American Canal.

Suez Route; that between Liverpool and Wellington (New Zealand) is over 11,000 miles by the Panama Canal and about 12,500 *via* Suez. Europe has not, therefore, been able to derive much advantage from the Panama Canal; most of her shipping take the Suez Canal Route for trade with Asia, Africa and Australia. Until 1923-24 the traffic through the Panama Canal remained much smaller than that through the Suez Canal; but the scale has now apparently turned in favour of the former. This has, however, been attributed mainly to the growth of the carriage of oil from California to the eastern (Atlantic) side of America. Of the commodities passing through the Panama Canal, lumber from Puget Sound is said to occupy the next place; other important commodities are wheat, China tea, Chilean nitrate and Australian meat.[1] It is extremely significant that the total tonnage of cargo carried from the Pacific to the Atlantic exceeds that moving in the reverse direction by more than 10 million tons. Although the traffic through the Panama Canal now exceeds that through the Suez Canal, the former does not yet seem to have such basic advantages as the latter. The regions along the Panama Canal Route are, unlike those along the Suez Canal Route, neither densely populated nor noted for productivity; the Pacific Ocean, moreover, may well be described as a vast water-desert. Important ports of call along the route are Colon, San Diego, Vancouver, Prince Rupert, Callao and Valparaiso in the Americas, and Nelson, Christchurch, Auckland and Dunedin in New Zealand. Newport News, Bilbao and Honolulu are important coaling-stations on the line. The Panama Route has gradually joined the various Atlantic Routes on the one hand and Pacific Routes on the other.[2]

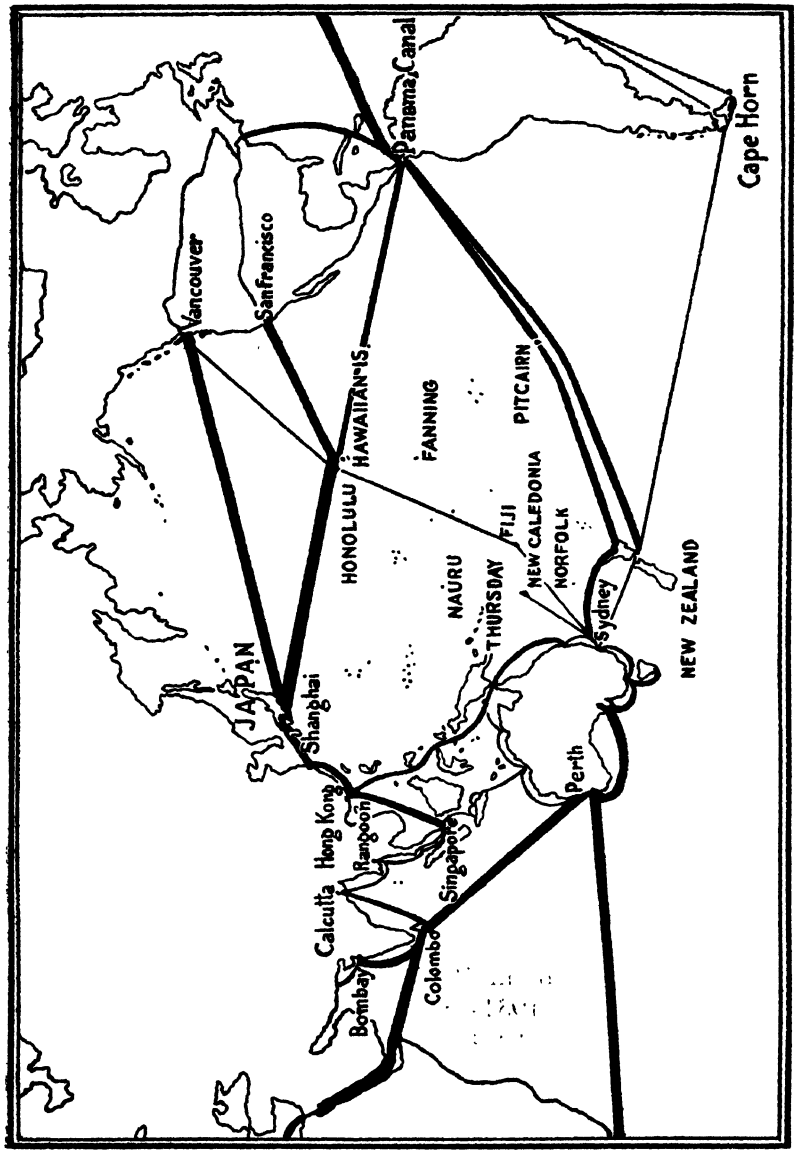
Nature of trade.

Panama *vs.* Suez.

Important ports.

[1] Chisholm's *Handbook*, p. 697.

[2] The length of the Panama Canal is 50 miles; the minimum depth of canal, 41 feet; minimum bottom width of channel, 300 feet. The average duration of transit through it is between 7 and 8 hours.



OCEAN TRADE ROUTES (II)

Development of Pacific routes.

5. **The Pacific Routes.**— The Pacific Ocean is steadily becoming more and more important as a commercial highway. This development is due mainly to American endeavour: the opening of the Japanese ports to foreign trade, the gold rush to California in the middle of the last century, the possession by the United States of Alaska, the Hawaiian Islands and the Philippines and the construction of the Panama Canal are said to be the chief factors responsible for the development of the Pacific trade routes.

Pacific Trunk Lines.

The main line connects the western seaboard of the United States with Eastern Asia, particularly with Japan and China. Another important line has established communication between the Philippines and the U. S. A. The trunk line that goes to Japan starts from the Puget Sound region and California and swerving northward reaches Yokohama by way of the Aleutian Islands; the other trunk line swerves southward to the Hawaiian Islands and then proceeds westward to Eastern Asia. There are direct routes to the Philippines as well. Important ports along these routes are

Chief Ports.

Seattle, San Francisco, Los Angeles, Vancouver, Manila, Yokohama and Shanghai; Honolulu is a very important coaling-station for vessels plying along the Hawaiian Islands. There are a number of ocean lanes connecting Australia and New Zealand with the various American states.

Development of trade between U. S. A. & Japan

The opening of the grand trunk line to Japan has been followed by the remarkable development of trade between that country and the U. S. A. The United States is now Japan's chief customer as well as her chief supplier: the United States supplied 27·4 per cent of all the imports into Japan in 1924, 29·2 per cent in 1926-30 and 32·4 per cent in 1931-35, and purchased 41·2 per cent of Japan's exports in 1924, 40·4 per cent in 1926-30 and 27·0 in 1931-35.[1] Equally remarkable has been the development

and

[1] Chisholm's *Handbook*, pp. 640-41.

of trade between the U. S. A. and the Philippines; since the latter was taken possession of by the U. S. A. (1898), the overseas trade has multiplied thirty-five times.[1] But the nature of the trade passing along the Pacific Routes is, on the whole, extremely unbalanced: the total tonnage of goods bound for the Far East (westbound) is nearly four times as large as that bound for the Far West (eastbound to America). This has been attributed to the fact that the U. S. A. generally exports bulky commodities and imports goods of lesser bulk but of high value. Thus in 1929, for example, the U. S. A. exported more than 593 million pounds of raw cotton to Japan, but imported only 74 million pounds of silk; and while the silk was valued at 348 million dollars, the cotton was worth only 127 million dollars. The trade between the U. S. A. and China also presents the same spectacle: the principal exports to China from the U. S. A. are kerosene, tobacco leaf and raw cotton, while the chief imports of the U. S. A, from that country is silk.[2] Other important exports from the Far East are tea, rice, hemp etc., and those from the Far West are wool, metal goods and machinery. This 'unbalanced trade' of the United States has its parallel in her trade with Western Europe in normal times.

between U.S.A. & Philippines.

Nature of Trade.

6. **South American Routes.**—These routes have some similarity with the South African or Cape Route. Prior to the opening of the Panama Canal, oceanic commerce between the eastern and western seaboards of America had to pass around Cape Horn or the Strait of Magellan. This traffic has now dwindled in importance. Yet sailing-vessels still continue to ply around the Horn between the Atlantic and Pacific ports of America, because it is difficult for them to use the Panama Canal owing to the calms of the Panama

An old route.

[1] Case & Bergsmark, *College Geography*, p. 652.

[2] *Op. cit.*, pp. 652-53.

Chief Ports.

Bay.[1] These South American routes connect West Indies, Brazil and the Argentine Republic. Chief ports along these lines are Kingston, Havana, Vera Cruz, Tampico, La Guaira, Georgetown, New Amsterdam, Paramaribo, Pernambuco, Bahia, Rio de Janeiro, Santos, Montevideo, Buenos Aires, Bahia Blanca and Rosario. Of all the South American routes that of the east coast is most important for commerce; for along that line lie the coffee-exporting ports of south-eastern Brazil and the equally important ports of the River Plate region whence grain, sugar, meat, wool, hide and rubber are exported to the U. S. A. and Europe.

Nature of Trade.

Origin.

7. **Aerial Transport.**—Aerial transport is a twentieth century development, although experiments with balloons go at least as far back as 1782 when Stephen and Joseph Montgolfier, two French brothers, conceived the idea of employing 'heated air' to lift bodies. Subsequently hydrogen and other gases were used. With the invention of the internal-combustion engine came the first aeroplane—a machine heavier than air. This petrol engine is now used on airships or dirigibles which are made lighter than air by the use of hydrogen or other gas. Seaplanes, hydroplanes and flying boats are specially designed for landing on water; they, too, are, like the aeroplane, heavier-than-air machines. It was only in 1910 that the first aeroplane crossed the English Channel. The Four Years' War of 1914-18 was responsible, more than any other event, for the rapid development of aerial navigation. The Zeppelin is also a lighter-than-air machine, christened after its designer Count Zeppelin of Germany. British and American experiments after the War with new types of airships and flying boats having proved disastrous, these were

Different types of aerial machines.

[1] The Strait of Magellan is extremely difficult to navigate; sailors therefore prefer to take even the more stormy passage round Cape Horn.

abandoned. But Germany succeeded in establishing a mail and passenger service to South America with the now famous Graf Zeppelin. The use of aeroplanes, however, has developed in all civilized countries.

Aerial transportation is now employed chiefly for the rapid transfer of mails, passengers and precious articles. It is advantageous in long journeys only, particularly in trans-continental flights. In short journeys railways are still supreme. At present regular air services have linked up most of the important cities of the world. The British airways between Europe on the one hand and Asia and Australia on the other generally start from Croydon (London), and passing through Marseilles, Athens, Alexandria, Cairo, Gaza, Baghdad, Bahrein, Sharjah, Karachi, Jodhpur, Delhi, Allahabad, Calcutta, Rangoon, Bangkok, Penang, Singapore, Batavia, Darwin, Brisbane, Sydney etc., reach Melbourne in Australia. The French and the Dutch also maintain air services along this route as they, too, have vested interests in the Far East and the South. There are air services between England and Africa as well; the British airway starts from Southampton and goes to Khartoom *via* Alexandria after crossing the Mediterranean Sea; at Khartoom the line branches out in two directions—one terminating at Capetown in the south and the other at Lagos in the west. The French and the Italians also have regular airways from Europe to Africa—to their respective possessions of French Equatorial Africa *via* Bathurst and of Madagascar across the Sahara and the Congo, and to Addis Ababa *via* Tripoli and Cairo. Airways between Europe and America have been developed by the French and the Germans. The African airport of Bathurst usually forms the point of departure and the Brazilian port of Pernambuco the terminus; thence a line radiates to Santiago in Chile and another to the various airports of the U. S. A. This is a

Aerial transportation *vs.* Railway transportation.

Chief airways:

Between Europe and Asia and Australia.

Europe-Africa.

Europe-America.

America-Asia.

trans-Atlantic air route. Airways across the Pacific Ocean connecting America and Asia are maintained by the U.S.A. The point of departure usually is San Francisco whence the trunk line goes to Canton *via* Honolulu and Manila. The continents of Europe and America (particularly the U. S. A.) are well served by air services: prior to the disorganisation of commerce brought about by the present European conflict, regular commercial air services were established all over Europe. Germany was till lately the leading air-transport power in the world, and she still ranks first in Europe in this respect. In 1928, however, the U. S. A. first surpassed Germany in the development of airways. The total freight and mail carried by aeroplanes and airships in the U. S. A. that year was well over 2500 tons, in Germany just 2500 tons, in France a little above 1250 tons, in Holland about 750 tons, in Great Britain 600 tons, in Colombia just short of 500 tons, in Poland nearly 275 tons, and in Italy 250 tons.[1] Important airports of the U. S. A. are New York, Washington and Boston on the east and San Francisco, Los Angeles and Seattle on the west.

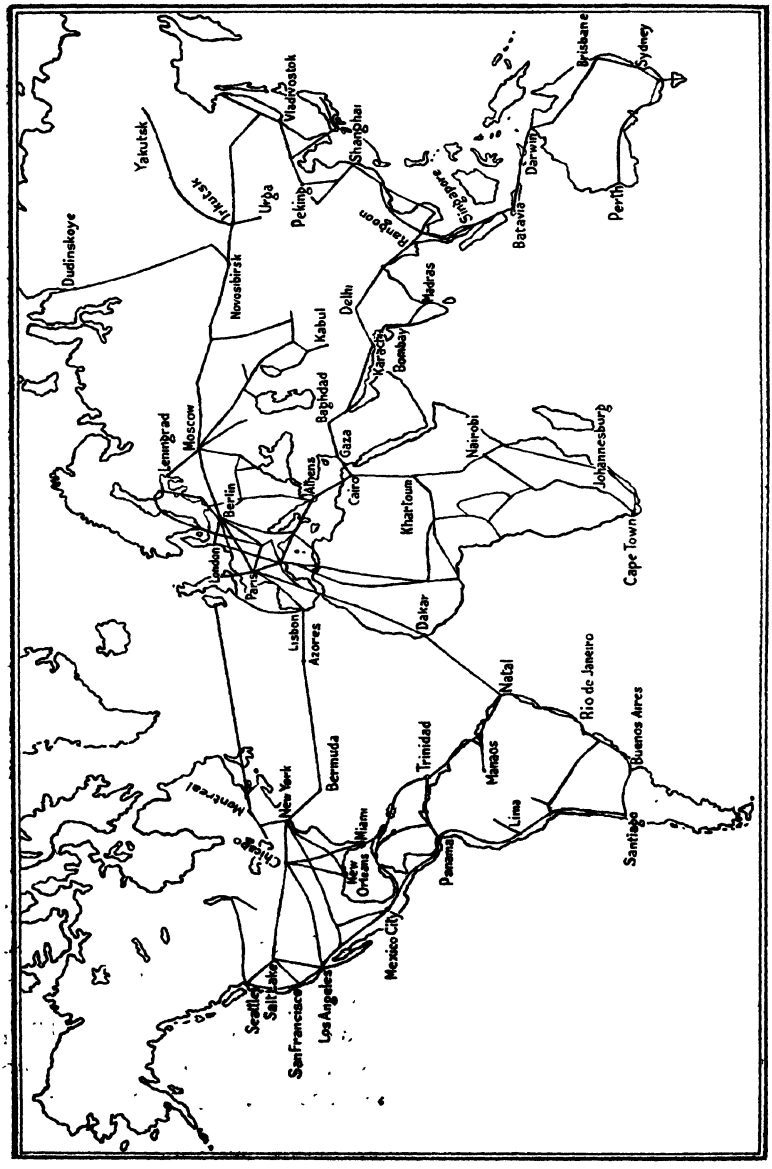
Position of different countries in air transport.

Importance of relief.

Commercial and Industrial Towns.—A moment's glance at the topographical map of any country or region will at once reveal to the thoughtful student that any random spot is not convenient for the exchange of commodities on a commercial scale, while certain other places are eminently suitable for such transaction. A study of the various towns, big and small, within a given region will, on the other hand, show that these are all, more or less, centres of exchange for the districts around. The inevitable conclusion from these data is that a town is always a centre of exchange, even if all the spots favoured by topography for commercial and industrial development are not towns. It is necessary, therefore, to

Towns as centres of exchange.

[1] Compiled from Case & Bergsmark, *College Geography*, p. 666.



THE AIRWAYS OF THE WORLD

Conditions favouring growth of towns.

study the factors that help to the growth of towns and cities as well as of commercial and industrial areas. These are, however, of various kinds, and it is customary to enumerate them in some such way as follows:—

(*a*) Many of the world's most famous cities owe their origin and development mainly to religion. Familiar instances are Mecca, Jerusalem, Benares, Lhasa etc.

(*b*) Several other towns have grown up to be what they are chiefly as educational centres. Obvious instances are Oxford and Cambridge.

(*c*) Health and pleasure resorts also sometimes grow up to be more or less important towns. Vichy, Bath, Saratoga, Darjeeling etc. are some of the instances.

(*d*) Natural wealth, especially minerals, are responsible for the growth of many important towns. Scores of instances may be cited at will. Unfavourable climate is no hindrance to the growth of towns located in the vicinity of mineral deposits as the towns of Northern Chile and Western Australia show.

(*e*) Nearness to the site of water-power is another factor helping the growth of towns. The 'fall-line towns' of the U. S. A. like Buffalo, Holyoke, Minneapolis, St. Paul etc. are well-known instances.

(*f*) Towns often grow up at the meeting of hill and plain, at the confluence of navigable rivers, at the highest point to which a river can be navigated, at points where a river suddenly changes its course, and at spots where surface relief lead to the convergence of various railways or roads. Milan at the foot of the Alps is a place where commodities from the mountains can be exchanged for those of the plains. Allaha-

bad, Lyons, Manaos, St. Louis, Frankfort-on-Main, Pittsburg etc. have grown up at the junction of rivers. Chicago, Toronto, Winnipeg etc. are important railway junctions.

(*g*) Towns often spring up where physical and other conditions necessitate a change in the mode of transport or where it is most convenient to deposit bulk goods for their eventual distribution. Sea-ports are the most outstanding examples of this class of towns.

(*h*) Many towns owe their origin and growth to strategic advantages of location. Copenhagen, Istanbul, Gibraltar etc. are notable examples.

(*i*) Historical and political movements are also responsible for the growth of many towns. Paris, Washington, Berlin etc. may be cited as familiar instances.

Importance of location in determining the origin and development of towns.

It is clear from the foregoing analysis that of all the factors responsible for the growth and development of towns, location is by far the most important; indeed it very nearly subsumes under it all the other factors, topography included. According to Semple it is the supreme geographical fact in history; "area itself, important as it is, must yield to location."[1] A place of pilgrimage will not develop into a large town or centre of business if located unfavourably for the exchange of commodities. Badrinath in the mountain fastnesses of the Himalayas has not developed into a town at all. The importance of Benares, on the contrary, lies in its favourable position on the Gangetic Valley. Mecca was an important city even in pre-Muslim days, and so was Jerusalem in pre-Christian times; both the cities are remarkably situated. As for educational centres the truth is that

[1] E. C. Semple, "Geographical Location as a Factor in History,' *Geographical Society Bulletin*, Vol. 40, pp. 65-66.

towns rarely grow up because of universities, but universities are established where towns have already sprung up. The situation of the two most famous universities of England—that of Oxford and Cambridge—in the east midlands is important; Oxford, moreover, is now a centre of England's motor industry. Other university towns of England—London, Liverpool, Leeds, Durham, Sheffield, Manchester and Birmingham—are important business centres as well.

Ports. Another thing to be noted in this connection is the fact that most of the great cities of the world are sea-ports *i.e.*, situated on or near the margin of the sea. A port is a gateway between the land and the sea, and thus performs the dual function of loading and unloading cargo.

Harbours. The importance of a port depends primarily on two factors—(1) *the facilities it can afford to shipping,* and (2) *the productiveness and accessibility of the region it serves.* The entire region served by a port is called its **hinterland,** and where ships can have a place of shelter is known as a **harbour.** A port must, therefore, have a harbour in front and a hinterland behind. Harbours may be either *natural* or *artificial*: a natural harbour is essentially an indention in the coastline spacious and deep enough to admit ocean-going vessels and sufficiently protected by topographical features from destructive winds and waves so as to provide a tranquil anchorage for shipping. Liverpool and Cork in Britain and San Francisco in the U. S. A. are said to possess excellent natural harbours. Where, however, topographical features are unfavourable artificial harbours are constructed for providing safe accommodation to shipping. In order to combat the recurring shallowness caused by the deposit of materials due to streams, waves, current and tides, the work of dredging is repeated at frequent intervals. Large sums of money

are thus regularly spent for deepening many such harbours. Breakwaters are also used for combating the destructive work of waves within the harbour area so that shipping may lie in safe anchorage; this is especially important where the harbour space is limited. But it must also be borne in mind that in these days of giant ocean liners the distinction between natural and artificial harbours has come to be one of degree only; for all the great harbours are now regularly dredged for the passage of ocean-going vessels. The essentials of a good harbour are (*a*) an approach channel of ample dimensions, (*b*) adequate protection against storms, (*c*) sufficient space for docks and wharves, (*d*) ample area, and (*e*) ample depth. For the accommodation of the largest vessels a harbour must have more than 40 feet of water. London, Liverpool, Southampton, Le Havre, Hamburg, Antwerp, New York, Boston, San Francisco, Rio de Janeiro and Sydney are the outstanding examples of deep water harbours of the world. Another factor determining the value of harbours is the tidal range: the depth of water at high tide enables many ships to enter and clear a port at that time; where the water level does not permit this type of activity lighters are used for loading and unloading cargo. Another point of importance is the area of a harbour. New York, San Francisco, Rio de Janeiro and Sydney are among the extensive harbours of the world. Climate is another factor determining the value of not only ports and harbours but also of entire coastlines. Not a single harbour along the entire northern coast of Russia remains ice-free for the whole of winter. Even Vladivostok situated on the south-eastern coast of Siberia does not remain free from ice all the year round. At present, however, it is kept open by the use of ice-breakers. The Baltic ports also suffer from the same fate during winter. Many of the northern ports of Germany would be closed for a part of winter were it not for ice-breakers. Canada carries on her commercial activity

during winter through Halifax and Portland, because the St. Lawrence remains ice-bound for several months in winter.

Hinterlands.

But of more fundamental importance to a port is its hinterland. A hinterland may be defined as *"the land which lies behind a seaport or a seaboard, and supplies the bulk of the exports, and in which are distributed the bulk of the imports of that seaport or seaboard, either generally or in relation to certain uses."*[1] Hinterlands are sometimes classified as *distributory* and *contributory*: a distributory hinterland is concerned mainly with the importation of goods and raw materials in order to supply its inhabitants with the necessaries and luxuries of life and to keep its manufacturing industries supplied with the necessary raw materials. A contributory hinterland is concerned chiefly with the exportation of commodities—food, raw materials and manufactured articles as the case may be. But this is more in the nature of an academical than a real distinction; actually all hiterlands serve both purposes—in varying degrees. The hinterlands of different ports often overlap as much in relation to different seas as to the same seas. There may also be several ports serving the same hinterland. Thus the Punjab is included in the hinterland of Karachi for Arabian Sea trade, but for Bay of Bengal trade it belongs to the hinterland of Calcutta. Considerable portions of Central India likewise may be included in the hinterlands of both Bombay and Calcutta. An enormous portion of Yorkshire belongs to the hinterland of Liverpool for Irish Sea and trans-Atlantic trade, but to that of Hull, Goole and Grimsby for North Sea traffic. Again, as the last illustration shows, the same hinterland is often served by different ports, or, to put it in another way, the hinterlands of different ports overlap in relation to the same sea. The ports of Bombay, Okha, Porbandar, Navalakhi etc. may be

Distributory & contributory Hinterlands.

Overlapping of Hinterlands.

[1] Chisholm's *Handbook*, p. 104.

said to serve the same hinterland, or their respective hinterlands may be said to overlap. The smaller ports of Kathiawar are now steadily rising in importance because of increasing traffic due to lower port charges. The value of a hinterland is increased by improvements in the means of internal communication, by adjustment of inland freight rates, and by improving the port itself.

Various types of sea-ports.

Sea-ports are sometimes divided into various types according to the nature of the harbours and the means of internal communication. These may be enumerated as follows:—

(a) *Open Roadsteads*: These are small areas of water near the shores where ships can ride at anchor. Naturally, therefore, these are extremely deficient in good harbours, and ships in such places are usually obliged to load and unload their cargoes by means of lighters. Often the roadsteads are deficient in the means of internal communication also as they are rarely situated at the end of large valleys. Boulogne, Mollendo and Antofagasta are among the noted illustrations.

(b) *Bay Ports*: These are usually situated on bays that penetrate the land deeply or on projections extending far into the sea. Naturally, therefore, these ports often afford safe, commodious and deep harbours. Boston is a good illustration.

(c) *Estuarine Ports* (often miscalled 'river ports'): These are situated at the head of estuaries or tidal mouths of large rivers. Obviously such ports have the advantage of easy inland communication, but they often suffer from the silting up of river beds and the want of space for anchorage, docks and wharves. Regular dredging is required to keep the ports open. Familiar instances are Calcutta and Chittagong; London, situated at the head of the Thames estuary 55 miles from the sea, is another example.

(d) *Bay Ports at river mouths,* however, are ideal for commerce. They combine all the advantages of ordinary Bay Ports with those of the Estuarine Ports. New York at the mouth of the Hudson may be cited as a good illustration.

River Ports.

Many important commercial towns, we have already noted, grow up on river banks. These are *river ports* properly so called. Some of these are located at the highest point to which rivers can be navigated, some others where further navigation is difficult owing to the existence of a rapid or a fall, still others at the turning points of rivers. The value as well as the importance of these ports depends on two primary factors—(*a*) the productivity of the region served by them and (*b*) the navigability of the rivers. Narayanganj, Goalundo, Chandpur and Jhalakati are some of the important river ports of Bengal. Narayanganj is a collecting and distributing centre which act as a clearing-house for the jute and rice of Eastern Bengal; Goalundo is noted for its fish trade; Chandpur acts as a clearing-house for the products of the fertile Surma Valley of Assam; Jhalakati, with the adjoining port of Nalchiti, is a centre of the betel-nut trade of Eastern Bengal. Gauhati, Dibrugarh and Sylhet are all important river ports of Assam. All these ports are situated on rivers navigable by steamers. Much of the jute and paddy brought to the mill towns on the Hooghly such as Naihati, Bhatpara, Titagarh and Serampore are transported by the waterways of the Delta.

Entrepôts.

Another word frequently met with in books on commerce is *'entrepôt'*. An *entrepôt* is a port where commodities are imported for the purpose of re-exporting them to regions which cannot import them direct from their sources. Gibraltar, Marseilles, Algiers, Port Said, Aden, Colombo, Singapore, Hong Kong and Shanghai are among the great *entrepôts* of the world.

Important Urban Centres of the World

Town	Population according to last census	Chief Manufacturing Industry.
New York	6,930,000	Clothing.
Tokyo	5,875,000	Miscellaneous industries.
London	4,397,000	" "
Berlin	4,243,000	Chemical and electrical industries.
Moscow	3,666,000	Cotton and textiles; metal workings and machinery.
Chicago	3,376,000	Meat packing.
Shanghai	3,259,000	Cotton spinning; ship building.
Osaka	2,990,000	Cotton spinning.
Paris	2,891,000	Articles of luxury.
Leningrad	2,780,000	Miscellaneous machinery; ship-building.
Buenos Aires	2,247,000	——
Philadelphia	1,951,000	Sugar; leather.
Vienna	1,874,000	Clothing.
Rio de Janeiro	1,701,000	Sugar: textiles.
Detroit	1,569,000	Motor Cars.
Calcutta	1,486,000	Jute manufactures.
Tientsin	1,387,000	——
Peiping	1,298,000	——
Sydney	1,249,000	Sugar; dairy farming.
Los Angeles	1,238,000	Fruit packing; motion pictures.
Bombay	1,161,000	Cotton spinning & weaving.
Rome	1,156,000	Miscellaneous industries.
São Paulo	1,151,000	Textiles.
Hamburg	1,129,000	Ship-building.
Milan	1,116,000	Silk weaving; steel industry; cutlery.
Glasgow	1,088,000	Cotton spinning and weaving.
Nagoya	1,083,000	Porcelain & other artistic products.
Kyoto	1,081,000	——
Budapest	1,061,000	Electrical machinery.
Nanking	1,013,000	——
Birmingham	1,003,000	Metal workings, machinery, motors &c.
Melbourne	1,000,000	——
Naples	866,000	——
Liverpool	856,000	Cotton spinning & weaving; shipbuilding & repairing.
St. Louis	822,000	Tobacco; malt liquors.
Baltimore	805,000	Canning; clothing.
Boston	781,000	Clothing; sugar.
Manchester	766,000	Cotton spinning and weaving; steam engines, railway carriage, etc.

Important Ports of the World

ndia.

Asia.— There are only four major sea-ports in India —Calcutta, Bombay, Madras and Karachi. **Calcutta** stands on the Hooghly, some 72 miles from the sea. The passage of the river is dangerous, especially to small crafts, owing to sand-banks and changes in the river bed. During the period of early influx of Europeans into India the river was navigable by ocean-going vessels for a considerable distance up stream, and many ports then flourished farther inland. These have now declined because of silting, which is a standing menace to Calcutta as well. The passage of the river upto Calcutta is only kept navigable at considerable cost. Moreover, the tidal wave which rushes up the river at high tide also helps to keep the waterway clear. Its wharves are, therefore, accessible to all but the largest ocean liners of today.[1] For facilities of inland communication, however, Calcutta is admirably situated: inland waterways connect her direct with the east and north of the Delta. The *Calcutta and Eastern Canal* is one of the arterial channels of such communication. It enables the raw jute of Eastern Bengal to reach the mills of Calcutta and the adjoining parts at a very cheap rate. The city's proximity to the Raniganj coal-fields has also contributed much to the development of her manufactures. Of the important delta channels the Hooghly is the westernmost, and so railways from the west are not required to cross any large body of water; this has made Howrah on the opposite (west) bank of the Hooghly the terminus of railways from Delhi, Bombay and Madras to the great advantage of Calcutta, which is connected with

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[1] Possibly Calcutta is accessible to the largest ocean liners as well. But these do not ply in Indian waters, because the Suez Canal cannot accommodate them. At the time the Canal was constructed the liners were smaller than they are now.

Howrah by a bridge of boats. Railways connecting Calcutta with North and Eastern Bengal and Assam radiate from Sealdah on the eastern boundary of the city. The hinterland of Calcutta is the largest in India; it includes Bengal, Bihar, the U. P., Orissa and Assam, and also extends to the Punjab beyond Delhi and to Central India in the neighbourhood of Nagpur. The bulk of Calcutta's exports—about 58 per cent—consists of *jute*, both raw and manufactured; other important exports in the order of importance are *tea, lac, oilseeds* and *cotton goods*. The principal items of import are *cotton goods, metals, machinery, government stores, railway stock, hardware*, and *oil*. Calcutta is often described as the 'Commercial Capital' of India. It is a fine estuarine port.

Hinterland of Calcutta.

Exports & Imports.

Bombay is the second city of India, and, according to many, the first 'if Howrah be excluded from the Calcutta agglomeration.' It owes its importance to several geographical factors: it has, first, a magnificient natural harbour; second, it is in command of two gateways through the Western Ghats; third, its location makes it the natural gateway to India from Europe; fourth, its hinterland includes the rich cotton lands of the Bombay Deccan; fifth, its climate, like that of the west side of the Pennine Upland of England being highly suitable for cotton manufactures, has made it a great centre of cotton spinning and weaving; sixth, the water-power resources in the Western Ghats near by have added impetus to its cotton industry. But like New York, again, Bombay is now experiencing difficulty of expansion on its island site; the bay on the west of the city and north of the lighthouse known as the 'Back Bay' is now being partially reclaimed for more land. The city is now connected by railways with the larger island of Salsette behind it and also with the mainland. Thus inland communication has been established with the north, east and south so as to connect the

Characteristics of port of Bombay.

Inland Communication.

city with Delhi, Calcutta and Madras. The hinterland of Bombay extends upto Delhi on the north, Jubbulpore and Nagpur on the east and almost reaches the city of Hyderabad on the south-east. The principal items of export are *raw cotton* (about 48 per cent), *cotton goods* (about 20 per cent), *cotton seed, linseed, groundnuts* and *sesamum, wool,* and *hides, skin* and *leather.* The principal items of import show a surprising sameness with those of Calcutta, except for the *treasure import* (gold and silver) which is virtually restricted to Bombay. Bombay is the great rival of Calcutta. It is a fine bay port.

Hinterland of Bombay.

Exports & Imports.

Madras is the third largest city in India, but the last of the four great ports. It was one of the many open roadsteads on the south-east coast of India. At present it is provided with a modern artificial harbour; constant dredging operations are required to keep it navigable. The city is well served by railways, and the *Buckingham Navigation Canal* provides a passage for small craft along the coast. The hinterland of Madras is neither so rich not so extensive as any of the hinterlands served by Calcutta, Bombay and Karachi. The bulk of export—about 45 per cent of the total—consists of *leather;* other items are *skins, raw cotton, cotton goods* and *groundnuts.* Imports are virtually the same as in the case of Calcutta.

Characteristics of Madras port.

Communication.

Hinterland.

Export & Import.

Karachi is the third largest port of India, although it is not an industrial centre as Calcutta, Bombay and Madras are. It is situated on a small bay to the west of the mouths of the Indus. It has a natural rock-girt harbour, which has been much improved by modern engineering. The harbour is now protected by a breakwater. In some respects it is admirably situated, being readily accessible from the Makran Coast, from Basra and the Persian Gulf, from Aden

Characteristics of Karachi port.

Communication.

and the Red Sea and from Bombay. Karachi is connected by railways with the Punjab and the N. W. F. P. *via* Multan, Lahore and Peshawar, with Baluchistan *via* Quetta and the Bolan Pass and with Delhi and Agra *via* Hyderabad and the Thar Desert. Its hinterland extends to Quetta and beyond as well as to Peshawar in the north and to Delhi in the north-east, while including the whole of Sind and the Makran Coast. The Makran Coast serves as a land-caravan route as well. The principal items of exports are *raw cotton* (more than 33 per cent) and *wheat* (about 25 per cent); other important items are *barley, oilseeds* (rape), *wool, gram* and *leather*. Imports are much the same as in Calcutta. Karachi may be described as a bay port at the mouth of a river; but the Sind Delta does not offer facilities for water carriage. With the introduction of air-mail services between India and foreign countries Karachi has become the leading airport of India.

Hinterland.

Export & Import.

Colombo is the chief seaport of Ceylon on the west coast of the island, and enjoys a virtual monopoly of the foreign trade. It is a great *entrepôt* as well. Its importance is due to the splendid geographical position it holds on the ocean highway from Europe to Australia and the Far East. It has a magnificent artificial harbour, and is a most important port of call. It is connected by railways with all the important towns of Ceylon. Principal items of export are *tea* (50 per cent), *rubber* (25 per cent) and *cocoanut products* (18 per cent). Leading imports are foodstuffs like *rice* (29 per cent), *sugar, fish, grain* and *curry* (together 11 per cent), raw materials like *mineral oil, coal, fertilisers* and *rubber* (together 20 per cent), and manufactures like *cotton goods* (8 per cent), *iron* and *steel, machinery* and *motor cars* (together 6 per cent).

Ceylon.

Characteristics of Colombo port.

Communication.

Export & Import.

Indo-China, Malaya, East Indies, etc.

Rangoon is by far the most important port of British Indo-China (Burma), handling, as it does about 86 per cent of the foreign trade of that country. It is situated some 20 miles from the sea on the Rangoon river to the east of the Irrawaddy Delta, and is connected by railways with Prome and Mandalay. It commands the land and water highways of both the Irrawaddy and Sittang Valleys. It is accessible to the largest ocean-going vessels plying in Indo-Chinese waters. By far the most important item of export is *rice* (62 per cent); next come *petroleum* and *wax* (together 14 per cent); other important exports are *teak* and *cotton* (together 8 per cent). Principal imports are *cotton goods, machinery* and *hardware, coal, silk* and *sugar.*

Characteristics, communication and export & import of Rangoon port.

Bangkok is the great port of Siam or Thailand. It is situated on the river Menam, and is said to be visited annually by nearly 1,000 vessels with an aggregate tonnage of over 1,000,000 tons. But there is a bar at the mouth of the Menam, which does not permit large vessels to enter the port. Bangkok is connected by railways with Penang and Singapore. By far the most important item of export is *rice*—about 87 per cent of the total; next comes *teak*—only 4 per cent; another notable item of export is *tin.* Leading imports are *cotton manufactures* (17 per cent), *cigarettes* (5 per cent), *iron and steel* (5 per cent), *gunny bags* (5 per cent), *yarns* (4 per cent), *silk* (3 per cent), *machinery* (2 per cent), *sugar* (4 per cent), *wine* (2 per cent), *gold leaf* (6 per cent), *mineral oil* (4 per cent), *precious stones* (3 per cent), and *opium* (3 per cent).

Characteristics, communication, export & import of Bangkok port.

Saigon, the chief port of Cochin-China (French Indo-China), stands on an outlet of the Mekong 34 miles from the sea. It is said to be annually visited by about 900 ships with an aggregate of nearly 2,000,000 tons. It has important channels of inland communication by railways and waterways. The chief exports are *rice, fish, fish-oil, pepper, cotton, copra,*

Characteristics, communication, export & import of Saigon port.

rubber and *spices*. Chief imports are as usual *cotton goods, metal goods, silk goods, machinery, iron and steel, cotton yarn, motor cars, munitions, petroleum* and *sugar*. Rice export covers more than 60 per cent of the total export business.

Characteristics, and communication of the port of Singapore.

Singapore is situated on an island of that name at the southern end of the Malay peninsula. It owes its importance mainly to its splendid geographical position at the junction of the world's great trade routes between the east and the west; it is the gateway of commerce between the Indian and Pacific Oceans. It has a magnificent harbour, and large ship-building and ship-repairing yards have also been established here. It is the great *entrepôt* and coaling-station of the Far East. It is connected by railways with Bangkok and Penang. Singapore is also a naval base for the British Admiralty. Large tin-smelting works have been established here. The trade of Singapore being that of an *entrepôt*, it imports and exports a large number of products, which, however, are not shown in official returns separately for Singapore but for the whole of British Malaya.

Characteristics, communication, export & import of Manila port.

Manila, the chief port of the Philippines, is on the Pacific trunk line between America and the Far East. It has an excellent artificial harbour, and is connected by railways with San Fernando on the north and Batangas on the south. Leading exports are *sugar, Manila hemp, cocoanut oil, copra* and *tobacco;* leading imports, *cotton goods, silk goods, iron and steel, paper, vehicles, chemicals, electrical machinery, rice, wheat, dairy and meat products, fish, vegetables, oil, coal and tobacco.*

China.

Hong Kong is situated near the mouth of the Canton river. It is an island, and is under British occupation. It is separated from the mainland by a strait only about a mile

Characteristics, communication, export & import of port of Hong Kong.

wide. It has a deep and commodious anchorage at Victoria Bay on the northern side of the island; moreover, the strait between the mainland and the island is an excellent harbour. It has also some of the largest ship-building and ship-repairing yards in the British Empire outside Great Britain. The Canton river is navigable for more than 600 miles from its mouth, and the great city of Canton, which resembles Calcutta in many respects, only about 90 miles north of Hong Kong, is very advantageously situated for the sea-borne trade of this island port. Hong Kong is said to be visited annually by 30,000 vessels. It is the great *entrepôt* for Southern China. The principal items of export from Hong Kong are *foodstuffs* (23 per cent), *treasure* (9 per cent), *piece goods* (9 per cent), *oils and fats* (7 per cent), *metals* (5 per cent), and *tobacco* (3 per cent). Chief imports are *foodstuffs* (41 per cent), *piece goods* (12 per cent), *oils and fats* (6 per cent), *metals* (1 per cent), *treasure* (5 per cent), *Chinese medicines* (4 per cent). Hong Kong is a free port.

Characteristics of port of Shanghai.

Shanghai is the largest of the many 'treaty ports' of China. It is the great port of the Yangtze Kiang and the gateway of the most extensive and productive natural region of China. It is, however, not situated on the Yangtze Kiang, but on a tidal creek 54 miles from the sea; it is on the Wusung or Hwangpu river, 14 miles from the confluence of the Yangtze Kiang and the Wusung. But a bar at the mouth of the Wusung long prevented the entrance of the largest vessels; the river has now been canalized and the largest vessels plying in Chinese waters are now admitted. Excellent shipbuilding yards have now been established at the port by Europeans. The Yangtze Kiang itself is an admirable waterway for more than 1,000 miles from its mouth, and several of its tributaries are also good inland waterways.

Shanghai is also connected by railways with Tientsin and Peiping on the north and with Hangchow immediately south. Owing to the richness of its hinterland and also because of the dearth of good seaports in the region lying north of the Yangtze Kiang, Shanghai has grown into one of the great *entrepôts* of the world: it serves all the other Yangtze ports such as Nanking, Hankow, Chinkiang, Ichang, Kiukiang, Chungking, etc., as well as the whole of Northern China. Leading exports are *raw silk, beans, bean cake, vegetable oils, raw cotton, tea, coal, silk goods, metals and ores, eggs, groundnuts*, etc.; leading imports, *cotton goods, machinery, iron and steel, cigars, woollens, kerosene, raw cotton, tobacco, coal, indigo, rice, sugar, flour* and *fish*.

Communication & Hinterland.

Export & Import.

Canton, situated on the west bank of the Canton river, is the leading port of Southern China. Its situation in the Si Kiang delta region is analogous to that of Calcutta; but as to facilities for inland water carriage it is said to resemble Venice. Like Calcutta, however, Canton is situated 'on one of the most productive of tropical deltas'. Besides natural waterways and canals to link it up with various towns, Canton is connected by rail with Tientsin and Peiping on the north; another railway line has established connection between Hong Kong and Canton, but the running of trains has been abandoned for some years. Regular steamer services between Hong Kong and Canton are, however, being maintained, and Canton is visited regularly by ships from foreign countries as well. The exports and imports are, on the whole, similar to those of Shanghai.

Characteristics, communication, export & import of Canton port.

Japan.

Most of the Japanese towns are seaports. But the most important seaport of Japan is **Yokohama**, the outport of Tokyo which is not accessible to large vessels. Yokohama has a safe and commodious harbour accessible to the largest liners plying the Pacific. It deals with miscellaneous articles of trade. **Kobe**, provided with an

Port of Yokohama.

Port of Kobe.

excellent harbour, serves mainly as the outport of Osaka, the leading centre of Japan's cotton-spinning industry. Osaka itself is accessible, like Tokyo, for small vessels.

Port of Nagasaki.

Nagasaki has an excellent harbour and a great shipbuilding yard. The leading exports of Japan are *raw silk* (38 per cent), *cotton goods* (23 per cent), *silk goods* (7 per cent), *coal* (2 per cent), and *pottery* (2 per cent); leading imports, *raw cotton* (27 per cent), *iron* (7 per cent), *machinery* (5 per cent), *chemicals* (5 per cent), *oil-cake* (5 per cent), *wood* (4 per cent), *wool* (4 per cent), *woollen goods* (4 per cent), *sugar* (3 per cent), *paper* (2 per cent), *rice* (2 per cent), *wheat* (2 per cent), *miscellaneous metals* (2 per cent), and *beans and other foodstuffs* (6 per cent).

Manchuria and Asiatic Russia.

Port Arthur and Dairen on the Liau-tung peninsula in Manchuria and **Vladivostok** on the east coast of Asiatic Russia are notable ports for their respective locations. All of them are well served by railways for inland communication.

Ports of Dairen, Port Arthur & Vladivostok.

Of these Dairen is probably the busiest port, acting, as it does, the part of the great outlet for Manchurian products. The leading exports of Manchuria are *bean cakes, beans, bean oil* (together 50 per cent), *wheat* (12 per cent) and *other cereals* (8 per cent), *coal* (4 per cent), *silk yarn, Kaoliang and lumber.* Vladivostok on the Sea of Japan is Russia's most important harbour and naval station in the Far East. It is connected by rail with Moscow and Leningrad. The trade, however, is small, and the port would remain ice-bound for several months of the year were it not for the use of ice-breakers.

Harbin and Moukden.

Harbin is an important inland town of Manchuria, situated at the spot where the railways diverge for Vladivostok, Port Arthur and Dairen. Its neighbourhoods are rich in coal measures and forests. **Moukden** is the great inland trade centre of Manchuria; there is a large production of coal from its neighbourhood.

Turkey.

Izmir, formerly **Smyrna,**—apart from Istanbul (Constantinople)—is the leading port of Turkey. It is situated on the Gulf of Smyrna, Aegean Sea, and serves as the chief outlet of the west coast. It possesses an excellent natural harbour commodious enough for the largest ships. The hinterland comprises the valleys of the Caicus, Hermus, Cayster, Meander and Indos, which together form the richest and most important region of Turkey. The Izmir region is rich also in mineral deposits, some of which are now being worked. Though not very well served by railways, it has railway connection with many important places such as Ankara in the interior and Adana and Alexandretta on the Mediterranean coast. The principal items of export are *raisins, valonia, cotton, opium, figs, barley, liquorice, carpets, wool* and *sponges.* Chief imports are *cotton goods, woollens, metals* and *cereals.* **Trabzon,** formerly **Trebizond,** is the chief port on the Black Sea, serving the north-eastern region of Mediterranean agriculture. **Istanbul,** formerly **Constantinople,** belongs to European Turkey. Situated between the straits of Bosporus and Dardanelles it holds a most strategic position. Much of the trade between Western Europe and Turkey is carried on by way of this important city.

Characteristics, communication, hinterland, etc. of port of Izmir.

Trebizond the Black Sea Port.

Istanbul the gateway to West.

Arab Asia and Near East.

Beirut is the chief port of Syria. It is connected by a road and a railway with Damascus. **Alexandretta,** the port of Aleppo, lies farther north. **Haifa** in Palestine is a notable port south of Beirut; a railway connects it with Cairo across the isthmus of Suez. But **Jaffa** is at present the leading port of Palestine. Syria's chief exports are *cotton and cotton thread, raw wool, animals, raw silk and cocoons, fruits and nuts;* chief imports are *textiles* (cotton, wool and silk) and *cereals.* Palestine's exports are *oranges, soap, water melons, wine, almonds* and *skins;* her imports

Ports of Beirut, Aleppo, Haifa, Jaffa and Aden

are *foodstuffs* (rice, flour, sugar, etc.), *manufactured goods* (cotton fabrics, motors, etc.), and *raw materials* (kerosene, benzine, wool, etc.). The foreign trade of the whole region is extremely unbalanced; Syria's imports are more than double the exports in value, while Palestine's imports exceed her exports nearly five times in value. **Aden,** on the south coast of Arabia, possesses an admirable natural harbour and serves as a great *entrepôt* in the trade between Asia, Africa and Europe. It is a fortified coaling station as well. The opening of the Suez Canal has increased its strategic value to a great extent.

United Kingdom.

Europe.—The first nine seaports of the United Kingdom, according to Stamp, are London, Liverpool, Hull, Southampton, Manchester, Glasgow, Harwich, Bristol, and Grimsby. Of these **London** and **Liverpool** are by far the most important, handling, as they do, 60 per cent of the total trade of the United Kingdom between them; London leads in exports, Liverpool in imports. London's pre-eminence is due, among other things, to its excellent situation at the head of the Thames estuary, about 55 miles from the sea. It is accessible to the largest ocean-going vessels. The mouth of the Thames is directly opposite another important estuary —that of the Scheldt, and nearly opposite the mouth of the Rhine. This has given London a commanding position in its trade with continental Europe. It is now one of the biggest *entrepôts* of the world—in fact, the greatest import market the world has yet seen. London handles more than 50 per cent of the trade of the United Kingdom. But curiously enough it is situated in the heart of the agricultural region of England and has no coal, no iron, no water-power; nor has it any outstanding manufacture. It is now the chief railway centre for the British Isles, and its docks have been built at great expense. The exports and imports

Port of London.

of London are of a miscellaneous kind. Liverpool is situated at the mouth of the Mersey; the harbour is said to be commodious enough for 'all the fleets of the world'; the hinterland comprises Preston, Accrington, Burnley, Bradford, Leeds, Bolton, Blackburn, Oldham, Manchester, Sheffield, Northwich, Nottingham, Leicester, Birmingham, etc.; the chief articles of commerce are *cotton goods, woollens, cutlery, leather, hardware, potteries,* and *glass and chemicals.* Of these cotton goods are by far the most important. The damp climate and the abundance of soft water from the Pennines are said to be ideal for cotton manufacture. The principal item of import is, of course, *raw cotton.* Liverpool is now connected with the port of **Manchester** by means of the famous *Liverpool-Manchester Ship Canal,* which has enabled shipments of cotton to reach Manchester direct. Manchester is the town most closely associated with the cotton industry of Great Britain. **Hull,** at the confluence of the rivers Hull and Humber, serves the northern midlands, and to a lesser degree the southern midlands and London as well. Like London it also handles miscellaneous goods. The hinterland of Hull, as also that of Goole and Grimsby, overlaps with that of Liverpool. **Southampton** is the chief commercial port on the south coast of Britain. The harbour is commodious, and it is an important port of call for trans-Atlantic vessels. Its export trade is of a miscellaneous nature and its import trade, though on the whole of the same nature, is characterized by the importation of large quantities of fresh and refrigerated meat and fruit. **Glasgow,** on the Clyde, first rose to importance, like Liverpool, with the growth of American trade. It has an excellent natural harbour, improved considerably for the accommodation of modern giant liners. There are abundant coal and iron deposits in the immediate neighbourhood of Glasgow, and this has led to

Port of Liverpool.

Port of Manchester.

Port of Hull

Port of Southampton.

Port of Glasgow.

the growth of various industries there. Owing to the varied nature of these industries it is difficult to single out a single industry as characteristic of Glasgow, except, of course, ship-building and marine engineering. The export trade of Glasgow, it is interesting to note, is 50 per cent. more in value than its import trade. **Harwich,** to the north-east of London, is engaged mostly in continental trade, and has a relatively small export business. **Bristol,** on the west, commands the Severn Valley and the thickly peopled region immediately east of it. Its export trade has, however, dwindled considerably in importance, but the import trade still continues to be large. **Grimsby,** on the eastern seaboard, is a minor port specializing in the export of coal and large iron and steel castings.

Ports of Harwich, Bristol & Grimsby.

France: The principal seaports of France in the order of their importance are Marseilles Le Havre, Rouen, Dunkerque, Bordeaux, La Rochelle, Nantes and Cherbourg. **Marseilles,** to the east of the Rhone delta, is said to be the only first-class port on the Mediterranean Sea. It commands the rich and productive Rhone Valley which enjoys the Mediterranean type of climate, and affords direct access by means of waterways to the plains of northern France and Belgium. It is also well served by railways. Although it shares in the trans-Atlantic trade, its main business is with the Mediterranean region and the East. It is one of the principal *entrepôts* of the world, importing, among other things, large quantities of *wine, wheat, oil-seeds, sugar, coffee, hides, silk* and *pepper.*

Port of Marseilles.

Le Havre, at the mouth of the Seine, is the principal centre of trade with America, and affords direct access to the Paris Basin by means of waterways. The Seine estuary, however, is dangerous to small craft, and constant dredging operations are necessary to keep the port open. It also serves more or less as an *entrepôt,* and imports *cotton, tobacco,*

Port of Le Havre.

wheat, animal products and *coffee.* **Rouen,** on the Seine farther inland, stands in much the same relation to Le Havre as Manchester to Liverpool. The Seine has been well canalized for enabling large vessels to approach the port of Rouen direct, and this has resulted in the diversion of much of the trade of Le Havre to that port. Besides, Rouen at times imports large amounts of coal, and thus sometimes exceeds even Marseilles in the total tonnage of commodities handled. **Dunkerque,** the only North Sea port of France, was rising with surprising rapidity until its occupation by the Germans in 1940. Its hinterland comprises the coalfield region of Northern France—a continuation of the Great Belgian Coalfields—and the port serves the northern manufacturing towns like Lille, Roubaix and Valenciennes. The principal import is *wool* from South America and the chief items of export are *textiles, iron, beet sugar* and *oils.* The harbour has been deepend for the accommodation of large vessels, and the port is well served by a splendid network of first-class waterways. **Bordeaux,** on the Garonne, is the principal centre for the export of French wines. Its outport, Pauillac, is accessible to the largest vessels, and the river has been deepened for miles inland. **La Rochelle,** with its outport of La Pallice which is accessible to large vessels, serves the middle regions of Western France. **Nantes,** on the Loire, became thoroughly useless as a seaport owing to the silting up of the Loire below it. Its outport, St. Nazaire, at the river-mouth, however, is accessible to large vessels, and the river has now been thoroughly dredged so as to enable moderately big vessels to reach Nantes. A ship canal also connects Nantes with Brest. St. Nazaire is well known for its ship-building yards. **Cherbourg,** on the English Channel, is well situated for trans-Atlantic trade.

Port of Rouen.

Port of Dunkerque.

Ports of Bordeaux, La Rochelle, Nantes & Cherbourg.

Antwerp, on the Scheldt estuary, is the largest port of Belgium. It lies directly opposite the Thames estuary, and

Belgium:

is much more advantageously situated than London for inland trade. It is connected by first-class waterways with the Meuse, Seine and Rhine. It serves not only as an outlet for Belgium, but also as the chief outlet for the principal manufacturing region of Germany. The quayside is said to be 28 miles long and the dock water area 1,334 acres. **Ghent,** at the confluence of the Scheldt and Lys, has been made accessible to vessels of moderate size by the construction of a ship canal. **Ostend,** on the west coast, and **Bruges** with its outport, Zeebrugge, are of much less importance. There is a large artificial harbour at Zeebrugge, and Bruges is connected with the sea by a ship canal.

Port of Antwerp

Ports of Ghent, Ostend, & Bruges.

Holland: Amsterdam and Rotterdam are the two chief ports of Holland. **Amsterdam,** on the Ij, near the shallow Zuider Zee, has been made accessible to the large modern vessels by means of the North Sea Canal. The port is well served by inland waterways, especially by the Merwede Canal. Amsterdam was the world's centre of diamond trade until its occupation by Germany in 1940. **Rotterdam,** on the Nieuwe Maas, is the largest port of Holland. But the river is too shallow even at the mouth for large ocean steamers, and a ship canal—the 'New Waterway'—now acts as the commercial highway for the port. Constant dredging operations are required for keeping the whole network of canals open to traffic. Much of the trade coming down the Rhine Valley passes through Holland, especially Rotterdam.

Ports of Amsterdam and Rotterdam.

Germany: The largest and and most important seaport of Germany is **Hamburg** with its outport, Cuxhaven. It is a North Sea port, and has risen to importance with the development of American trade. But in normal times it trades with the East as well, and buys much jute from India for its own jute mills. **Bremen,** with its outport of Bremerhaven,

North Sea ports.

another important North Sea port, also trades with America and the East in normal times. **Emden,** another North Sea port, has risen to importance in recent times. Important Baltic ports of Germany are **Lubeck, Travenunde, Stralsund, Stettin,** etc. Most of the German ports, particularly those on the Baltic Sea, would be useless in winter were it not otherwise for the use of ice-breakers. And although Germany under the Nazi regime has been trying hard to develop her own ports, much of her foreign trade still passes through the ports of Belgium, Holland, France, Italy and Yugoslavia. The trade of the mining and manufacturing regions of western Germany passes, in normal times, mainly through Antwerp and Rotterdam.

Baltic ports.

Disadvantages of German ports.

Danzig, the apple of discord, was a German port before the foolish Treaty of Versailles had been signed. It is a Baltic port and the main outlet and inlet for the Vistula Basin. The port and its neighbourhood together constituted, under the terms of the Versailles Treaty, a 'free city'—whatever that might mean—under the supervision of the so-called League of Nations; but the Republic of Poland was entitled to certain special rights within it. The principal exports of Poland through this port were *coal, timber, wood-pulp, paper, sugar* and *mineral oil.* But the Poles had, for some time past, been developing a port of their own called **Gdynia** outside the 'free city' of Danzig. Both are now in German hands.

Port of Danzig and its rival Gdynia.

Most of the important Norwegian towns are seaports. **Oslo,** at the head of the Glommen Valley, is the chief port and capital. It has a dock that can accommodate vessels of medium tonnage only. Principal exports are *timber* and *wood-pulp.* Next comes **Bergen** on the southern part of the west coast. It is a centre of fishing industries, and its principal export is *timber.* Farther south lies the fishing

Norway.

port of **Stavenger,** and farther north is **Trondheim,** the third port of Norway, and in the far north stands **Hammerfest.**

Sweden. The principal seaport of Sweden is **Goteborg** (or Gothenburg) on the south-west coast. The harbour is fairly deep, but not commodious. The situation of the port, however, is excellent; it is easily accessible from Great Britain, France and Germany. **Malmo,** at the southern end, may be said to stand face to face with Copenhagen, and is nearest to Germany; the bulk of the trade is naturally with Denmark and Germany. **Stockholm,** the capital, is the principal Baltic Sea port. The chief items of Sweden's export are *wood-pulp and paper* and *timber* (together about 50 per cent), and *metals* (about 30 per cent).

Denmark. The principal town of Denmark is **Copenhagen,** a free port now; it has a good natural harbour, and is connected with the Swedish port of Malmo by an excellent system of train-ferry vessels. Copenhagen holds a most strategic position, controlling, as it does, the narrow entrances to the Baltic Sea. With the opening of the *Kiel Canal* (Germany), however, its strategic advantage has been greatly minimised. **Aarhus** and **Aalborg** are the chief ports on the east of Jutland. **Odense** is the chief port of Fyen. The principal exports of Denmark are *butter, cheese, bacon* and *eggs.*

Spain The chief ports on the mountainous north coast of Spain are **Bilbao** and **Santandar,** noted for the export of good quality *iron ore.* These and other northern ports, however, are always under the possibility of being obstructed by bars, and constant engineering care is neeeded to keep them open. **Cadiz** and **Huelva** in southern Spain have the command of the Guadalquivir Valley, although **Seville** on the Guadalquivir about 70 miles from the sea is the principal port of the region. The harbour of Cadiz, though accessible to the largest vessels, is not spacious enough for a large

number of ships. The harbour of Huelva, on the other hand, is deep and spacious enough for 'a large fleet of the largest vessels', but obstructed by a shifting sand-bar at the mouth of the Rio Tinto. Constant dredging is required to keep Seville open to large vessels. *Wine* and *dried grapes* are the chief exports of this region. **Malaga, Cartagena, Valencia** and **Barcelona** are the principal ports of the Mediterranean coastlands of Spain. All these ports possess good natural harbours, rendered more suitable for modern vessels by engineering. The principal seaports of Portugal are Oporto and Lisbon on the west coast. **Oporto,** at the mouth of the Douro, is famous as 'the port-wine port'. A new harbour has now been constructed a few miles north of the river mouth for large vessels. **Lisbon,** the capital, is at the estuary of the Tagus and its admirable natural harbour is directly accessible for the largest ocean liners of to-day. It is the largest port of Portugal, exporting *cork*, *wine*, *fish*, *oranges*, *lemons*, etc., and importing *coal* and *manufactured goods* generally. **Gibraltar,** belonging geographically to Spain, is in British hands. It is a rock fortress commanding the gateway to the Mediterranean. Commercially it is important as an *entrepôt* and coaling station, and its docks have accommodation for the largest men-of-war in the British Navy.

Portugal.

Gibraltar.

The principal ports of Italy are Venice and Genoa. **Venice,** built upon a number of islets on the shore of the Adriatic Sea, is a natural port. Its entrance is guarded by a line of low sand islands. Two channels, one in the north and the other in the south, now made deep enough for the largest vessels, allow easy access to the port. The hinterland of Venice comprises not only the eastern part of the northern plain, but also extends to the whole of the Po Valley, and Venice, which is connected by railways with

Italy:

Port of Venice.

Milan and Turin, handles much of the traffic of the Brenner railway. Venice has large ship-building yards as well. The

Port of Genoa.

position of **Genoa** on the gulf of that name is very interesting. It is flanked on the north, east and west by the Alps; a gap through the northern highlands, however, connects it by rail with Milan in the heart of the Po Valley. Railways along the coasts connect it with Pisa, Leghorn, Rome, Capua and Naples on the south-east, and with Savona and the Riviera on the south-west. From Savona a railway line runs direct to Turin in the Po Valley. Genoa has shipbuilding, iron, and cotton works. It has a fine natural harbour, which has been much improved and enlarged. The hinterland of Genoa includes, in addition to a large part of the Po Valley,

Ports of Naples, Brindisi, Trieste, and Fiume.

southern Switzerland as well. **Naples,** in the middle of the southern half of the west coast, itself an important centre of various manufacturing industries, has a deep and spacious harbour. **Brindisi,** on the south-east coast, was till lately a port of call for mail steamers from the East; but the service has been discontinued.[1] **Trieste,** at the head of the Adriatic Sea, belonged to the empire of Austria-Hungary, but was annexed to Italy at the close of the Four Years' War (1914-18). It still serves as an outlet for Austria, Hungary and Yugoslavia. **Fiume,** on the Adriatic, also annexed to Italy, serves mainly as a Yugoslav port.

Malta.

Valetta, on the British island of Malta, is an important fortress and coaling-station and considerable *entrepôt.*

Greece.

Piraeus, the port of Athens, is said to be the fourth port in the Mediterranean and the principal port of Greece. It has a fine natural harbour. **Salonika,** another Greek port, serves also as an outlet and inlet for the trade of Yugoslavia.

[1] Mails were being landed at Marseilles until the French collapse in 1940.

Patras, on the Gulf of Corinth, is famous for the export of currants; it is also a Greek port.

Russia.

Leningrad, with its port, **Kronstadt,** is the chief port of the U. S. S. R. on the Baltic Sea. The harbour accommodation of Leningrad is not what it should be, and it is at Kronstadt that all large ships ride at anchor. A ship canal now gives direct access to Leningrad where all but the very largest vessels find a spacious anchorage. **Riga,** till lately the capital of Latvia and now in Russian hands, is also another important outlet for the U. S. S. R. Its harbour has been much improved, although its port for large vessels is *Ust Dvinsk*. **Reval,** the capital of Estonia until that state's recent incorporation into the Soviet Union, is another important outlet for Russia; the harbour has been deepened and extended. Russia's chief port on the Black Sea is **Odessa.** The chief Caspian port is **Astrakhan.** Another Caspian port is **Baku,** whence oil is sent by pipe-line to **Batum** on the Black Sea.

Egypt.

Africa.—The principal port of Egypt is **Alexandria** on the north-west fringe of the Nile Delta. It handles about 80 per cent of the import trade and 90 per cent of the export trade of Egypt. **Port Said,** at the entrance to the Suez Canal, is a considerable *entrepôt* and important coaling-station. **Bulak** is the port of Cairo. **Port Sudan,** on the Red Sea coast, handles about 80 per cent of the foreign trade of Anglo-Egyptian Sudan. Nearly two-thirds of its total export consists of *cotton and cotton seeds;* other exports are *gum, sesamum, skins, gold,* and *ground-nuts.* **Massawa,** on the Red Sea, is the port of the Italian colony of Eritrea; its chief exports are *hides and skins,* and *pearls.* **Mogadiscio** is the chief port of Italian Somaliland, whence *gums* and *hides* are exported. **Berbera** is the chief port of British

Anglo-Egyptian Sudan.

Somaliland, Abyssinia, and Libya.

Somaliland. **Djibouti** is the chief port of French Somaliland; it is the terminus of the railway from Addis Ababa, Abyssinia's capital. **Tripoli** and **Benghazi** are the two ports of some importance in Libya, now under Italian domination. **Oran, Tenes, Algiers, Bougie, Bona,** and **Tunis** are the ports of Algeria and Tunisia, which are under French domination. Chief exports from these ports are *iron, zinc, phosphates* and *cereals* like wheat and barley. Most of these ports are open roadsteads, although some of them have now been provided with artificial harbours. **Tangier,** on the Strait of Gibraltar, and **Mogador** in the south, the port of Morocco, **Casablanca,** and **Rabat** are the well known ports of Morocco. **Durban** is the principal port of Natal, S. Africa. It is in the south-east coast region of Africa, which receives its rain from the Trade Winds mainly in summer (Nov.-Feb.). The chief products of the region are *sugar-cane, cotton, tea, arrowroot* and *black wattle. Coal* is mined in the extreme north of the province, and Durban has become an important coal-exporting port and coaling-station on the Cape Route. Large numbers of Indians have settled here, and large quantities of coal from Durban are exported to Bombay. Other important ports of South Africa are **Cape Town, Port Elizabeth, East London,** and the Portuguese port of **Lourenco Marques.** Cape Town has a fine natural harbour, which has now been much improved by the construction of an artificial one. It, too, is naturally a port of call on the Cape Route. Lourenco Marques also exports some coal to India. **Dakkar,** in French West Africa, is a port of some importance, now grown famous after the French collapse in 1940. **Freetown,** in Sierra Leone, is at the estuary of the Rokelle river and has a fine natural harbour. It is in British hands. Other West African ports that can only be mentioned here are **Accra, Porto Novo, Lagos, Port Noire, Boma, Loanda, Benguela** and

Tunis and Algeria

Morocco.

South Africa.

West Africa.

Swakopmund, all of which are under one or other of the European powers.

North America:

N. America.—Halifax, on the east coast of Nova Scotia, has an excellent natural harbour and is the principal naval station of Canada. It remains ice-free all the winter through in most years. **Charlottetown,** in Prince Edward Island, is another Canadian port with a good harbour. **St. John,** in New Brunswick, is on the Bay of Fundy and possesses a fine harbour, which remains open all the year round; it is now connected by rail with **Montreal,** the principal centre of commerce in Canada. Montreal is on an island in the St. Lawrence some 180 miles above Quebec.. This has contributed to its rapid rise and the consequent decline of the latter city. St. Lawrence has been well dredged for the passage of large ocean-going vessels to Montreal. It is now the largest grain port of Canada after Vancouver. **Quebec,** at the confluence of the Charles river with the St. Lawrence, is, like its rival, Montreal, in command of the second manufacturing region of Canada. **Toronto,** on Lake Ontario, has a fine harbour, and is the capital of the first manufacturing province of Canada. **Victoria** at the south-east end of Vancouver Island has an excellent harbour, and serves as a considerable *entrepôt* on the west of the Dominion. **Vancouver,** at the mouth of Burrard Inlet, has a deep, commodious harbour, from which mail steamers run regularly to Alaska, Seattle, San Francisco, Hawaii, China, Japan, Australia and New Zealand. **Prince Rupert,** on Kai-En Island, is a terminus of the Canadian National Railways. The leading seaports of the U. S. A. in the order of importance are New York, New Orleans, Galveston, San Francisco, Philadelphia, Boston, Seattle, and Los Angeles.[1] **New York** is an admirable port.

Canada.

U. S. A.:

[1] Chisholm's *Handbook*, p. 748.

Port of New York.

Like Bombay it is built upon an island, and has a splendid natural harbour, which has been turned into an ideal shelter for the largest ocean-going vessels. The Hudson river flows by it, and the gap thus caused to the north connects New York with Montreal in Canada. At right angles to this gap is another, the Mohawk Gap, which terminates at the confluence of Lakes Erie and Ontario. New York is, thus, directly connected by a splendid series of waterways with all the towns on the Great Lake System of N. America—with Duluth, Port Arthur (Canada), Chicago, Milwankee, Detriot, Cleveland, Buffalo, and Toronto (Canada). The Delaware Gap, again, connects it with Philadelphia, the Susquehanna Gap with Baltimore, and the Potomac Gap with Washington. Down the narrow Hudson Valley alone run two canals and four main railways to New York. Of the total foreign trde of the U. S. A. New York alone handles more than 40 per cent.

Port of New Orleans.

New Orleans, on the Gulf of Mexico, though not provided with a good harbour by nature, has been made accessible for large ships by means of a network of canals. It has direct railway connection with new York and Chicago. It has one of the largest hinterlands in the whole of the U. S. A., and trades in *gunny cloth, rice, bananas, cotton, molasses* and *sugar.*

Port of Galveston.

Galveston, also on the Gulf of Mexico, has grown in importance only recently, after the construction of a navigable channel across the bar at its entrance. It, too, has railway connection with all important centres. Large quantities of *cotton* are exported from this port to Britain.

Ports of San Francisco, Seattle, and Los Angeles.

San Francisco, Seattle, and **Los Angeles** are on the Pacific coast. San Francisco, in California, is at the head of a fine natural bay, which serves as an excellent harbour, and has a Mediterranean climate. **Seattle,** farther north, is in the region of the timber trade, and has a good natural harbour. Los Angeles, in California, lacks a good harbour and may be described as an open road-

stead; but an artificial harbour has now been constructed. It is a centre of American *oil trade*. **Boston** and **Philadelphia** are on the east coast. Boston, in the New England region, is a fine bay port, and is the great wool market of America. But the railway routes across the Alleghany Mountains being difficult Boston cannot compete with New York in handling the products of the hinterland around Chicago. Philadelphia, provided with a good harbour, is another centre of the wool trade. *Ports of Boston and Philadelphia.*

S. America.—Buenos Aires, the largest city in South America, is the chief port of the Argentine Republic. But the harbour is not good and has to be kept open at great expense. Its principal exports are *meat, wheat,* and *dairy products;* principal imports, *coal, oil* and *manufactured goods.* **La Plata, Bahia Blanca** and **Rosario** are other important ports of the Republic. All of them are well served by railways, but none possess a good natural harbour. **Rio de Janeiro,** the chief port and capital of Brazil, has a safe and commodious natural harbour. **Santos,** farther south, is also a Brazilian port of growing importance. **Sao Paulo,** lying immediately behind Santos, is not actually a seaport, but an important centre of textile industries. All these towns are well served by railways. The chief exports of Brazil are *coffee, maté, meat* and *rubber;* chief imports, *oil, coal, wheat, machinery,* etc. **Valparaiso,** the port of **Santiago,** the capital of Chile, is situated on a beautiful bay; chief imports are *foodstuffs* and *manufactures;* chief exports, *nitrate of soda, copper* and *guano.* The ports of **Antofagasta** and **Iquique,** however, handle the greater part of the exports. *South America: Argentina. Brazil. Chile.*

Australia.—Sydney, the capital of New South Wales, is the largest town and seaport of Australia. Its harbour, Port Jackson, is one of the finest natural harbours in the world. **Brisbane,** at the head of the estuary of the river of that name, *Australia.*

is the capital and chief port of Queensland, Australia. It is accessible to large vessels. **Fremantle,** on the west coast, is the port of call for mail steamers; mails are landed here and sent by train or aeroplane all over the continent except North Australia. **Hobart,** on the south of Tasmania, upon the river Derwent, is the capital of that island and a port of some importance. The Derwent is navigable by the largest vessels. But the chief port of Tasmania is **Launceston** on the north at the head of the Tamar estuary.

Tasmania.

STUDIES AND QUESTIONS

1. Describe the Suez Route with the object of showing its commercial value. (C. U., B. Com., '24).

2. Discuss the relative advantages and disadvantages of the Suez and Panama Routes from Western Europe to Eastern Asia. Large quantities of jute goods are exported from Calcutta to the Pacific ports of South America. What route do the ships follow for this trade, and why? (C. U., B. Com., '34).

3. "The opening of the Panama Canal has brought about many changes in the ocean routes, but by no possibility can it have such an important effect on the commerce of the world and lead to such rapid expansion of trade and traffic as was brought about by the opening of the Suez Canal."—Discuss. (C. U., B. Com., '26).

4.. "The traffic through the Panama Canal has increased with surprising rapidity in recent years." State briefly the factors that have led to the improvement. What are the principal commodities that pass through this canal? What are the main defects of this route to the East and how are these going to be remedied? (C. U., B. Com., '27).

5. Discuss the importance of the Suez Route to India's external trade. How will this trade be affected if the route be temporarily closed? (C. U., B. Com., '36).

6. How does the Cape Route compare with the Mediterranean from India to Europe. In what way will India's trade with Western Europe be affected if the latter route is blockaded during a war? (C. U., B. Com., '39).

7. State the necessary conditions for the development of good seaports. Apply these considerations to any of the following: (*a*) Montreal, (*b*) Fremantle, (*c*) Shanghai, (*d*) Buenos Aires, (*e*) Trieste. (C. U., Inter., '25-6).

8. Describe the position of any four of the following ports and discuss the parts they play in the commerce and industry of the country they serve: (*a*) Rotterdam, (*b*) Yokohama, (*c*) Genoa, (*d*) Galveston, (*e*) Buenos Aires. (C. U., Inter., '28).

9. What do you understand by the hinterland of a port? Illustrate your answer by reference to a few ports in the different parts of the world. (C. U., Inter.' '34).

10. State the situation and describe the reasons for the importance of any five of the following: (*a*) Buenos Aires, (*b*) Danzig, (*c*) Durham, (*d*) Chicago, (*e*) Hobart, (*f*) Sydney, (*g*) San Francisco, (*h*) Vancouver, (*i*) Yokohama. (C. U., Inter., '31).

11. State the situation and mention the geographical circumstances giving importance to any five of the following: (*a*) Glasgow, (*b*) Danzig, (*c*) Mosul, (*d*) Singapore, (*e*) Hong Kong, (*f*) Durban, (*g*) Los Angeles, (*h*) Buenos Aires, (*i*) Brisbane. (C. U., Inter., '26).

12. "The importance of a port depends upon the extent and the productiveness of its hinterland."—Discuss. (C. U., Inter. '40).

13. Account for the importance of any four of the following: (*a*) Harbin, (*b*) Colombo, (*c*) Manchester, (*d*) Chicago, (*e*) Warsaw, (*f*) Minneapolis. (C. U., Inter. '33).

14. What factors make for the successful development of a river port? Give a few conspicuous examples. (C. U., Inter. '34).

CHAPTER I

AUSTRALIA AND POLYNESIA

AUSTRALIA

Position and Size.—Australia is the largest island in the world and smallest of the continents except, of course, the barren snow-covered territory of Antarctica. Even including the islands of Tasmania, New Guinea and New Zealand and the numerous islands that lie scattered over the vast open expanses of the Pacific Ocean,—a group often described collectively as the continent of Oceania—it is perhaps the smallest continent. The area of Australia proper, including Tasmania, is **3 million square miles,** *i.e.*, four-fifths that of Europe. The coast-line is remarkable for its general compactness; good harbours are, therefore, lacking, and to this has partly been attributed the delay in opening up the interior. Certain outstanding features relating to its position must be noted: the continent lies entirely in the *Southern Hemisphere* far away from all other continents; the *Tropic of Capricorn* passes through the northern third of the continent, so that while one-third of the territory lies in the Tropics, the southern two-thirds is in temperate latitudes. And here we must guard against a possible misconception: although in the Southern Hemisphere, Australia does not lie at the fringe of the Antarctic Circle; in a topsy-turvy world it would occupy the position of the Sahara Desert, and the island of Tasmania would very nearly touch the northern fringe of Spain, because the positions occupied by them in the Southern Hemisphere correspond to those of the Sahara and northern Spain in the other. The longitude of 135°E. is the central meridian of this island continent. The **Commonwealth of Australia** is almost

Australia and Oceania.

Area.

Coastline.

Tropical and Temperate parts.

Antipodes.

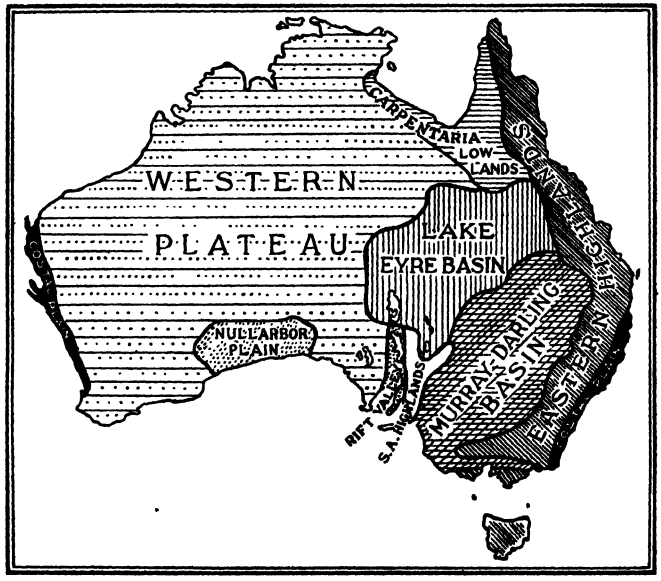
Central Meridian.

Commonwealth and Continent.

coincident with the **Continent of Australia.** The Commonwealth is a British Dominion.

Physical Features.—Topographically considered, Australia can be divided into three natural regions:

(a) **The Western Plateau Region,** consisting of a vast mass of ancient metamorphic rocks. The average elevation of the plateau, however, is variously stated to be between 600 and 1,500 feet, or between 1,000 and 2,000 feet above sea-level. This huge block covers more than half the total area of the continent, sometimes descending direct into the sea, and at other times leaving marginal spaces for narrow coastal plains.



THE PHYSICAL REGIONS OF AUSTRALIA.

(b) **The Central Lowlands,** formed by the *Carpentaria Lowlands* in the north, *Lake Eyre Basin* in the middle, and **Murray-Darling Basin** in the south. The **South**

Australian Highlands, consisting of a series of hills running in a general north-south line, form an interruption in the south-central plains of the Murray and Darling. To the west of the Highlands is the *Rift Valley* of Australia.

(c) **The Eastern Highlands,** formed by a series of block mountains and possibly by some pre-Tertiary fold mountain ridges as well. The slope of these mountains is from east to west. The western slopes form the great grassland region of Australia, and the famous **Darling Downs** of Queensland are only a part of this important region. The whole range is known as the **'Great Dividing Range',** although the different parts have different names such as *Australian Alps, Blue Mountains* etc. Towards the south these ranges curve in a westerly direction, throwing out parallel ranges to the south. In the northern part the ranges directly reach to the sea, while in the southern part they leave space for an extremely narrow but very important *coastal plain.* Since the continental shelf upon which the mainland of Australia stands is also the platform, geologically, of the mountainous island of Tasmania, it may be regarded as a detached mass of the Eastern Highlands.[1]

Rivers and Lakes.

Australia is singularly deficient in large rivers. Those of the north coast like the *Fitzroy, Roper, Mitchell, Flinders* and *Victoria* are all tropical rivers fed by the periodical (monsoon) rains and all of them lack a steady supply of water. The principal river of the west coast is the **Swan,** 200 miles long, at the mouth of which stands the city of Perth. Most of the permanent rivers, however, are in the east and south-east, the Trade Wind region of Australia, where the rainfall is heaviest and where the rivers

[1] The island of New Guinea to the north of the mainland also stands on the same continental shelf, which is separated by a deep sea line from the Asiatic shelf on the one hand and that of New Zealand on the other. Most of the East Indian islands belong to the Asiatic shelf.

are fed by the melting snow of the Eastern Highlands. The *Fitzroy*,[1] *Brisbane, Hawkesbury, Hunter, Clarence* and, above all, **Murray** and **Darling** are the principal rivers of this region. The main stream of the Murray is 1,300 miles in length; rising in the south of the Eastern Highlands, it flows in a west and north-west direction until deflected to the south by the Flinders Mountains lying ahead; after turning to the south it drains into the sea through *Lake Alexandrina.* The source of the Darling is more than 2,300 miles from the sea; it drains into the Murray with its many affluents from a north-easterly direction. Other important tributaries of the Murray are the *Murrumbidgee* and the *Lachlan.* Several streams of Australia like the *Diamantina,* the *Cooper's Creek* and the *Eyre's Creek* drain into **Lake Eyre,** in the heart of the Central Lowlands; but in the dry season these generally dry up, leaving the lake basin an unhealthy swamp. The surface of the Lake Eyre Basin is below sea-level.

Metallic minerals: *Gold, copper, lead, zinc, tin, silver, wolfram, iron etc.*

Geology and Minerals.—The underlying geological structure of Australia is, comparatively speaking, very simple, and the close correlation between its surface topography and geological structure is obvious. The Western Plateau region is composed of ancient metamorphic (crystalline or old, hardened sedimentary) rocks, resistant to denudation. As we have noted in an earlier chapter (p. 11), the metalliferous minerals tend to be associated with these rocks. The widespread occurrence of **gold** in the Western Plateau region is, therefore, not at all surprising; the three important goldfields of this region are those at *Kalgoorlie, Coolgardie* and *Cue* (Murchison goldfield). Gold is plentiful in the eastern parts as well, since the Eastern Uplands, though perhaps of more recent origin (probably Palæozoic or Cambrian &/or Mesozic or pre-Tertiary), are also formed by crystalline or metamorphic and other

[1] There are two rivers of that name (Fitzroy) in Australia.

hard rocks. The famous goldfields of *Ballarat* and *Bendigo* are in this region. Other important metallic minerals are **copper** (Queensland, Tasmania, South Australia and New South Wales), **tin** (Tasmania and the eastern states), **silver** (Queensland, New South Wales, Tasmania), **lead** (Queensland, New South Wales, Tasmania), **zinc** (New South Wales), **wolfram** (Queensland), and **iron** (generally distributed). Of all the iron deposits those of the famous *Iron Knob,* a hill of iron ore in South Australia, is the most important. The Central Lowlands of the continent are formed by young, soft, sedimentary rocks (p. 11) of the post-Tertiary or later Cainzoic age (probably Miocene &/or Pliocene). Non-metallic minerals like coal and oil usually tend to be associated with young, sedimentary rocks,[1] and thus on the flanks of the Eastern Highlands in the region of Queensland and New South Wales occur large deposits of **coal.** The most important coal basin is near *Newcastle,* New South Wales. But no oil has as yet been discovered in Australia, and considering the age of the rocks it seems highly improbable that oil will ever be found there. The young, soft rocks, however, usually furnish a soil and a topography suitable for agriculture; but unfortunately the Australian lowlands are climatically very dry as the Great Dividing Range effectively cuts off the rain-bearing Trade Winds from the east. Yet this unfortunate state of things has been compensated for to some extent by the folds in the underground rocks, enabling them to form basins containing water. Artesian wells can, therefore, be bored for providing water for sheep and cattle, though not for cultivation as the water is generally too saline for plants. Thus considerable parts of the dry region of Australia have been transformed into large cattle-and sheep-rearing areas. There is, however, one great geological puzzle in Australia as to the future supply of underground water: some are

Non-metallic minerals: *coal.*

No oil in Australia.

Climate the great hindrance agriculture.

Artesian Wells.

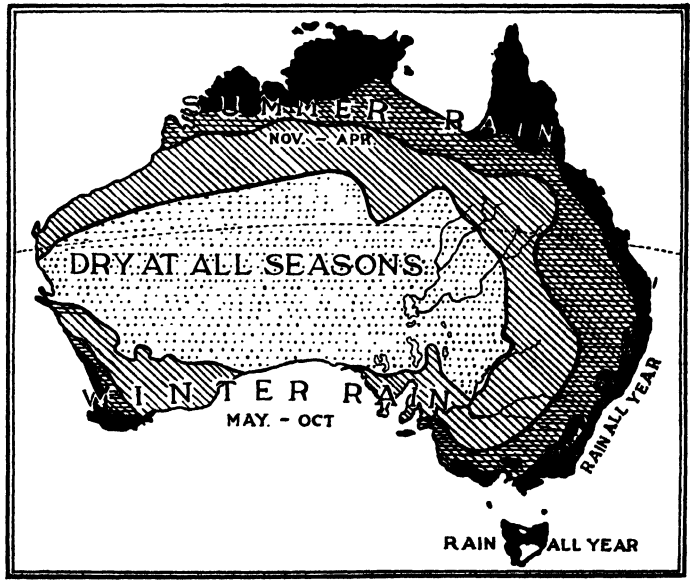
[1] Mineral oil occurs mostly in the margin of Alpine fold mountains.

Future of Australia's Underground Water Supply.

apprehensive of its exhaustion in no very remote future, while others believe in the constant renewal of the supply by the rain that sinks into the ground every year in other parts of the continent.

Climate.—Australia is a topsy-turvy world, lying south of the Equator, where it is mid-winter in July and blazing hot in January. The Tropic of Capricorn, we have seen, passes through the heart of the continent. So during the summer months (Nov.-April) the sun shines vertically almost over the centre of the mainland, where the average shade temperature soars as high as 80°F., and in some parts well over 90°F. All over the enormous central territory, and particularly in the north-west coast, low pressure

Conditions in Hot Season.



RAINFALL IN AUSTRALIA.

centres of varying barometrical gradient are formed accordingly, to which the cool, rain-bearing winds flow from the

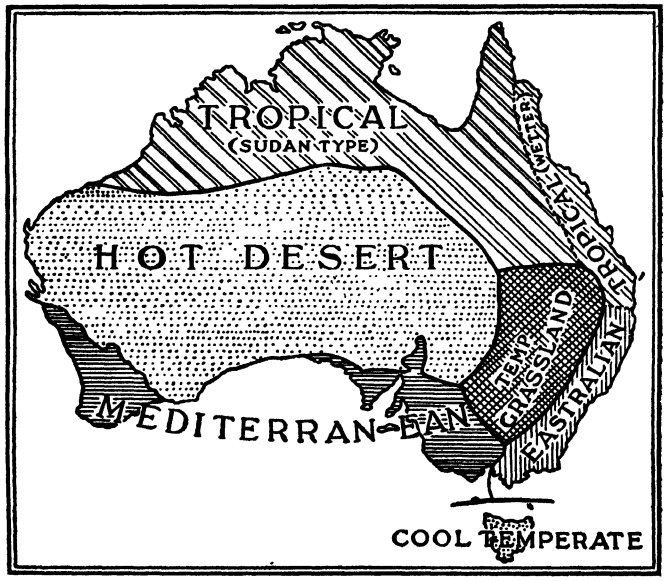
Indian Ocean to the north and west. This is the North-west Monsoon of Australia. The northern fringes of the north-western coastlands receive a good rainfall—sometimes as much as 40″ annually; but it is progressively light towards the interior, the greater part of which lies beyond the monsoonal range. Nearly the whole of the east coast lies in the belt of the South-east Trade Winds; but the Great Dividing Range cuts off these winds, so that only the narrow coastal areas receive a good rainfall (40″) all the year round. The vast interior of the continent is thus exceedingly dry at all seasons. The east coast, especially the southern half of it, has a marine climate. The southern coast also remains dry during the hot season, because the passage of the westerlies (N. W. Anti-Trade Winds) shifts too far to the south to blow over the mainland, although they bring rain to Tasmania. The southern fourth of Australia is, however, not so hot during the summer months as the northern three-fourths, partly because of their relative distance from the Tropic of Capricorn and partly because of occasional cool winds from the Antarctic. As the sun moves farther and farther towards the Tropic of Cancer during the Australian winter (May-Oct.), the earth's thermal equator begins to shift to the north, and because of the resulting fall in temperature over the greater part of the continent, high pressure centres are formed in the interior, particularly in the south-east. But the northern fourth of the continent keeps relatively hot with an average temperature of 80°F. Obviously the heavy air over the heart of Australia will flow towards the hotter north, and owing to the general northerly swing of the world's wind systems during this season, the entire north actually comes under the influence of the S. E. Trade Winds which blow, except in Queensland, from the dry interior. These dessicating winds bring no rain to the north. The southern part at this season comes in the belt of the N. W. Anti-Trades, which thus bring winter rain to this region. This is therefore the Mediterranean

Conditions in Cold Season.

region of Australia. The rainfall is fairly good, varying, as it does, normally between 40″ and 20″ annually. Tasmania, always in the westerly wind belt (Anti-Trade belt), has rain all the year as do the east coast of the mainland owing to the Trade Winds from the Pacific.

Six Natural Regions.

Natural Vegetation.—Combining all these data we find that Australia can be divided into at least six climatic regions: (*a*) there is, first, the *Tropical Climatic Region* in the north and north-east with a climate of the Sudan type. The coastal areas are generally fringed with mangrove swamps; farther inland there are Monsoon forests (evergreen), which eventually pass into rich glasslands or savanas. (*b*) In the heart of the continent prevails the *Hot Desert Climate* with its



THE CLIMATIC REGIONS OF AUSTRALIA.

characteristic spiny grass and scrub. (*c*) The *Mediterranean Climate* prevails in the south, especially along the south-

eastern and south-western coasts, where fine forests are sometimes seen. (*d*) South of the tropical grasslands and covering the greater part of the Murray-Darling Basin occurs the *Temperate Grassland Climate;* in the wetter parts of this region tall trees are found. (*e*) Along the southern half of the eastern seaboard lies the region of the *Eastralian Climate*, where the natural vegetation is eucalypt forest. The Eastralian type of climate is closely similar to the China type, but characterized by milder winter and rainfall at all seasons. (*f*) The island of Tasmania has a *Cool Temperate Oceanic Climate* like that of the British Isles.

Typical Vegetation.

The continent of Australia is believed to have been isolated from the rest of the world long before any other land had thus been separated, and so has a characteristic flora and fauna of its own. Amongst the plants particularly characteristic are the several varieties of the eucalyptus tree; the '*mallee scrub*' covering vast areas of the Desert Region is a stunted eucalyptus tree with small leaves that are arranged vertically; in the wetter parts—especially of tropical Australia—on the contrary, exceedingly tall varieties of the eucalyptus plant, yielding very hard wood, not eatable by white ants, grow luxuriantly. In the Mediterranean regions the **karri** and **jarrah** forests are very important, and on the hill slopes generally there are the fine **blue gum** forests. The '*mulga*' is a stunted **acacia** plant, occurring extensively like the 'mallee' in the dry interior. The tall **Kangaroo grass** and various other herbs like the **salt bush,** notable for their capacity to stand long drought, are nutritious food for sheep. But the Australians have upset the balance of the plant world by the introduction of the succulent prickly pear to provide fodder for sheep and cattle in the drier parts; this has now resulted in the invasion of wetter regions by this wild plant.

Prickly pear menace.

Animal Life.—But even still more characteristic are the animals of Australia. The several varieties of the

Tropical animals.

Kangaroo, the **platypus,** the **emu,** the **dingo** and other animals and birds are unknown in any other continent. Some of these animals, particularly the kangaroo, yield furs of some value, but the value is not sufficient—at least so we are told—to cover the loss they inflict by destroying grasslands and orchards. The fact is that the barbarous colonists have almost wiped out the land mammals of Australia for obtaining the fur. Animals from Europe have now been introduced, especially the sheep and the rabbit. There being no wild animals except the dingo to prey upon them, they have multiplied at an enormous rate. And although the increase in number of the sheep has been salutary to Australia's wool industry, the rabbits have grown to be a serious menace to pastures and orchards, and in Western Australia an enormous wire fence, 2,000 miles long, has been put up to keep them out. This rabbit nuisance is an example of how the balance of the native animal life of a country is sometimes upset by the introduction of foreign animals.

Rabbit nuisance.

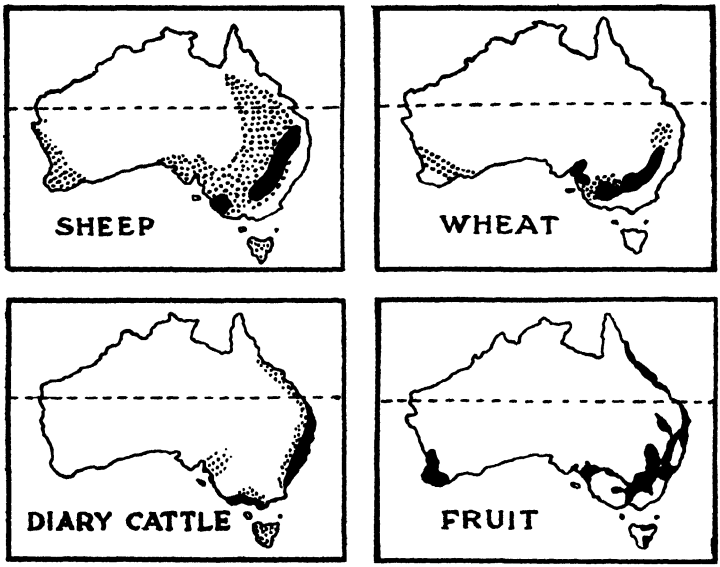
Primary Production.—Although Australia as a whole is rich in minerals, primary production is a factor of major importance in the national economy of the Dominion. The leading agricultural products are **wheat** and **fruits.** There are two major wheat belts—one occupying the south-western Mediterranean region and the other extending from the south-eastern Mediterranean region through the temperate glasslands (Murray-Darling Basin) to the eastern fringes of the wetter tropical lands. The highest concentration of wheat is, however, to be found in this second belt.

Wheat Belts.

Fruit Regions.

Various tropical fruits, including *banana* and *pineapple,* as well as the tropical *sugar-cane,* are largely grown in Queensland in the north-east, especially along the east coast of that state. But more important from the point of view of national economy are the Mediterranean fruit-growing regions of Victoria, South Australia and Western Australia. Deciduous fruits like *peaches, apricots* and *apples* are grown

chiefly in the northern parts of the temperate grasslands, while farther south are found citrus fruits and plants like *oranges, lemons* and the *vine*. Wine is produced from the vine, but does not form an important item of export; but peaches and apricots are exported, after drying and tinning; apples are also exported, chiefly from Victoria and Tasmania. Besides agriculture, cattle farming and sheep rearing are very important. On the tropical glasslands of the north are kept a limited number of **beef cattle**; but of much more importance are the cattle lands of the south; **dairy-farming** is most extensively carried on in Victoria and the well-watered south-east coastlands. Australia's leading export is **wool**; there are, we are told, no less than a hundred million sheep in the continent, and most of these are confined to the two great sheep-rearing belts of western and eastern Australia; the largest concentrations of sheep are in the temperate part of the continent and the south-eastern Mediterranean region;



Cattle farming and sheep rearing.

in the west the sheep-rearing belt almost coincides with the south-western Mediterranean land, although lesser concentrations are to be found along the whole of the west coast.

Natives of Australia.

Population.—The aboriginal Australians are allied to the pre-Dravidian races of Southern India, the Vedda of Ceylon, the Sakai of the Malay Peninsula and a few other races of Oceania. Whether they were ever very numerous we cannot positively say; but it is now definitely known that they came very near total extinction in the hands of the first white settlers from Europe. Their total number is now estimated at 60,000. Driven out of the more fertile and well-watered regions, most of them now live in the north and west 'as do also the 20,000 half-castes'.

British Settlement.

The earliest British settlers were convicts sentenced to penal servitude for life; the first batch consisting of 850 men and women, mostly hardened criminals, arrived at Botany Bay, New South Wales, in 1788, and to them fell the task of developing the resources of the continent. No wonder that the aborigines should be cruelly hunted down like game animals. Came the Napoleonic Wars and the Industrial Revolution with the consequent maladies of unemployment, food shortage, riot and what not, and the Government of Great Britain, eager to be relieved of the hungry millions, persuaded them to emigrate to Australia and other parts of the Empire. The discovery of gold in the eighties of the last century subsequently led to a gold rush which eventually culminated in extensive settlement. With the growth of settlement began to be felt an acute need for labour, and thus Chinese and Polynesian labourers were recruited. But since 1904 the Commonwealth of Australia have been following the socalled **'White Australia Policy'**, as a result of which the introduction of all 'coloured' labour has been prohibited, and all coloured peoples already settled have been legally dispossessed of their settlements (*Pacific Island Labourers' Act, 1904*). The entry of white labourers under contract however, is permitted only in exceptional cases. But it is

Labour question & White Australia Policy.'

extremely doubtful if tropical Australia can ever be developed without 'coloured' labour. The present population is a little over 6 million with an average density, in an area of 3 million square miles, of only 2 to the square mile. Nearly all the settlers are from the British Isles. Turning to the distribution of population we find that, more than half the total population is concentrated in the capital cities such as Melbourne, Sydney, Perth, Adelaide and Brisbane. This may appear rather strange in a continent which depends for its prosperity largely on its primary production. But it may be attributed to the growing tendency of the people to develop manufactures in the cities for local consumption at least, if not for export.

Total population and density.

Distribution of population.

Concentration in cities and causes thereof.

Communications.—The surface of Australia is, on the whole, fairly level, consisting, as it does, of vast plateaus and extensive plains. Railway communication would, therefore, be easy were it not for the Great Dividing Range which acts as the chief obstacle to communication with the interior. Another difficulty standing in the way of establishing through communications is that different railway systems already existing are on different gauges. These systems have been joined up actually, but through communication has not yet been established. Since the continent offers suitable conditions for road-making, extensive highways and motor tracks are now being built all over the territory. Trans-continental airways have also been developed, and the continent is now connected with the vast outer world by means of trans-oceanic airways. The principal air services of Australia are the (*a*) Melbourne —Hobart Service, (*b*) Cootamundra—Charleville Service, (*c*) Perth—Daly Waters Service *via* the towns on the north-west coast, (*d*) Perth—Adelaide Service, (*e*) Cloncurry—Normanton Service, and (*f*) Brisbane—Darwin—Singapore Service which is connected with Imperial Airways to London.

Railways.

Motor roads and Airways.

Foreign Trade.—Australia is a vast territory that is very thinly populated. Naturally, therefore, enormous areas lie undeveloped. It is still essentially a pastoral and

General character of Australian trade.

agricultural country, and the industries it has developed are mainly occupied with the exploitation and utilisation of pastoral and agricultural produce. Consequently, the export of Australia consists chiefly of its natural products and the bulk of the imports consists of manufactured articles. The foreign trade of Australia may be studied from the following tables:

The Exports of Australia[1]

Commodities	Percentage of Total Value		
	1909—13	1921—25	1931—35
Wool	43	42	39
Wheat & Flour	14	24	20
Meat	6	4	8
Butter	5	7	11
Hides & Skins	6	2	3
Tallow	2	2	—
Lead	2	3	—
Spelter	3	—	—
Fruit	—	—	4
Sugar	—	—	2
Others	19	16	13
Total	100	100	100

The Imports of Australia[1]

Commodities	Percentage of Total Value		
	1909—13	1921—25	1931—35
Textiles	18	22	20
Machinery	7	5	6
Iron & Steel	8	5	4
Other metals	9	3	—
Paper	2	4	4
Chemicals	3	3	5
Sacks	2	3	3
Oils	2	—	—
Timber	3	2	2
Tea	2	2	3
Spirits	2	—	—
Cars	—	6	5
Rubber	—	2	2
Petrol	—	4	5
Tobacco	—	2	—
Other oils	—	—	2
Other food	—	2	—
Others	42	35	39
Total	100	100	100

[1] Compiled from Stamp, *A Commercial Geography*.

Export of Bullion & Specie

The gradual decline in Australia's export of **bullion and specie** is noteworthy: in 1904-5 the percentage was 27·6 of the total value of exports, during 1906-10 it came down to 17·4, and subsequently during the period 1911-13 to only 12·8; in 1924, however, there was a phenomenal rise to 53·0, but again in 1926-30 the percentage fell down to 7·7; there was no export of bullion and specie from Australia during the quinquennium of 1931-35.[1]

Expansion of Foreign Trade.

The foreign trade of Australia was long confined to the United Kingdom alone. Only in 1879 direct trade was opened up with Germany, and this was followed by the establishment of similar trade relations with Belgium in 1881 and with France in 1883. There has, however, been a marked advance in Australia's trade with other countries since 1885, although the major portion of the trade is still with the United Kingdom. The development of Australia's trade relations with foreign countries may be studied from the following table:

Direction of Australia's Foreign Trade[1]

Countries	Exports.					
	1904-5	1906-10	1911-13	1924	1926-30	1931-35
United Kingdom	47·5	47·6	42·8	38·1	41·1	48·9
United States	2·9	3·8	2·6	6·0	5·8	2·3
India	5·5	3·3	3·2	—	—	—
Japan	1·0	1·7	1·4	9·7	7·5	9·7
Germany	6·6	9·2	8·8	3·7	6·4	5·0
France	8·4	9·8	10·9	12·5	10·8	5·7
New Zealand	2·7	3·4	3·1	4·2	2·9	2·9
Belgium	4·8	7·2	8·5	5·5	5·4	4·9
Italy	—	—	—	3·9	3·2	3·2
Ceylon	9·6	3·2	6·0	—	—	—

[1] Compiled from Chisholm's *Handbook*.

Countries	Imports.					
	1904-5	1906-10	1911-13	1924	1926-30	1931-35
United Kingdom	53·0	51·0	50·3	45·2	41·7	41·1
United States	13·1	12·6	13·7	24·6	24·2	13·5
Duch East Indies	0·8	1·0	1·2	3·3	4·3	6·2
India	3·7	4·0	3·4	3·4	4·1	5·7
Japan	1·0	1·2	1·2	2·5	3·1	5·6
Germany	7·9	8·8	9·1	1·0	2·8	3·2
Canada	1·0	1·1	1·2	3·6	2·7	4·1
France	3·5	3·4	3·0	2·9	2·5	2·0
New Zealand	5·9	4·6	3·6	1·7	—	—

Trade Agreements.

The interstate trade is free; and since the Commonwealth Government is in control of foreign trade as well, customs duties are uniform throughout the continent. Steps have specially been taken to encourage inter-Imperial trade, and various trade agreements with the different parts of the British Empire such as South Africa, New Zealand, Canada etc. are in operation. Moreover, a preferential tariff in favour of the United Kingdom has been in force since 1907, and the *Customs Tariff Act of 1933* has given effect to the famous **'Ottawa Agreement'** by increasing the preference. Thus commodities imported into Australia from 'Empire countries' are now taxed less than those coming from other sources, and in return the 'Empire countries' give preference to Australia's exports.

Trade Routes.

Australia is now in regular trans-oceanic communication with Asia, Europe, Africa and America. Steamers from Asia, Europe and Africa call first at Fremantle, Western Australia, for unloading the mails, which are then sent by train to all parts of the continent except North Australia. From Fremantle the steamers proceed along the south to the east, calling at Adelaide, Melbourne, Sydney, and Brisbane.

[1] Compiled from Chisholm's *Handbook*.

Towns of Australia

(With population, 1934)

Federal Capital Territory	
Canberra	9,000 (?)
Western Australia	
Perth	208,000
Fremantle	25,000
Albany	—
Northern Territory	
Port Darwin	—
Palmerston	1,200 (?)
South Australia	
Adelaide	315,000
Port Augusta	—
Port Pirie	—
Port Lincoln	—
Victoria	
Melbourne	1,000,000
Ballarat	48,000 (?)
Bendigo (Sandhurst)	—
New South Wales	
Sydney	1,249,000
Parramatta	—
New Castle	106,000
Bathurst	—
Broken Hill	—
Silverton	—
Queensland	
Brisbane	305,000
Rockhampton	30,000
Townsville	—
Tasmania	
Hobart	62,000
Launceston	33,000

Steamers taking the north-eastern route call at Brisbane first. This is the less important route, and is followed mainly by

tramps. Although different routes are used for trade purposes, most of the ships to and from Australia now pass through the Suez Canal and along the south coast of Australia (contrast New Zealand). The most convenient port of departure for the Panama Canal route from Australia is Sydney.

TASMANIA, now a state of the Australian Commonwealth, is a small island 120 miles from the extreme south of the mainland. It is about the size of Ceylon or Ireland. Being a continuation of the Eastern Highlands of Australia, it is a mass of mountains interspersed with small fertile valleys here and there. The island is rich in important minerals like *copper, silver, lead, gold* and *tin.* The climate is much like that of the British Isles. The principal agricultural products are *wheat, barley* and *fruits.* The highlands are covered with fine *forests.* The capital and chief port is **Hobart,** which has an excellent natural harbour at the estuary of the Derwent. **Launceston,** at the head of navigation on the Tamar, is another important port.

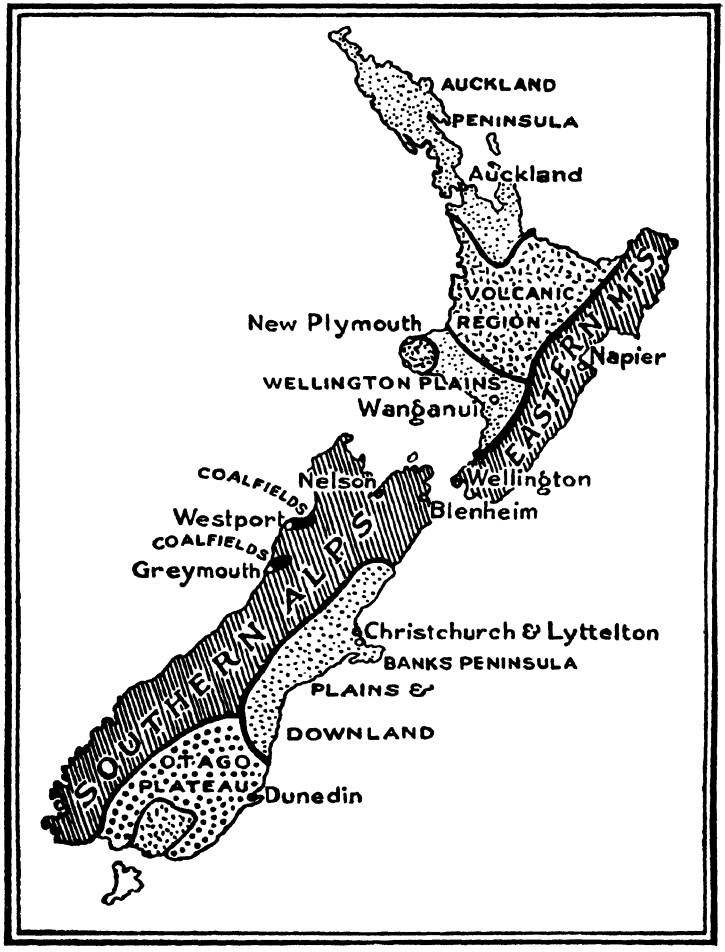
NEW ZEALAND

The Brighter Britain of the South

Position & Size.

NEW ZEALAND is a British Dominion, consisting of two large islands, called the **North** and the **South Islands,** and a much smaller one to the south known as **Stewart Island,** together with several groups of still smaller islands in the South Pacific Ocean. The total area of the Dominion is 105,000 sq. miles, and it lies almost at the centre of the Water Hemisphere of the globe as the British Isles are at the centre of the Land Hemisphere. The extreme northern end of the Dominion, however, lies in the same latitude as Spain. The most characteristic feature of New Zealand's sur-

face relief is a **mountain backbone** running right through the two main islands; in the North Island this backbone, Surface Relief.



THE NATURAL REGIONS OF NEW ZEALAND.

known as the **Eastern Mountains,** runs by the east coast, and in the South Island, where it has been given the name of

Southern Alps, it is near the west coast. Bordering the Eastern Mountains on the west and covering a large part of the central region of the North Island is an extensive area of volcanic rocks. In the south-east of the South Island lies the Otago Plateau. Many of the peaks of the Southern Alps are over 10,000 feet above sea-level and are always covered with snow. The two major plains of New Zealand are the **Canterbury Plains** of the South Island and the **Wellington Plains** of the North Island; to these may also be added the well-watered rolling country of the **Auckland Peninsula.** There are numerous rivers in New Zealand, but most of them are too rapid for navigation. The *Molyneux* or *Clutha* is the largest river of the South Island; but the chief navigable river, the *Waikato,* is in the North Island. The whole of the Dominion, except perhaps the extreme northern end, lies, like the British Isles, in the **Westerly Wind Belt.** But New Zealand is nearer the Equator than the British Isles, and therefore, enjoys a warmer and sunnier climate. Unlike Australia, New Zealand never experiences drought. We can distinguish six natural regions in New Zealand:

Climate.

Natural Regions.

(a) **The Southern Alps Region,** occupying the western parts of the South Island. Owing to abundant precipitation (over 70″) the mountains are—unless, of course, too high—covered with thick **forests,** little exploited as yet. Rainfall, however, is progressively less towards the east. **Mountain pastures** lie scattered over the whole region, especially in the drier parts to the north-east. Valuable minerals such as **gold, copper, coal** and **greenstone** are also found in this region; but mining industries are still in the infant stage.

(b) **The South Island Grassland Region,** covering not only the Otago Plateau and the Canterbury Plains, but also the Banks Peninsula in the east, and Downland in the north of the Plains; the two small strips of coastal land at

the northern end of the South Island may also be included in this region. It is the chief seat of New Zealand's pastoral and agricultural industries;—even on the comparatively poor Otago Plateau sheep-rearing and agriculture are of prime importance. The climate being, on the whole, similar to that of the British Isles, various English grasses have been introduced in this region and elsewhere for feeding the sheep. Sheep are kept for both **wool** and **mutton.** The chief agricultural products of this region are **oats** and **wheat,** the former associated naturally with the colder, poorer lands mainly of the Otago Plateau and the latter with the warmer, richer lands of the Canterbury Plains and the small coastal strips.

(c) **The Eastern Mountains Region** of the North Island. Although the mountains here are lower, the whole region is topographically more varied. The Eastern Mountains, in contrast to the Southern Alps, lie in the drier side of the North Island. Unlike the latter, again, this region abounds in pastures suitable for sheep, and is another important **wool-and mutton-producing** region of New Zealand.

(d) **The Wellington Plains,** to the south of the volcanic region, have a large concentration of sheep and a fairly large number of cattle, and are among the chief **dairying** regions of the Dominion.

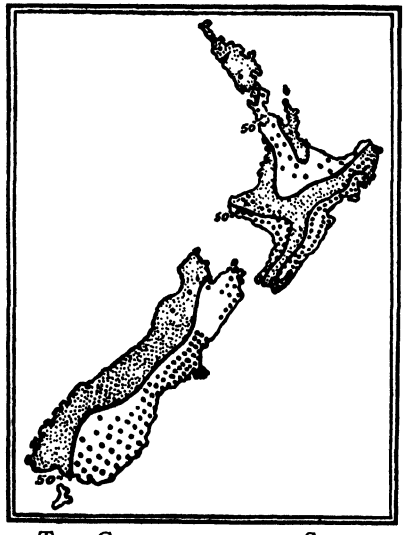
(e) **The Volcanic Region,** to the north of the Wellington Plain and east of the Eastern Mountains, occupies the heart of the North Island. Hot springs and geysers abound and there are many volcanoes, some still active but most of them now extinct. The soil is poor and dry except in the south where small concentrations of sheep are seen.

(f) **The Auckland Peninsula,** to the north of the Volcanic Region, occupies the northern parts of the North Island. This is the only region of New Zealand, except a few of the smaller Pacific islands, which has a warm climate akin to the Mediterranean type. The forested parts of the

Peninsula formerly yielded much **Kauri-gum,** prepared from the resin of the Kauri trees. These are the only forests of New Zealand that have been thoroughly exploited. **Grass** suitable for cattle naturally grows here, and it is, therefore, one of the principal **dairy-farming** regions of the Dominion. Mediterranean fruits and plants like the **vine, orange,** and **lemon** are also cultivated here; but wine is rarely distilled. Some minerals are found, chiefly **gold.**

People. The total population of the Dominion is about a million and a half, the bulk of the population is of British descent, the aborigines, called the Maori, numbering some 70,000. These latter are a tall, slenderly built, intelligent stock of the Polynesian races, and are characterized by mesaticephalic features generally.

Towns of New Zealand. The capital of the Dominion is **Wellington** at the southern end of the North Island on the Cook Strait which reaches the city in the form of an inlet forming an excellent commodious harbour; its port is **Port Nicholson.** The total population of the city and its port, according to the census of 1935, is 148,000. **Westport** and **Greymouth,** on the north-western coast of the South Island, serve the coal areas of the Southern Alps Region. **Dunedin,** on the east coast of the South Island, with a population of 89,000, is the port of the Otago Plateau. **Christchurch,** with its port of

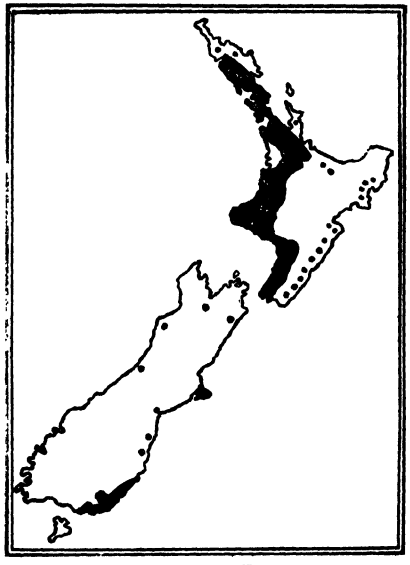


THE CONCENTRATION OF SHEEP IN NEW ZEALAND.

Lyttelton, is the chief city of the Canterbury Plains; it has a population of 132,000. **Nelson,** at the head of the Tasman Bay, serves the small sheltered valley on the west of the main mountain chain of the Southern Alps. **Blenheim** similarly serves the valley on the east of that chain. Both the towns—Nelson and Blenheim—lie at the northern end of the South Island. **Auckland,** on a narrow isthmus of the peninsula of that name, is, with a population of 223,000, the largest town of New Zealand; it is a coaling-station for steamers between Australia and America.

Trade & Industry.

New Zealand is essentially a pastoral and agricultural country, and its prospects of industrial development are still very remote. But it has, for its size, large potential water-power resources, which, if and when fully developed, would supply 4,750,000 horse-power; at present, however, something like 950,000 h.p. is being utilised. The principal installations are the Lake Coleridge station in the neighbourhood of Christchurch, the Waikato River Works near Hamilton and the Mangahoe installation near Wellington. More than 80 p.c. of the exports of the country consists of the four principal items—**wool, mutton, butter** and **cheese.** About three-quarters of the total export trade is with Great Britain, which, in its turn, supplies nearly half the total



DAIRY-FARMING REGIONS.

Preference.

imports of New Zealand. A preferential tariff in favour of the United Kingdom has been in force since 1903. The nature of the trade is unbalanced, the exports being usually in excess of imports. This is explained by the fact that while the exports consist almost solely of raw materials of lesser value, the bulk of the imports consists of manufactured goods of high value.

Exports of New Zealand[1]

Commodities	Percentage of Total Value		
	1909-13	1921-25	1931-35
Wool	40	26	22
Frozen Meat ..	21	21	25
Butter & Cheese ..	18	36	32
Sheepskins	3	2	2
Tallow	4	2	—
Agricultural produce ..	—	—	2
Others	14	13	17
Total ..	100	100	100

Bullion & Specie.

In contrast to Australia, New Zealand is exporting more and more **bullion and specie** of late years; in 1924 the value of gold bullion exported was 1·1 of the total value of exports, and although the quinquennium of 1926-30 did not show any rise, it rose to be 2·8 during 1931-35.

Imports of New Zealand[2]

Commodities	Percentage of Total Value		
	1924	1926-30	1931-35
Foodstuffs	..	12·2	14·6
Raw Materials ..	..	14·3	15·4
Manufactures ..		73·5	69·1

[1] Compiled from Stamp, *A Commercial Geography*, p. 287.
[2] Compiled from Chisholm's *Handbook*, p. 824.

The principal foodstuffs are sugar, tea and fruits; principal raw materials, tobacco and cigars, petroleum and oils and fertilisers; chief manufactures are textiles (cotton, wool and silk goods), apparel, cars, machinery, paper and books, iron and steel, rubber tyres and tubes, and chemicals and drugs.

Direction of New Zealand's Foreign Trade[1]

Exports

Countries	Percentage of Total Value		
	1924	1926-30	1931-35
United Kingdom ..	79·9	76·7	85·8
United States ..	6·2	6·5	3·0
Australia	4·8	4·9	3·4
Canada	1·4	4·4	1·1

Imports

Countries	Percentage of Total Value		
	1924	1926-30	1931-35
United Kingdom ..	51·1	46·9	50·7
United States ..	15·6	18·5	13·4
Australia	13·0	8·0	9·8
Canada	8·2	7·8	6·6
Dutch East Indies ..	—	2·0	3·8
Japan	0·6	1·3	2·2

THE ISLANDS OF THE PACIFIC

NEW GUINEA, with an area of nearly 300,000 sq. miles, is the second largest island in the world after Australia. Its western portion, comprising about one-half of the total area, is in Dutch hands. The southern

Political Divisions.

[1] Chisholm.

portion of the eastern half, together with the **Louisiade Archipelago,** is a British Crown Colony now officially known as the **'Territory of Papua'** and administered by the Commonwealth of Australia. The north-eastern portion, known officially as **New Guinea,** was formerly in German hands, but has been placed under the control of Australia by a mandate of the League of Nations. The whole island lies in the Equatorial region and receives abundant rainfall, with the result that the lowlands are covered with hot wet evergreen forests. The interior is a tableland and the narrow south-eastern extremities are traversed by mountain chains—*the Owen Stanley Range*—rising to altitudes of 13,000 feet and more in some places. The tableland of the interior, much of which still remains unexplored, is said to be covered with dense tropical grasslands. The *Fly* and the *Sepik* are the two great navigable rivers, serving as natural highways to the interior. The chief agricultural products of the island are **bananas, yams, sugar-cane, cocoanuts, taro** and some **tobacco.** Some minerals are found, notably **gold.** The trade is small; the chief exports are **copra, gold, rubber, trepang** and **pearl-shell.** The gold is alluvial and worked by Europeans, mainly in the Louisiade Archipelago. **Port Moresby,** the capital and port of Papua, has regular ocean communication with Australia. The natives belong to what for want of a better and more precise term is called the Melanesian race. They are, despite racial intermixture, basically of Negrito descent, usually short, dark, and long-headed, and perhaps of an indolent disposition. The great obstacles to the development of the island are its climate and the scarcity of labourers, to which we must add the not always harmonious interests of the Dutch, German and British planters. Otherwise the island offers opportunities for development as much as Ceylon and Jamaica.[1]

Physical Features.

Production & Trade.

Question of development.

[1] Chisholm.

MELANESIA, meaning 'Islands of the Blacks', is a name given to several groups of small islands lying to the east and south-east of New Guinea. These are grouped under the names of **Bismarck Archipelago, New Caledonia, Solomon Islands, New Hebrides** &c. Most of these islands are of volcanic origin and bordered by coral reefs; the general nature of the surface relief is characterized by the presence of mountains. The climate is of the Equatorial type, but much tempered by oceanic influences. The natural products, however, are more of a tropical nature than equatorial, represented in the main by **bananas, yams, cocoanuts, sugar** and **cotton.** Some minerals are found, notably **nickel** in New Caledonia.[1] The natives belong to the Papuan stock and are said to practise cannibalism and head-hunting; but the fact seems to be that they are primarily an agricultural folk who occasionally resort to food-gathering and hunting in order to supplement their meagre rations. Even these remote islands, on the other hand, now bear ample witness to the greater 'cannibalism' of Europe. The Bismarck Archipelago was formerly in German hands; now it is under British 'protection'. New Caledonia is French. Solomon Islands were, before the last War, partly German and partly British; now thy are wholly in British hands. The New Hebrides are under the 'joint protection' of France and Britain. Melanesia comprises various other groups of islands, too numerous to mention; of these the Loyalty Islands belong to France; the Admiralty Islands, together with the islands of New Britain and New Ireland, actually form parts of what was formerly known as the Bismarck Archipelago; the islands of the Soloman group, which were formerly under Germany, are now administered by the Australian Commonwealth, while the original British

Chief groups.

Relief, Climate, & Natural products.

People.

Political Divisions.

[1] The two chief sources of the world's nickel are Ontario in Canada, supplying about ¾ of the total, and New Caledonia which supplies the bulk of the remainder.

possessions in that group are administered by Great Britain. **Noumea,** in New Caledonia, is a port of call on the route to Australia.

POLYNESIA, meaning 'many islands', is the general name given to the innumerable islands of the Pacific not grouped under the term, Melanesia. These are either of volcanic origin or of coral formation. Nearly all of them are located within the tropics and have abundant rainfall. They are—most of them—covered with dense tropical vegetation, and their chief agricultural products are **yams, cocoanuts** and **breadfruit.** The principal export is **copra.** Some minerals are found, notably **phosphates.** The natives belong to the socalled Polynesian race (or races?), of which there are two main stocks; the one stock, akin to 'the more European-looking Maori', is tall and slender and characterized by long head, open eyes, light skin, thin lips and narrow but high nose; the other stock is shorter, darker, relatively course-featured and slightly brachycephalic or mesaticephalic. Most of these islands, especially the larger ones, have felt the greed of the western nations. The **Fiji Islands,** situated to the north of New Zealand, now form a Crown Colony of Great Britain. The total area of the group is over 7,000 sq. miles, and the total population of nearly 200,000 consists, besides the natives, of a few thousand Europeans, Indians and, of course, half-breeds. The chief products are **cocoanuts, sugar, bananas, rice, pineapple** and **cotton.** A brisk trade has grown up. **Suva,** in the island of Viti Levu, is the capital and chief port with a fine harbour protected by coral reefs. **Levuka,** in another island, is also a considerable port with a fine natural harbour. The island of **Nauru** was formerly German; it is now administered jointly by Great Britain, Australia and New Zealand according to the League mandate. The **Tonga** or **Friendly Islands** are a British protectorate. The **Society Islands,** of which the island of **Tahiti** is the most important, the **Low Islands** and the **Marquesas** group are under

French protection. The **Marshall, Caroline, Pelew, Marianne** or **Ladrone** Islands formerly belonged to Germany; these are now ruled by Japan according to the League mandate.[1] The **Ocean** island and the **Gilbert** and the **Ellice** groups are ruled by Great Britain as protectorates. The **Cook** or **Hervey** Islands now form a part of the Dominion of New Zealand. The **Fanning** and **Christmas** Islands as well as the **Penrhyn** Island (formerly German) are also British. The **Samoan** or **Navigator** Islands and the **Hawaiian** or **Sandwich** Islands are owned by the U. S. A. The total area of the Hawaiian Islands is 6,500 sq. miles; the population of nearly 385,000 consists of various peoples—Japanese, Chinese, Portuguese, Filipinos, Americans and the natives. Of these various peoples the Japanese alone constitute nearly 40 per cent, while the natives and half-breeds constitute only 6 and 9 per cent respectively.[2] The whole group is very mountainous; but the climate is pleasant. The principal agricultural products are similar to those of the Fiji Islands. **Sugar** and **pineapples** are the chief items of export. The bulk of the trade is naturally with the U. S. A., of which the Hawaiian Islands are now regarded as a territory, and thus share the former's customs tariff. The chief imports, almost wholly from the U. S. A., are **wheat, flour** and **pork.** The imports are free of duty.

STUDIES AND QUESTIONS

1. Describe carefully, with the aid of sketch maps, the distribution of sheep in (North America), Australia, and New Zealand. Under what conditions does this animal thrive best? (C. U., B. Com. '29).

2. Describe the principal industries of Australia, including agriculture. (C. U., Inter. '40).

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[1] The island of Guam belonging to the Mariane group, however, belongs to the U. S. A.

[2] Chisholm's *Handbook,* p. 830.

3. Give an explanatory account of the distribution of population in Australia. (C. U., Inter. '29).

4. Why does not Australia, which is a large producer of wool, develop extensive woollen manufactures? (C. U. '34).

5. Discuss the development of east and west coasts of Australia and show how far the influence of climate is responsible for such development. (C. U., Inter. '28).

6. What are the principal exports from Australia and New Zealand? Discuss the possibilities of increased exchange between these countries and India. (C. U., B. Com. '36).

CHAPTER II

EUROPE AND AFRICA

ASIA

The Continent of Extremes and Contrasts

Area.

Position and Size.—Asia, with a total area of more than **17 million sq. miles,** is the largest of all the continents, and occupies nearly one-third of the land surface of the globe. It is continuous with Europe, with which it constitutes the great land-mass of **Eurasia,** covering an area of about 21 million sq. miles. The narrow isthmus of Suez connects it with the continent of Africa, and a festoon of islands link it up with Australia and the land-masses of the Southern Hemisphere generally. The continent itself, however, is situated entirely in the Northern Hemisphere. For its size, however, Asia has a rather short coast-line—only 34,000 miles, *i.e.,* one mile of coast to every 500 sq. miles of surface. From north to south the mainland stretches between **78½°N.** within the **Arctic Circle** and the **Equator (0°);** no town of any importance exists at the northern limits, and the only town of importance near the Equator is Singapore (1°1′N.) Although the continent

Asia and other continents.

Coast-line.

Location.

includes 155° or more of longitude between its extreme eastern and extreme western points and thus covers nearly one-half of the earth's circumference, the mainland extends from 25°E. on the west to 170°E. on the east, covering well over a third of the circumference of the globe. Yet the main territory does not, for the grater part, conform to the land-mass lying within these lines, and so the position of Asia may better be determined by reference to the longitudes of **45°E.**, which runs by Baghdad and Aden, and **135°E.**, by Kobe, Japan. The longitude of **90°E.**, running by Barisal, Dacca, Dhubri, Lhassa, Krasnoyarsk, etc., may, therefore, be regarded as the central meridian of the mainland. The latitude of **40°N.**, passing by Peiping, Kashgar, Bokhara, Samarkand, Baku, Ankara, etc., cuts the mainland into two equal halves—northern and southern. The position of the **Tropic of Cancer (23½°N)** is also important; this line, which passes by Maskat, Ahmedabad, Jabbalpur, Calcutta and Canton, penetrates through the heart of India from east to west.

Physical Features.—Topographically Asia consists of a number of broad physical units, which may be enumerated and described as follows:

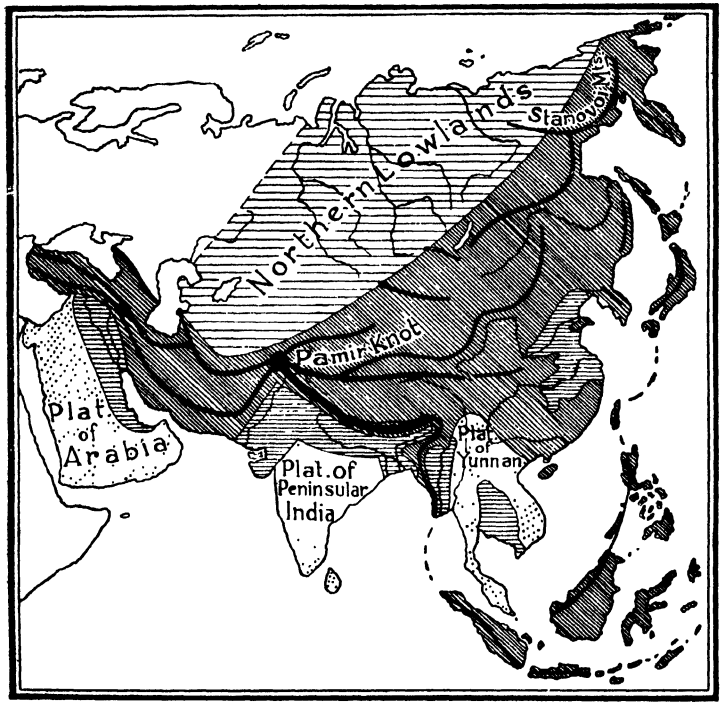
A complex of plateaus and Alpine fold mountains.

Pamir Knot the central focus of mountain chains.

Alpine range and their continuation.

1. **The Plateaus of Central Asia,** forming a huge triangular territory flanked by a succession of Alpine mountain chains. From the **Pamir Knot,** which is itself a plateau, known as *'the roof of the world'*, issue huge mountain chains.. To the south-east is the lofty **Himalayan Chain,** reinforced on the north by the **Karakoram** stretching eastward; farther north is the **Kunlun** which ultimately branches out in two directions—the main line proceeding directly to the east, while the other branch known as the **Altyn Tagh** proceeds eastward by a more northerly route; to the north-east of the Pamir Knot is the **Tien Shan.** The Himalayan Chain penetrates along the north of India into

China, and probably proceeds across the Western plateau of China on the one hand and continues, on the other, along



THE PHYSICAL FEATURES OF ASIA.

the border of India and Burma through the Andaman and Nicobar Islands as well as through Sumatra and Java to form the mountain festoons of the East Indies. The main chain of the Kunlun ultimately passes into the Tsingling Mountains of China, and the Altyn Tagh passes into the Nanshan or Southern Mountains of China. The Khingan Mountains, forming the natural eastern boundary of Mongolia, may also be a further continuation of the Altyn Tagh. The Tien Shan proceeds into the Pei Shan or Northern Mountains of China towards the east and extends

westward into Russian Turkestan as well. The plateau of **Tibet** lies between the Himalayas-Karakoram and the Kunlun. Between the Kunlun and the Altyn Tagh lies the **Tsaidam Basin.** Farther north is the **Tarim Basin** between the Kunlun-Altyn Tagh and the Tien Shan. The **Dzungarian Basin** is located between the Tien Shan and the **Altai.** The **Gobi Plateaus** and the **Ordos Basin,** bordered by the **Khingan** and the **Sayan** Mountains, are to the north-east of the Tsaidam, Tarim and Dzungarian Basins. The Khingan passes into the **Stanovoi** Mountains farther north. Along the north-west border are also the **Barguizin, North Müya** and the **Konam** Mountains. The **Vitim** and **Aldan Plateaus** lie farther north-east. These high plateaus of Central Asia cover well over a fifth of the entire continent. Plateaus.

2. **The Plateaus of Western Asia.** From the Pamir Knot, again, are given off another series of mountain chains bordering a second series of plateaus. To the north-west of the Knot are the **Trans-Alai, Alai** and **Hissar** Mountains; to the south-west lies the **Hindukush,** and to the south-south-west are the **Gilgit** and **Sulaiman** Mountains. The Trans-Alai, Alai and Hissar Mountains eventually fade into the plains of Russian Turkestan. The Hindukush proceeds along the north of Iran (Persia) for some distance and then branches out in two directions,—the northerly branch, after passing through the Caspian Sea, becomes the **Caucasus,** and the southerly branch, which sweeps along the southern shores of the Caspian Sea, passes into the **Elburz** Mountains. The Elburz continues along the **Armenian Knot,** farther west, to become the **Pontic Ranges** along the southern shores of the Black Sea. The Sulaiman Mountains continue as the **Kirthar Hills** and the ranges which define the southern boundary of the Seistan-Iran plateaus; then sweeping in a curve they proceed to the Armenian Knot as the **Zagros**

Pamir Knot the focus of mountain chains.

Alpine ranges and their continuation.

Armenian Knot.

System; from the Armenian Knot they continue farther west as the **Taurus** chain along the south of Asia Minor.

Plateaus.

Between the Pamir Knot on the east and the Armenian Knot on the west, and bounded by the Hindukush and the Sulaiman lies the great **Iranian Plateau**; an eastern fragment of this large territory, covering portions of Afghanistan and Baluchistan, is known as the plateau of **Seistan.** To the north-west of the Iranian Plateau and beyond the Armenian Knot lies the plateau of **Anatolia** bounded by the Pontic and Taurus Chains.

3. **The North-Western Lowlands,** forming another triangular territory to the north of the central mountainous triangle. The whole of this area, however, is not a true plain; it is bordered along the central plateaus by 'high plains' buttressed by fold mountain ridges; the basins bordering the Aralo-Caspian depression on the south-west of this lowland triangle, in Russian Turkestan, are separated by a number of hill ridges; Central Siberia, again, is a low dissected plateau, and Eastern Siberia, a complex of hills and plains not yet well explored. Western Siberia alone is a true lowland, bordered by the low ranges of the Urals on the west. The principal rivers of this region are the **Ob, Yenisei,** and **Lena.**

A complex of plains, depressions, low plateaus and Alpine ridges.

4. **The Eastern Complex of Lowlands and Mountain Festoons.** The great lowlands falling within this territory are the river **plains of the Amur** in Central Manchuria, **plains of the Hwang Ho and Pei Ho** in North China, of the **Yangtze Kiang** in Central China, of the **Si Kiang** in South China, of the **Mekong** in Indo-China, and of the **Menam** in Siam. These basins are separated by innumerable spurs of ancient mountains such as the mountains of Eastern Mongolia in Manchuria; the Mongolian Plateau, the Tsinling Mountains and the Southern Mountains in China; the plateau of Yunan and Indo-China as well as the Great

A complex of river plains and Alpine festoons.

Indo-Malayan Mountains Block in Indo-China, Thailand and the south generally. A number of fold mountain curves guard these basins on the east.

5. **The Southern Complex of Plateaus and River Basins,** comprising the ancient tablelands of **Arabia, Peninsular India,** and **Indo-China,** and the river plains of the **Tigris-Euphrates,** of the **Indus-Ganges-Brahmaputra,** and of the **Irrawaddy.** These river plains separate the southern plateaus from the central mountain complex. A complex of river basis and plateaus.

Geology and Minerals.—The geology of Asia is even more complicated, and authorities naturally are more at variance with regard to its basal structure than to its orography. Here it is possible only to set forth the points upon which there seems to be some measure of general agreement.

The Anatolian Plateau, we have seen, lies between the Alpine chains of the Pontic and Taurus Mountains; much of the interior of the plateau is also covered with rocks of the late Tertiary period; but the hills which penetrate this Alpine cover are of folded Palæozoic and Mesozoic rocks. Such a region, we may easily anticipate, will be fairly rich in mineral resources—both metallic and non-metallic; and Turkey, which is coincident for the greater part with the plateau of Anatolia, is known to be richly endowed with mineral wealth: thus there are important **coal** measures especially along the Pontic Mountains; **lignite** occurs in several other areas. Some of the largest **copper-mines** in the world are said to occur to the south-east of the plateau as well as in the south by the Taurus Mountains and also in the neighbourhood of the port of Trebizond on the Black Sea. Other important minerals of Turkey are **gold, silver, lead, zinc, chrome, manganese, antimony, iron, mercury, borax, emery, arsenic, meerschaum,** and salt. Turkey.

The old massif of Arabia, which lies in the anticlinal area of Alpine folding, is not known to have important mineral deposits, and so is also Palestine, except for its vast stores Arab-Asia.

of **salts** (bromide, common salt, etc.). Iraq and Mesopotamia, however, have a covering of later rocks, and the whole of the Iranian Plateau lies in the main geosynclinal area of Alpine folding. We may, therefore, look for non-metallic minerals in these regions. Iraq has large deposits of **salt** and also some pool **coal,** and an abundance of **oil.** Iran is known to have fairly large deposits of **coal** and **iron** in the north-west, but the most developed of her mineral resources is **oil** along the south-western belt, which, however, is linked with the eastern oil belt of Iraq. The Caucasian geosyncline, penetrating the Caspian Sea, continues as the **Oxus Oil Belt** to the north-east of Iran. Of the mineral resources of Afghanistan we know very little except that there are **iron** ores in Kaffiristan, **copper** in the Hindukush, lead in Hazara, **rubies** in Badakhshan, and **salt** deposits of the Tertiary age in Badakhshan, Bactria (Afghan Turkestan) and Herat.

Afghanistan.

India as a whole is not rich in minerals; her chief minerals are **coal, manganese,** and **gold.**[1] The Himalayan geosyncline may be rich in non-metallic minerals as the coal and oil-fields of the Punjab show, but this huge and difficult area requires to be more thoroughly explored. The Assam Oil Belt geologically belongs to the great Burman geosyncline, although Assam coal-fields belong—at least for the greater part—to the Himalayan geosyncline. The whole territory of Burma can be analysed into three major geomorphological units,—(*a*) the Arakan Yoma, (*b*) the Shan Plateau, and (*c*) the Central Basin. The Arakan Yoma consists of a series of Alpine fold ranges, but has a core of ancient crystalline rocks. In this region occur **chromite** and some other useful metals. The Shan Plateau is formed of granite or gneissose rocks, abounding in **rubies** and other gemstones, and limestone rocks of a very ancient age. Large **silver-lead** ores, **tin** and **tungsten** are also found in this region. The Central Basin of the Irrawaddy consists

India.

Burma.

[1] For details see the Chapter on India.

almost entirely of Tertiary rocks; here, between the Arakan Yomas and the Shan Plateau lie the famous **oilfields** of Burma. Considerable deposits of **brown coal** also occur in this region. The island of Ceylon has a central mass of mountains formed by crystalline rocks of the pre-Cambrian period. These rocks constitute a great store-house of valuable gemstones, such as **sapphires, rubies, moonstones, catseyes,** etc. The basal structure of Indo-China has already been referred to; the same general structure seems to be continued through the whole of South-Eastern Asia to the East Indies generally. The Burman geosyncline, too, appears to be continued through the whole region. The **oilfields** of Sumatra, Java, and Borneo are, thus, located in the belt of Tertiary sediments, which flank the central core of older rocks as Alpine fold chains. The mountainous tracts of Siam are geologically of the same character as those of Eastern Burma—varying, as they do, from pre-Cambrian to early Mesozoic periods in age, and having occasional lake-basins of younger rocks, and the country is rather rich in minerals—alluvial **gold, iron, coal, tin, zinc, manganese, antimony,** etc. French Indo-China has fairly large deposits of various minerals such as **coal, zinc, phosphates, tin,** and **graphite** in the Tonking region; and **gold, lead, tin,** and **precious stones** in Cambodia. The principal minerals of Malaya are **tin, coal, gold, phosphate,** and **China-clay.** Besides **oil,** the minerals of the East Indies chiefly are **tin, coal, gold, silver, iodine** and **diamonds;** diamonds are obtained from Borneo. The vast sub-continent of China may be divided into four main geological units: (a) *The north-eastern massif* (Archean massif), formed mainly of pre-Cambrian crystalline rocks, and flanked on the west by Palæozoic fold sediments, and interspersed here and there by Carboniferous **coal-measures.** Included in this area are Korea, Liaotung, and East Shantung. Underlying the alluvial plain of North China is a down-faulted block of this

Ceylon.

South-Eastern Asia and East Indies.

China.

massif. (b) *The North-western Basins,* bordering the northern parts of the Great Plain (plain of N. China) on the west, are composed of a series of synclinal and anticlinal ridges; the synclinal basins have enormous deposits of Palæozic and Mesozoic sediments, folded long before the Tertiary age, the anticlinical basins are formed of pre-Cambrian rocks. **Coal-measures** of various ages are believed to underlie these basins. (c) *The South China Block,* covering an enormous territory south of the Great Plain, seems to be of the same age, on the whole, as the Indo-Malayan Mountains Block, and in general of the same composition. Huge **coal-measures** occur here, and also **red sandstones** which have given the famous Red Basin its beautiful name. (d) *The Mountains of the Far West,* bordering the Red Basin and the South China Block, are believed by many to be of Alpine or Tertiary age; but there is no consensus of opinion on this question. As it appears from this brief analysis, **coal** is China's foremost mineral; estimates vary, but a conservative estimate places the total coal resources of China at about 100,000,000,000 tons.[1] The coalfields of Shansi and Shensi, we are told, are comparable with the great Pennsylavian coalfields of the U. S. A. But the annual output is some 16,000,000 tons. **Iron** is also abundant in China, though much less than coal. The principal deposits are in Shansi, Chihli, Shantung, and Manchuria. The annual output of iron ores is about 1,500,000 tons. **Copper** and **tin** are plantiful, especially in Yunnan. China produces over 60 per cent of the world's **antimony,** most of which comes from Hunan. Some **gold, silver, lead, wolfram, molybdenum** and **bismuth** are also found. There is **oil** in Shansi, but China is not known to have large resources of oil.

[1] Stamp, *Asia,* p. 455. These figures as also much of the general material have been taken from that book. One estimate places China's coal resources at 994,987,000,000 tons against 747,508,000,000 tons for the whole of Europe.

Eastern Tibet is known to have considerable mineral wealth; but our knowledge of that country as well as of its associated basins is most rudimentary. For its size the geology of Japan is very complicated owing chiefly to the intensity of Alpine folding and its extraordinary volcanicity, and the country is not, on the whole, rich in mineral wealth. There are small **coal-fields** and **oil pools** in the sedimentary rocks of the Tertiary age, and **anthracite** is also found in the Mesozoic rocks. Associated with Archean and Palæozic rocks and Tertiary volcanics are found **copper, gold, silver,** and **iron. Copper** is the most important metallic mineral, and Japan ranks fifth among the largest producers of copper. The general facts relating to the basal structure of Siberia have already been noted. The country is rich in minerals. Its **coal** resources are said to be a quarter of the total coal resources of Asia or a half of those of Europe. **Oil,** however, is far less plentiful, although there are abundant resources in Sakhalin and Kamschatka. **Gold** is very widely distributed along the principal river basins, and so is also **iron.** Other minerals such as **copper, zinc, lead,** and **silver** are especially important in the Altai region, Yenisei province, Transbaikalia, and the Maritime Territory. **Tin, manganese, platinum, iridium,** and **osmium** are also fairly plentiful, and there are also numerous non-metallic minerals all over the country.

Tibet-Mongolia.

Japan.

Siberia.

Climate.—The general nature of the climate of Asia is determined by two of its basic features; the one is its *size;* the other, its *central complex* of lofty plateaus and mountain chains. The interior of the continent is more than 1,500 miles from the sea,—a feature sufficient by itself to ensure extreme *continentality* of the climate.[1] This, however, is accentuated by the fact that the central tangle of

Basic factors determining Asia's climate

[1] Meteorologically the whole of Eurasia together with the northern parts of Africa—a territory of about 25 million sq. miles—is considered as a single land mass.

plateaus and Alpine chains effectively cuts the interior off from all oceanic influences. The climates of Asia are, thus, characterized by extremes and contrasts to be found nowhere else on the earth in the same degree of completeness.

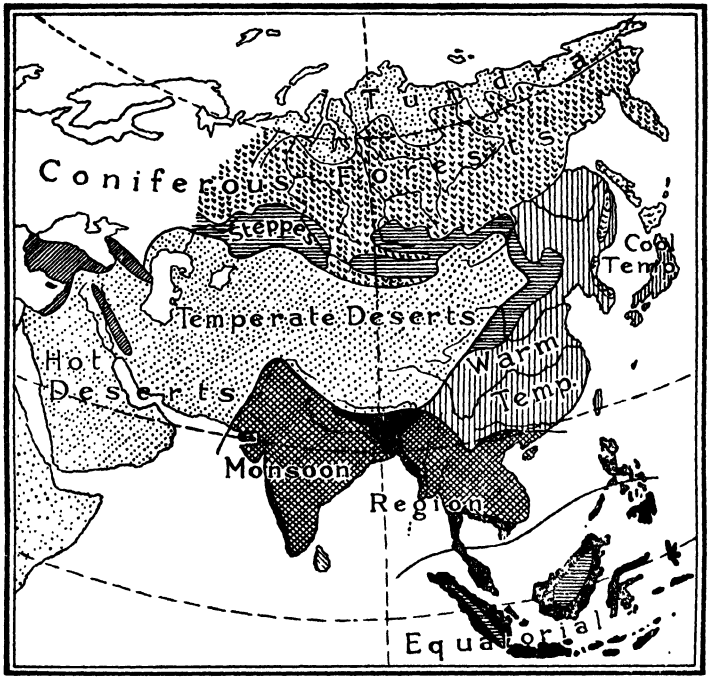
Conditions in Summer. With the advent of the summer months, accompanied by a gradual shifting of the earth's thermal equator to the north of the Equator, the south and the centre of the continent become extremely hot, and a number of low-pressure centres are formed. Inflowing winds from the ocean then rush to these low-pressure centres, causing rainfall over the whole of Asia except the south-west (N. Arabia, Persia, Afghanistan and Baluchistan), which forms a continuation of the Mediterranean region of Europe and Africa. The amount of rainfall, however, is determined by topography: thus the great mountain barriers of the central plateaus prevent heavy showers all over the vast interior.

Conditions in Winter. In the winter months, when the earth's thermal equator shifts to the south of the Equator, the centre and north of the continent become very cold, and a number of high-pressure centres are formed over the whole of the interior. Dry, cold winds then begin to blow out in all directions from the heart of Asia, but they are cut off in their progress towards India by the lofty Himalayas. Since these are dry winds blowing from a vast land surface, they do not bring in rain until they have crossed the seas. Thus the whole of Asia, excepting Japan, Central and South China, the coasts of Indo-China, the Philippines and Ceylon and a few other places, is practically rainless in winter. The East Indies, however, have rainfall all the year round, owing to their situation in the Equatorial Belt. The Mediterranean continuations of Asia also receive some rain in the winter months.

Different climatic zones of Asia. Owing to the vast extent of the continent and the diversity of its orographical features, a number of climatic zones can be distinguished:

1. **The Equatorial Climate** prevails in Malaya, nearly the whole of the East Indies, and, in a modified degree, in Ceylon. Malaya, East Indies and Ceylon.

2. **The Tropical Monsoon Climate** occurs in India, Indo-China, and Southern China. The rainfall in Central and Northern China and Japan is, no doubt, monsoonal, but India, Indo-China and S. China.



THE NATURAL REGIONS OF ASIA.

the climate of these places is characterized by much colder winters; moreover, these regions lie outside the Tropics.

3. **The Warm Temperate East Coast Climate** (China Type) is found in Central and Northern China and Japan. Unlike India, China is not protected by any moun- Northern and Central China and Japan.

tain barrier like the Himalayas from the dessicating winter winds from the heart of Asia. Three sub-types are often distinguished:

(a) *Central China sub-type,* represented by the climatic conditions of Shanghai and Hankow.

(b) *Northern China sub-type,* represented by those of Peiping.

(c) *Japan sub-type,* which is modified owing to the insular position of that country.

Manchuria and Amuria.

4. **The Cold Temperate East Coast Climate** (Manchurian Type) prevails in Manchuria and Amuria. This is akin to the Laurentian type; but the rainfall is basically monsoonal.

Arabia and Thar Desert.

5. **The Hot Desert Climate** (Sahara Type) prevails in Arabia and the desert regions of India. But the climate is not everywhere strictly of the Sahara type. At least two sub-types can be distinguished:

(a) *The Thar sub-type,* which occurs in the Thar Desert of India and the Lower Indus Valley, is a very dry type of monsoon climate.

Syria, Mesopotamia, and Persia.

(b) *The Mesopotamian sub-type,* occuring in Syria, Mesopotamia, and Persia, is, likewise, a very dry type of Mediterranean climate.

Tibet, Iran, Gobi, and Turkestan.

6. **The Temperate Desert Climate** prevails in the high plateaus of Central and South-eastern Asia. It is particularly in these regions that we find evidences of extreme continentality. The rainfall, which is invariably very low, is peculiar in that the eastern parts receive their scanty share of moisture mainly in summer and the western parts mainly in winter. This apparent anomaly is easily explained by the fact that these temperate deserts of Asia are bordered on the south-east by monsoon lands and by Mediterranean lands on the south-west. Four sub-types have been distinguished:

(a) *The Tibet sub-type,* prevailing over most of Tibet and reaching as far to the south-west as Leh in Kashmir.

(b) *The Iran sub-type,* prevailing in **Persia** and Afghanistan and characterized by rain in winter.

(c) *The Gobi sub-type,* found in north-Tibet, the Gobi Desert and the Tarim Basin.

(d) *The Turkestan sub-type,* occurring in the lowlands of south-western Siberia.

7. **The Mediterranean Climate,** found in the coasts of Asia Minor and Syria, and, in a modified degree, along the Kurdistan Mountains. The Asiatic Mediterranean lands, however, belong to the climatic zone known as that of the 'Eastern Mediterranean sub-type', and have, therefore, colder winters than the Mediterranean lands farther west.

Western Siberia and Mongolia.

8. **The Temperate Continental Climate** (Temperate Grassland Climate) is found in the steppelands of Western Siberia, and, in a modified degree, in the glasslands of Mongolia. It is characterized by long and severe winters, short and warm summers, and light spring and summer rains.

Northern Lowlands.

9. **The Cold Temperate Climate,** is found in the northern coniferous forest region of Asia. It is characterized by low average temperature and scanty precipitation mainly in the form of snow.

Northern Shores.

10. **The Arctic Desert Climate** (Tundra Climate) is found along the northern shores of Russia. It is characterized by very long and very cold winters, but very short and hot summers.

(1) Equatorial Regions.

Natural Vegetation.—The natural vegetation of the Equatorial Regions of Asia is lofty, evergreen forest. The forests are not so dense as in the Amazon or Congo Basin. The trees, especially the larger ones, are almost invariably of the **hardwood** species, and frequently rise to heights of 200 and 250 feet or more. Owing to the comparative openness of these forests smaller trees and ground vegetation are not wanting: bamboos, canes, grasses and other herbaceous vegetation are often found. But it is difficult to exploit these forests on a commercial scale, mainly because the taller trees commonly stand widely apart from one

Tropical Hardwoods.

another. A fall in temperature due to elevation does not ordinarily affect equatorial vegetation below 5,000 feet. The natural vegetation of the monsoon regions is also forest; but the forests differ according to rainfall: where there is more than 80″ of rain annually, evergreen forests of the equatorial type occur; the typical 'monsoon forests', however, are found in regions having an annual precipitation between 40″ and 80″; these 'monsoon forests' are the home of the famous **sal** and **teak** woods, which, though of the hardwood species, are much more tractable than equatorial hardwoods. Since the Monsoon forests are more open than equatorial forests, bamboos and drier types of grass are more numerous. Where the precipitation is below 40″ occur thorny trees like **acacia.** These woodlands gradually yield place to scrubland and thorny bushes as the rainfall decreases, and these latter to succulent plants of semi-desert regions. The frost-line in the Monsoon regions is generally on a level of 3.000 feet, and hill forests of these regions fall into two broad classes—the evergreen forests represented by the various species of **oak,** and **coniferous forests.** The natural vegetation of East Asia seems to be of a mixed character —broad-leaved **evergreen trees** and **conifers** interspersed with bamboo, the **wood-oil** and the **varnish** trees. The Chinese, it is interesting to learn, have almost wiped out the natural vegetation from their country. In Japan there are ever-green and deciduous broad-leaved trees of the hardwood species and conifers. In Manchuria and the adjoining tracts mixed forests of conifers and hardwoods predominate. The conifers include **spruce, silver fir, red pine** and **larch,** and the hardwoods are represented by **oaks, alder, ash,** and **beech.** In the Mediterranean regions of South-Western Asia flourish evergreen woodland of small trees represented by the **olive, myrtle, orange, vine,** and some **conifers** of smaller species. The glassland regions of Asia comprise those

(2) Monsoon Regions.

(3) Temperate Monsoon Regions of China and Japan.

(4) Manchurian Region.

(5) Mediterranean Regions.

of south-west Siberia, the Mongolian plateau, and the low lands of Central Manchuria. **Coniferous forests** predominate in the cold temperate regions of Sibera and reach as far south as the mountains of Central Asia. The typical vegetation of the Arctic Regions consists of **mosses** and **lichens.** In the more favoured areas dwarf **shrubs** and **willows** exist. This Tundra vegetation is not only confined to the Arctic wastes, but are found in the Tibetan uplands as well. The natural vegetation of the Desert Regions is an impoverished prototype of the more fortunate adjoining tracts.

(6) Grassland Regions.

(7) Cold Temperate Regions.

(8) Arctic Regions.

(9) Desert Regions.

Population.—Asia is easily the most populous of the continents, but the population, besides being very irregularly distributed, is much smaller relatively to its area than that of Europe; for it has a density of about 46 to the square mile as against 90 in Europe. Yet, again, the combined population of the four Asiatic countries, *viz.,* India, Java, China and Japan, which together constitute an area equal to about five-sixth of the total area of Europe, is nearly double the population of the latter continent. The rest of Asia is extremely thinly peopled. The total population of India (excluding Burma), according to the census of 1931, is about 338,300,000 with a density of about 220 to the square mile[1]; that of China some 400,000,000 with a density of 260; that of the Japanese Empire is expected to be nearly 100,000,000 with a density of 380, and Java with a population of 41,720,000 (1930) has a density of over 817. On the other hand, the vast tract of Arabia is believed to have a population density of 7; the enormous territories of Siberia, below 5; and much of Central Asia, under 1. The explanation of the anomaly is to be found mainly in differences of climate, and these differences are, in their turn, due to location and topography.

Certain anomalies

Populous countries.

Under-populated areas.

[1] The population of India in the census of 1941 is expected to exceed 380,000,000.

THE COUNTRIES OF ASIA

TURKEY

The Exit from Asia

Position & Extent.

The Republic of Turkey comprises an area of about a third of a million square miles, and a population of some 15 millions. It includes a small European territory around Istanbul and Edirne (Adrianople) as far west as the Maritsa River. Turkey is practically coincident with that indefinite territory called Asia Minor. She, however, holds a key position at the entrance to the Black Sea.

Relief.

The whole territory can be divided into two broad regions,—(a) *The Plateau*, and (b) *The Coastlands*.

Climate & Natural Regions.

Two broad climatic belts may easily be recognized; the coastal tracts have an essentially Mediterranean climate, but that of the plateau region is more akin to the climate of the steppelands of Russia—dry and severe. The people of the plateau region are nomads, and their principal occupation is stock-raising. *Wool* and *mohair* constitute the chief products of this dreary region, and Turkey held a virtual monopoly of fine silky mohair until surpassed by South Africa. In the heart of the

Chief products.

plateau region lies **Ankara**, now the capital of the Republic. The principal products of the coastlands are the typical Mediterranean fruits such as the *grape*, *olive*, and *fig; wheat, barley, tobacco* and some *cotton* are also grown; *sponge fishing* is important amongst the Aegean Islands; another important product is *opium*, especially in the west coast. There are enormous forest tracts, yielding valuable timber and other forest products such as *oak, pine, beech, fir, elm, lime, walnut, chestnut*, etc. **Izmir** (Smyrna) is the most important port and town on the west coast.

Production & Industry.

Although richly endowed with mineral wealth, these for the most part lie unexploited yet, the working of metals being largely confined to the pro-

duction of household utensils of brass and copper. *Carpet weaving,* however, is amongst the chief manufacturing industries and modern cotton-ginning and cotton-oilcake factories as well as salt and sugar works are steadily being established. *Silk* production and the manufacture of silk fabrics are old industries. Some *mining* is also done, but the production is small at present, although future prospects are bright. The difficulty in exploiting the mineral resources of the country has been attributed mainly to the lack of communications. The total road mileage of Turkey is some 30,000, but the road system shows a curious absence of main trunk lines, which has resulted in the isolation from the rest of the country of even such important centres as Izmir and Bursa. And the railways constitute a total mileage of some 3,000 miles only. But railway connections have now been established between Ankara and Paris *via* Istanbul on the one hand (Simplon-Orient Express—Paris to Istanbul), and between Paris and Tripoli (Syria) *via* Istanbul and Aleppo. There are two railway systems in Turkey:—the one, coveniently grouped as the Anatolian-Baghdad system, runs, with all its adjuncts considered together, across the whole country from Haidar Pasa, opposite Istanbul, to Nisibin on the Syrian border, connecting Ekichehr, Konia, Adana and Aleppo (Syria), and throwing out lines to Ankara and Kaisarie; the other, grouped as the West Coast system, establishes communications amongst Panderma, Izmir, Aidin etc. Various projects are now under operation: thus there are projects of establishing communications between Adalia and Konia, Sivas and Kaisarie, Erzerum and Trebizond and so on.

Communications.

It is, however, difficult to obtain accurate figures relating to the foreign trade of the Republic, owing mainly to governmental reticence on the subject. The general trend of the trade, however, may be indicated by the following tables compiled from the incomplete statistics available:

Foreign Trade.

The Exports of Turkey

Tobacco	28 per cent
Fruits & Vegetables	17 „ „
Cotton & Cotton manufactures ..	12 „ „
Wool & Wool manufactures ..	9 „ „
Various	34 „ „

The Imports of Turkey

Manufactures	
Cotton goods	31 per cent
Woollens	7 „ „
Metals	9 „ „
Cereals	9 „ „
Colonial goods	8 „ „
Various	36 „ „

The Direction of the Foreign Trade of Turkey

Exports (Percentage of Total value)	Countries	Imports (Percentage of Total value)
24	Italy	20
14	Germany	12
11	France	10
12	U. S. A.	7
12	U. K.	17
27	Others	34

The foreign trade of Turkey has been showing a general upward trend since the turmoils of the Revolution of 1922 were over. But there is still an adverse balance; the total value of imports exceeds that of the exports by about 20 per cent. Recently, however, the Republic has entered into a trade pact with Great Britain (after the declaration of War between Britain and Germany), and negotiations are afoot for a similar pact with Germany.[1]

[1] If the Mediterranean Sea be blockaded, and with a hostile Germany to cut off land routes, Turkey will find it almost impossible to maintain trade relations with Great Britain and America, and it will mean a 24 p.c. loss of her total export and import business. This she will have to compensate for by increased trade with Germany and German occupied Europe.

Cyprus, an island to the south of Turkey, is a British Crown Colony. Its chief products are *beans, wheat, sesame* and *grapes.* The small amount of export consists mainly of wine and agricultural products. The capital is Nicosia, and the chief port is Larnaka. Agriculture. Export. Towns.

ARAB ASIA

Introductory.—Arab Asia is both a geographical and cultural unit. It comprises roughly the whole of south-western Asia 'lying, south of the main mountain belt of Armenia and west of the Zagros'. The predominant language over this vast territory is Arabic, and the culture essentially Semitic and more pronouncedly Islamic. Prior to the Four Years' War (1914-18) nearly the whole of it was a part of the Ottoman Empire. As a result of the post-war settlements it is now divided into the French mandated territory of **Syria,** the British mandated territories of **Palestine** and **Transjordania,** the kingdoms of **Iraq** and **Arabia,** and the British sphere of influence extending from Aden. Geographical & cultural homogeneity. Political units.

SYRIA lies south-west of Asia Minor, and readily falls into four natural divisions: (a) *The Western Coastal Plains,* formed by a succession of extremely narrow strips of land. The climate is, of course, Mediterranean, the rainfall fairly abundant, and the soil fertile. The chief products are **oranges,** especially in the Plains of Tripoli and Sidon (Saida), **olives** particularly in the Plain of Beirut, and **tobacco,** mainly in the Plain of Latakia. The principal towns of this region are the ports of Alexandretta, Latakia, Tripoli, Beirut, and Sidon (Saida), all actually open roadsteads except **Beirut** which has a good semi-natural harbour. (b) *The Western Mountain Ranges,* formed by the three principal blocks of the Amanus Range (Giaour Position & Natural Divisions. Products & Trade Centres. Products & Minerals.

Dagh), Jebel en Nuseirîye, and Lebanon. There are occasional forests, from which the famous **'Cedars of Lebanon'** are obtained. North Lebanon also yields good quality **iron-ore,** and there is **lignite** in South Lebanon. Syria, however, is poor in mineral resources. To the east of Lebanon is the Anti-Lebanon, and in between the two is the valley of the Litanî river. (c) *The Great Central Depression,* actually an agglomeration of unhealthy marshes and fertile tracts of land, formed by the fertile plain of Antakia (Antioch), and the Basin of the Orontes river. The principal products are temperate **cereals** (wheat, barley, durrah, etc.), and temperate **fruits.** On the banks of rivers and near the marshes **liquorice root** grows wild. Another important thing extensively cultivated is the **mulberry tree** for the silk worms; **silk** production is an important industry, especially in Antakia. The principal towns of the region are Antakia, Hama, and Homs. (d) *The Eastern Mountain Ranges,* which gradually fade into the Syrian Desert. The whole of this region, except a few places such as the lands around **Aleppo** and **Damascus,** is climatically very dry, and subject to dessicating cold winds in winter and severe heat in summer. Large numbers of sheep and goats are kept in Syria, especially in the Aleppo district, and **wool** forms an important item of export. Syria is rather well served by roads and railways. There is direct railway communication between Aleppo and Tripoli *via* Hama and Homs. The Simplon-Orient Express which runs from Paris to Istanbul is now continued, by means of connections, to Egypt through Syria and Palestine. There is broad-gauge connection between Aleppo and Tripoli, and narrow-gauge (metre gauge?) trains run between Damascus and Beirut, as well as between Damascus and Haifa; the latter line runs to Egypt from Haifa (Palestine). Motor cars run from Tripoli to Acre (Palestine), *via* Beirut, Sidon, and Tyre, as between Damascus and Beirut, and between Aleppo and

Products & Trade Centres.

Products & Trade Centres.

Communications.

Trade.

Acre *via* Hama, Homs, and Damascus. The general nature of Syria's foreign trade has already been indicated (pp. 303-4). Most of the sea-borne trade is with France, Britain, and Italy.

PALESTINE is geographically as well as historically a part of Syria, and like the latter it falls into a number of natural regions running more or less parallel to the Mediterranean: (a) *The Coastlands* on the west are very much alike in climate, fertility and products to those of Syria. This is the region of the famous **Jaffa oranges.** The principal towns of this region are Acre, an ancient town and port, **Haifa,** the chief port of Palestine, **Jaffa,** an open roadstead but owing to its position the central outlet of the country, the newly built Jewish town of **Tel Aviv** adjoining Jaffa, and Gaza, a minor port. (b) *The Hill Country* lying in the middle serves mainly as an extensive pasturage for sheep and goats. Some **olive** is grown in the comparatively fertile tracts. This is the region where lies **Nazareth,** the famous old village of Biblical antiquity, and the town of **Jerusalem,** the Mecca of the Christians. (c) *The Jordan Rift Valley* (El Ghor), consisting of the river Jordan, the Ganges of the Christians, the Sea of Galilee, and the Dead Sea. Naturally the region is cut off from the rain-bearing westerly winds and is therefore climatically as dry as a desert except for the waters of the Jordan. **Salt** is obtained from the Dead Sea, and electricity is generated from the flowing waters of the Jordan for illuminating the holy city. Roughly two-thirds of the people of Palestine are Syrians or Northern Arabs, a quarter Jews, and the remainder Christians. The British Government has been openly endeavouring since the famous **Balfour Declaration** of 1917 to establish a national home in Palestine for the Jewish people. But this has engendered much friction

Position.

Natural Regions.

People.

Immigration & Emigration of Jews.

between the Muhammedan and Jewish communities, and although the first decade since the declaration witnessed an overwhelming influx of Jews in Palestine, there has been an excess of Jewish emigrants over immigrants in subsequent years. Palestine is well served by roads and railways.

Communications.

There is road communication between Nazareth in the north and Jerusalem (and beyond) in the south; from Nazareth one road goes as far as Tripoli (Syria) along the coast, and another to Aleppo *via* Damascus, Homs and Hama. There are road communications between Haifa and Nazareth (and beyond), and between Jaffa and Jericho in the Jordan Valley (and beyond) *via* Jerusalem. Various projects for a new system of trunk roads (as between Haifa and Gaza along the coast and between Haifa and Jericho over the interior) are being considered. The railway lines along the coast connect all the ports, while throwing out branch lines to all the important inland towns.

Foreign Trade.

The general nature of the foreign trade of Palestine has been described elsewhere (pp. 303-4).

TRANSJORDANIA, east of Palestine, actually constitutes the margin of the great Desert of Arabia. Its chief town, **Amman,** has motor communication with Jerusalem and Jaffa. The unfinished Hejaz Railway destined to Mecca also proceeds through this town. Agriculture and pastoral pursuits form the chief occupations of the people.

Position,

IRAQ, bordered on the west by Syria and Arabia and on the east by Persia, falls into four natural divisions: (a) *Kurdistan,* a mountainous tract on the

Relief & Natural Regions.

north-east; (b) *Upper Iraq,* corresponding roughly with Assyria of old and embracing a considerable portion of Mesopotamia; (c) *Lower Iraq,* extending roughly from Baghdad to the Persian Gulf, and thus embracing the greater part of Mesopotamia; and

(d) *The Desert Fringe* on the west. Mesopotamia, literally meaning the land between the rivers, in the country drained by the Tigris and Euphrates. The general barrenness of Kurdistan is only occasionally relieved by good pastures and cultivable lands on the lower slopes and in the valleys. That portion of Upper Iraq which lies between the Tigris and the foothills of Kurdistan is also not fertile except for the deep broad valleys of the Tigris and its tributaries, the Great Zab and Little Zab. Upper Mesopotamia, which is included in this division, is an open, undulating plain with a few ranges of low hills; it, too, is not a fertile tract of land. Lower Iraq, however, is a fine fertile alluvium. The **date** crop is the most important agricultural product of Iraq; for 80 per cent of the world's dates are produced here. It is the staple food of the Arabs. **Rice,** though of poor quality, ranks second amongst the agricultural products. The largest concentrations of dates and rice as well as of **maize, millets,** and **sesame** are in Lower Iraq. Iraq specializes in the cultivation of **wheat** and **barley,** where 'dry-farming' is the general rule. Another important crop is **tobacco,** especially in the north. Iraq also produces **opium, hemp, lentils** and **liquorice root,** particularly in the famous Shatt el-'Arab region in the extreme south. The production of **cotton,** however, is meagre, but there are great possibilities for the finest types of Egyptian cotton. Large numbers of camels, horses, donkeys, sheep and goats are reared by the nomadic and semi-nomadic tribes on the desert fringes and the upland plains of Upper Iraq. Fine **wool** and **mohair** are obtained from the sheep and the Angora goats of Kurdistan. The mineral wealth of Iraq consists of **salt** and some poor quality **coal,** but above all of **oil.** There are three oil-belts —the western belt runs along the Euphrates Basin, the middle belt along the Tigris Basin, and the eastern belt along the border of Iran. The eastern belt was discovered

Production.

Minerals.

only in 1927, and since the construction of a twin pipe-line to Tripoli and Haifa in 1935 production of oil has greatly increased. Iraq is, on the whole, well served by rivers, roads, and railways. The Tigris is navigable by steam craft for more than 450 miles from above Baghdad to where it unites with the Euphrates to from the Shatt el-' Arab. Below this point, however, navigation is impossible except for very small crafts because of the loss of water in a number of distributories. The Euphrates is too much obstructed by shallows. Though there are good motor roads in Iraq, the absence of trunk lines is obvious. There is railway communication between Basra in the south with Kirkuk in the north *via* Nasiriya, Hilla and Baghdad. Another railway line starts from Baghdad to Mosul through Samarra, but there is a project to discontinue this line and link Baghdad and Mosul by a new route starting from Kirkuk. The principal town of Iraq is **Baghdad** situated in the heart of the country. It has been a meeting-place of caravan routes from Arabia, Syria and Persia for centuries on end, and is now a centre of various manufactures—silk, woollen, cotton, rug, pottery, etc. **Basra,** on the Shatt el-'Arab some 60 miles from the sea (Persian Gulf), is the chief port—indeed the only port accessible by ocean-going vessels. **Mosul,** the third city of Iraq, is the principal town of the north. Nineveh, the capital of the ancient Kingdom of Assyria, was situated near the modern town of Mosul. Near the ruins of Babylon is another town, Hilla, situated on the river Shatt el-'Hilla. To the north-west of Hilla is the holy city of **Karbala,** and to the south-west of Hilla is **Najaf,** another holy city. Kut-al-Imāra and Kurnah 'Amāra are important wheat centres on the Tigris.

Communications.

Towns & Industrial Centres.

Nature of Foreign Trade.

The foreign trade, as is quite usual, shows an unfavourable balance; for of the total value of this trade nearly 50 per cent is covered by imports, less than 25 per cent by

exports, while transit trade accounts for the remaining 25 or 30 per cent. This transit trade is actually *entrepôt* trade, carried on mainly with Persia, and in this Iraq is in keen competition with Russia.

Relief, Climate & Production.

ARABIA is a desert tableland, climatically very dry; only the mountainous tracts of Yemen in the south-west and Oman in the south-east have a rainfall sufficient for the cultivation of the **coffee** plant. But the prolonged washing away of the soil has rendered coffee-culture difficult. The isolated oases in the interior, however, are suitable for the **date-palm.**

Political Divisions.

Arabia is now divided into a number of political units such as the kingdoms of the Hejaz, Oman, Nejd, the Imāmate of Yemen, the Egyptian dependency of Sinai, the British protectorate of Koweit, the British possession of Aden, etc. The Sultanate of Oman is bound by a treaty with the British Government, and the task of guarding the Persian Gulf has now devolved upon the British Admiralty. The Bahrein Islands are also under British protection. Riyādh, in the heart of the oases region, is the capital of Nejd. Sanā, an upland town in the interior, is the chief centre of Yemen; its port is Hodeida. But the port of **Mocha,** famous for the 'Mocha coffee', is the principal outlet for Yemen. The holy cities of **Mecca** and **Medina** are in the Hejaz. **Maskat** (Muscat) is the capital and port of Oman. Korein (Grane) is an excellent natural harbour round the inlet of Koweit (Koait). Manama is the capital and commercial centre of the Bahrein Islands. **Aden,** on the south coast, a fortified coaling station and *entrepôt,* has an admirable natural harbour. Its area is 75 sq. miles, but the settlement includes the island of Perim in the Straits of Bab-el-Mandeb with a further area of 5 sq. miles, and a hinterland, forming a British Protectorate, comprising an area of 9,000 sq. miles. The trade of Arabia is

Towns & Ports.

Trade.

small. The most important item of export is perhaps the fine **Mocha coffee,** but the quantity raised and exported is not much. But the quality and price of the indigenous coffee enable the Arabs to import the cheaper Brazilian or Javanese coffee for home consumption. Other items of export are **gums, hides,** and **wool.** The Bedouins carry on the breeding of **camels,** and sell them to the settled peoples of Arabia, Syria, Palestine and other places. **Asses** are also bred in large numbers, in Hejaz, Nejd, and Yemen, and are sold; for in Arabia they are scarcely less important than camels as means of transport. The famous **Arab horses** are also bred, especially in Nejd, but they are of much less importance than either camels or asses. Bahrein is the centre of the **pearl fisheries** of the Persian Gulf.

IRAN AND AFGHANISTAN

Position.

PERSIA, now officially known as **IRAN,** lies east of Asia Minor. It is largely made up of tablelands encircled by Alpine fold ridges. The elevation is greater in the east.

Relief, Climate & Rainfall.

Precipitation is rather heavy in the mountainous north and west; but since it occurs mainly in winter, most of it is in the form of snow. This, however, has a salutary effect on the productivity of the land as the melting snow in spring feeds a large number of streams that can be used for irrigation. Otherwise nearly the whole of Iran would be a desert like Arabia. At present roughly the eastern half of the country may be classed as desert or semi-desert. The climate of Iran, especially of the interior, is sufficiently distinctive to be described as of the Iran type; it is there blazing hot and dry in summer and moist and intensely cold in winter.

Production & Industry.

The high summer temperature enables the cultivation of the **date-palm** at an altitude of 3,500 feet, of **rice** at 4,000 feet, of **cotton** at 5,000, of the **grape-vine** at 7,500, and of **wheat** at 9,000. Rice, however, is grown mostly in the swampy

plains bordering the Caspian Sea, and although the bulk of it is consumed at home, a small quantity is exported, mainly to Russia. Wheatlands are much more uniformly distributed all over the country, and a large surplus is available for export. Another crop deserving special mention is **opium**, cultivated largely for export—mainly to China and Great Britain. Persian **tobacco** is of excellent quality, but home consumption being high, only a small surplus is exported. Persia's **cotton** is coarse and short-stapled; before the Four Years' War, however, Russia was the leading customer of this commodity; now cotton production has declined, and Persia imports large quantities of cotton goods and yarn—the latter largely from India—for her own **carpet** industry. But the country is said to have a soil in Khuzistan, a portion of the Tigris lowland, suitable for American and even for Egyptian cotton. Some **barley, millets,** and **maize** are also grown throughout the land, but no surplus is available for export. Sugar-cane can be cultivated in the region of rice, and the soil and climate of Persia are fairly suitable for beet as well; but the bulk of her sugar requirements has to be imported at present. The climate of Persia is suitable for a variety of **fruits**—both Mediterranean and tropical. The manufacture of **wines** from the vine is of some importance. **Sericulture,** for which Persia has always been famous, came to the verge of ruin owing to a disease in the latter part of the last century; yet it is still important in the region bordering the Caspian. The bulk of the raw **silk** now produced goes to France, Italy, Russia and Turkey. There are large numbers of transport animals in Persia—horses, mules, donkeys and camels, as well as sheep and goats. Much **wool** is produced both for export and the local manufacture of carpets and shawls. Persia is believed to be fairly rich in various minerals; but their existence is as yet mostly problematical, and even those that are positively known to exist have not been, with the only exception of **oil,** thoroughly exploited owing

Minerals.

Exploits of Anglo-Iranian Oil Co.

mainly to transport difficulties. The oil industry has been in the hands of the *Anglo-Iranian* (formerly Anglo-Persian) *Oil Co. Ltd.*, since 1909. The British Government owns a disproportionately large number of shares in this Company—to the extent of £2,000,000. And the purchase of shares was prompted by the necessity of getting oil mainly for the British Navy. A pipe-line, 145 miles long, connects the source of the oil at Maidan-i-Sulaiman with the refinery on the island of Abadan in the Persian Gulf. More than 15 per cent of the total revenue of the Government of Iran is derived from the royalties from the Company. Ever since the formation of the Company the business has been expanding by leaps and bounds, as it were, and it is now definitely known that at any time the total output of oil can be trebled. This oil-belt, we have seen, lies along the south-western border of Persia, and is linked with the eastern oil-belt of Iraq. The Caucasian geosyncline, we have noted further, spreads along the north of Persia, culminating in the Oxus Oil Belt farther east; it is, therefore widely believed that there are abundant oil resources in Northern Persia as well. In the north-west there are **coal** and **iron,** and it was proposed sometime ago to manufacture steel rails in that country.

Interest of British Govt.

Persia's problems.

Persia is handicapped in her national economy by two major drawbacks: the country lacks man-power and modern means of communication. The whole territory is larger than the British Isles, France, Belgium, Holland, Switzerland and Germany combined, and yet the population is about 10 millions, of which some 3 millions are nomads. There are only about 230 miles of railways, some 600 miles of motor roads, 1,500 miles of gravel-surfaced roads, and 3,000 miles of unmetalled roads. Three railway systems, however, enter Persia from foreign lands: one line terminating at Duzdap in the south-eastern frontier connects it with India *via* Quetta; another line terminating at Tabriz in the north-west establishes communication with Russia *via* Julfa on the Russian frontier; another line from

Communications.

Basra and Damascus terminates at Khanigin on the Iranian frontier. From Tabriz and Khanigin to Tehran, the capital, there are motorable roads; but Duzdap to Tehran is an arduous journey of hundreds of miles by motor roads and caravan routes. A north-south railway, destined to connect Bandar Gaz on the Caspian Sea, Tehran, Hamadan and Mohammera near the Persian Gulf, has been under construction for some years.

Chief Towns of Iran

Tehran	360,000	Bandar Gaz ..	Caspian Port.
Tabriz	219,000	Astara ..	„ „
Meshed	139,000	Bandar Shapur	Persian Gulf Port.
Siraz	119,000	Bushire ..	„ „ „
Isfahan	100,000	Bandar Abbas	„ „ „
Hamadan ..	——		

Position. **AFGHANISTAN** may be said to occupy the eastern third of the great Iranian Plateau. Except for a small strip on the north (Plain of Turkestan), Relief. the country is an agglomeration of lofty mountains and elevated plateaus. The climate is much like that of Iran—Climate. dry and sunny and subject to extremes of temperature. Much of the insufficient precipitation is in the form of snow, and this gives rise to a large number of short-lived streams in spring. Cultivation is confined to oases and the large river valleys of the Kabul and the Heri Rud. The leading crops are **dates, pomegranates,** and **sugar-cane**; some **wheat, barley, millet, maize, rice** and a number of **fruits** (oranges, Products. figs, grenadines) are also grown. There are large numbers of sheep, especially the fat-tailed sheep, said to be a native of Afghanistan. **Meat, grease, wool** and **skins** are obtained from them. **Kabul,** the capital, stands on the Kabul river. It is connected with Chief towns & communications. Peshawar by a motor road through the famous Khyber Pass. Another motor road connects it with Bamian. **Kandahar,** another important city, has motor communication with

the capital. **Ghazni,** once the centre of a large empire, lies on the motor road between Kabul and Kandahar. **Herat,** on the Heri Rud, is connected by a circuitous motor road with Kandahar. A railway from Merv, Russian Turkestan, terminates at the Afghan frontier north of Herat. Another line from Quetta proceeds to Chaman on the British side of the Afghan frontier some miles south-east of Kandahar. There are motor roads from Herat to the frontier between Afghanistan and Russian Turkestan, from Kandahar to Chaman, and from Kabul to Lundikhana where the railway from Peshawar terminates. Except the motor roads mentioned above goods are carried by beasts of burden like camels, asses, pack-horses and oxen. Afghanistan was once the great gateway of trade between India and Central Asia; a large part of the merchandise then passed through the Bamian Pass between the Hindukush and the Koh-i-baba west of Kabul. At present the small foreign trade of Afghanistan is mainly with India *via* Peshawar and with Russian Turkestan *via* Mazar-i-Sharif in Afghan Turkestan. Statistics are not available for the total trade; but the principal exports from India consist of **cotton goods, tea, sugar, dyes, hardware** and various **small manufactures;** exports to India consist mainly of **wool, sheep-skins, wood** and **fruits.** Imports from India alone are usually in excess of exports in value.

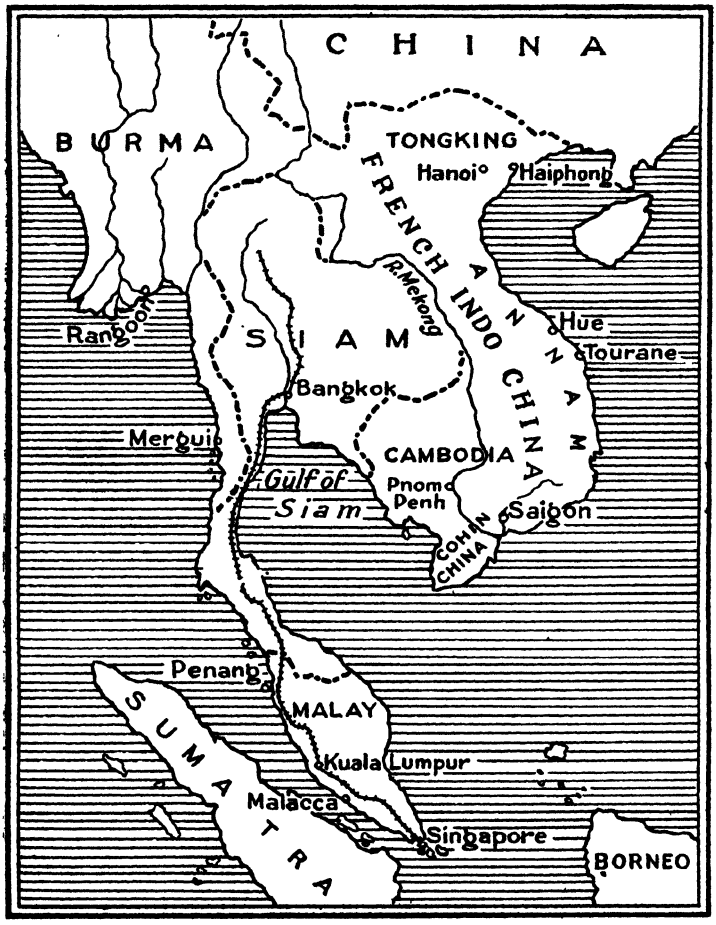
Foreign trade.

INDO-CHINA

Introductory.—The peninsula of Indo-China, lying as it does between India and China, is a separate geographical unit by itself. To its south, however, is the long narrow subsidiary peninsula of Malaya. But despite this geographical unity, both are now divided into a number of states between Great Britain, Thailand (Siam) and France. Under Great Britain are Burma, the Straits Settlements and the so-called protectorates of the Federated and Unfederated

Geographical units.

Malay States; Siam or Thailand is an independent kingdom; and under France are the Lower Cochin-China, Cambodia, Political Divisions



Annam, and Tong-king. The mountainous Shan States are shared amongst themselves by the British, Siamese and French.

Position. **BURMA**, till lately a province of India, has been constituted as a separate unit of the British Empire. Geographically a part of Indo-China, Burma is cut off from India by the lofty chains of the Arakan Yoma on the west. The most characteristic feature of its surface relief is the north-south alignment of its mountain chains and major river

Relief. basins. Covering the whole of the east is the great massif of the Shan Plateau. In between the two is the great Central Basin drained by the Irrawaddy and Chindwin.

Climate & Rainfall The climate is monsoonal. The rainfall is governed by topography: it is heaviest in the mountainous west and the Irrawaddy Delta—as high sometimes as 200″ annually; but the interior, sheltered by the surrounding mountains, is a dry country suffering from semi-desert conditions. There

Vegetation. are dense equatorial or semi-equatorial forests in the hottest and wettest regions; then there are monsoon forests, yielding valuable **teak** wood, where rainfall is between 40 and 80 inches a year; the drier parts are covered by scrub. Besides these, there are extensive tidal forests in the Irrawaddy Delta, where tall trees of considerable value

Products. abound. Burma is, of course, essentially an agricultural country; but at present only about 20 per cent of the land is under cultivation. **Rice** is by far the most important agricultural product, covering, as it does, no less than 66 per cent of the land under tillage. Its cultivation is confined mainly to the Irrawaddy Delta, the valley and delta of the Sittang and the coastal strips of Arakan and Tenasserim. Other important agricultural products are **sesamum** (covering 6 per cent of the land under tillage), **beans** (6 per cent), **millet** (6 per cent), **groundnuts** (2 per cent), and **cotton** (2 per cent). Fruits and vegetables, tobacco and rubber—the last especially in Mergui and Tavoy—are also grown. Irrigation is essential in the dry inte-

Irrigation. rior; the principal channels of irrigation at present are the **Mandalay Canal** (40 miles), with fourteen distributories, the **Shwebo Canal** (27 miles) with its two

branches (20 and 29 miles), and the **Mon Canal** (53 miles). Burma, we have seen, is rich in minerals. There are extensive fields of **lignite,** little exploited as yet, in the Chindwin Valley and the old lake basins of the Shan Plateau. **Iron** is said to have been fairly well distributed over the hill tracts; but the production has considerably diminished now owing chiefly to its extensive exploitation in the past by local inhabitants. **Gold** is found in nearly all the rivers in Upper Burma; but the output is small. There are important **silver-lead** deposits at Bawdwin and other parts of the Shan Plateau. The mine at Bawdwin, said to be one of the largest silver-lead mines in the world, is worked by the Burma Corporation, Ltd., mainly a British concern. From their smelting works at Namtu the refined minerals are sent by rail to Rangoon for export. The Corporation also works some **zinc** and **copper.** Some of the other silver-lead mines of the Shan Plateau were formerly worked by Chinese miners. The Shan Plateau is famous also for its **ruby** mines; but the manufacture of artificial rubies has dealt a death blow to the mining of gem stones. The extraction of **amber** and the manufacture of **salt,** both confined in Upper Burma and the Shan States, may also be mentioned here. In the south, however, particularly in Tenasserim, there are large deposits of **tin** and **tungsten,** some of which are worked by Europeans. But the most important mining industry in Burma at present is that of **oil.** The oilfields of the country —almost all of them—lie in the old gulf between the Arakan Yomas and the Shan Plateau; only the Arakan oilfield lies west of the Arakan Yomas. The two leading oilfields, both situated near the Irrawady, are those of Singu and Yenangyaung.[1] There are refineries near Rangoon, to which oil is sent by pipe-lines from these fields—

Minerals.

[1] There are eight oilfields in Burma, arranged from north to south as follows: Indaw, Nhalaingdwin, Yenangyat, Singu, Yenangyaung, Minbu, Yenanma, Padaukbin, and one, that of Arakan, in the west.

at a distance of 300 miles. Burmese oil is said to be of the very best quality, and is used largely for petrol rather than for crude oil. Burma holds the second place in the British Empire as a producer of oil (after Trinidad); but its total production is said to be only about 0·6 or 0·7 per cent of the world's total.[1] Further discovery of oil in Burma, however, is dismissed as highly improbable. Besides minerals, there are some **pearl** fisheries in the Mergui Archipelago; but the work is done spasmodically as in the case of gold.

Communications.

The Irrawaddy, which is navigable for a thousand miles from its mouth, is, with its tributaries, particularly the Chindwin, the principal highway of Burma. The Irrawaddy Flotilla Company maintains regular services up and down the river; and besides other forms of river traffic, rafts are also in use for carrying timber and other bulk commodities. The railways (1,930 miles in 1930-31) constitute a supplementary system only. The main line runs from Rangoon to Mandalay along the Sittang Valley and thence to Myitkyina in the northern frontier; the line was till lately interrupted by the Irrawaddy at Mandalay; now a new rail and road bridge across the river has established through communication. Another line connects Rangoon and Prome along the Irrawaddy, and a third line connects Rangoon with Bassein across the Irrawaddy Delta. There is railway connection between Rangoon and Moulmein *via* Pegu across the east of the Delta as well. Burma has no railway communication with any of its neighbouring countries. Roads are conspicuously non-existent over the greater part of the country: even Rangoon and Mandalay are not connected by any motor road.

Foreign trade.

Of the total foreign trade of Burma about 96·5 per cent is seaborne. The principal items of export are **rice, petroleum and petroleum products, timber, cotton, hides** and **skins, metals** and **ores, beans, rubber,** and **lac.** Rice

[1] Chisholm.

alone constitutes about 44 per cent of the total exports. The principal items of import are **cotton goods, machinery hardware, coal, silk,** and **sugar.** The port of Rangoon alone handles about 86 per cent of the total foreign trade. A study of Burma's foreign trade since the opening year of the present century shows a steady increase every year with the result that the total value of the foreign trade at present is more than five times that of the foreign trade of 1901-02. The exports are more than 1½ the imports in value. Of the total export trade more than one-third is with India, over one-third with the rest of the British Empire, and only one-quarter with other countries. Of the import trade nearly one-half is with India, about 3/10 with the rest of the British Empire, and only one-fifth with other countries. Burma is still largely an undeveloped monsoon country with great possibilities for economic development. Only 20 per cent of the land is now under cultivation, while 18 per cent is covered by forests (mostly 'reserved' by the government) and 22 per cent classed as waste.[1] Much of the remaining 40 per cent may be suitable for cultivation. The country, moreover, is underpopulated, although quite capable of supporting a large population if fully developed. One of its many problems, therefore, relates to immigration from the neighbouring countries of India and China, both of which are overpopulated. About a million of the entire population now consists of immigrants, mainly Chinese and Indians. The Chinese have largely succeeded in establishing themselves in the country by intermarrying with the Burmans. The bulk of the coolie labour is supplied by the Indians, who, it is alleged, are 'undercutting' native labour by their wonted lower standard of living. This 'undercutting' of the natives has engendered much bad blood between the two communities, and the recent Burmese riots have largely been traced to that factor. The separation of Burma, effected in the face of

Burma's new position and future possibilities.

[1] Stamp, *Asia,* p. 342.

vehement opposition from both the countries, was inspired, among other things, by the desire to exploit its resources to the advantage of the Empire.

Towns of Burma

Rangoon	Capital and Chief Port.
Mandalay	Irrawaddy Port.
Bassein	West Delta Port.
Akyab	Arakan Outlet.
Moulmein	Tenasserim Outlet.
Tavoy and Mergui	Tenasserim Outlets.

The population of Rangoon is 400,000; of Mandalay 148,000. Many of the important towns of Burma are river ports as, for instance, are Bhamo, Mandalay, Yenangyaung, Minbu, Prome, Henzada, etc.

Position.

THAILAND, known for centuries as **SIAM,** is the only independent kingdom in Indo-China. It lies between Burma and French Indo-China. The country falls into four broad topographical regions: (a) *Northern Siam,* consisting of forested hill ranges and intermediate valleys arranged in a general north and south trend; (b) *Central Siam,* practically a vast single plain, bordered on the north by the hills and valleys of Northern Siam, on the east by the hill ridge of Eastern Siam, on the south by the Gulf of Siam, and on the west by the eastern mountains of Burma; (c) *Eastern Siam,* a large shallow basin encircled by hills; and (d) *Southern* Siam, occupying a rather long narrow part of the Malay Peninsula and a small strip of land between Lower Burma and the Gulf of Siam. The country is drained by numerous streams, but there is only one large river —the *Menam*—which flows through the heart of Siam. For considerable distances, however, the *Salween* and *Mekong* form its natural as well as political boundary. Like the rest of Indo-China, Siam is also under the influence of the monsoon climate, and its natural vegetation is of the same type as that of Burma. **Teak** and

Relief & Natural Regions.

Climate & Products.

sappan woods are the chief products of the forests; the exploitation of timber is mainly in British hands. **Rice** is the principal agricultural produce, and forms about 87 per cent of the total export. Other agricultural products are **pepper, tobacco,** and **betelnuts;** some **rubber** and **cotton** are also grown, but not in large quantities, although the production of both can easily be increased. Like Burma, Siam is also rich in minerals; there are important **tin** deposits in Siamese Malaya and the island of Puket; **wolfram** is also found in Siamese Malaya. Alluvial **gold** is of wide distribution, but as in Burma it is worked in the intervals of agriculture. Other minerals of importance are **coal, iron, zinc, manganese,** and **antimony. Bangkok,** on the Menam, is the capital and chief port, handling, as it does, about 85 per cent of the total foreign trade. Its population is 600,000. It is connected by rail with Khorat and Buriram in Eastern Siam, and with Chieng-mai or Kiang-mai in the north. The eastern line has now been extended to the French border, and there is a scheme to extend the northern line beyond Chieng-mai to Kiang-sen on the Thai frontier. Another line running south-west from Bangkok proceeds to the Malayan border, where it is joined with the Malayan railways so as to enable through trains to run between Bangkok and Singapore. Like the Irrawaddy of Burma, the Menam is navigable for a considerable distance up-stream (for about 300 miles from its mouth), and logs from the forests are often floated down the river to Bangkok for export.[1] Something has already been said about the foreign trade of Siam (p. 298). A noteworthy feature of Thai national economy is the rapid increase in the output of rubber from the extreme south of the country (Siamese Malaya); but it is too early to predict its probable consequences.

Minerals.

Towns & communication.

Foreign trade.

[1] Sometimes these are floated down the Salween to Moulmein in Burma.

Extent, population, & Divisions.

FRENCH INDO-CHINA is now divided into five units—the Colony of *Lower Cochin-China* and the Protectorates of *Cambodia, Annam, Laos,* and *Tonking.*

Extent & population.

Cochin-China is roughly coincident with the large delta of Mekong. The land is very fertile; but only 41 per cent is classed as cultivated, a large part of the delta being unreclaimed marsh. Of the area cultivated more than 97 per cent is under rice, and the territory is said to supply 35 per cent of the total **rice** crop of the whole of Indo-China. Other agricultural products comprise *maize, sweet potatoes, beans, sugar-cane, tobacco, cocoanuts, betelnuts, bananas,* etc.; small quantities of *rubber* and *cotton* are also grown. As in Siam, the production of rubber is increasing. **Saigon** (150,000) is the chief port; its hinterland is said to comprise all the great rice-growing countries of Cochin-China, Cambodia, Southern Laos and a large part of Annam. **Cholon** (200,000) is the chief industrial centre.

Products.

Towns.

Extent & population.

Cambodia is largely covered with valuable forests, little exploited yet. The soil is very fertile, but the bulk of the land lies uncultivated owing to shortage of labour. **Rice,** however, is the chief product. Other crops that may be mentioned here are *pepper, tobacco, kapok, coffee, indigo, rubber* and *cotton.* Attempts are being made to increase the output of cotton. **Pnom-Penh** (82,000), on the Mekong, is the capital; it is accessible by ocean-going vessels. But the bulk of the foreign trade passes through Saigon.

Products.

Towns.

Extent & population.

The Laos is mountainous and believed to be rich in minerals such as *gold, lead, tin,* and *gemstones.* The mountains are covered with valuable **teak** forests, and logs are floated down the Mekong to Saigon for export. **Vientiane,** on the Mekong, is the capital.

Resources.

Capital.

Extent & population.

Annam is a native kingdom under French protection. **Rice** is naturally the chief product; other products include pepper, tobacco, sugarcane, etc. But

Products.

a special feature of interest is the production of **silk** and **tea.** The capital is **Hué** (60,600), and its port is **Tourane.** But the largest town of Annam is **Binh-Dinh** (147,000). Since the narrow coastal strip is divided by mountain spurs into a number of separate basins, Northern Annam is served by the port of Haiphong, Southern Annam by Saigon, and only Central Annam by its own port of Tourane.

Towns.

An anomaly.

Tongking is roughly coincident with the valleys and delta of the Red River and its tributaries. The country is mountainous. There are abundant mineral deposits, and *mining* is important. **Rice** is naturally the chief crop, grown mainly in the Delta region. Other agricultural products are *maize, sugar-cane, arrowroot, tea, coffee* and *tobacco.* **Silk** is also produced in large quantities. **Hanoi** (100,000) is the chief town of Tongking and capital of Indo-China. **Haiphong** is the chief port; its hinterland comprises Tongking, Northern Annam and Northern Laos.

Extent & population.

Products.

Towns.

MALAYA is a peninsula forming the south-eastern extremity of the Asiatic mainland. Geographically it may be said to cover considerable tracts of Siamese and Burmese territories. The peninsula is highly mountainous, but at the *Isthmus of Kra* there is a gap. The climate is Equatorial, but marked by transitional phases. The mountains are naturally clothed with dense lofty evergreen forests. The principal agricultural products are **rubber, cocoanuts,** and **rice**; *pepper, pineapples* and *palm oil* may also be mentioned. Malaya is famous for **tin,** but there are other minerals, too. The peninsula is divided into a number of political units: (a) **The Straits Settlements,** enjoying the status of a British Crown Colony, comprise Province Wellesley, the island of Penang, the territory of Malacca, and the island of Singapore, together with the Cocos or Keeling Islands, the Christmas Island and the island of Labuan. (b) **The Federated Malay States,** consisting of the native

Position & extent.

Relief.

Climate.

Products.

Minerals.

Political Divisions.

Sultanates of Perak, Pahang, Selangor, and Negri Sembilan. (c) **The Unfederated Malay States** of Perlis, Kedah, Kelantan, Trengganu, and Johore. The native Malayas belong to the Oceanic Mongol race (or races?). But the population consists of large numbers of Chinese and Indians, besides, of course, a much smaller proportion of Europeans. The Chinese are largely permanent settlers; the Indians, mostly from the Deccan, are mainly temporary immigrants, working on the rubber plantations. There is thorough railway communication between Singapore and Bangkok across the Johore Strait and along the more fertile western section of the peninsula; numerous branch lines cover this part of Malaya like a complicated network; another trunk line, separating out at Gemas from the Singapore-Bangkok line, proceeds through the eastern section of the peninsula to Siam (since 1932); this line touches the port of Khota Bharu on the east coast. A new system of metalled roads, with a total mileage of 1,000, has also been constructed. There is a project for the construction of a ship canal at the Isthmus of Kra. **Singapore** (300,000?), is not only the headquarters of the Governor of the Straits Settlements, but the leading port of Malaya; about 75 per cent of the foreign trade passes through it. **Kuala Lumpur** (80,000?), the capital of the Federated Malay States, is a large commercial centre; its port is **Port Swettenham,** formerly called Kuala Klang. **Penang,** officially called Georgetown, is the chief port for the export of tin from Perak; it has an excellent natural harbour. **Malacca** was once the greatest port of Malaya; but its importance has declined now, owing to the silting-up of its harbour and the rivalry of Singapore.

Population.

Communications.

Towns.

THE EAST INDIES OR THE MALAY ARCHIPELAGO

Introductory.—To the south-east of the Asiatic mainland there is a deep channel between the islands of Bali and Lombok, which, according to the great naturalist Wallace, separates the Asiatic and Australian flora and fauna. This is the famous **'Wallace's Line'**. But while Wallace's line passes through the Strait of Macassar, the channel separating the two continents diverges eastward through the Molucca Passage. It is said that if the sea bed were elevated some 100 fathoms, the islands west of this Channel would be continuous with Asia and those east of it with Australia. The curious term, **East Indies,** is rather vaguely applied to the former group with the exception of those islands which belong to China and Japan. More indefinitely still, East Indies are often regarded as synonymous with the **Malay Archipelago.** The geological structure of these islands is very complicated, and authorities are much at variance with regard to it. Brouwer and many others believe that the main tertiary folds running down Burma, Sumatra and Java are continued in such a way as to exclude New Guinea, which, on the contrary, stands on the edge of the hypothetical Australian massif. Gregory, on the other hand, thinks that the principal tertiary folds are continued through New Guinea, which, therefore, cannot be regarded as part of the Australian massif. Brouwer's is, more or less, the orthodox view; but while he would not go beyond the Sunda Islands as marking the eastern limit, on land, of these folds, many others would place that limit farther east on the Tanimbar and Kei Islands. The folds are then said to swing west in a great curve through the Buru and Ceram Islands. The whole area however naturally falls into two distinct climatic zones: (Malaya) Sumatra, Java, Borneo, Celebes, Moluccas, Timor and even New Guinea lie in the region of

Foreign trade. Line of separation between Asia & Australia.

East Indies & Malay Archipelago.

Geology.

Topography & climate.

Equatorial Climate; and the term, Malay Archipelago, may be applied to this group only. (Indo-China) and the Philippine Islands, on the other hand, lie north of this group and have certain features in common. The term, East Indies, may be used in a wider sense to denote both the groups.

Political Divisions.

The islands are almost entirely in the hands of European and American Powers. The largest slice has been carved out by the **Dutch,** to whom belong the greater part of Borneo; the *Great Sunda Islands* of Sumatra, Java and Celebes; the whole of the *Lesser Sunda Islands* except only the north-east of Timor; the Molucca Islands; and the western half of New Guinea. To the Portuguese belong the north-east of Timor. The northern and north-western parts of Borneo are in **British** hands. And the Philippines are under the **U. S. A.**

Extent, Population, & Division.

Java & Madura.

Netherlands East Indies.—This economic and political unit is usually divided into two parts: (a) *Java* and *Madura*, and (b) The *'Outer Territories'*. From the commercial point of view Java, with its satellite island Madura, is the most important island in the whole group. The soil is very fertile and there are abundant facilities for irrigation. The principal products are *sugar, rubber, tobacco, coffee, tea, oil-palms, cinchona, kapok,* and *pepper.* But the cultivation of sugar-cane has recently shown a 14 per cent decline owing to over-production in other countries and the drop in the demand from India. There is a fair output of *petroleum* from Java; and the Netherlands East Indies, we are told, enjoy a virtual world monopoly in cinchona, kapok, and pepper. **Batavia,** on the north-west of Java, is the capital of the whole of the Netherlands East

[1] On this fascinating subject the ambitious student may be referred to H. A. Brouwer, *The Geology of the Netherlands East Indies*, and J. W. Gregory, 'The Banda Arc', *Geographical Journal*, Vol. LXII, 1923, pp. 30-32.

Indies (inclusive of New Guinea); owing to the silting up of its old harbour, a new one, called *Tandjong Priok*, has been built six miles away; it has a considerable *entrepôt* trade. **Samarang** and **Sourabaya** are important roadsteads enriched by artificial harbours. **Chilachap** or Tjilatjap, in the middle of the south coast, is the only natural harbour in Java.

Sumatra.

The 'Outer Territories', comprising the rest of the Netherlands East Indies, together have a population density of only 30 to the sq. mile. **Sumatra** is a large island, offering abundant facilities for development. It has a mountain backbone in the west and a progressively widening plain in the east. Large areas of the plain are, however, covered by marsh. Its chief products are *coffee, tobacco, tea, palm-oil* and *rubber*. But Sumatra is richer than Java in minerals, especially in *coal* and *petroleum*. *Tin* is obtained in large quantities from the islands of Banka and Billiton or Belitong, off the east coast. The island is being rapidly developed; for the population of Java seems to have reached the saturation-point (page 365). **Belawan Deli, Palembang** and **Padang,** are the principal ports of Sumatra. A new harbour called *Emmahaven* has been constructed five miles away from Padang for the export of coal from the Ombilin coal-field; the harbour and the coal-field are connected by rail.

Other islands.

Bali, adjoining the eastern extremity of Java, and resembling that island in physical features, climate and vegetation as well as in economic development is called 'Little Java' and 'the jewel of the East.' **Lombok,** separated by a deep channel from Bali, has a different flora and fauna. **Celebes,** separated from Borneo by the Strait of Macassar, is exceptionally fertile, and has a large produce of *copra, spices,* and *Macassar oil* (used in cosmetics); and it is also known to have very large deposits of *iron* ore. **Macassar,** in the south, is the chief port of Celebes. **Dutch Borneo,**

still very little developed, is sure to make much headway in near future as *coal* and *oil* in considerable quantities have been discovered there. The **Moluccas** or Spice Islands, separated from Celebes by the sea of Celebes and linked with New Guinea by a feston of islands, are still famous for *spices,* especially cloves and nutmegs. All these islands still bear ample testimony to the inhuman treatment the natives received in the hands of the early European adventures, and many of the smaller islands now lie absolutely uninhabited.

Extent & Divisions.

British Borneo comprises three political units: (a) *British North Borneo,* governed by Governor under the authority of the British North Borneo Chrtered Company directed by a Court of Directors in London; (b) *Brueni,* a little British Protectorate administered by a native Sultan at the advice of a British Resident; and (c) *Sarawak,* ruled by an English Rajah since 1842. The chief commercial products are *rice, gums, sago, coffee, cocoanuts, pepper, spices, jelutong, timber, rubber, gutta-percha, rattans, camphor,* and a tanning extract called *cutch.* Some *coal, oil, iron* and *gold* are also exported. The capital of British North Borneo is **Sandakan** on the north-east coast; it has a fine natural harbour. There is another fine harbour at **Kudat Bay** on the north. **Kuching,** on the Sarawak River about 23 miles from the sea, is the capital and chief port of Sarawak. **Miri** is the headquarters of the Sarawak Oilfields, Ltd.

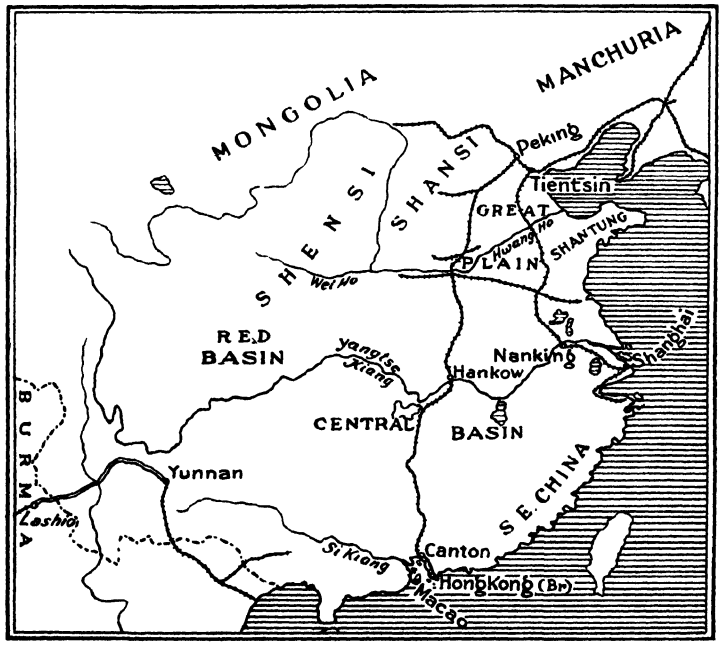
Products.

The Commonwealth of the Philippines, together with the Sulu Archipelago and the island of Palawan, were purchased by the U. S. A. from Spain in 1898. In 1935 they were constituted as a Commonwealth, with a promise of full independence to follow in ten years. The chief commercial products are *sugar, copra, tobacco, cigars, cocoanut oil,* and *Manila hemp.* Some minerals are found, notably *gold.* **Manila** is the capital and chief port. The

bulk of the trade—roughly 70 per cent—is naturally with the U. S. A.

THE FAR EAST

CHINA proper, excluding Manchuria and the Outer Territories, has a total area of 1,532,800 sq. miles, *i.e.*, almost the same as that of India exclusive of Burma Extent & Position.



A General Map of China

(1,542,600 sq. miles). But 'Greater China', which comprises Manchuria, Mongolia, Sinkiang or Chinese Turkestan, and Tibet, has the enormous extent of 4,278,352 sq. miles. Viewed broadly, China proper lies to the east of the central mountainous triangle of Asia. Part of the Mongolian Plateau Relief.

penetrates the Chinese country in the north-west, and in the south-east lies the Plateau of Yunnan. The remainder of China proper consists almost entirely of the three great river basins—those of the Hwang-ho, the Yangtze-Kiang, and the Si-Kiang, corresponding in order roughly with North China, Central China, and South China. The basins of the Hwang-ho and the Yangtze-Kiang are separated by the Tsinling Shan, and between the basins of the Yangtze-Kiang and the Si-Kiang lie the South China plateaus. This tripartite division of the country, we have seen, corresponds to its principal climatic zones as well (pp. 361-62). For its latitude China becomes intensely cold in winter, and suffers from strong dessicating dry winds rushing towards the sea from the icy heart of Asia. In North China the rivers usually become frozen, and in Central China large areas are not infrequently under snow; but in South China snow and frost are rare. These out-blowing winds, being dry, give rise to violent dust storms, especially in the north; but after picking up some moisture from the sea they bring in a little winter rain in the Yangtze Delta. In summer, temperatures are, on the whole, fairly high and uniform all over the country, and rain-bearing monsoon winds distribute moisture throughout the land; but rainfall in North China is comparatively low—rarely rising above 40″ annually. Owing to the great pressure of population the natural vegetation of China has been almost completely wiped out, the only remaining forests—for forests seem to be its natural vegetation—being those of the Tsinling and Central Mountains, the Nan Shan or Nanling Mountains, and the plateau of Szechwan and Yunnan. In the south the typical vegetation is tropical monsoon forest of hardwoods; elsewhere it is of mixed conifers and deciduous and evergreen hardwoods; towards the plateau of Mongolia the natural vegetation is grassland. The Chinese are now 'cultivating' forests in a few places, especially in Fukien and Chekiang; but forestry is there naturally in its earliest infancy now. The enormous popula-

Climate.

Natural vegetation.

tion of the country has many a time been referred to; and China being far more mountainous than India, the pressure of population in several areas is said to be as great as 3,000 to the square mile, to say nothing of as many as 1,000 domestic animals that often depend on the same area for sustenance as an additional burden. The seriousness of the situation is better apprehended when we remember that, unlike the industrial population of Europe that of China cannot look to imported foodstuffs. Yet that is not the end of the tale; for, even taking the entire Chinese territory, with the exception of Tibet, into consideration we find that half of it is too arid or too cold for cultivation, one-fifth too mountainous, and more than 1/67th part completely barren. Thus only about 29 per cent of the whole is suitable for crops, and yet of this remainder only about a quarter is actually under tillage.[1] Knowing, as everybody does, that the mute millions of China are regularly half-starved, no one can pass these facts by without asking the question why should China leave three-quarters of her arable land lying waste. The common answer is: China lacks the essential instruments of production—machinery and tools as well as power. But this is only the reverse of the coin. Why does she lack machinery and tools and all the parapharnalia of modern agriculture? The answer is to be sought for in her 'treaty ports'—in the fact of her being bled white by the exploiting foreign Powers. About 95 per cent of the people in China to-day are engaged in agriculture in some way or other. The influence of climate on agriculture is obvious.

Pressure on soil & Agriculture.

Areas under Principal Crops in China[2]

(Percentage of total cultivated land)

Millets & Sorghums	20	Rice	28
Cotton	2	Wheat	21
		Others crops	29

[1] La Fleur & Foscue, *Economic Geography*, Vol. III., p. 297 *et seq.*

[2] Stamp.

In Southern China *rice* is the principal food crop; in Central China both *rice* and *wheat* share the leading position, and in North China *wheat* is dominant. Millets are grown in the drier regions, especially in the north-east; but *soya-beans* are steadily invading the areas under millets. The bulk of the *cotton* is grown in the central and northern parts; but Chinese cotton is of poor quality. *Sugar* is grown in the south, and *maize, peas* and *beans* in the north. Tea is grown on the southern and western hills. Besides a large variety of *vegetables,* another important plant largely cultivated is the *mulberry* tree for feeding the silk worms. Stock-raising is also widely practised. There are numerous *pigs* in China, and fat pork is said to constitute a favourite food-stuff. *Sheep* are also reared, primarily for wool; but *Chinese* wool is said to be of inferior quality. *Cattle* are used in ploughing as in India and also as draught animals, besides *horses* and *mules. Poultry* are important; for eggs form one of the chief items of export (p. 152). China is the largest producer of silk, but in the export business her share is relatively very small (p. 165). The country is distinctly backward, much like India, in manufacture, and that may be a reason for the overwhelming pressure of population on land. The dying and dead village industries of both China and India are a strong evidence of the exploitation of these countries by the great industrial nations of the West. As in India, hand looms are still to be found in most of the rural areas of China. In some of the cities such as Canton and Shanghai, cotton, wool and silk mills have been established. A large number of the Shanghai mills are owned by the Japanese. Flour mills are also increasing. And there are the large ironworks at Han-yang, near Hankow. China, we have already noted, is rich in various minerals (pp. 357-58), especially in **coal,** much of which is of excellent quality. In North China there are a number of small coalfields in the neighbourhood of Peiping, and a fairly big one to the north-east of Tientsin. In the west of the mountains of Shantung

Stock raising &c.

Manufacture

Minerals.

are large deposits of both bituminous and anthracite coal; but these have now passed into Japanese hands. Towards the interior of the country there are enormous coal measures —both anthracite and bituminous—in the southern portions of the province of Shansi, the anthracite alone covering an area of some 13,500 sq. miles, and it is believed that this field alone contains 80 per cent of the total coal reserves of China. There are smaller fields in south-eastern Hunan, eastern Szechwan and northern Yunnan. **Iron** is found in several places, particularly in Hupeh, Shansi, and Szechwan. The ores of Shansi are said to be of very good quality. But the largest deposits of iron are in Manchuria, which is now in Japanese hands. There are large deposits of **copper** in Yunnan. **Silver** and **tin** are also found in Yunnan. Hunan is noted for **antimony,** of which China was for some time the leading producer. Large quantities of **wolfram** are also obtained from China. Much of China's mineral resources still lie untouched or little exploited, and the reason ordinarily adduced for it is the want of adequate means of communication, on which subject much has already been said (pp. 257, 264, 266-67, 299—301, etc.). The Great Plain of China, which has much in common with the Great Plain of Hindoostan, affords, however, excellent facilities for communication. An admirable canal, 700 miles long, constructed in the seventh century A.D., starts from Hangchow, and, after crossing both the Yangtze-Kiang and the Hwang-ho, terminates at Tientsin, thus establishing communication nearly throughout the whole of the Plain. The numerous rivers, large and small, such as the Yangtze-Kiang, even the Hwang-ho, the Pei-ho, the Meiling Pass and their numberless feeders, serve, more or less, as supplementary waterways over the Great Plain. But communication is difficult between the east and the west of China. Of the three great rivers—the Hwang-ho, Yangtze-Kiang and Si-Kiang—only the Yangtze-Kiang may be described as an admirable water-

Communication.

course, being navigable for more than 1,000 miles from its mouth by ordinary steamers and for 680 miles up, *i.e.*, as far inland as Hankow, by ocean-going vessels. Between Ichang and Chungking commodities are exchanged by means of small craft. Railway lines now link Hangchow and Shanghai with Tientsin and Peiping, Hankow with Tientsin and Peiping, and Peiping with Moukden, Vladivostok and Harbin. Another line starts from Peiping and terminates at Paotao in Inner Mongolia *via* Kalgan. Hongkong is now connected by rail with Hankow *via* Canton, and this, as noted elsewhere, has now made it possible to travel by rail from 'Calais to Canton' as the phrase is commonly used. Regular air services now link up several cities of China. The foreign trade of China, like that of India, is nearly all sea-borne, and it passes through the so-called **'treaty-ports'.**

Foreign trade & Treaty ports.

A 'treaty-port' is a place where foreign merchants have acquired land and property (mostly by force), and the Government of China have been compelled to surrender their own rights, and agree (by means of highly unequal treaties) to respect the rights thus acquired by the foreigners and allow them to transact business as they choose. At the present time more than forty ports are thus open to foreign vessels. Not all of them are seaports; for most of the important river ports are also at the disposal of foreigners now. The most important of these seaports are **Shanghai,** Hangchow, Ningpo, Wenchow, Foochow, Amoy, Swatow, and **Canton;** these are all located on the east coast between the Yangtze-Kiang and the Si-Kiang. Shanghai is by far the most important seaport of China. The chief Yangtze ports are Chinkiang, Nanking, Kiukiang, Hankow, Ichang, and Chungking; **Nanking** was the capital of the Chinese Republic (since 1928) till its fall in the present Sino-Jap War; **Chungking** has been serving as the capital since. **Peiping** was the old capital of the Chinese Empire; its port is Taku, a treaty-port. **Tientsin,** on the Pei-ho, is the inland port of Peiping;

it, too, is a treaty-port. The bulk of the foreign trade, however, passes through the three ports—Shanghai, Canton, and Tientsin. It is an open secret now that China, with her vast potential resources and 400 million people, offers immeasureable possibilities as a market for the capitalist industrial countries such as Japan, Great Britain, the United States, etc. And to this may largely be attributed the present political unrest in China. "It was to the advantage of the nations of Western Europe and of North America to realise," writes Stamp, "that China must be encouraged to standardise her own affairs and to appreciate the higher standard of living which will encourage her demands. But Japan saw this first and her military dictators took matters in their own hands." To the fundamentally harmonious, but in parctice, mutually exclusive policies of the great capitalist powers playing their game in China we must add the rival policy of the socialist U. S. S. R., which is now helping nationalist China in her life-and-death struggle with Japan. But one thing is obvious: unless the unequal treaties forced upon China be liquidated and her home affairs satisfactorily settled, there is no prospect of her figuring prominently in world trade.

HONG KONG (pp. 299-300) has been in British hands since 1841, and is in control of a large part of the trade passing through the south of China. With the improvement of conditions in China its importance is likely to wane. **Victoria** is the chief town.

Macao, at the mouth of the Canton River, is a decaying town under Portugal.

MANCHURIA is now informally included in the Japanese Empire under the title of **Manchukuo.**

MONGOLIA is a plateau, west of Manchuria, comprising a total area of 1,367,953 sq. miles, and surrounds the deserts of Gobi. It is inhabited by nomadic Mongols.

A considerable part of it, called 'Outer Mongolia' has been under the suzerainty of Russia since 1924, and a part of 'Inner Mongolia' has passed under Japan and now forms part of the state of Manchukuo. **Maimachin,** on the Russian frontier, is the chief town.

SIN-KIANG, known also as Chinese or Eastern Turkestan, has an area of 550,579 sq. miles, and occupies the Tarim Basin. It is also a plateau with a desert in the interior; but intensive cultivation is practised in the oases. **Kashgar** and **Yarkand** are the leading towns; caravan trade across the Pamirs as well as with China is carried on.

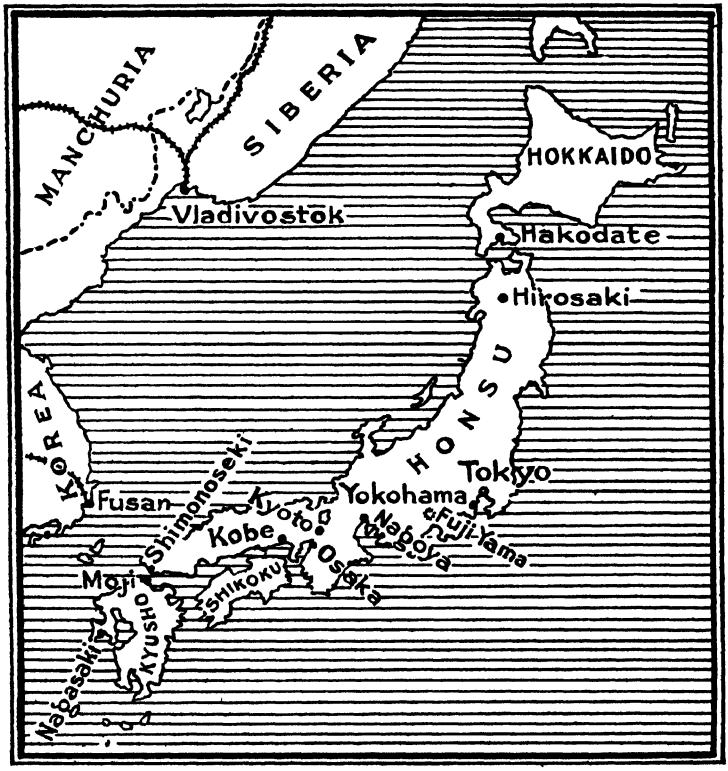
TIBET, an agglomeration of lofty tablelands, has a total area of 463,320 sq. miles. **Lhassa** is the capital, and **Shigatse** and **Gyangtse** are the outposts for trade with India.

THE JAPANESE EMPIRE

Extent & Population.

JAPAN proper, or **NIPPON** as it is called, consists mainly of the four islands—Honshu (or Mainland), Kyushu, Shikoku, and Hokkaido, with a total area of 149,000 sq. miles and a population (in 1930) of 64,500,000. By the term, Old Japan, is however meant the first three islands mentioned above. The total extent of her overseas possessions is only 112,000 sq. miles, and they consist of the southern half of the Sakhalin Island, called Karafuto, the Peninsula of Korea or Chosen, the island of Formosa or Taiwan, besides the leased territory around the port of Dairen and a large number of mandated islands in the Pacific. The State of Manchuko is, however, not formally incorporated in the Japanese Empire. The total population

of the Empire was 90,400,000 in 1930, and it is now expected to be well over 100 millions. The position of Japan is, in many respects, analogous to that of Great Britain; for while Britain lies to the west of Europe (or Eurasia) and thus commands Position.



A General Map of Japan

the entrance to the Atlantic Ocean, Japan—often called the 'Britain of the East'—lies to the east of Asia (or Eurasia) and guards the entrance to the Pacific. But she is nearer the Equator than the British Isles. The surface of Japan is extremely mountainous, and the arrangement of the moun- Relief.

tains seems to be very irregular; but the main mountain-chains, forming two parallel arcs, run along the entire length of the country—the one along the east coast, the other along the west coast. The mountains are, no doubt, interspersed with lowlands and valleys, none of any considerable extent, and even these lowlands are often traversed by mountains of volcanic origin. Only 20 per cent of the entire area is available for cultivation and settlement. In climate, too, there is at least a superficial analogy between Japan and the British Isles; for while the British Isles have a 'west-coast' climate and enjoy the warming influence of the North Atlantic Drift, Japan has an 'east-coast' climate, and is under the warming influence of the Kuru Siwo. But while rainfall in the British Isles is determined by the pleasant westerly winds, that of Japan is mainly determined by the summer monsoon, and in winter she is at the tender mercies of the cold dessicating winds from the heart of Asia. These winter winds, after crossing the sea, bring heavy precipitation in the form of snow to the western coasts and mountains of Japan. The eastern parts are usually dry in the cold season. Rainfall in summer is rather heavy in the south and east, but light in the west. Summer temperatures are rather high throughout the country, and more so in the south; but in winter it is often bitterly cold. Just as the warm Kuru Siwo on reaching Japan from the south divides into two currents, so also a cold current coming from the opposite direction divides into two on reaching the northern shores. The western branch of the Kuru Siwo flows close to the shore and thus mitigates the severity of the winter winds, but the eastern branch flows at a distance from the shore. The eastern branch of the cold current, however, flows between the shore and the eastern branch of the Kuru Siwo and thus keeps that shore relatively cold. The natural vegetation of Japan is forest; conifers and cold temperate forests predominate in the north, temperate forests in central Japan, and

Climate.

sub-tropical forests in the south. *Rice* is by far the most important food crop, and occupies even more than half (or, actually 40 per cent?) the total area under tillage. Other important grains are *rye, wheat,* and *barley.* The *soya-bean* has also been introduced in recent years. *Tea* is certainly important, but nearly all of it is green tea (p. 139), and there has been for the last few years a steady decrease in acreage under it. The production of *silk* is very important (p. 165). Japan, owing chiefly to her lack of pasturage, is not an important stock-raising country; but her fisheries are extremely important (p. 156). Japan is rather poor in minerals. Unlike those of Britain, her resources in coal and iron are small, and hence she lacks the essential basis of modern industry. Her present average output of **coal** is about 30 million tons a year. But the coal-seams are often highly disturbed, owing, no doubt, to frequent seismic disturbances.[1] The principal coalfields are in Kyushu and Hokkaido, containing, as they are believed to do, about 66 and 17 per cent respectively of the total coal reserves of the country. There is a small coalfield in Honshu. But despite a small and decreasing export mainly of bunker coal, she has got to import a considerable amount every year. The mountainous nature of the country has encouraged the Japanese to make use of hydro-electric power largely as a substitute for coal. The principal **oilfields** are on the north-west coast; but the total output is only about 30 per cent of her actual requirements, and large quantities of oil are, therefore, imported—chiefly from California, the Netherlands East Indies and Mexico. The only **iron** mine of any importance is Kamaishi, and Japan depends mainly upon China for the raw materials of her steel industry. Some **gold** and **silver** are also found, but the output of both is insufficient for her own requirements. Gold and silver mostly occur together, and Saganoseki is the chief centre. It is only in **copper** that she holds

Natural vegetation.

Agriculture.

Fisheries.

Minerals.

[1] Japan, we are told, experiences no less than 1,500 shocks a year on the average.

an important—actually the fifth—place (p. 180). The ores are widely distributed, and the principal mines are Ashio, Besshi, Kosaki, Hitachi, and Saganoseki. Other important minerals include *lead, tin, sulphur,* etc., and there are large deposits of **kaolin.** The **industrial revolution** in Japan had begun in 1868 or thereabouts, but it was not till the Sino-Jap War of 1894-95 was over that Japan began to take rapid strides in modern manufacture. In the meantime the old feudal system of government had given place to a constitutional limited monarchy (1889), and in 1899 the whole country was thrown open to foreign merchants. Subsequently, however, the special privileges enjoyed by the foreigners were withdrawn, and all resident foreigners made subject to Japanese law-courts.[1] Modern Japan may thus be said to be a creation of the last six decades or so. The most amazing developments have been made in the cotton-spinning industry: the number of cotton-spindles increased from 325,000 in 1892 to nearly 1,000,000 in 1897, and from 2·4 millions in 1914 to 7·0 millions in 1930; and although during the trade depression there was a marked decline in nearly all countries, the number of spindles in Japan swelled to over 9·0 millions in 1933.[2] Besides, there are about a million spindles owned by the Japanese in Shanghai, a quarter of a million in Tsingtao, and over 50,000 in Manchuria. Silk-spinning and silk-weaving, as well as the production of rayon or artificial silk is also very important. Paper-mills and match factories are also nearly as important. In chemical industries, too, Japan is making rapid headway; there are large manufacturing concerns for the production

Manufacture

[1] It was in 1858 that a number of ports ('treaty ports') were first thrown open to foreigners.

[2] Chisholm. In the year ending January 1931 Japan consumed 2,694,000 bales of cotton as against 5,225,000 bales consumed by the U.S.A.; 2,495,000 by India; 2,384,000 by China; 2,109,000 by the U.S.S.R.; 2,026,000 by Great Britain; 1,203,000 by Germany; 1,177,000 by France; 861,000 by Italy; 356,000 by Brazil; 196,000 by Canada; and 163,000 by Mexico.

of soda-ash and caustic soda; and the manufacture of pottery, porcelain and glassware are also important. And even in large scale manufacture of toys Japan has made much headway. It was in 1874 that the first native steamship company in Japan came into existence, and ship-building, ship-repairing and allied industries have made enormous progress since. At the present time Japan owns over 5,000,000 tons of merchant navy. In 1893 the first locomotive was built in Japan; and Japan is now self-sufficient in the manufacture of dynamos and other electrical machinery. The development of water-power is also notable: in 1905 it was 12,215 horse-power; in 1911 it rose to be equivalent to 103,532 h.p., and in 1924 to 1,750,000 h.p.; this has greatly been increased since; and at the present time Japan probably ranks fourth in this respect (p. 225). The extra-ordinary success of the Japanese in trade and industry has been largely attributed to cheap labour; other factors favouring this state of affairs include the proximity of coal (in a modified degree, no doubt), the comparative ease with which raw materials can be obtained from China, India and even the U. S. A., and the vast markets of these three countries. The last Great War enabled Japan to capture many of the markets in the East, including that of India; and although she was ousted subsequently from some of these, she was virtually the only country with an expanding foreign trade even during the depression of 1931-34. At the present time the great problem of Japan is that arising out of the pressure of population. The population seems to have reached the saturation-point;[1] and this, coupled with the extra-ordinary industrial development of the country, is making Japan more and more dependent on foreign supplies of foodstuffs and raw material. One of the possible solutions is the securing of the economic control of neighbouring areas, and Japan has long been trying to achieve

Pressure o population.

[1] It has been reported in the papers (June 1941) that the Govt. of Japan is encouraging a further increase of population.

that objective. The bulk of the foreign trade of Japan passes through the three leading ports, **Yokohama, Kobe,** and **Osaka.**

Towns.

Tokyo is the capital of Japan; its chief port is **Yokohama,** and Yokosuka, twelve miles south of Yokohama, is the government dockyard. **Osaka** is the 'Manchester of Japan'—its chief seat of the cotton-spinning industry; **Kobe,** the great silk centre of Japan, may be regarded as the chief port of Osaka as well. **Nagoya** is the chief centre of porcelain and allied industries. **Kyoto** is the old capital. **Nagasaki,** on the south-east coast of Kyushu, is the bunkering port. **Hakodate** is the port of shipment for coal from Hokkaido. **Otaru** is the chief port of Hokkaido. **Kushiro** is the lumber of port of Hokkaido. **Hiroshima Moji,** and **Shimonoseki** are also notable ports.[1]

The Exports of Japan[1]

Commodities.	Percentage of Total Value		
	1909-13	1921-25	1931-35
Raw materials &c ..	*45*	*41*	*37*
Silk	40	39	30
Coal	5	2	—
Rayon	—	—	5
Canned goods	—	—	2
Manufactures	*34*	*32*	*42*
Cotton goods	18	23	31
Silk goods	10	7	7
Copper	6	—	—
Pottery	—	2	2
Machinery	—	—	2
Various	*21*	*27*	*21*

[1] After having made her position quite secure in Manchuria, Japan invaded China in 1937, and has so far succeeded— may be temporarily—in establishing herself over the greater part of that sub-continent.

[1] Stamp.

The Imports of Japan[1]

Commodities.	Percentage of Total Value		
	1909-13	1921-25	1931-35
Foodstuffs	*15*	*12*	*5*
Rice	6	2	—
Sugar	5	3	—
Wheat & flour	2	2	2
Beans	2	2	3
Other foods	—	3	—
Raw materials	*50*	*43*	*53*
Cotton	40	30	37
Oil cake	7	5	2
Wool	3	4	8
Wood	—	4	2
Coal	—	—	2
Pulp	—	—	2
Manufactures	*16*	*23*	*13*
Cotton goods	2		—
Iron goods	3	6	6
Machinery	4	6	4
Wollens	4	4	3
Oil & Petrol	3	—	—
Paper	—	2	—
Chemicals	—	5	—
Various	*19*	*22*	*29*

The Direction of the Foreign Trade of Japan[1]

Exports (per cent)	Countries.	Imports. (per cent)
30	U. S. A.	32
10	China	8
11	India	12
7	Dutch E. Indies	3
5	Gr. Britain	—
3	Egypt	—
2	Australia	9
—	Germany	6
—	Br. Isles	4
—	Canada	3
32	Others	23

[1] Stamp.

HOKKAIDO lies north of 'Old Japan', and is inhabited mainly by the aboriginal Ainu. The climate is severe in winter, the island being more exposed to the bitter winds from the heart of Asia. In summer, however, it is warm enough for *rice*; but *peas* and *beans* are the principal crops; some *oats, barley, maize, buckwheat, millet,* and *potatoes* are grown. About 25 per cent of the land is said to be suitable for cultivation. *Mining* and *fishing* are important; the mining is done mainly by the Japanese. The island, however, does not offer suitable facilities for Japanese emigration. *Forests* are also important, and *stock-raising* is, relatively speaking, more extensive than in old Japan.

KARAFUTO, farther north, is the southern half of the island of Sakhalin. The northern half is under Russia. The climate is even worse than that of Hokkaido, and there can be no question of Japanese emigration there. Only about 0·7 p.c. of the land is suitable for cultivation. *Fishing* and *forestry* are important; and there is some *coal;* but the oil-resources of the island are within the Russian boundary.

KOREA, or Chosen, as the Japanese call it, is a mountainous peninsula to the west of Old Japan. It was formerly a dependency of China. The climate is, broadly speaking, like that of North China, and there are wide stretches of arable land. The principal products are *rice, beans, wheat, barley* and *oats.* The production of *cotton* has also increased, and *flax* has also been introduced. *Gold* and *coal* are also mined. **Seoul** is the capital, and **Fusan** the principal port. Other ports are Wiju, Chemulpho, Ping-yang, and Wousan. Korea is very important to Japan as it supplies her with a considerable amount of foodstuffs. The principal **exports** are *rice* (47 p.c.), *beans* (9 p.c.), *fish* (5 p.c.), *raw cotton* (3 p.c.), *vion* (2·5 p.c.), and *timber* (2·5 p.c.); about 92 per cent of the total export trade is with Japan, 7 p.c. with China, and only 1 p.c. with other countries. The principal imports are *cotton manufactures* (13 p.c.), *machinery*

Climate & Products.

Ports.

Foreign Trade.

(2 p.c.), *grass cloth* (2 p.c.), *paper* (2 p.c.), *timber* (4 p.c.), *coal* (3 p.c.), *kerosene oil* (2 p.c.), and *sugar* (1·5 p.c.); about 66 per cent of the total imports come from Japan, 25 p.c. from China, 4 p.c. from the U.S.A., 2·5 p.c. from Great Britain, and the rest from other countries. Korea does not, however, offer good prospects for Japanese settlement, because her own population at present is over 21 missions.

FORMOSA, or Taiwan, lies to the south-west of Japan. The Tropic of Cancer cuts the island into two halves, and the climate, in some respects, resembles that of Central China, and in other respects that of South China. It, too, was formerly a Chinese province, and the inhabitants are still mainly Chinese. But there are a number of primitive races in the east, which is a mountainous tract of land. Some Japanese have, however, settled in the island. It, too, is very important to Japan: the island is rich in minerals such as *coal, gold, copper, petroleum, sulphur, phosphorus* etc., and the mining is naturally in Japanese hands; there is also a large surplus of *rice* for export to Japan; *camphor* trees abound, and it is from here that Japan obtains the bulk of her output of camphor and camphor oil; such tropical crops as the *sugar-cane,* which it is nearly impossible to grow in Japan, can be grown here; *jute* and *China grass* have also been introduced; and Formosa *tea* is famous for its delicate flavour. **Keelung** and **Takao** are the chief ports, now provided with good artificial harbours. The chief **exports** are *cereals* (20 p.c.) and *other foodstuffs* (43 p.c.), *chemicals and drugs* (6 p.c.), *minerals* (5 p.c.), and *yarn* (2 p.c.); about 83 per cent of the export business is with Japan, 8 p.c. with China, 3 p.c. with the U. S. A., 2 p.c. with Hong Kong, and 1·5 p.c. with the Netherlands East Indies. The chief imports are *oil-cake, wood, petroleum, opium,* and *manufactured goods;* nearly 68 p.c. of the total imports are from Japan, 16 p.c. from China, 3 p.c. from the

Netherlands East Indies, and about 2·5 p.c. from Great Britain.

The South Sea Islands of Japan.—Japan, we have seen, governs a large number of islands in the Pacific, which were formerly under Germany, in exercise of her mandatory powers. The chief products obtained from these islands are *copra* and *sugar-cane,* and some *phosphate.*

Extent. **MANCHUKUO,** ordinarily regarded as coincident with Manchuria, now includes a part of Inner Mongolia, and is governed by an Emperor nominated by the Government of Japan. It is formally independent, but actually a vassal

Relief. state. Manchuria proper has an area of 363,700 sq. miles, and consists of a large central plain bordered by mountains on the east and west. The climate is akin to the Laurentian

Climate. type (pp. 67-68), and the country's chief resources are *timber, coal* and *iron.* The principal agricultural products

Products & Resources. are *soya beans, Kaoliang* (sorghum), *millet, maize, wheat,* and *rice.* The chief items of export are *bean cakes* (25 p.c.),

Foreign Trade. *beans* (16 p.c.), *bean oil* (11 p.c.), *wheat* (13 p.c.), *other cereals* (9 p.c.), *coal* (4 p.c.), *silk yarn* (3·5 p.c.), *Kaoliang* (3·5 p.c.), and *lumber* (2·5 p.c.). About 41 p.c. of the export trade is with Japan, 6 p.c. with the British Empire, 4 p.c. with Holland, and 3 p.c. with the U. S. A. Even long before Japan turned her hungry eyes towards Manchuria, Chinese emigrants had begun to settle there, with the result that the bulk of the 30 million inhabitants of the country now are Chinese. The Japanese do not take

Immigration. kindly to the winter severity of the climate, nor have they migrated to Manchuria in very large numbers. At the present time the Chinese are the hewers of wood and drawers of water, and the Japanese are the masters; for while the former cultivate the land, the latter run the commerce of the country. **Moukden** is the chief inland trade centre.

Towns. **Fushun,** near Moukden, is a colliery town. **Harbin** is another inland trade centre. **Dairen** is the chief port, and **Hsinking** the capital.

ASIATIC RUSSIA, extending, as it does, from the Arctic Ocean to the borders of China, Afghanistan, Iran, and Turkey, is only a part of the still larger economic and political unit known as the **Union of the Socialist Soviet Republics.** U. S. S. R.

STUDIES AND QUESTIONS

1. Describe briefly the development in the transport system of the Middle East (C. U., B. Com. '34).

2. It is said that export markets for India's manufactures can be developed in Arabia, Iraq, Iran, and Afghanistan. Discuss the possibilities of such development (C.U., B. Com. '37, '39).

3. Estimate and locate the mineral wealth of China (C.U., B. Com. '33).

4. Estimate and locate the mineral wealth of Japan (C.U., B. Com. '32).

5. Give an account of the output of cotton and the cotton manufacturing industry of China and Japan.

6. Give an account of (*a*) the natural resources and (*b*) the climatic conditions of Japan, and show how they have affected their development. (C.U., Inter. '33).

7. What are the principal industries of Japan? Where are they situated? State the sources of supply of the raw materials of those industries (C.U., Inter. '36).

8. Show by reference to climate, natural vegetation, and mineral resources, why Manchuria has such important economic possibilities for countries like Russia, Japan and China (C.U., Int. '34).

9. Write an essay on the geographical factors affecting the relationships of China, Japan, and Manchukuo. How far do they explain the relative strength of China and Japan?

10. What are the main economic resources of China? Why are the U.S.A. and Japan interested in their development?

EUROPE

The Cradle of Western Civilization

Area.

Position and Size.—The continent of Europe is actually a peninsula of the greater land mass of Asia—a mere appendage. With the exception of Australia, it is the smallest of the continents, the area being 3,760,000 sq. miles.

Location.

It has a westerly situation, and nearly the whole of it (except a small fragment in the north) lies within the Temperate Zone.

Coastline.

The coast-line is relatively the longest—nearly 20,000 miles, *i.e.*, there is one mile of coast to every 190 miles of surface. No part of Europe is thus even 1,000 miles from the sea.

Physical Features.—Although quite small in area for a continent, Europe has a fairly varied topography. At least three broad divisions may be distinguished:

Scandinavian, Highlands, Iceland, N. Ireland.

1. **The Mountain Regions of the North,** comprising the Scandinavian Mountains, the island of Iceland, the Highlands of Scotland, and the mountains of Northern Ireland.

Sweden to Black Sea, France to Urals.

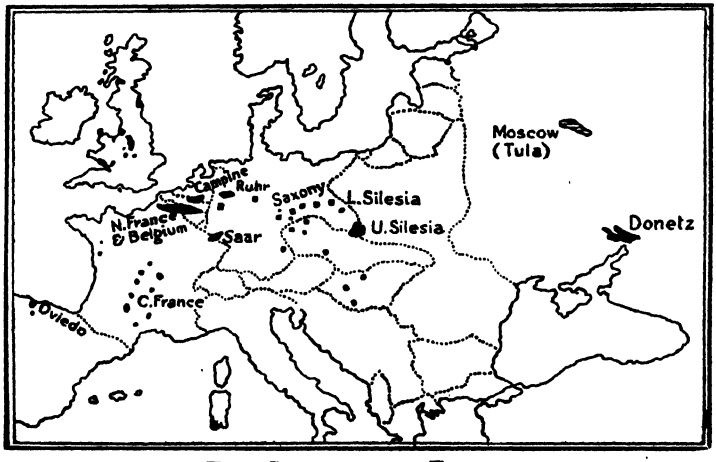
2. **The Great European Plain,** stretching from the lowlands of Sweden to the borders of the Black Sea, and from Western France to the Urals. Besides the Great European Plain, two of the most important plains are the Plain of Hungary and the Valley of the Po.

Fold Mountain chains.

3. **The Alpine Region** of Southern Europe, actually a complex of plateaus and enclosing fold mountain chains. The central mountain knot here is formed by the **Alps,** from which a number of chains are given off in all directions to form the **Apennines** of Italy; the **Sierra Nevada,** the **Pyrenees,** and the **Cantabrian** Mountains of Spain; the **Dinaric** Mountains, the **Carpathains,** the **Transyl-**

vanian Alps and the **Balkan Mountains** of the Balkan Peninsula; and the **Jura** Mountains on the north-west of the main mountain knot of the Alps. The Apennines after entering the island of Sicily are continued as the Atlas chains of North Africa. Between the Cantabrian and Pyrenees on the north and the Sierra Nevada on the south lies the plateau of Spain and Portugal, called the **Meseta.** North of the Pyrenees lies the **Central Plateau** of France. The **Bohemian Plateau** lies enclosed by a mountain chain north of the Alps-Carpathian chain. And then there are the small plateaus of the islands of Corsica and Sardinia. Plateaus.

Geology and Minerals.—The geology of Europe is not so complicated as that of Asia, and what is more important still is the fact that it has been studied much Geology.



THE COALFIELDS OF EUROPE

more thoroughly than that of any other continent as many of the geological terms—Caledonian, Cambrian and Alpine earth movements, for example,—clearly indicate. Broadly speaking, the mountain masses of Northern Europe consist

of ancient crystalline rocks resistant to later Alpine folding. And some of the southern plateaus are aso of the same composition. The Alpine chains are, of course, of tertiary fold sediments. The mineral resources of Europe have already been described incidentally in previous chapters (Ch. VI—VII), and they will be more systematically dealt with under different countries.

Mineral Resources.

General facts.

Climate.—Climatically Europe is exceptionally fortunate in her westerly situation; for the entire continent lies in the Westerly Wind Belt in winter, and even in summer a compartively large portion of it is under the influence of the Westerlies. Moreover, the warm North Atlantic Drift flows along the western coasts of the continent, keeping the whole seaboard warm and free from ice in winter. But, of course, it is then colder and colder on the mainland, though in a modified degree in comparison with the conditions prevailing in Central Asia. With the advent of summer, however, this state of affairs is modified: with the gradual swing of the wind systems towards the north as the sun progresses towards the Tropic of Cancer, Southern Europe falls outside the Westerly Wind Belt, and forms part of the high-pressure belt from which the North-East Trade Winds begin to blow westward. Thus the Mediterranean Region of Europe is dry in summer. But the whole of the continent being under the influence of the Westerlies, the Mediterranean Region receives its share of rainfall in winter; and the rest of the continent have rainfall all the year round, although each place has its own seasonal maximum. The broad climatic zones into which Europe can be divided as well as its natural vegetation have been indicated elsewhere (p. 61ff.).

Conditions in winter.

Conditions in summer.

Rainfall.

NORTH-WESTERN EUROPE.

THE BRITISH ISLES consist of two large islands, **Great Britain** and **Ireland,** together with innumerable

smaller islands of varying size off the north-west coast of Europe. Great Britain comprises **England, Wales,** and **Scotland** which together form a single kingdom, while Ireland is divided into the two political units of **Northern Ireland** and the **Irish Free State** or **Eire.** The term, **United Kingdom,** now means the United Kingdom of Great Britain and Northern Ireland. The total area of the British Isles is about 121,000 sq. miles—roughly the same size as that of the Bombay Presidency. But England, the largest country in the British Isles, is smaller than Assam. The most noteworthy feature about the geographical location of the British Isles is perhaps their central position in the Land Hemisphere of the globe. Moreover, there is an extensive continental shelf around, and the coast-line is long and deeply indented so that even the remotest corner in the British Isles is not even 100 miles from the sea. We can divide the different political units into a number of well-defined physico-structural units. **Scotland** is divisible into three parts: (a) *The Highlands,* covering roughly the northern half of that country; (b) *The Midland Valley,* bordering the Highlands on the south; and (b) *The Southern Uplands,* west of the Midland Valley. The Highlands are mainly of old crystalline rocks, and in some places of inter-penetrating granite formation, yielding building stone. There are stone quarries at Peterhead and Aberdeen. The soil is poor and the region covered with moorland, except for the small eastern valleys and coastal areas. The Southern Uplands, on the contrary, consist of a broad but low fold range, furnishing a poor soil, but is suitable for sheep. The Midland Valley is actually a rift valley formed by a sedimentary block, bordered on both sides by rocks of ancient sandstone, and containing three extensive coal basins—the Ayrshire Basin in the west, the Midlothian and Fifeshire Basin in the east, and the Lanarkshire or Clyde Basin in the middle. Running down the middle of north **England** is (a) a mountain backbone called the *Pennines,* north-west of which is

Political Divisions.

Position.

Continental Shelf & coastline.

Relief & structure.

(b) *Cumbria* or *The Lake District,* formed by ancient rocks in the centre and overlaid on all sides by younger rocks. Then there is the great (c) *Midland Plain* covering the greater part of the country, and (d) *The South-Western Peninsula* of Devon and Cornwall, consisting of masses of granite intruded into ancient rocks, a region fairly rich in various metalliferous minerals. The whole of **Wales** is mountainous; in the north are the (a) *Cambrian Mountains,* formed by ancient crystalline rocks. But (b) *South Wales* consists largely of younger folded rocks, with the South Wales Coal-field. The greater central part of **Ireland** is a hollow plain, nearly encircled by mountains. For its latitude the British Isles have pleasant and equable climate. This is attributed to the warm and moist Westerlies (S. W. Anti-Trades) and the warm North Atlantic Drift. But the weather is capricious, because the Westerlies are not steady like the Trade Winds or Monsoons. Rainfall is fairly distributed all over the country, but owing to the mountainous nature of the west it is heaviest in that section; and although there is rain all the year round, the maximum precipitation occurs in autumn. The natural vegetation of the British Isles is deciduous forest, and the shedding period of the broad-leaved trees is in winter. Some conifers are found in the north and on the hills. But as in China, although largely for a different reason (for Britain is essentially an industrial country), the natural vegetation of the country has been nearly wiped out. The relative importance of agriculture in Great Britain is best understood by comparing the total value of agricultural produce with that of other items of primary production as well as of manufactures. As the statistics for 1935-37 (post-Depression years) show, the total value of agricultural produce sold (exclusive of consumption in farmers' households) was a little less than 1/15th that of manufactures; while the total value of the mineral output was nearly 1/19th, and that accruing from the fisheries was less than 1/216th that of manufactures.

Climate.

Rainfall.

Vegetation.

Agriculture.

The distribution of the two principal food crops in the British Isles may be noted in the accompanying diagrams. To understand this distribution thoroughly we must remember that moorland occupies large tracts of Great Britain in the mountainous north and west, and even in the Midlands more than half the total area is under permanent grass

THE WHEATLANDS OF BRITISH ISLES.

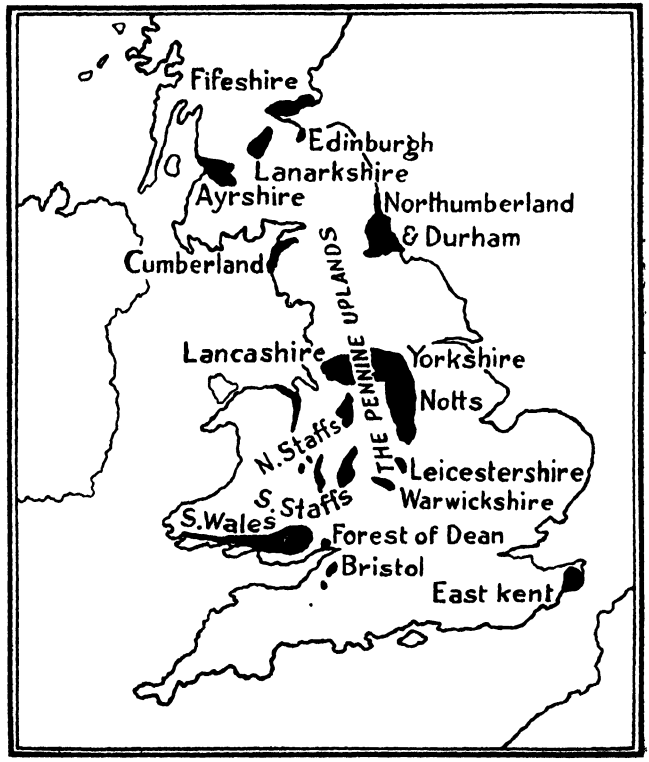
THE OAT-LANDS OF BRITISH ISLES.

for the sheep. Moreover, Scotland is too cold and Ireland too damp for *wheat*, which is the chief food crop. The largest concentration of wheat is, therefore, in the drier south-east. *Oats* are also grown mainly in the drier east, but their range is greater as they can ripen in a colder climate. Intensive agriculture is practised, and mixed farming and crop rotation are the general rule. Other important crops are *barley*, various *root crops*, *sugar beet*, *peas*, *beans*, *fodder crops*, *hay* and *fruits*. The distribution of barley is similar to that of wheat; sugar beet is distributed mainly in the east of England, and some *flax* is also grown in Ireland. Only 8 per cent of the population in Great Britain are farmers. Britain is one of the leading *wool-producing* countries (p. 163), and her wool has always been noted for its quality. There are over 20 million sheep of

Animals.

various breeds in the country. The number of cattle is half that of sheep, but they are more important than the latter in Ireland because of the damper climate there. The number of pigs in Britain is above 3½ million, and about 1½ million in Ireland. Owing to transport facilities draught animals are, however, becoming rare; the number of horses on the farms, for example, is now about a 1 million only. The *fisheries*, however, are very important (pp. 155-56).

Minerals. The mineral position of Great Britain is peculiar: about 90 per cent of the total output of minerals consists of **coal** only.



THE COALFIELDS OF GREAT BRITAIN

The coal basins are quite characteristically situated on either side of the Pennines in the following way[1]:

Cumberland	PENNINE CHAIN	Northumberland and Durham
Lancashire		Yorkshire
North Staffs.		Nottinghamshire
South Staffs.		Leicestershire

There is another important coalfield in South Wales. But Ireland is extremely poor in her coal resources. Since the last Great War, however, there has set in a slump in the British coal trade (pp. 210-12). But this is not due to any exhaustion of her coal reserves, for her reserves are still very large. Perhaps **iron** is Britain's most important mineral commodity after coal; much of her industrial prosperity has been traced to the association of iron ores and coal seams. But of the total mineral output of Britain at the present time iron ores constitute only about 1·5 per cent, and iron ores are no longer—or very little, if at all—worked in the coalfield region; the bulk of it is obtained from the Cleveland field in Yorkshire and from the Midlands—Lincoln, Rutland and Northampton. These ores are of poor quality, and the total output is not sufficient for her own requirements. So, large quantities of good quality ore have to be imported from Spain and Sweden. Owing to the War, however, trade relations with Sweden have been cut off through enemy action. Other metals include **tin** and **copper** in Cornwall and **lead** in Wales and Derbyshire, besides *building stones, road materials* and *China clay*. But the production of metals has diminished considerably, and Britain is now dependent on foreign supply. The distribution of Britain's manufacturing industries has naturally been governed by a desire for location in the coalfield regions for obvious reasons. But a special feature of British manufacturing industries is localisation and specialisation. The most important of these is the *cotton industry*, which is located

Manufactures.

[1] Stamp.

in—or almost restricted to—the Lancashire coalfield region in England and Glasgow region in Scotland. This localisation, especially in Lancashire, has been attributed to two causes,—(*a*) the manufacture of woollens from the wool of the Pennine sheep was an early industry in England, and thus here have been born generations of spinners and

THE INDUSTRIAL REGIONS OF GREAT BRITAIN

weavers; (*b*) secondly the damp climate and the soft water from the Pennine streams are eminently suited to cotton manufacturing. Even spinning and weaving are largely localised; for the chief spinning towns in the Lancashire

zone are **Bolton** and **Oldham,** while the weaving towns are **Preston, Blackburn, Burnley, Bury** and **Rochdale.** The principal business centre is **Manchester,** together with **Salford. Liverpool** is the great port of this region, but supplies of raw cotton are now directly available in Manchester (p. 305). Though cotton-spinning in Scotland is centred in **Glasgow** and **Paisley,** it is scarcely possible to single out an industry as quite characteristic of this region (p. 305-6). The principal centre of the *woollen industry* is **Leeds,** around which a number of other towns such as **Bradford, Halifax, Wakefield, Dewsbury, Barnsely, Huddersfield, Nottingham** and **Leicester** are engaged in different branches of the industry. Woollen industry in Scotland is carried on in such towns as **Selkirk, Hawick** and **Galashiels.** In ireland the chief centre of the woollen industry is **Belfast.** The *silk industry* is centred at **Derby, Chesterfield, Leek, Ilkeston, Congleton, Macclesfield,** etc. **Dundee** is the principal centre of the *jute industry.* The different branches of the *iron and steel industry* are thus distributed: iron-smelting in Northern Yorkshire, South Durham, Cumberland, North Lancashire, South Wales and Midlands, particularly at **Middlesborough, Barrow, Port Talbot** and **Cardiff;** the manufacture of iron wares chiefly at **Birmingham** and **Sheffield;** the *manufacture of motor cars* is centred at **Birmingham, Coventry** and **Oxford.** *Railway stock* is manufactured chiefly at **Crewe** and **Swindon.** There are *ship-building* concerns in the Clyde region and other places and at Belfast. **Swansea** is virtually the only centre of the *tin plate industry.*

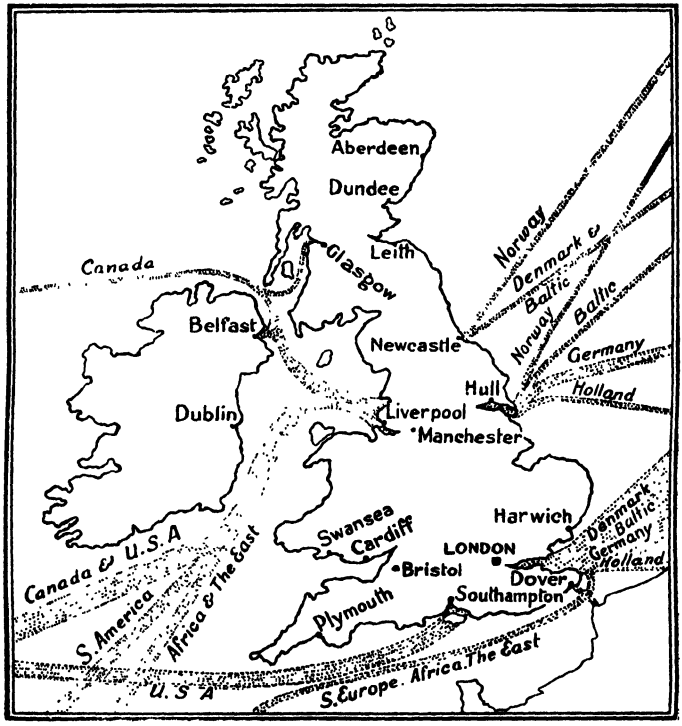
Communications.

It is perhaps needless to say that Great Britain is very well served by *railways;* the total mileage is 20,400, and the railways are grouped into four systems: (a) *The London-Midland-Scottish System,* (b) *London and North North Eastern System,* (c) *Great Western* and (d) *Southern.*

Ports.

The *Manchester Ship Canal* is the principal inland water-

way. The principal ports of the British Isles have been dealt with in some length elsewhere (Pp. 304-6).



BRITISH PORTS AND TRADE ROUTES

The Exports of the United Kingdom[1]

Commodities.	Percentages of Total Value.		
	1924	1926-30	1931-35
Raw materials		*13·6*	*13·4*
Coke & coal	2·8	6·4	8·7
Foodstuffs	—	*5·9*	*5·4*
Fish	1·1	1·1	1·1
Spirits	1·5	1·3	1·6

[1] Chisholm.

Exports of U. K.—Con.

Commodities	Percentage of Total Value		
	1924	1926-36	1931-35
Manufactures	—	*71·3*	*57·2*
Cotton goods	24·9	19·2	15·3
Yarn	3·5	3·0	2·7
Thread	0·9	0·9	1·1
Iron & Steel	9·3	8·3	6·9
Machinery	5·6	7·4	8·9
Automobiles	—	2·4	3·3
Ships	0·7	1·8	1·1
Electricals	1·3	1·8	1·9
Railway vehicles ..	—	1·4	0·6
Woollens	8·5	7·2	6·9
Tissues	5·2	4·6	3·8
Yarn	2·0	1·5	1·6
Tops	0·8	0·7	0·8
Silk (& artificial) ..	0·3	1·4	1·3
Linen Yarn & mf. ..	1·7	1·4	1·5
Apparel	3·8	3·7	3·0
Paper &c.	—	1·4	1·6
Rubber goods	—	1·3	1·4
Glass & earthern ware ..	1·6	1·9	2·0
Leather goods	1·5	1·1	0·9
Chemicals	3·2	3·5	4·7

The Imports of the United Kingdom[1]

Commodities.	Percentages of Total Value.		
	1924	1926-30	1931-35
Raw materials	*23·3*	*25·4*	*24·6*
Cotton	9·5	6·0	4·6
Wool	5·5	4·7	4·9
Wood & wood pulp ..	4·0	4·8	5·5
Petroleum	—	3·6	4·2
Rubber	0·8	1·7	0·9
Hides, skins & furs ..	1·7	2·2	2·1
Tinc, lead, tin, copper, iron oras	1·8	2·4	1·8
Oil-seeds & nuts ..	4·1	1·4	1·5
Foodstuffs	*37·9*	*31·7*	*37·0*
Meat (for dried) ..	15·8	17·9	22·2
Animals	1·7	1·1	1·2
Grain & flour	9·5	8·3	8·7
Wheat	5·4	5·0	4·1

[1] Chisholm.

Imports of U. K.—Con.

Commodities	Percentage of Total Value		
	1924	1926-30	1931-35
Maize	1·3	1·1	1·5
Wheat meal & flour ..	0·7	0·6	0·5
Butter	4·3	4·2	5·2
Tea	3·2	3·1	3·6
Sugar	3·5	4·0	2·0
Fresh Fruit	2·5	2·9	4·0
Eggs	1·5	1·4	1·2
Cheese	1·1	1·2	1·1
Tobacco	1·2	1·4	1·7
Manufactures	*8·7*	*10·6*	*14·4*
Silk yarns & mf. ..	2·0	1·2	0·6
Wool yarns & mf. ..			
(with apparel) ..	1·2	2·5	1·9
Cotton yarns & mf. ..	0·7	0·8	0·5
Iron & steel mf. ..	1·7	2·3	1·5
Machinery	0·8	1·4	1·6
Leather mf.	1·1	1·2	1·1
Chemicals	1·2	1·3	1·0
Paper &c.	—	1·5	1·8

Direction of Foreign Trade of U. K.[1]

EXPORTS

Countries.	Percentages of Total Value.		
	1924	1926-30	1931-35
Br. India	11·3	11·2	8·8
Australia	7·8	7·2	5·6
U. S. A.	6·6	6·3	5·0
Eire	5·3	5·5	6·2
Germany	5·4	5·1	4·3
Canada	3·5	4·6	4·8
South Africa	3·8	4·2	6·2
Argentina	3·4	4·0	3·4
France	5·2	3·9	5·0
Netherlands	3·1	3·1	3·2
Belgium	2·8	2·9	2·5
New Zealand	2·6	2·7	2·8
Italy	2·2	2·0	2·3
Empire	*41·7*	*45·6*	*45·7*
Foreign countries ..	*58·3*	*54·4*	*54·3*

[1] Chisholm.

Direction of Foreign Trade of U. K.

IMPORTS

Countries.	Percentages of Total Value.		
	1924	1926-30	1931-35
U. S. A.	18·5	16·3	11·6
Argentina	6·2	6·1	6·4
Germany	2·9	5·6	4·9
India	6·2	5·1	5·0
France	5·3	4·9	3·3
Denmark	3·8	4·6	5·2
Australia	4·6	4·4	6·6
Canada	5·2	4·4	6·2
Eire	4·0	3·8	3·2
Netherlands	3·3	3·8	3·3
New Zealand	3·8	3·9	5·1
Belgium	2·8	3·0	2·5
U. S. S. R.	1·5	2·2	2·8
Sweden	1·6	2·0	2·3
Egypt	3·0	1·9	1·6
Empire	*30·2*	*27·1*	*33·5*
Foreign countries ..	*69·8*	*72·9*	*66·5*

Superficially viewed, the foreign trade of the United Kingdom shows an adverse balance; for there is a large excess in the total value of imports over that of exports.[1] But the United Kingdom derives great benefits from investments elsewhere, and the value derived from this source is about one-half of the total obtained from the exports. Moreover, receipts from shipping constitute about one-third of the total value of the export trade. And last but not least, the United Kingdom carries on considerable *entrepôt* trade, and the receipts accruing therefrom are also quite considerable.

[1] The total value of imports in 1924 was £1279·8 million, in 1926-30 £1184·5 million, and in 1931-35 £745·5 million. Corresponding figures for the export trade were £795·4 million, £338·6 million and £389·5 million. But corresponding figures for the re-export trade of imported commodities were £140, £113, and £54 millions.

Exports of Imported Commodities from U. K.

Commodities.	Percentages of Total Value		
	1924	1926-30	1931-35
Raw materials			
Wool	22·4	22·3	22·3
Rubber	7·2	13·2	3·7
Hides	1·4	1·2	0·7
Skins & furs	8·0	8·6	12·4
Cotton . ..	8·3	4·9	3·3
Jute	0·3	0·3	0·4
Petroleum	—	1·3	1·9
Tin	1·8	1·7	1·2
Foodstuff			
Tea	5·0	6·8	8·7
Meat	—	1·£	2·3
Fish	—	1·4	1·2
Spices	—	0·9	0·4
Tobacco	—	0·7	1·3
Coffee	1·2	1·8	2·7
Butter	—	1·2	1·9
Fruits	—	1·2	2·1
Marize	0·7	0·6	0·9
Wine	0·5	0·5	0·7
Manufactures			
Leather	1·3	1·7	2·0
Silk	2·5	1·4	0·8
Carpets & rugs	—	1·3	1·0
Cotton	1·8	0·7	0·3
Machinery	—	1·4	1·2
Artificial silk	—	0·6	0·9
Drugs	—	1·4	1·7

NORTHERN IRELAND has an area of only 5,237 sq. miles, and a population of about 1·28 million. The inhabitants are mainly of English and Scotch descent. The chief agricultural products are *oats* and *flax*. The capital is **Belfast,** where there are textile mills (for spinning flax and weaving linen and cotton), distilleries, and ship-building yards. Another seat of textile industries is **Londonderry.**

THE CHANNEL ISLANDS together comprise a total area of 75 sq. miles only. The principal products are *potatoes, tomatoes,* and *grapes.*

EIRE or the **Irish Free State** is a self-governing democracy enjoying the official status of a British Dominion. The total area is 26,592 miles, and the population 2·97 million. The principal crops in the order of their importance are *oats, potatoes,* and various other *root crops,* as well as some *barley* and *wheat.* Large numbers of domestic animals are kept; and the country, with its hurried weather conditions and extensive ill-drained areas, is said to be more suitable for stock-raising than agriculture. The principal manufacturing industry is concerned with the preparation of liquors. There is a large water-power station at Limerick for harnessing the flowing waters of the Shannon, the largest in the British Isles, which provides electricity for the entire country, and to a large extent compensates for the want of coal. Under the present regime the country is endeavouring hard for economic self-sufficiency. About 90 per cent of the total trade was with the United Kingdom; but a drop has been in evidence for some years.

SCANDINAVIA

Scandinavia is a mountainous peninsula on the north-west of Europe, and resembles the island of Great Britain in topographical as well as structural features. The coast-line is long and deeply indented, especially on the west, and the inlets, often quite considerably long, are called *'fjords'.* Often again these long narrow fjords are bordered by vertical cliffs rising directly out of the water. Near the west coast is a long ridge of mountains, consisting of very ancient hard rocks similar to those of the Scottish Highlands. The slope of the land is naturally to the south-east. The warm North Atlantic Drift flows close to the western shores, and the peninsula lies in the path of the Westerlies. Thus the western shores as far even as the North Cape within the Arctic Circle remain ice-free all the year round;

and there is a fairly heavy rainfall throughout the year especially in the mountainous west. The larger rivers flow south-east because of the general slope of the peninsula; and the mountains of Scandinavia being much loftier than those

A GENERAL MAP OF SCANDINAVIA

of Scotland, run swiftly down great heights, enabling them to be harnessed for electricity (p. 225ff). The peninsula is divided between the two countries of **Norway** and **Sweden.**

NORWAY lies west of the mountain divide, and is much more fiorded and mountainous than Sweden. It has an area of about 125,000 sq. miles, and a population of 2,800,0000. Owing to heavy precipitation the mountains are often covered with *forests*, which, together with the *fisheries*, constitute the principal source of the national wealth (pp. 155 ff.). More than 50 per cent of the total area is waste land covered by mountains, 25 per cent by forests, and less than 10 per cent classed as arable, and only 4 per cent of the total area is actually under crops. The leading crops are *oats* and barley, and in general, other crops are much the same as in Great Britain. About 12½ per cent of the forests are reserved by the Government. Norway is poor in mineral resources. There is no coal. But she has fairly large reserves of low-grade *iron* and a limited supply of high-grade iron ores. Perhaps the most valuable sources of her mineral wealth are the *copper* mines at Roros in the Glommen River Valley and at Sulitjelma and other places. There are *silver* deposits at Konigsberg near Oslo. *Silica* and *apatite* are abundant near Stavanger. There is a refinery for *nickel* ores at Kristiansand. Some *sulphur* is also exported, and there is a fairly large exoprt of granite and other stones. But poor as she is in mineral resources, Norway has almost unlimited water-power (p. 225). Of the available total estimated at 9·5 millions of horse-power, only 2·2 millions have been developed. These have been largely developed by foreign capital, and many of the manufacturing industries of Norway are in the hands of foreigners.

The towns of Norway have already been dealt with (pp. 309-10). The country lacks extensive railways, because of the mountainous nature of the surface. With the exception of the railway to Narvik, all the lines are in the south, connecting Oslo with Bergen and Trondheim.

Spitsbergen and **Bear Island** in the Arctic circle are the only foreign possessions of Norway. Recently, however, *coal* has been discovered there.

SWEDEN, with a total area of 173,000 sq. miles, is larger than Norway, and supports more than double (6,200,000) the population of the latter. It is on the broader slope of the Scandinavian Peninsula, and comprises a considerable portion of the Great European Plain in the south. The northern half or two-thirds of the country is covered with *forests*, where lumbering is the dominant occupation of the people; but Southern Sweden is essentially an agricultural country. More than 12 per cent of the total area of Sweden is actually under crops. But the climate of the south is of the continental type, too cold for wheat, and so the leading crops are *oats* and *rye*. Much *hay* and *fodder* for the cattle are also grown in this region. On the shores of the Baltic there are many saw-mill towns, to which timber from the northern forests are floated down the numerous mountain streams. Sweden is fairly rich in mineral resources: there are deposits of very highgrade *iron* ore in the north, whence large quantities are exported to Germany, Britain, Belgium and other countries. Dairy farming is important in the south; and so are the manufactures of electrical machinery and matches. The capital, **Stockholm**, has iron works. There are textile mills at **Norrkoping**.

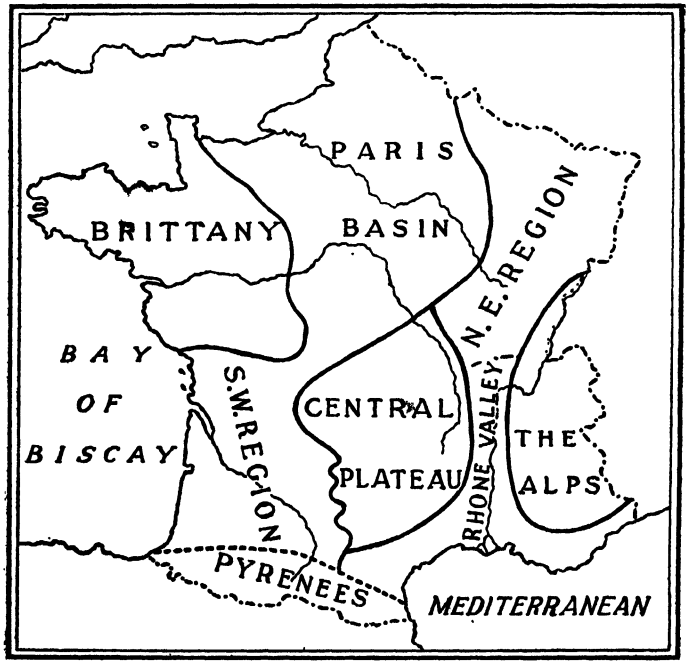
THE GREAT EUROPEAN PLAIN

Position & Size.

FRANCE comprises an area of 213,000 sq. miles, with a population (in 1931) of 41,800,000. Her geographical position is, in many respects, unique in Europe: she has a long coast-line along the English Channel facing Great Britain; another long coast-line along the Bay of Biscay faces the New World across the Atlantic; and she shares a considerable portion of the coast-line along the Mediterranean Sea. France thus possesses certain unique advantages for maritime development; and she, too, is, like Great Britain, the mistress of a fairly vast overseas dominion, which—and that is the most characteristic point about it—

Advantages & disadvantages thereof.

is comparable in variety and extent with the still vaster empire created by Great Britain. In some respects, however, France enjoys far greater advantages of situation than does Great Britain: she is continuous with the rest of Europe, and has benefited (and also been handicapped) more by the heritage of ancient Roman civilisation. Space does not permit any analysis of such facts here. But it is obvious that these have never proved to be quite unmixed blessings; for her contiguity with all the



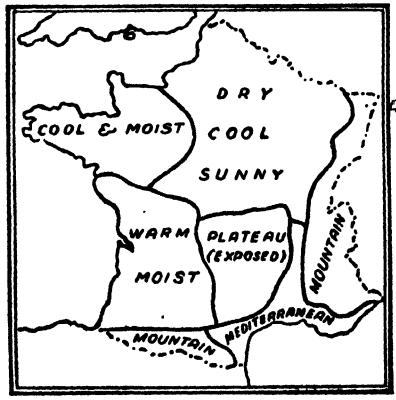
THE PHYSICAL REGIONS OF FRANCE

strong and warring nations of Europe has always involved her in the whirlwind of European politics, while Britain's comparative isolation has left her hands free for overseas expansion. From a strictly geographical point of view,

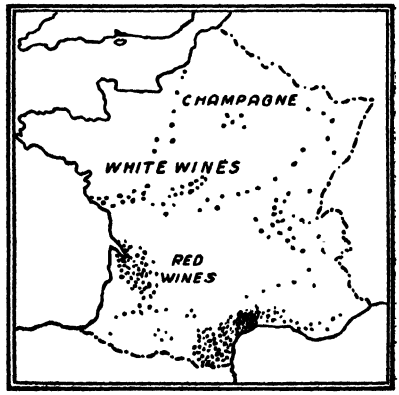
however, the disadvantages of her land frontier far outweigh its advantages: the lofty and difficult Pyrenees stand in the way of communication between France and Spain; the great Alps form the boundary between France and Italy, rendering communication between the two countries difficult; so it is between France and Switzerland; and even between France and Germany on the one hand, and between France and Belgium on the other, the frontiers are ill-defined, and have been the occasion of many a bitter struggle. The physical regions of France are shown in the accompanying map. The region of Brittany is mountainous. The Paris Basin, together with the S. W. and N. E. Regions, actually form part of the Great Plain of Northern Europe; and this is the great agricultural region of France. The Rhone Valley, as may be readily seen, eventually passes into the arable land along the Mediterranean coast. The climatic regions of France, as indicated in the accompanying diagram, make it quite clear that the country has a fairly great range of agricultural produce.

Physical Features.

Climate.



THE CLIMATIC REGIONS OF FRANCE



THE VINEYARDS OF FRANCE

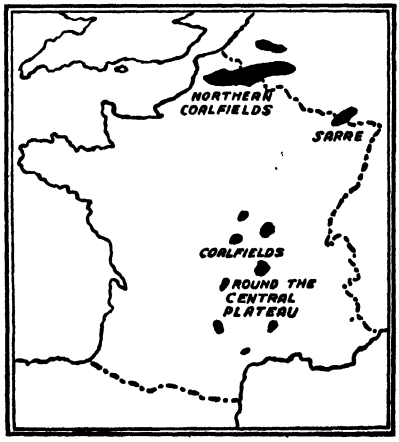
Vegetation.

The natural vegetation of France is forest, which covers about 20 per cent of the total area; and forestry is quite important in the country. Moorland covers some 10 per cent of

the surface. And as much as two-thirds of the whole area is under tillage. The principal crops are *wheat, oats, maize,* and a great variety of *fruits.* Wheat is naturally concentrated in the Paris Basin, where the climate is 'dry, cool and sunny'; and if Russia is excluded, France alone produces a quarter of the wheat of Europe, although she has got to import a small amount of wheat now (p. 99ff). Oats are grown chiefly in the 'warm moist' south-west. The diversity of France's climate is easily reflected in the great variety of the fruits grown: apples and cherries flourish in the Paris Basin; the olive in the Mediterranean region; and grapes—most important of all—in the south. France is the largest producer of wine in the world (p. 144ff). Though not noted for animal products like Argentina, Uruguay, etc. the climate and soil of France are suitable for dairy cattle rather than for sheep. The number of cattle, horses, and pigs is said to be double that of Britain,

Agriculture.

Animals.

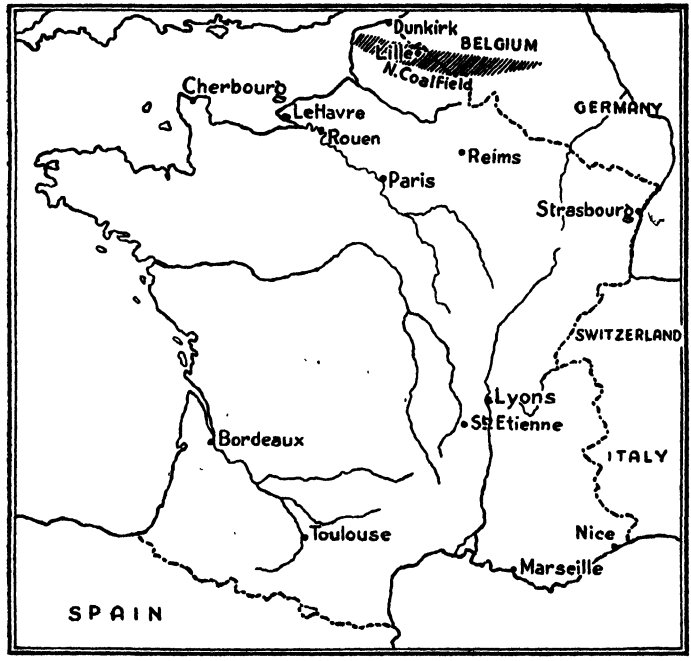


THE COALFIELDS OF FRANCE

but that of sheep is half. French fisheries in both the Atlantic and the Mediterranean are also of some importance. France is, however, not rich in minerals—generally speak-

Minerals.

ing. But the *coalfield* of Northern France is very important, and geologists are of opinion that this field is connected under the Straits of Dover with the coalfield of East Kent in England on the one hand, and with the coalfield of Belgium on the other (p. 205). There are very small coalfields in the Central Plateau Region. The loss of the Saar coalfield in 1935 has deprived France of an average output of 10 million tons a year; the present output is in the



THE INDUSTRIAL REGIONS OF FRANCE

neighbourhood of 50 million tons annually, which being insufficient for her requirements, large quantities have to be imported from abroad, particularly from Britain and America. But France is rich in *iron* ore, though the bulk of the local supply is of poor quality, and France buys coke

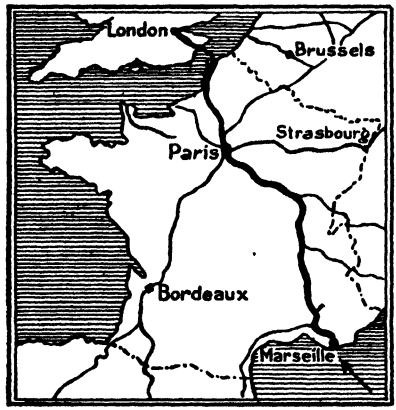
from Germany or Belgium chiefly for the smelting of her iron ores. The largest iron-field is in Lorraine. There are other deposits near Le Creusot and in Normandy, near Caen, as well as in various other places such as the eastern Pyrenees and Canigou. Other minerals include a small amount of *petroleum* and large quantities of *potash salts,* both obtained mainly from the Alsace region. France's poverty in coal but her wealth of potential water-power have impelled her to develop *hydro-electricity,* called playfully 'white coal.' She has abundant reserves of water-power in several areas, particularly in the regions of the Alps, the Pyrenees and the Cevennes (p. 225). Even main-line railway trains are now being driven by electricity in many places, particularly in the south; and there is a plan to use electricity throughout the French railway systems. The localisation of French manufacturing industries has been governed more by the facilities for obtaining raw materials, both from local and foreign sources, and the conveniences for marketing the products than by the supply of fuel.

Water-power.

The principal industrial region of the country, however, is in the coalfield region of Northern France; and the southern coalfields also have given rise to a few industrial towns there. The industries of **Paris,** the capital of the country, are, however, of a miscellaneous nature; but in general it may be said that the production of articles of luxury is its distinctive feature. The principal region of various *textile manufactures* is in the north; **Lille** is the largest manufacturing town of this region; other manufacturing towns are **Roubaix** and **Tourcoing,** all carrying on cotton, linen and woollen industries. **Cambrai,** to the south-east of Lille, is famous for fine linens. Besides these towns, woollen industry is centred at **Rheims, Amiens, Fourmies, Sedan, Louviers, Elbeuf, Troyes,** etc. The supply of wool is obtained from native pastures lying around as well as from abroad, the latter

Manufacture.

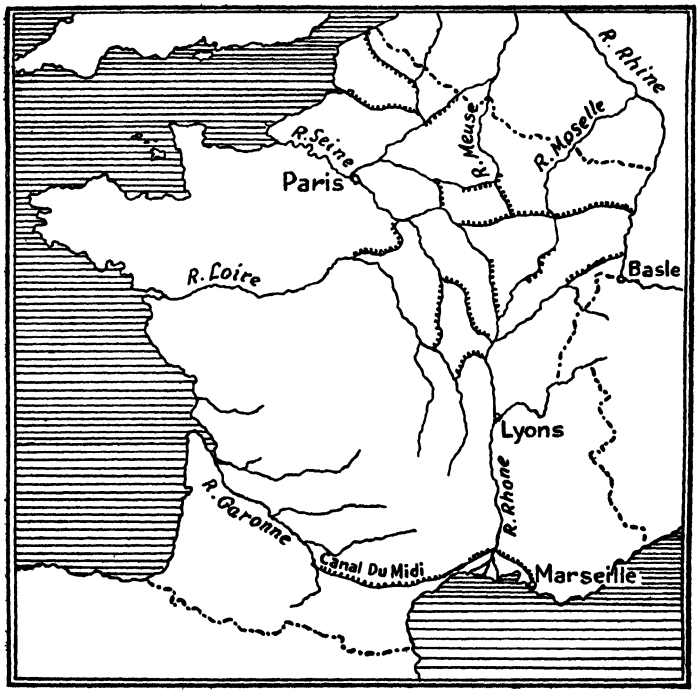
particularly from Australia and the River Plate region of South America. Roubaix, Croix, and Tourcoing are noted for carpets as well,, and Troyes is the chief seat of hosiery. *Silk industry* is centred in the Rhone Valley. **Lyons** is the main centre; other centres are **St. Etienne, Avignon** and **Nimes. Mulhouse,** St. Dié, Epinal, Sénones, Guebviller, **Rouen,** Roanne, **St. Quentin,** Colmar are, more or less, important centres for the cotton industry, besides those spoken of above. Other industrial towns are **Angouleme** and **Annonay** noted for the manufacture of paper, **Limoges** for porcelain and earthenware, **Besancon** for watches, **Grenoble** for kid gloves, and **Strasbourg** for various manufactures. The *manufacture of glass* is centred in the coalfields of the north and the centre. The chief seats of the *iron and steel industry* are Lille, St. Etienne, Paris, Le Creusot and Caen. The seaports of France have already been described (pp. 306-7). France is very well served by roads and railways. Her road and railway systems centre on Paris. But perhaps the most characteristic feature of the inland communication of France is furnished by the splendid network of waterways. We have already seen that all the larger rivers of France—the Seine, Loire, Rhone—as well as their chief tributaries are generally navigable for long distances; these are now connected by a most complicated system of canals, and it is now possible to travel from the Mediterranean Sea to the English Channel entirely by water. The principal canals



THE MAJOR RAILWAYS OF FRANCE

Communications.

are: (a) *The Marne and Rhine Canal,* which connects the navigation of the Rhine with that of the Seine, and both of these with the Saar navigation by means of a northerly branch; (b) *The Burgundy Canal,* connecting the navigation of the Seine and Rhone through the Yonne and Saône; (c) *The Canal du Centre,* connecting the Saône with the



THE INLAND WATERWAYS OF FRANCE

Loire; (d) *The Rhone and Rhine Canal,* connecting those two rivers through the Saône; (e) *The Canal du Midi,* connecting the Garonne with the Mediterranean Sea and thus establishing direct communication between the Mediterranean and the Bay of Biscay; and (f) *The Marseilles-Rhone Canal,* which passes through a tunnel

nearly 5 miles long. In 1924 the balance sheet of the foreign trade was favourable, but in subsequent years the value of imports has mounted about 14 per cent higher than that of exports. (For Trade-tables, see *Appendix*.)

Natural Regions and Resources.

BELGIUM is quite a small country, less than 12,000 sq. miles in area; but it supports a population of nearly 8 millions. Though so small, it is easily divisible into three distinct parts: (a) *The Ardennes Region* in the south is formed by a plateau, covered partly with sheep-pastures and partly with forests yielding valuable pine. An extension of the Luxemburg **ironfields** penetrates into this region from the south; and Belgium's output of iron is nearly a quarter of that of the United Kingdom. (b) *The coal-field Region*, bordering the Ardennes on the north, runs right across the country from west to east. It is a continuation of the great coalfield that stretches from East Kent through Northern France to the eastern borders of Belgium. Naturally, therefore, it is the great manufacturing region of Belgium, supporting, as it does, the bulk of the population. Belgium's output of coal is about 1/8th of that of the British Isles. Here are situated her chief industrial towns **Mons, Charleroi, Namur,** and **Liege.** These are all coal towns; but Charleroi is concerned with glass and chemical industries as well, and there are railway works at Liége. Much of the iron required for her industries is brought from Luxemburg, and **zinc** ores are found in the east. (c) *Northern Belgium,* however, is, in the main, an agricultural country, and belongs more particularly to the Great European Plain. The chief crops, more or less in the order of their importance, are *rye, oats, wheat, potatoes, sugar-beet,* and *flax*. The land is not very fertile, and in the east especially it is of little use. A fairly large number of cattle are also kept in this region. Belgium has a second source of coal in the *Campine Coal-field*, lying in this region (p. 205). **Brussels,** the capital and largest city, lies in the heart of this agricultural country; it is well served by rail-

ways, and has too many industries to be particularly associated with any, except perhaps the manufacture of lace. And here in this region lies the chief spinning and weaving towns of Belgium such as **Ghent, Tournai,** and **Courtrai,** all situated in or near the flax-growing region. Ghent is the principal seat of Belgium's cotton manufactures as well. The principal seat of her woollen industry, **Verviers,** however, is near the Ardennes. The ports of Belgium have already been dealt with (pp. 307-8). An industrial country like Belgium must naturally be well served by railways. The principal inland waterway is the River Meuse. The foreign trade of Belgium, however, shows an adverse balance; the total value of her imports is in excess of that of the exports by about 30 per cent.[1] Belgium has considerable transit trade (p. 308).

Communications.

Foreign trade.

HOLLAND is a little larger than Belgium, and has about the same number of people. The country is a flat level plain, and indeed a considerable portion of it lies below sea-level; hence the characteristic name of the **Netherlands.** The coasts are not fiorded, but the country has a long and varied coastline. Although a level plain, it falls into two divisions: (a) *The Eastern Region* is contiguous with the plain of Northern Germany; the soil is poor and largely covered with forests. (b) *The Western Region* is largely formed by the Delta of the Rhine and the Meuse (Maas). This is the more characteristic region of Holland; for a large part of it is below sea-level and consists of reclaimed submerged land. Great dykes have been constructed to keep out the sea. There has been a big project in hand to reclaim the shallow Zuider Zee. Although a neighbour of Belgium, Holland is essentially an agricultural and pastoral country. There are large fertile alluviums here and there. The chief agricultural

Natural Regions and Resources.

[1] After the conclusion of the last Great War it rose to be even as high as 128 per cent (in 1919).

products are *oats, rye, wheat, barley, potatoes,* and *sugar-beet.* Large areas are under *grass,* and cattle farming is important. Large quantities of *butter* and *cheese* are exported and there is also a considerable export of *beet-sugar. Fishing* is also important, especially in the islands of the north. An extension of the **Campine Coalfield** lies in the south-east of Holland (p. 205), and the present output of coal is said to be nearly half that of Belgium. Holland has always been famous for her wind mills; for the country lies in the path of Westerlies. And despite the introduction of electric power, many of her factories and flour mills are worked by wind-power.

Towns.

The Hague is the capital of the country as well as the seat of the International Court. But **Amsterdam,** the centre of the diamond trade of the world, and **Rotterdam,** the largest port of Holland, are larger towns. Rotterdam has distilling factories. **Utrecht** is the chief seat of the cotton industry; **Arnhem** the chief seat of inland trade. **Haarlem** has flax manufactures and is also noted for trade in flowers. **Groningen** is a centre of the butter trade. **Flushing** and the **Hook of Holland** are minor ports. (For other ports see p. 308).

Communications.

Holland has through railway communication with Germany, and the country is well served by rivers and canals (p. 308).

Characteristics.

DENMARK, though outside the Scandinavian Peninsula, is often classed as a Scandinavian country. Actually it consists of the peninsula of Jutland and a number of islands lying between the two peninsulas of Jutland and Scandinavia. Geographically the whole of Denmark is only an offshoot of the Great Plain of Europe, and has no similarity either in surface relief or in geological structure with the mountainous Scandinavian Peninsula. The surface of the country is gently undulating rather than flat, although the land everywhere is only a few hundred feet above sea-level. Considerable tracts in the west coast are waste land, covered by sand dunes deposited by the sea; and it has been necessary to plant stout trees in order to

prevent the sand from blowing inland, especially because the country lies in the Westerly Wind Belt. The greater part of the land is under crops, and owing to the smallness of the country intensive agriculture is practised. The soil, however, is much similar in general character to the North German Plain—poor and of glacial origin. But the highly industrious Danes have very nearly transformed the land, and the crops produced are of very good quality. The principal agricultural products are *wheat, oats, sugar-beet, barley,* and *margarine.* Cattle-farming and pig-rearing are scarcely less important than agriculture, and indeed from the point of view of foreign trade its importance is of the very first magnitude. With the exception of certain clays and lime-chalk, Denmark has no minerals. But there are many factories for making *butter* and *cheese* from milk, *sugar* from sugar-beet, *beer* from barley and oats and a few other products of a like nature. And what is more interesting still is the 'import' of electric power from Sweden for industrial purposes. The *fisheries* on the shallow west coast are important, and there are 'nurseries' for fish especially in the Lim Fjord. The capital and chief port is **Copenhagen** or Kjobenhavn (p. 310). **Esbjerg** is the chief west coast port and fishing centre. **Aarhus** and **Aalborg** are the chief ports on the east of Jutland, and **Odense** is the chief port of Fyen. There are railways connecting all the important centres; but the most interesting system of communication is that of train ferries (p. 310), and it is now possible to travel from Copenhagen to Berlin by these. Denmark has been linking up her railways by enormous bridges across the narrow fjords and straits.

Products and Industries.

Towns.

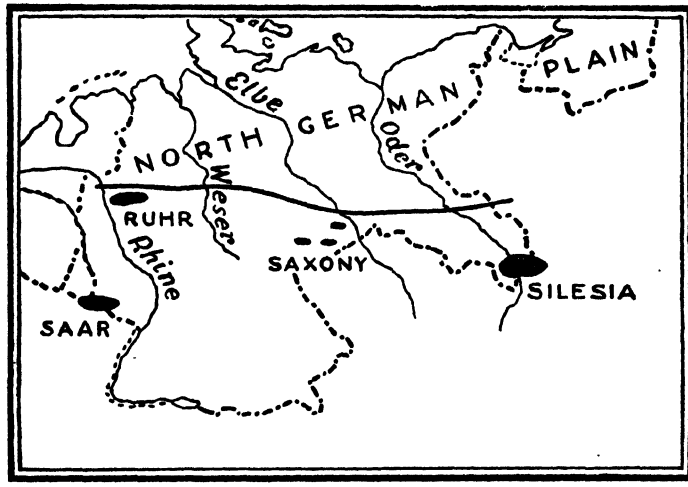
Communications.

GERMANY is nearly double the size of the British Isles, with a population nearly 1½ times that of the latter. North Germany is a part of the Great European Plain, while in the south it covers a considerable tract of the mountainous region of Central Europe. On the east and

Position and Extent.

west, however, her boundaries are scarcely defined by geographical limits, except for the river Rhine which roughly defines the borders between Germany and France. Germany thus falls into two broad physical divisions: (a) *The North German Plain* and (b) *The Southern Highlands*. In contrast to France and the British Isles, Germany has a very short coastline, only along the Baltic and the North Sea. The climatic conditions of Germany are marked by some degree of continentality as is only natural owing

Natural Regions.



THE PHYSICAL DIVISIONS AND COALFIELDS OF GERMANY

to her more or less central position on the mainland of Europe. Nearly 33 per cent. of the total area is covered by forests, yielding a considerable output of softwoods; about 17 per cent. classed as pastures; and roughly 45 per cent. as arable land; thus leaving only about 5 per cent. of the land as waste. This agreeable state of affairs speaks well of the industrious nature of the German people; for the soil is not naturally so fertile as it might appear from this account. The Northern Plain has, on the whole, an

indifferent soil, which the Germans have made good use of by planting *potatoes,* one of the chief sources of industrial alcohol (p. 197). The leading cereal in Northern Germany, however, is *rye,* which furnishes another point of evidence as to the poor quality of the soil. Next to rye *oats* occupy largest acreage in northern Germany. But *wheat* and *barley* are cultivated principally in the mountainous south, where the soil is generally better and the climatic conditions much more varied because of variations in the aspect of individual mountain slopes and valleys. And one of the most important crops of Germany is the *sugar-beet* (p. 128). But strange as it may seem, *hay* occupies the largest acreage in Germany with about 33 per cent. of the total arable land under it; and this may be attributed to the large number of cattle reared in the country. But the number of sheep is small, comparatively speaking. Germany has big interests in the North Sea fisheries. The mineral output of Germany is quite considerable, and in all probability she is second only to Great Britain in the total value of her mineral output. Her **coal** reserves are large, and the annual production of coal, including also brown coal, is normally about two-thirds of that of Britain. The largest coalfield is in the Ruhr district (p. 205-6). The Upper Silesian coalfield also belongs wholly to Germany now. There are smaller coalfields in Saxony. The next most important mineral is **iron,** obtained mainly from the mines of Lorraine until the conclusion of the Four Years' War. As a result of the present War these have again fallen into German hands. There are smaller iron-fields in the valley of the Sieg, a tributary of the Rhine. But the output is not sufficient for her own requirements, and Germany has to import large quantities of iron ore from Spain and Sweden. From Southern Germany—especially from Silesia—are obtained **lead, zinc,** and **copper,** which are often found in association. Huge quantities of **potash salts** are obtained from Saxony. Germany has a

Products.

Minerals.

Population.

population of over 75 millions, which, with the incorporation of Austria, actually a German-speaking country, and of Czecho-Slovakia, not to speak, of course, of the countries now unfortunately under German domination, has increased enormously. Roughly 32 per cent. of the population may be classed as urban; the total number of men engaged in the various manufacturing industries is considerably above 12 million. The *textile industries* of Germany are centred mainly in the Saxony region, particularly at **Chemnitz, Zwickau** and **Leipzig. Dresden,** lying in this region, is, however, famous for articles of porcelain and China clay. The *heavy industries* are located in two regions—Westphalia and Silesia. In the Westphalian region are the great industrial towns of **Essen, Dusseldorf** and **Duisburg,** noted for the basic industries of iron and steel manufacture; the town of **Solingen,** specialising in cutlery; and the lesser industrial towns of Crefeld, Munchen-Gladbach, and Aachen. The town of **Cologne,** however, carries on various industries. The other region of heavy industries is in Silesia. The ports of Germany have already been dealt with (pp. 308-9).

Industries.

Communications.

The raiways of Germany naturally centre on Berlin, the capital. And like France, Germany has made extensive use of inland waterways. All the great rivers—the Rhine, the Elbe, the Oder—are now navigable up to the German frontiers and often beyond them. These rivers have all been canalized and interlinked by means of excellent canals, and the inland waterways system of Germany now centres on Berlin. The *Dortmund-Ems Canal* links Emden with Dortmund, and unites with the Rhine navigation, linking up Strasbourg, Frankfürt, and Cologne with Rotterdam. An easterly branch from the Dortmund-Ems Canal crosses River Weser and unites with the Elbe, linking Minden, Linden, Hanover, and Magdeburg. The Elbe links Cuxhaven, Hamburg, Dresden, and Prague, and the whole line is linked in the north with Kiel through the famous *Kiel Canal* (a ship canal), and with Berlin in the centre by means of various

branches. The Oder links up Stettin, Breslau, and Kosel, and of course Berlin. The *Oder-Vistula Canal* links up Berlin with Danzig. The total length of inland waterways is upwards of 7,500 miles. The nature of the foreign trade of Germany, with 80 per cent. of her exports consisting of manufactures and a large import of raw materials and foodstuffs, bears close resemblance to that of the United Kingdom: in fact, she has been a great rival of Britain for more than half a century (since the Franco-Prussian War of 1870-71); and it was mainly to oust her from the world market that her colonies were wrested from her in the Treaty of Versailles (1918). With the loss of the colonies Germany lost her assured markets overseas, but still she has been able, to the marvel of the Great Powers, to maintain trade relations with the outer world at large. The balance sheet of the foreign trade was unfavourable upto 1930; but the quinquennium of 1931-35 showed an excess in the value of exports over that of imports. (For Trade tables, see *Appendix.*)

Foreign Trade.

POLAND for the most part lies in the Great European Plain, but stretches from the Baltic Sea to the Carpathian Mountains. Her only natural frontiers, if she has any, are, therefore, in the south; on all other sides she marches with neighbouring Powers, particularly with Germany on the one hand and with Russia on the other. Extensive marshes alone intervene between the main territory of Poland and Germany on the west, and between Poland and Russia on the east. Much of Poland's long array of difficulties have originated from her lack of natural frontiers: she had long been a prey to the aggressive designs of Prussia and Austria on the one hand and of Russia on the other, and indeed she had not only groaned under the yoke of foreign rule, but had actually been partitioned between Austria, Prussia, and Russia until at the conclusion of the last Great War her independence

Position.

Population problem.

was restored by the victorious allies. Modern Poland, although much smaller than the ancient kingdom of the Poles, is, however, larger than the British Isles. But her present

A General Map of Poland.

difficulties can largely be traced to past factors. Only about half the population of the Polish Republic are Poles, while the other half consists of Germans, Russians, and Jews whose forefathers had readily settled in Polish territory owing largely to the comparative ease of settlement there. In the Silesian coalfield region, for example, the bulk of the urban population is of Germanic origin, while the rural areas are mainly or solely Polish. On the eastern borders, again,

some importance. The principal means of inland communication are the lakes, many of which are linked by canals. **Lapland** is in the north of Finland. The Lapps are a nomadic people, depending as they do mainly on their herds of reindeer (p. 80).

ESTONIA lies south of the Gulf of Finland. Geographically it is a part of the great Russian Plain. Nearly 75 per cent. of the total area is forested, and the remainder is devoted partly to crops and partly to paturage. Agriculture and dairy farming are the chief occupations of the people. The climate is too cold for wheat, and the principal food crops are *rye, oats, barley,* and *potatoes;* some *flax* is grown and exported, but the main items of export are *timber* and *paper.* The capital and chief port is **Tallin** or **Reval** (p. 313). Estonia and Finland hold, between them, the key to the entrance to Leningrad and the adjoining tracts of Russia, and that country's sudden intrusion into them at the outbreak of the present hostilities in Europe was prompted by a desire to secure her western frontiers. The whole of Estonia and a considerable portion of southern Finland have now been incorporated into U. S. S. R. Position and Characteristics.

LATVIA, lying south of Estonia, is also a part of the Russian Plain. In climate, products, and occupations of the people it closely resembles Estonia; but the export of *flax* is perhaps more important than that of *timber.* The capital and chief port is **Riga,** and it is actually the frontier town between Western Europe and the U. S. S. R., and it is here that the railways from Western Europe and the U. S. S. R.—both the systems being on different gauges—terminate. But the Gulf of Riga is blocked by ice in winter, rendering the capital useless as a port for several months of the year. The ports of **Libau** and **Ventspils** (Windau), however, remain open nearly all the year. The republic of Position and Characteristics.

Latvia has also been incorporated into the U. S. S. R. at the outbreak of European hostilities.

Position and Characteristics.

LITHUANIA lies south of Latvia, and agrees with it in general characteristics. Besides *timber* and *flax, dairy produce* forms an important item of export. The republic is distinctly handicapped by the shortness of its coast-line. The capital is **Kaunas** or **Kovno,** and **Memel** the only port. The Lithuanians, however, had not given up the claim upon Vilna, which is in Poland, as their capital till the Soviet grabbed the whole country.

MEDITERRANEAN EUROPE

Physical features.

The Peninsula of Iberia is the westernmost of the three large pensinsulas of Southern Europe. It comprises the two republics of **Portugal** and **Spain.** The whole peninsula is cut off from France and the rest of Europe by the lofty *Pyrenees* and consists of a high plateau, called the *Meseta.* The plateau is bounded by the *Pyrenees* and the *Cantabrian Mountains* on the north and by the *Sierra Nevada* on the south. On the south the narrow Straits of Gibraltar separate it from the continent of Africa. A number of rivers such as the Guadalquivir, Guadiana, Duro, Tagus, and Ebro cut deeply through the plateau. The northern and

Climate.

north-western parts of the peninsula, however, form a part of the climatic zone of North-Western Europe, and hence have

Vegetation.

rainfall all the year. The remainder of the peninsula has a Mediterranean climate. The typical vegetation of the northern and north-western parts is, therefore, deciduous forests; in the river valleys of these regions there are rich grasslands, similar in general characters to those of Devon and Cornwall, Great Britain, or of Normandy and Brittany in France; these grasslands are eminently suitable for cattle

farming. The remainder of the peninsula offers varied characteristics: the Meseta has a modified Mediterranean climate; the climatic conditions of northern Meseta are quite typically transitional,—in some respects they agree with those of North-Western Europe, in others with those of the Mediterranean Lands. In winter this region is generally too cold for Mediterranean products, except a few stretches of fertile land where wheat can be cultivated. Southern Meseta has a more typical Mediterranean climate; but the region is generally deficient in rainfall and so too arid commonly for agriculture. It is therefore largely covered by poor grassland furnishing indifferent pastures. But in the more fortunate tracts it is possible to grow various Mediterranean products. The Mediterranean coastlands naturally have a typical Mediterranean climate, and it is here that the typical Mediterranean crops are grown. There are small strips in this region where the climate is hot enough for rice and even for the date-palm. In the whole of Europe rice is cultivated only in Italy and Spain, and the date-palm only in the latter.

Geology and Minerals.

The plateau is built up principally of ancient metamorphic rocks, usually associated with minerals, or are actually mineralised to a great extent, and that is why Spain has been famous for ages for her mineral wealth. Along the northern rim of the plateau formed by the Cantabrians are large deposits of **coal** and **iron,** especially round Ovieds. Iron and other metallic minerals are found in the south also. The chief iron producing areas of Spain in the order of importance are the province of Vizcaya (Biscay), the Basque provinces, Santandar, Murcia, Almeria, Malaga, and Lugo. **Lead** is obtained in the region of the Sierra Morena, especially at Linares, in the mountainous tracts near the port of Almeria, and in the region of the Puerto de Despenaperros. The principal **copper** mines are in the region of Rio Tinto. **Silver** is found in association with lead at

Linares and various other places. Some of the largest **quicksilver** mines exist in the region of Almaden. **Zinc,** and various salts are also abundant in Spain. Portugal, however, is much less fortunate than Spain in minerals, especially in coal.

PORTUGAL occupies the greater part of the West Coast of the peninsula. About 50 per cent of the entire territory is waste land, and a considerable part of the remainder covered by oak forests. Rainfall is heaviest in the north, where the chief crop is *maize*. This is also the richest cattle farming region of the republic. The chief agricultural products of the comparatively arid south are *wheat* and *maize;* and large numbers of pigs are also reared in this region. On the mountains the only notable crop is *rye*, and large numbers of sheep and goats are kept there. But the most important of the commercial products is *wine,* which alone accounts for more than a quarter of the total value of exports. Next comes *fish*, followed by *cork*, *coal, fruits,* and *olive oil*. Portugal alone supplies half the world's requirements of cork. **Lisbon** is the capital and chief port. **Oporto** is famous as the 'port-wine' port. **Setubal** is the chief seat of fishing industry. The foreign trade of Portugal, however, shows an adverse balance; in 1924 the total value of her imports was more than double that of her exports, during 1926-30 it was considerably above 1½ the total value of exports, and during 1931-35 the total value of imports exceeded that of exports by more than 80 per cent. The position, though bad, shows a steady improvement.

Products and Industries.

Towns.

Trade.

SPAIN occupies the greater part of the Iberian Peninsula. The country falls into several natural regions: (a) *The Northern Coastlands* are a mountainous region formed by the Cantabrian Mountains and extremely narrow and intercepted coastal areas. The climate is akin to that of North-Western Europe, and so the region has precipitation all the year round. This is the richest and most thickly

Natural Regions and Products.

peopled part of the country. The mountains are clothed by beautiful *pine forests*, and the region is rich in minerals, especially *coal* and *iron*. The principal food crop is *maize*, and the rich grasslands are well suited for *cattle farming*. (b) *The Central Plateau* (Meseta) occupies the greater part of the country. The climate is arid and cold, and the soil largely unsuitable for cultivation. *Wheat*, however, is the principal crop on more fertile areas. On the pastures sheep are kept and fine *wool* is obtained from them. (c) *Southern Spain*, corresponding roughly with the valley of the Guadalquivir, is a sheltered and warm area. The principal products are *oranges, lemons*, the *vine, sugar-cane*, and *sugar-beet;* the last two flourish on irrigated areas. The region is rich also in minerals, especially *copper* and *iron;* copper is obtained near Huelva, and iron from the Sierra Nevada. (d) *The Mediterranean Coastlands*, however, are in the rain-shadow of the high Meseta; but the land is irrigated from the mountain streams. The principal products are the various Mediterranean fruits such as *olives, grapes, oranges, lemons etc.* The capital is **Madrid** in the heart of the Central Plateau. **Valladolid** in the Plateau region is the milling centre of the wheat of this region. **Oviedo** is the centre of the coal-mining district of the Northern Coastlands. **Bilbao** and **Santander** are the chief ports of the Northern Coastlands, famous for the export of iron ore. **Seville** is the largest town and port of Southern Spain. Other ports of this region are **Malaga** and **Cadiz**, and the rock fortress of **Gibraltar** (British) is also in this region. **Valencia** and **Catagena**, on the Mediterranean coastlands are famous as fruit ports. **Murcia** is an inland centre of this region. **Saragossa** is the chief centre of Ebro Basin which constitutes the north-western part of the Mediterranean coastland Region. **Barcelona** is the largest port and principal manufacturing town of Spain. The total value of the imports of Spain in 1923 was roughly 1½ times that of the exports; in the quinquennium of 1926-30

Towns.

Trade.

the imports exceeded the exports by 58 per cent; but the next quinquennium witnessed an excess in the value of imports over that of exports in the ratio of 95:71. This is a tale of welcome improvement in the sphere of national economy.

Natural Regions.

ITALY is essentially a Mediterranean country. It is roughly of the same size as the British Isles, and has about the same number of people. Physically the country falls into three broad divisions: (a) *The Alpine Region* in the north, formed by the southern slopes of the Alps and associated valleys; (b) *The Plain of Lombardy*, also in the north, formed mainly by the great Basin of the Po; and (c) *Peninsular Italy*, down which runs the mountain backbone of the Apennines. These divisions correspond with the principal climatic zones. The Alpine Region is not totally cut off from Mediterranean influences because of the general west-to-east alignment of the valleys. But the Plain of Lombardy is cut off from them by the mountain spurs of the Apennines, with the result that in the cold season it is often below freezing there, but very hot in summer. The climate of Peninsular Italy is, of course, typically Mediterranean, and warmer and damper than that of the rest of the country. Nearly 20 per cent. of the total area of Italy is classed as woodland and forest, another 20 per cent.

Products.

covered by rough pastures, and the bulk of the remainder cultivable. The chief crop is *wheat*; but Italian wheat is generally hard (p. 98). Other agricultural products include *oats*, *maize*, *rice*, *olives*, *vines*, and *lemons*—the last especially in the island of Sicily. Asses and mules perhaps

Animals.

outnumber other domestic animals in Italy; they are more important as transport animals than horses in Southern Europe (p. 258). Goats, again, far outnumber the sheep. Italy is poor in minerals; having no coal and oil she naturally lacks the essential basis of modern industry. The bulk of her coal requirements is purchased from Britain in times of

peace; in fact, she was for many years Britain's largest customer of coal. But she has large **water-power** resources, much of which has already been harnessed in the service of her manufacturing industries (pp. 225 ff.). And this has naturally determined the situation of her great industrial towns such as Milan and Turin in the northern plain where water-power is easily obtained from the Alpine region. But Italy has good quality **iron** ore, though the reserves are small, in the islands of Sicily and Elba. Sicily has large deposits of **sulphur** as well; and the island of Sardinia is believed to be fairly rich in various minerals. The present population of Italy is over 42,500,000—a figure that is increasing by leaps and bounds. The pressure on the land is, therefore, quite considerable; and although Italy is the mistress of a vast overseas empire she is in great difficulties as regards getting relieved of the pressure of population, because the greater part of her overseas dominions, except only the newly acquired territory of Abyssinia, which, by the way, has again changed hands, is desert land. Italy is still more an agricultural country than an industrial one; but she is fast becoming an industrial country. Prior to her entry into the present European War manufactures gave employment to more than four million people. The largest industrial town of Italy is perhaps **Milan,** where there are cotton and silk mills as well as machinery and railway workshops. **Turin** has also developed railway and machinery workshops. There are cotton mills in **Naples,** where sugar-refining and engineering are also rapidly becoming important. **Como** and **Bergamo** are also important silk-spinning towns. Woollen manufacture is also graining in importance. The ports of Italy have already been dealt with (pp. 311-12). Italy is distinctly handicapped by the scarcity of raw materials and foodstuffs, especially because her overseas empire is largely useless. The bulk of her cotton requirements is imported from the U. S. A. and India. (For Trade tables see *Appendix.*)

Water-power.

Minerals.

Industrial centres.

Trade.

MALTA and **GOZO** are two islands holding the key to the route between the eastern and western regions of the Mediterranean Sea. They are in British hands, and serve as naval bases.

ALBANIA is an undeveloped mountainous country between Greece and Yugoslavia; it is inhabited by hill tribesmen. The capital is *Tirana;* and there are good natural harbours at *Durazzo* (Durres) and *Valona* (Avlona). It is now an Italian principality.

Position and Characteristics.

GREECE, the forerunner of European civilisation, occupies the southern part of the Balkan Peninsula, and includes an archipelago and the large island of Crete. The country is very rugged and mountainous, and the climate typically Eastern Mediterranean, and rainfall low. The mountains are mostly bare or covered with sparse vegetation; forests occur only in specially favoured mountain tracts. Owing to the extreme scarcity of rains it is difficult even to find sufficient water for irrigation. The settlements are therefore concentrated in the coastal tracts, where the soil is generally of rich alluvium. The principal food grains are

Products.

wheat, barley, and *maize;* no surplus is available for export. But Greece is noted for fruits such as *olives, oranges, figs, lemons* and *grapes;* and *currants,* together with *tobacco,* are the staple export of the country (p. 145). Sheep are reared especially in Northern Greece, and *wool* is obtained, but it does not enter into the export trade. *Honey* is obtained from Hymethus near Athens, and it often enters into foreign trade.

Minerals.

Some minerals are available in small quantities such as *iron* ore near Laurion in Attica and in the island of Seriphos, *chrome* in Thessaly, and *silver-lead* near Laurion. Greece is essentially an agricultural country, and her main industries are connected with the production of olive oil, wine, cheese,

Towns,

leather, and soap. The capital is **Athens,** and its port is **Piraeus.** The port of **Salonica** serves mainly as the outlet for Yugo-Slavia, and is the chief seat of the carpet

industry. **Patras** is the principal currant port. **Volos** is the main outlet and inlet of Thessaly, and has been provided with a break-water. **Candia** is the principal town of Crete. The foreign trade shows an unfavourable balance; the imports since 1924 show an excess in value over exports by about 50 per cent.

TURKEY now occupies a small territory in Europe around Istanbul (p. 366).

CENTRAL EUROPE AND DANUBE BASIN

SWITZERLAND is a small republic in the heart of the mountains of Europe, with frontiers against France, Germany, Austria, and Italy. In its physical features the country is divisible into three broad units: in the north lies a part of the *Jura Mountains;* the southern half is formed by the principal chain of the *Alps;* and between the two lies the *Swiss Plateau.* The country is not very fertile, but the people have made the best possible use of a bad situation. The plateau region is the most developed agriculturally, and contains the bulk of the population. The crops are, on the whole, similar to those of the adjacent parts of France and Germany. But *dairy farming* is even more important than agriculture, and *cheese* and *condensed milk* form important items of export. The general moistness of the climate on the exposed mountainous tracts and the windward slopes encourages a luxuriant growth of pasture-grasses, and about 70 per cent of the useable land is devoted to cattle-rearing. The cattle graze on the mountain pastures in summer, and are brought down to the valleys in winter as they become snow-covered in the cold season. About 30 per cent of the total area, exclusive of forests and waste land, is devoted

Position.

Natural regions.

Minerals.

to crops. Switzerland is poor in minerals: there is little or no coal; the output of **iron,** chiefly from the Gonzen mine, is quite small; so is also the case with **manganese,** which is also worked in the Gonzen mine. **Salt** is worked at Bex and elsewhere, and among other mineral products can be mentioned *asphalt* and *cement.* But Switzerland possesses large reserves of water-power, estimated at 4 million horse-power; of this total reserve about 20 per cent has actually been developed. The development of water-power has actually transformed Switzerland into a manufacturing country, and the bulk of the country's exports now consist of manufactured articles. Nearly the entire railway system of the country has now been electrified, and so have also been all the factories. But transport is expensive, and so it has been necessary for Switzerland to specialise in the manufacture of small objects—watches and clocks, scientific instruments and apparatus, jewellery, fine silk materials, fine cotton goods etc. The capital is **Berne** on the river Aar; it is one of the important seats of silk manufacture. Other seats of silk manufacture are **Zurich** and **Basle.** The famous city of **Geneva,** the headquarters of the League of Nations, specialises in the manufacture of watches and clocks. **Neuchatel** is also noted for watches and clocks. **Vevey** is a centre of the milk-tinning industry. The manufacture of textile and electrical machinery is done especially at **Oerlikon** and **Baden.** Switzerland's central position has made it the meeting place of various important routes. Bern and Vevey are connected with Milan, Venice and Trieste through the Simplon Tunnel which lies in Switzerland; another important railway tunnel is the St. Gothard. The Mont Cenis Tunnel through which runs the railway between Italy and France, and the Brenner Tunnel which connects Italy and Austria by rail are, however, outside Switzerland. Switzerland has no port and no coast-line; Antwerp therefore serves as the principal port for export, and Rotterdam as the principal port for

Water-power.

Industrial centres.

Communications.

imported commodities. The main *items* of export are *manufactures*—watches and clocks, machinery, fine cotton and silk goods, and cheese and tinned milk. The principal items of import are *raw materials*, and *foodstuffs*—cotton, silk, wool, metals, wheat, sugar etc. But the foreign trade is unbalanced; the total value of the imports since 1924 exceeds that of exports by about 33 per cent. Trade.

AUSTRIA has experienced many a vicissitude during the last quarter of a century or so. Once the centre of a vast empire in Europe, it was reduced to a small fraction of its former size at the end of the pan-European hostilities of 1914-18. It was a republic from 1918 to 1938 when suddenly it passed into German hands. In many respects it is like Switzerland, and like the latter it, too, readily falls into three broad physical units: the eastern end of the Alps, known as the Tyrol, covers nearly three-quarters of the total area; then there is the valley of the Danube, which cuts through the east of the country; lastly there are the hills to the north of the Danube, resembling the Jura Mountains of Switzerland. The most populous and important part of the country naturally is the Danube Valley, where the chief crops are *wheat* and *maize;* those of the Alpine region are *rye* and *oats*, but *forestry* is more important here than agriculture, and large tracts are devoted to *cattle farming*. Austria is rather rich in minerals; there are fairly large deposits of *iron* ore, *lignite*, *lead*, *zinc*, *copper*, and *salt*. The principal seats of iron and steel industry are at **Steyr** and **Donawitz**. The capital is **Vienna**, the only large town in present-day Austria, situated just where the Danube leaves the Alps and enters the Hungarian Plain; all traffic between Southern Germany and the Hungarian Plain converge on it. The city was once the seat of several important industries; at present its only industry of note is that of cloth-making. History. Characteristics. Products. Industries.

HUNGARY was a part of the former empire of Austria and Hungary; after the last Great War it become History.

Characteristics.

an independent republic. Nearly in all respects it is a direct antithesis to Austria; in contrast to mountainous Austria it is almost entirely a plain; whereas Austria is fairly rich in various minerals, Hungary is very poor in mineral resources except for a little coal and some lignite; the people of Hungary are quite distinct from the Austrians, who are essentially a Germanic race; the Hungarians are Magyars and said to be racially allied to such Asiatic races as the Turks. The fertile plains of Hungary were covered by beautiful glasslands; these have now yielded place to various

Products.

crops—*wheat* and *maize* principally in the richer south, and *rye*, *oats*, and *barley* in the comparatively poor (though not actually quite poor) north. Other important crops are *sugar-beet*, *hemp*, and *flax*. The country is suitable for *cattle*, *sheep* and *pigs*. The capital is **Buda-Pest,** a twin

Towns.

city on the Danube. **Szeged** is the chief town in the south, but it is more like an agglomeration of villages than like a town, and so are also the so-called towns of Debreczen, Kecskemet, and Szabadka. Hungary is an agricultural

Trade.

country, supplying the neighbouring regions with its own produce, and receiving in return such manufactured goods as clothing and textiles. Her largest customer still is Austria, where goes nearly a third of all the exports. Next comes Czechoslovakia for about a fifth of the exports. Germany probably stands third among her customers. And these three states between them supply about 55 per cent of the imports of Hungary.

History.

CZECHO-SLOVAKIA is also another 'succession state' which arose after the last Great War largely out of the former Austro-Hungarian Empire. It was carved out as a union of the Northern Slavs. A large part of it was absorbed in the German Reich in 1938 as a result of the notorious Munich Agreement. The whole of it is now under German vassalage. The territory includes the plateau

Bohemia.

of Bohemia known also as the Czech Plateau, where there

are large deposits of good **coal** and **lignite** as well as some **iron** ores. The region is drained by the Elbe River and its tributary, the Moldan. The rich alluvium of the river valleys yields a varied harvest of *potatoes, rye, wheat, sugar-beet* and *hops*. And here also have sprung up various manufacturing industries, and the region is dotted about by cotton mills, paper mills, saw mills, glass and chemical factories, iron and steel works etc. The capital, **Prague** (Praha), and the other important industrial town of **Pilsen** lie in this region. The Moravian lowlands, in the centre of the country, are similar in general character to the neighbouring Hungarian Plain, and the principal products of this region are *barley, maize, sugar-beet*, and *fruits*. There are rich coalfields here also: besides in the south of the region, a part of the great **Silesian Coalfield** lies in the north. And naturally therefore various manufacturing industries have sprung up in this region also. The chief centre of the region for woollen goods and machinery is **Brno**. East of the Moravian Lowlands lie the Carpathian Mountains and associated valleys—a region often called simply Slovakia. Large areas of this region are forested, and many places are rich in minerals, but it is the least developed part of Czecho-Slovakia.

Moravia.

Slovakia.

YUGOSLAVIA is another 'succession state' that arose after the last Great War. It is the union of the Southern Slavs. The Alpine region of the country, formed by a few small spurs of the Alps, is roughly coincident with the province of Slovenia, and resembles the neighbouring state of Austria in general characters. The Adriatic Coast, known also as Dalmatia or the Dinaric region, is also mountainous, being formed largely by the Dinaric Alps. The region is generally very dry and full of limestone mountains. The principal products of the more fertile tracts of the region are Mediterranean *fruits*. At the junction of the Alpine region and the Dinaric region some minerals

History.

Alpine region.

Adriatic coast

Northern Plain.

are found. The Northern Plain of the country is actually a part of the great Hungarian Plain; it is, however, entirely cut off from Mediterranean influences, and has a continental type of climate. But the products of the naturally rich soil agree with those of Hungary, and are represented mainly by *wheat, maize, tobacco,* and *sugar-beet.* The Southern Region of the country is the largest natural unit, and has varied characteristics. The hills are partly forested and partly covered by pastures suitable for sheep and cattle. The sheltered valleys yield *wheat, maize,* and *fruits,* especially plums which forms an important item of export in the dried state. The *vine, sugar-beet, hemp,* and *tobacco* are also grown in suitable areas. And there are, in this region, deposits of various minerals, especially of *iron* and *lead.* The capital is **Belgrade**, on the Danube; it lies at the northern end of the Southern Region. **Nish** is on the route to the Greek port of Salonika. On the Adriatic Coast and near the Italian port of Fiume has been built the new Jugoslav port of **Susak.** Farther down are the ports of **Split, Dubrovnik** (Ragusa), and **Kotor** (Cattaro). **Sarajevo** is an important inland town; **Zagreb** is the principal town of the Northern Plain. The Jugoslav ports are difficult of access, and the country's main outlets are the Greek port of Salonika on the Aegean Sea, and the Italian ports of Trieste and Fiume. The Danube, on the other hand, serves as the highway into the northern countries. The principal exports are *timber, fruits, animals, wheat,* and *maize;* the principal imports *manufactured goods* generally. The balance of foreign trade is, on the whole, favourable.

Southern region.

Towns.

Trade.

RUMANIA is divided into two parts by the Carpathian Mountains and the Transylvanian Alps. The mountains are covered by forests, yielding valuable *forest products;* and along the southern foothills lie a number of rich *oilfields,* which constitute the principal source of

Natural regions and Resources.

national wealth. The country is, moreover, rich in other minerals; for among the difficult hill region in the west are important deposits of *gold, copper, silver, lead, iron,* and *coal;* but the output of minerals is small. To the south-east of the mountains lie the Wallachian Plain, formed mainly by the valley of the lower Danube. Geographically it may be regarded as a part of the steppelands of Russia. The climate is continental and the rainfall low. It has now been transformed into one of the major wheat-lands of the world. Besides *wheat,* the other crops grown are *barley, maize* and *oats,* and it is from here that the bulk of the surplus of agricultural produce is obtained for export. The capital, **Bucharest,** lies in this region. Other important towns. towns of this region are **Galatz** and **Braila,** both river ports on the Danube. **Constantza,** on the Black Sea, is the most important port of Rumania; it remains ice-free all the year round, and oil from the refineries at **Ploesti** is sent by pipe line to Constantza for export. The principal items of export are *wheat, maize, timber, oil,* and *livestock;* Trade. the principal items of import are *cotton* and *woollen goods* and *machinery.* The foreign trade has long been maintining a favourable balance.

BULGARIA is a small mountainous country, and falls into three natural regions: (a) *The Lower Danube Valley* in the north, (b) *The Balkan Mountains* and the *Rhodope Mountains* in the centre, and (c) *The Valley of the Maritza River* in the south. It is essentially an agricultural country; Natural regions. the principal crops are *wheat, maize, tobacco, sugar-beet,* and *fruits.* There are valuable forests of *oak* and *beech* on the mountains; and the country owns large numbers of Products. sheep, goats, and pigs. The capital is **Sofia.** The centre of the Maritza Valley is **Philippopolis. Ruschuk** is a Towns. Danube port, and **Varna** the Black Sea port. The principal exports are *eggs, wheat, maize, tobacco;* the principal imports, *cotton* and *woollen goods.* The imports Trade. are generally slightly higher in value than the exports.

EASTERN EUROPE AND SIBERIA

RUSSIA

The Union of Socialist Soviet Republics

Area and Population.

Position and Size.—The Union of Socialist Soviet Republics—an enormous territory covering an area of over 8¼ million square miles, with a population (in 1932) of 163,200,000—is, however, not exactly coincident with the old Czarist Russia; in the political settlements which followed the Bolshevist Revolution of 1917, Finland wrested her own independence, a fragment on the western margin of the old empire was added to the new Republic of Poland, and the three small Baltic states—Estonia, Latvia, and Lithuania—were constituted as independent Republics. With the opening of the present European conflict, however, has been witnessed the swallowing up by the U. S. S. R. of part of Poland, all the three Baltic states and a small fragment of southern Finland. The whole of the Soviet territory lies far beyond the tropics—in the Temperate and the Frigid Zones; and, although bordered on nearly all sides by oceans and seas, Russia has few outlets to the open ocean: the Arctic Ocean on the north allows passage only for two or three weeks in mid-summer; the Pacific coast on the east remains ice-bound in winter; the passage through the Black Sea, open all the year, is, however, under the control of Turkey at the Bosporus and the Dardanelles; on the west, Russia is guarded by Rumania, Poland, and the three small Baltic states recently absorbed in the U. S. S. R; and Finland and Estonia, between them, have complete control over the entrance to and exit from the region of Leningrad.

Position.

European Russia.

Physical Features.—The enormous territory of the U. S. S. R. may be divided into the following broad

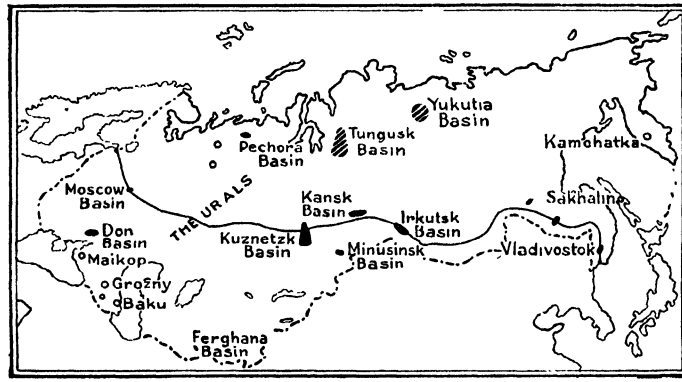
physical units: (a) *The Plain of European Russia;* this is actually the famous Russian Platform, and it occupies nearly the whole of European Russia from the Arctic Ocean to the Black Sea on the one hand, and to the Caucasus

THE NATURAL REGIONS OF RUSSIA

Mountains and the Caspian Sea on the other. (b) *The Caucasus and Trans-Caucasia* form a comparatively tiny area in the southern part of European Russia (c) *The West Siberian Lowlands* lie east of the Ural Mountains. (d) *Eastern Siberia,* bordering the West Siberian Lowlands on the east, is a low dissected plateau. (e) *The Far East* consists of a succession of mountain chains. (f) *Russian Central Asia* lies east of the Caspian Sea and south of the West Siberian Lowlands; it is bordered on the south and east by the mountains of Central Asia, and consists of steppelands. Asiatic Russia.

Geology and Minerals.—Russia is enormously rich in mineral resources. The Russian Platform consists of pre-Cambrian rocks resistant to later Alpine folding, and is covered by huge deposits of later sediments. These later sediments contain large **coal** measures and deposits of lignite. One of the coal basins lies in the Arctic region of Russian Platform.

European Russia; another field yielding lignite occurs south of Moscow; but the most important coalfield of European Russia is in the Don or Donetz basin south of Moscow. Other minerals include large deposits of **iron** ore near



THE COAL AND OIL FIELDS OF RUSSIA

the Black Sea, and **nickel** and **apatite** elsewhere. Russia is now the second greatest producer of iron and steel in the world (after the U. S. A.). There are huge deposits of wind-borne loess over central and southern Russia, and this has transformed a vast tract of the country into a rich agricultural land.

Caucasus and Trans-Caucasia.

The region of the Caucasus and Trans-Caucasia is formed by folded mountain chains and exposed rocks of a very remote geological age. These ancient rocks are often highly mineralised; there are large deposits of **lead** and **zinc** in the north, and vast stores of **iron, manganese, copper,** and **aluminium** in the north of this region. But more important than any of the metallic minerals is **oil,** which occurs along the flanks of the Caucasus. The important oilfields of the region are those of Grozny, Maikop, Baku, and Tiflis. Russia is now second only to the United States as a producer of oil.

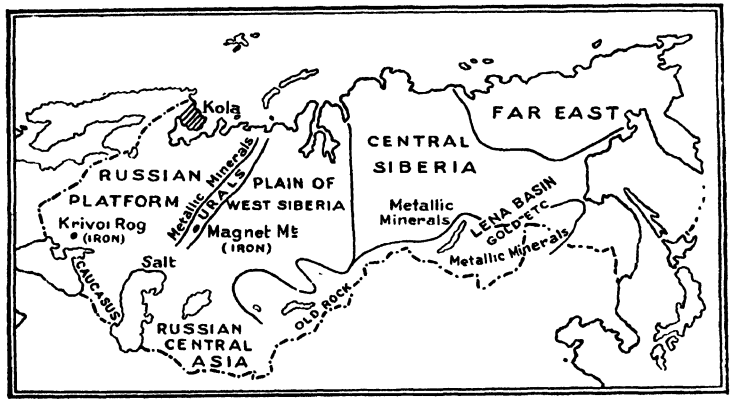
Urals.

The Ural region is also largely composed of ancient mineralised rocks, yielding large quantities of **iron, copper, manganese,**

nickel, gold, aluminium, coal, and **oil.** Of the various iron-fields the most important is the Magnet Mountain near the town of Magnetogorsk, an important centre of iron and steel industries. The oilfields occur along the flanks of the Urals from the Arctic Ocean to the Caspian Sea. There is an important coalfield on the flank of Siberia, and in the north occur huge deposits of potash **salts.** Along the south-eastern margin of the West Siberian Lowlands is the great coalfield of the Kuznetzk basin. The low dissected plateau of Central Siberia is also a great mass of ancient rocks,

West Siberia.

Central Siberia.



THE MINERALS OF RUSSIA OTHER THAN COAL AND OIL

which are mineralised in places; and here we find the **goldfields** of the Lena basin, and various other minerals including **coal** in the Tungusk basin, Yakutia basin, Minusinsk basin, Irkutsk basin, and Kansk basin (p. 359). There are two **coal** basins in the Far East, and **oilfields** in Kamchatka and the island of Sakhalin, while **gold** is of wide distribution in this region. The region, however, lies largely unexplored yet. Russian Central Asia has deposits of **gold, copper, lead, tin, zinc,** and **coal,** and the region is believed to have oil as well. Russia is now believed to rival South Africa in the production of gold. The country

Far East.

Russian Central Asia.

also possesses huge reserves of water-power, sometimes estimated at 33 p.c. of the world's total.

Basic facts.

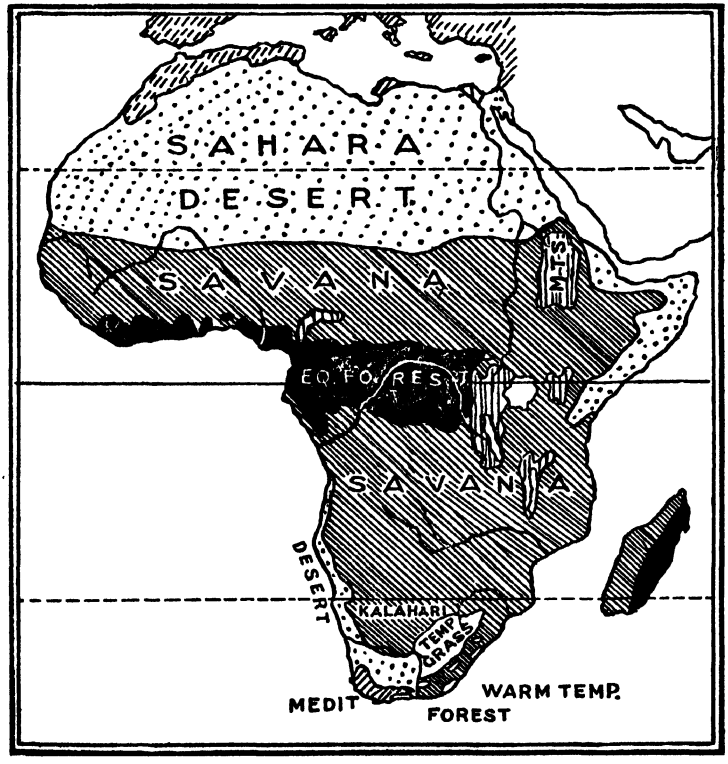
Climate and Vegetation.—Russia is an enormous land mass, and the climate must necessarily be of the continental type; and indeed it is so, for the world's coldest spot lies in the heart of Siberia (p. 71). But in summer temperatures of over 90°F. are sometimes recorded even within the Arctic Circle. The whole country can be divided into at least six major climatic belts: there is first the region of Arctic Climate along the northern rim of Russia; south of this lies the belt of Cold Temperate Climate, covering by far the largest part of the country; the south-eastern margins have the Manchurian Climate, and to the south-west of the Manchurian belt is a small area of Steppeland Climate; the Steppeland Climate occurs also along the borders of the Black Sea and the Caspian Sea, and south of this is found Desert Climate; and lastly the East European type of climate occurs in the region nearest to the Baltic Sea. Corresponding to these climatic divisions are the major vegetation belts: along the Arctic seaboard lies the *Tundra region,* with its characteristic swampy soils and mosses and lichens. South of it lies the great belt of *Coniferous Forests* which yield valuable soft-woods; the soil of the Coniferous Forest region is known as podsol,—it is ash-coloured and poor in plant food. Then there are *Deciduous Forests* in the region of East European Climate; the soil is better. South of the Deciduous Forest region lies an enormous area of rich *glassland* with scattered trees; this is the region of the famous chernozems or black earths of rich loess formation, and the region is naturally the great granary of Russia (p. 90). South of the Black Earth region lie the *Steppelands* with characteristic chestnut-brown soil, which is fairly rich in plant food. Last of all there lies the *Desert belt* around the Caspian Sea, with its red and yellow soils; but the region, though infertile, is very important to Russia as it is the only area where tropical

Climatic Zones.

Vegetation Belts.

northward, and the south-west extremity of the continent, where it is then winter, receives its share of moisture from the N. W. Anti-Trades. And owing to the severe heat over the Sahara region the hot air rises and draws in a deflected branch of the S. E. Trades across the sea so as to cause heavy showers all over Central Africa. This deflected branch of the S. E. Trade Winds may as well be described

Wind Systems and Rainfall.



THE NATURAL VEGETATION OF AFRICA

as monsoon winds. During the southern summer (Nov.-April) the wind systems swing southward, so that the S. E. Trades cover the whole of South Africa and bring in

heavy showers; but the south-west extremity falls in the rain-shadow of the eastern mountains. At this season the N. E. Trades shift farther south in North Africa, where it is still very dry; but the north-west extremity comes under the influence of the rain-bearing S. W. Anti-Trades. Central Africa, however, is a region of rainfall all the year round, and as is only natural for all Equatorial regions it, too, is a land mass of convectional rains.

Natural Vegetation.—These climatic conditions are beautifully reflected in the natural vegetation of the continent: (a) *Equatorial Forests* occupy the Congo Basin and the Guinea Coast where it is always 'hot and wet.' (b) *Tropical Grasslands or Savanas,* with rain in summer and drouth in winter, cover both sides of the Equator as far north as the Kalahari Desert. (c) *Deserts* cover enormous tracts in Africa and occur on the borders of the Savanas. (d) *Mediterranean Vegetation* likewise occurs on the borders of the deserts in the north as well as in the south. (e) *Warm Temperate Forests* are found only in the south-east. (f) *Temperate Grassland,* known as the veld, covers the south-eastern part of the high Plateau of South Africa. (g) *Mountain Vegetation* occurs in the Abyssinian Mountains.

THE ATLAS REGION

General considerations.

The Barbary States occupy the north-west of Africa. Along this region run the mountain chains of the Atlas; and each of the three states is divisible into three parts—(a) *The Coastal Plains;* (b) *The plateau bounded by the principal chains of the Atlas;* and (c) *The Plateau of the Sahara.* The climate is Mediterranean throughout.

MOROCCO is the westernmost state of the three. It is a Sultanate under French protection. The chief agricultural products of the fertile coastal plains are *barley, wheat, maize*, and various *fruits* such as olives, organes, vines, figs, etc. *Date-palms* are grown in the oases of the Sahara region; and the chief forest products obtained from the plateau enclosed by the Atlas chains are *cork* and *cedar* In this plateau region sheep are reared, and there are numerous cattle in the plains. The capital is **Marrakesh** or **Morocco**; but the chief town and port is **Casablanca. Fez** is an important inland trade centre. The exports consist chiefly of *eggs, wheat, barley, almonds, wool, linseed*, and *fez cap* and *leather*. The trade is chiefly with France and Britain, but fez caps and leather go mainly to other parts of Africa. The imports, however, exceed the exports by more than double the value.

Products.

Trade.

A small area of Morocco, including the port of **Ceuta,** however, belongs to Spain.

ALGERIA is a French Colony. Its products are similar to those of Morocco, and it has important *fisheries* along the coast. Mining is important, especially of *iron* ore and *phosphate*. The principal towns are **Algiers,** the capital and **Oran**—both ports. The chief items of export are *wine, sheep, wheat, tobacco*, and *minerals*. The trade is mainly with France.

Products.

Trade.

TUNIS is also a French Protectorate. Its capital is **Tunis.**

For the development of this region the French have built a number of railways, which connect nearly all the important towns such as Casablanca, Fez, Oran, Algiers, and Tunis, and at the same time penetrate into some of the oases of the Sahara.

Communications.

THE NILE BASIN

Characteristics.

THE SUDAN lies between Egypt and Uganda, and is under the joint control of Egypt and Great Britain; hence the name, **Anglo-Egyptian Sudan.** It, too, is a 'gift of the Nile,' though in a somewhat modified sense; the rainfall is low, and but for the waters of the Nile the whole tract, covering as it does an area of more than 1,000,000 sq. miles, would be a desert. Large stretches of land have been irrigated, especially since the construction of the *Sennar Dam in* 1925. The climate is suitable for a great variety of crops, especially *cotton,* and the soil has also been made suitable for them. Large tracts are now actually under cotton; for the British Empire is now trying hard to be self-sufficient in respect of this valuable commodity (pp. 158-60, 162). The principal town is **Khartoum,** and the chief port is **Port Sudan.** There is railway connection between the two. The principal exports are *cotton, gum* and *millet.*

Trade.

Natural Regions.

EGYPT is theoretically independent, but actually under British protection. It, too, is a vast country with a total area of 383,000 sq. miles; but the habitable territory of the country is no more than only 12,000 sq. miles in area. The population is 14,200,000. Long, long ago Herodotus called it 'the Gift of the Nile.' Leaving the great desert waste, we may divide Egypt into two natural divisions: (a) *Upper Egypt* and (b) *Lower Egypt.* Upper Egypt is actually coincident with the *Nile Valley,* and Lower Egypt with the *Nile Delta.* The principal commercial crop of Egypt is *cotton,* and Egyptian cotton is noted for its quality (pp. 160-61). Other crops of importance are *maize, wheat, barley, beans, sugar-cane, and rice.* The capital is **Cairo** at the head of the Nile Delta, and the principal port is

Trade.

Alexandria. Cairo has railway communication with Palestine. The total value of Egypt's export trade for a long period has been roughly 7 p.c. higher than that of her import trade. (For Trade tables, see *Appendix*.)

ABYSSINIA is an undeveloped mountainous country believed to have great economic possibilities. The capital is **Addis Ababa,** which has direct railway communication with the French port of Jibuti.

THE EASTERN HORN

ERITREA, to the north-east of Abyssinia, is an arid country little developed as yet. The capital is **Asmara,** and the chief port is **Massawa.** There are *pearl fisheries* along the coast, and the export trade consists of some hides and skins.

SOMALILAND, divided into French, British and Italian Somalilands, is also arid and undeveloped. Political Divisions. **Jibuti** is the chief port of French Somaliland. **Berbera** is the principal port of British Somaliland. And **Mogadiscio** is the chief port of Italian Somaliland.

EAST AFRICA

East Africa is divided between Britain and Portugal. The whole region consists of two broad physical units: (a) *The Plateau* (which is actually a part of the high plateau of Africa) and (b) *The Coastal Plain.* The whole region lies in the tropics, and has abundant rainfall. Natural regions. But the Plateau Region, usually quite high, has a pleasant climate, and a moderate rainfall. Moreover, the soil is often rich. And the region is suitable for *maize* and *cotton* as well as for *coffee* and *sisal hemp.* It is also suitable for Products.

cattle. The Coastal Region, on the cntrary, is hot and humid and often covered with mangrove swamps. It is suitable for *rice*, *cocoanuts*, *rubber*, *sugar*, and *spices*.

UGANDA is a British Colony, south of the Sudan. It lies wholly within the plateau region. The principal commercial product is *cotton*.

KENYA lies east of Uganda. It is also a British Colony. It is divisible into two parts—plateau and coastal plain. The chief products are *cotton* and *coffee*, besides *maize* and *millet*. **Mombasa** is the chief port of Kenya, and **Nairobi** an important inland town.

TANGANYIKA lies south of Kenya. It is a British Protectorate, wrest from the Germans. **Dar-es-Salaam** is the chief port.

NYASALAND, farther south and inland, is also a British Protectorate. **Zomba** is the capital.

PORTUGUESE EAST AFRICA is formed entirely by coastal lowlands, and its southern end lies outside the tropics. **Beira** and **Lourenco Marques** are its ports; the latter serves as the main outlet for Transvaal, South Africa.

ZANZIBAR and **PEMBA** are two islands under British protection. The chief town, **Zanzibar**, is a busy trading centre and port, noted for spices.

SOUTH AFRICA

Political Divisions.

South Africa consists of the Union of South Africa, a British Dominion, and a number of native states under British protection such as Basutoland, Swaziland, and Bechuanaland. The British colonies of Northern and Southern Rhodesia may also be included in this division.

THE UNION OF SOUTH AFRICA occupies the greater part of South Africa, and consists of the four provinces of the **Cape of Good Hope, Natal,** the **Orange Free State,** and the **Transvaal.** The whole area naturally falls into two broad divisions: (a) *The Plateau,* containing the Stormberg and Drakesberg Mountains (these are really the highest edges of the plateau), and (b) *The Coastal Lands.* Since the plateau descends to the coastal lands by a series of steps, the latter again fall into two sub-divisions: (i) *The Karoo, i.e.,* the series of steps, and (ii) *The Coastal Plain.* With the exception of the south-western part where the climate is Mediterranean, the whole of this territory has rainfall in summer. But the lower surface of the plateau is in the rain-shadow of the Stormberg and Drakesberg Mountains. The slope is from east to west. The whole territory of the Union can thus be divided into a number of natural regions: (a) *The Mediterranean Region* of the south-west coastlands around the port of Cape Town. The principal products of the region are *wheat, barley* and a variety of *fruits* such as oranges, grapes and peaches. Naturally therefore fruit-tinning, wine-distilling, and the preparation of jam are the important industries of this region. (b) *The Karoo,* sub-divided into the Little Karoo and the Great Karoo, occupies the area lying between the Mediterranean coastal tracts and the High Plateau of South Africa. Owing to low and uncertain rainfall and the consequent poverty of vegetation this is a region of sheep farming. (c) *The Warm Temperate Forest Region* of the south-east coastlands is a region of summer rain. The principal crops are *maize* and *corn, sugar-cane,* and *tobacco.* (d) *The Veld* or Temperate Grassland of the south-east highlands lie between the south-eastern coastlands and the edge of the high plateau, covering the greater part of Natal, and the Transvaal, the whole of the Orange Free State, and the eastern part of Cape Colony. Large tracts are, however, covered by

Units.

Relief.

Climate.

Natural Regions and Products.

forests, yielding timber of some value. In the grasslands sheep farming and cattle farming are important. Much *wool* from this region is exported to England every year. But the region is very rich in mineral wealth: Coal is mined near New Castle and Johannesburg, and exported through the ports of Durban and Lourenco Marques. Half the world's total annual output of **gold** is mined at the Witwatersrand, near Johannesburg. And there are the large **diamond** mines of Kimberley and Pretoria. (e) *The Desert Region* occupies the western half of the plateau and extends as far west as the coastlands. **Cape Town** is the capital and chief port of the Cape of Good Hope. **Port Elizabeth,** on Algoa Bay, is another important port of the province. **East London,** on the Buffalo River, is a rising port. **Simon's Towns** is the naval station of the Union. **Pietermaritzburg** is the capital of Natal, and **Durban** its chief port. **Bloemfontein** is the capital of the Orange Free State. **Pretoria** is the capital of the Transvaal; but **Johannesburg** is the largest town.

Minerals.

Towns.

RHODESIA, now divided into the two British colonies of **Northern Rhodesia** and **Southern Rhodesia,** lies in the plateau region. But the land is said to be arable, especially in the valleys of the rivers Limpopo and Zambesi; and it is suitable for sheep and cattle also. The territories are not yet developed in any sense, although agriculture and mining are practised there. The population is exceedingly small. The whole territory is said to be rich in minerals: there are valuable **copper** mines and **coal** deposits in Northern Rhodesia; and in Southern Rhodesia there are **gold mines.** The natural outlet of Rhodesia is the Portuguese port of Beira.

Divisions.

Resources.

ANGOLA is a Portuguese possession. The territory is said to be suitable for cattle farming. **Lobits** is the port, and **Loanda** the capital.

THE BELGIAN CONGO occupies the greater part of the Congo Basin, which is the most notable Equatorial region in the world after the great Amazon Basin of S. America. It is a hollow-shaped plateau drained by the Congo and its tributaries, which have their sources generally in the mountain fastnesses of the high plateau of South Africa. Owing to the unbearable humidity of the atmosphere the lowlands are covered with dense equatorial forests and the uplands with savana or grassland. The typical products of the forests are *rubber, oil palm, palm kernels,* and *copal.* The Congo forests are the homelands of numerous herds of elephants, and one of the most important product of the region is, therefore, *ivory.* In the interior is the **Katanga** region, a southern appendage of the Belgian Congo, believed to be rich in mineral reserves, especially in **copper. Elisabeteville,** the metropolis of Katanga, is the chief centre for the mining of copper. There are **iron** and **lime** also in close proximity to the copper-fields. Other minerals worked are **gold, tin,** and **diamonds.** Katanga lies close to Rhodesia, and indeed from the geogrphical point of view it is more a part of the latter than of the Belgian Congo. Coal and foodstuffs for the miners are, therefore, obtained from Rhodesia. The capital of the Belgian Congo is **Boma**; it is also a port of importance. **Matadi,** about 100 miles from the sea, is another important port accessible by ocean-going vessels. **Leopoldville** and **New Antwerp** (formerly Bangala) are important towns. There are railway communication between Matadi and Leopoldville.

Extent.

Characteristics.

Products.

Resources.

Towns.

THE GUINEA COAST

The Guinea Coast is divided amongst Britain, France, Portugal, and Spain; but there is a small Negro

Physical Units.

republic also. The whole of this region may be divided into two physical units: (a) *The Plateau Regions,* and (b) *The Coastal Plain.* The Plateau Regions have a comparatively light rainfall and a poorer soil covered by savana or grassland. The principal food crops of this region are *millet, maize, rice,* and *ground-nuts, Cotton* is also important. Minerals sometimes occur as, for example, **gold** and **manganese** in the Gold Coast; and **tin** and **coal** in Nigeria. The coasted plain has a heavy rainfall and a hot damp climate. In the damper parts the typical vegetation is evergreen equatorial forest, in the drier parts occur deciduous forests. The principal forest products are *mahongany, ebony* and other hard timbers, *wild rubber, oil palm, etc.* There are rubber plantations as well, and large quantities of *cocoa* are also produced. *Rice, manioc, maize,* and *cocoanuts* we also cultivated.

Products and Resources.

LIBERIA is a Negro republic founded in 1820 for the liberated slaves. The territory is undeveloped. **Monrovia** is the capital.

GAMBIA is a small British Colony of only 4 sq. miles; but the Protectorate has an area of about 4,000 sq. miles. The capital is **Bathurst.** The exports consist of *rubber, cotton, hides* and *ground-nuts.*

SIERRA LEONE consists of another British colony and Protectorate. Its exports are *rubber, palm oil* and allied products, **Freetown** is the capital and chief port; it is a coaling station, and has a good harbour.

NIGERIA also consists of a British colony and a Protectorate. Its chief products are *rubber, palm oil, cocoa, cotton, coffee, gum etc.* The capital and chief port is **Lagos.**

GOLD COAST also consists of a British Colony and a Protectorate. The chief exports are *palm oil, rubber* and *cocoa.* The principal port is **Accra.**

French West Africa include all the territories from Cape Blanco to the Congo, with the exception of those under other European Powers. The principal units are **SENEGAL,** with its capital of **Fort Louis; Dahomex** with its capital of **Porto Novo;** and that indefinite territory known as FRENCH EQUATORIAL AFRICA extending upto the Nile Basin.

SAHARA is nominally a French possession. The typical product of the oases is the *date-palm.*

LIBYA is the north-eastern part of the desert held by Italy.

ISLANDS OF AFRICA

Madagascar is one of the largest islands in the world. It is a French colony. The island consists of a plateau in the centre, surrounded by coastal plains. It is covered with dense forests, from which *rubber* is obtained. *Hides* are exported. The capital is **Antana** in the centre, surrounded by coasted plains. It is covered with dense forests, from which *rubber* is obtained. *Hides* are exported. The capital is **Antananarivo.**

Mauritius, St. Helena, and **Ascension** belong to Britain. The French island of **Reunion** lies near Mauritius.

CHAPTER III

AMERICA

THE NEW WORLD

North America

Area.

Position and Size.—North America with Greenland has an area of about 9½ million sq. miles—rather more than half the size of Asia. Its position is best defined by three lines of latitude and longitude: the **Arctic Circle** runs through the north of the continent across Alaska and Greenland; the **Tropic of Cancer** cuts through the southern tip of California and the middle of Mexico; and the longitude of **100·W.** passes through the heart of the continent from north to south. The coastline is longer relatively to area than that of either Africa or Asia.

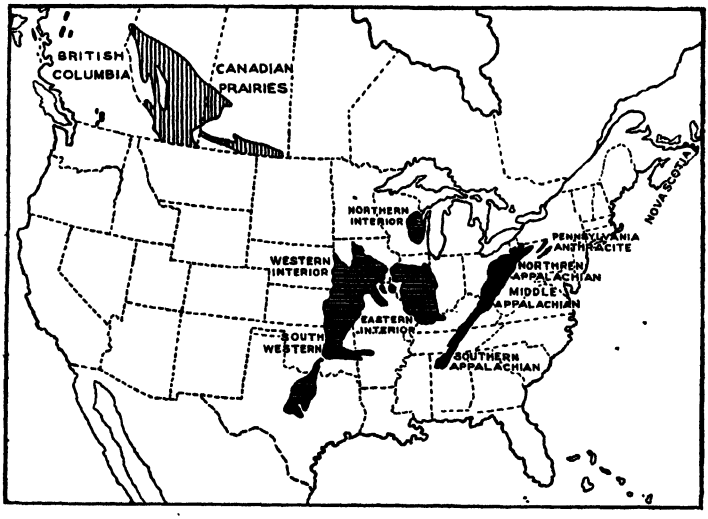
Position.

Rocky Mountain System.

Physical Features.—North America falls into three broad physical divisions: (a) *The Rocky Mountain System* of the west is constituted by a series of Alpine fold mountains and intervening plateaus. In the north there is the **Coast Range** bordering the narrow and broken coastal plains; then there is the **Selkirk Range,** and in between the two are a number of small plateaus. Further east is the **Rocky Mountains.** Between the Coast Range and the Rocky is the **Plateau of Yukon.** In the middle region of the System is the **Coast Range** bordering the Pacific Ocean; then there is the **Cascade Range** and the **Sierra Nevada;** and farther east is the main mountain chain of the Rocky. The **Plateau of Columbia** and the **Colorado Plateau** lie in the intervening space. Farther south lies the **Plateau of Mexico.** (b) *The Central Plains*

Central Plains.

of North America are constituted by the lowlands round the Hudson Bay in the north, the lowlands round the Gulf of Mexico in the south, and in the west by the gradually rising plains adjoining the Rockies. (c) *The Eastern* Eastern Highlands.



THE COALFIELDS OF NORTH AMERICA.

Highland are constituted by the **Appalachian System of Mountains** and the **Plateau of Greenland** and the **Laurentian Plateau** (or Plateau of Labrador).

Geology and Minerals.—The Rocky Mountain System is formed by Alpine fold ranges and plateaus of ancient rock formation. Naturally therefore it is associated in places with various minerals such as **gold** in the Yukon, **silver** in Mexico, and a variety of minerals in the United States. **Oilfields** also occur on the flanks of the mountain chains. The great 'Canadian Shield' is a mass of ancient crystalline rocks, in many places highly mineralised; and so a large number of minerals such as **iron, copper, silver, gold, cobalt,** and **nickel** are found in that region also.

The Appalachian Mountains are also formed of ancient rocks, and on the western side of them lie the richest known **coalfields** in the world. Important **oilfields** also occur on the flanks of the Appalachians.

Temperature and Winds.

Climate.—The warm North Pacific Drift flows along the west coast of North America, keeping it warm. The west coast is also under the influence of the warm, moist Westerly Winds (S. W. Anti-Trades); but the Rockies act as an effective barrier and prevent them blowing inland. The heart of the continent is, however, open to Arctic influences in winter. The climate of the interior is continental. The south-eastern parts of the continent are under the influence of the N. E. Trade Winds. Rainfall is rather heavy on the northern part of the west coast and the Pacific slopes of the Rockies, since the region lies in the Westerly Wind Belt, and therefore has rain all the year round. So also does the eastern sea-board, which is under the influence of the N. E. Trades. But in the interior precipitation occurs mainly in summer; while the eastern half of this region has a fair share of rain, the western half is exceedingly arid. A small part of the west coast, however, has winter rain.

Rainfall.

THE STATES OF N. AMERICA

Area and Population.

CANADA is a British Dominion. It is over 3¾ million sq. miles in area and has a population of about 10,400,000. It stretches from the Arctic Ocean on the north to the boundary of the U. S. A. on the south, and from the Pacific shores on the west to the Atlantic shores on the east. Thus the whole territory is entirely outside the tropics, and in this Canada offers a sharp contrast to Australia, another British Dominion. It readily falls into the three broad physical divisions enumerated above: there is the *Rocky Mountain System*

Position.

in the west; farther inland is the great *Central Plains;* and in the east are the *Eastern Highlands.* (a) **The Rocky Mountain System** roughly coincides with the province of British Columbia. The whole region is mountainous; the coastal areas are often deeply fiorded and separated by narrow straits. Of the numerous islands that lie in this region Vancouver is the largest. It is a region of the S. W. Anti-Trades, and thús receives abundant rainfall; but the distribution of rainfall is governed by topography with the result that while the exposed mountains receive an abundant supply of moisture, the sheltered plateaus and valleys lie in their rain-shadow. The warm North Pacific drift flows by the coast keeping it warm. The mountains are often covered with coniferous forests yielding good quality *pine, fir* and *cedar.* Lumbering is, therefore, an important industry in this region. But owing to the mountainous nature of the country, the amount of land available for settlement and cultivation is strictly limited. But there are fine orchards, especially in the southern part of British Columbia where the climate is comparatively warm; the chief fruits grown are *apples, plums, peaches, pears, cherries,* and *grapes.* The older rocks of the plateaus are often rich in minerals: **copper** is fairly abundant in the coastlands; **zinc** and **lead** in the interior; **gold** is also found: there were the famous *Klondike Goldfields* in Yukon in the north. The *fisheries* of the Pacific Coast are very important (p. 154), and the tining of fish, especially of salmon, is an important industry. (b) **The Central Plains** roughly coincide with the three *'Prairie Provinces'* of Alberta, Manitoba, and Saskatchewan. But in the north large tracts of land are covered by tundra, bordered on the south by the great coniferous Forest Belt. Lumbering and the gathering of pulpwood are naturally important in the Forest Belt. Another industry particularly associated with these forests is that of gathering furs from the animals of the forests; but these are now getting scarce, and animals

Western Region.

Resources.

Central Plains.

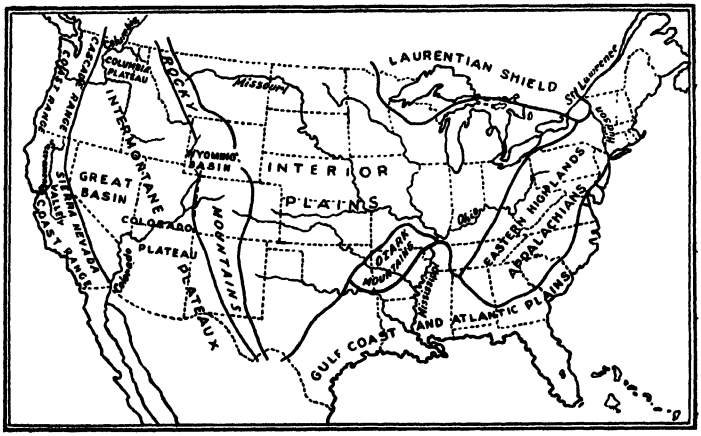
are now being largely reared for obtaining furs. The actual prairies lie south of the coniferous Forest Belt, and form part of the enormous grassland of North America. The soil is generally fertile, but the rainfall not sufficient everywhere. The eastern parts have a moderate rainfall, and constitute one of the best *wheatlands* in the world. The middle regions are drier, but still suitable for wheat. But in the extreme west it is so dry that irrigation from the streams of the Rockies has to be carried out even for raising *fodder* crops; at present this is the principal *cattle-ranching* area of Canada. Other crops of the prairie region are *oats, barley,* and *flax*. *Cattle-farming, poultry farming* and allied industries are extensively practised, and the products obtained from such industries are *eggs, butter, ham* etc. Canada has often been described as 'the making of railways', and considering the rapid development of the prairies the description seems quite justified.

(c) **The Eastern Highlands** include the Laurentian Shield as well as the Maritime Provinces. The climate and other notable features of the region covered by the basin of the St. Lawrence River has already been noted (p. 67). The prairies constitute the principal agricultural region of Canada, while this is the main manufacturing region. The paper and pulp industry as well as the timber industry of the Dominion is centred in **Ottawa,** the capital. **Quebec** is the chief seat of the leather and cotton industries. Iron and steel industries are centred at **Toronto,** and there are some weaving mills here, too. **Montreal** has miscellaneous industires. The ports of Canada have already been dealt with (p. 315).

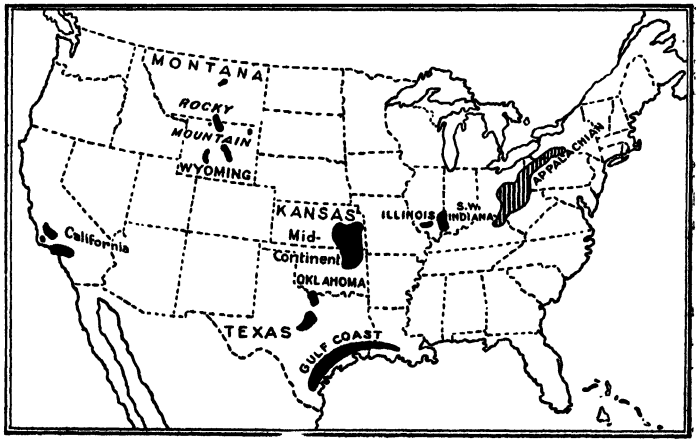
Position and Extent.

THE UNITED STATES OF AMERICA extends from the Canadian borders on the north to the Mexican borders on the south, and from the Pacific coast on the west to the Atlantic coast on the east. It includes 48 states, and holds sway over Alaska, the Philippine Islands and the Hawaiian Islands. The whole territory of the union

falls into three broad physical divisions: (a) *The Rocky Mountain System* in the west, (b) *The Central Plains,* and



THE PHYSICAL REGIONS OF THE UNITED STATES.

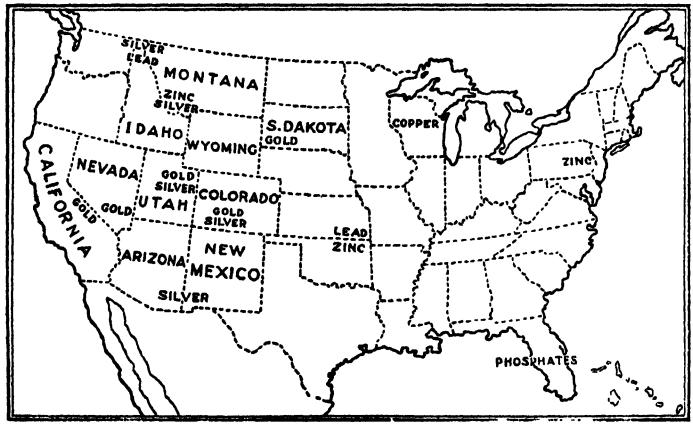


THE OILFIELDS OF THE UNITED STATES.

(c) *The Eastern Highlands.* The Rocky Mountain System is formed by Alpine chains and the intervening plateaus of

Relief, Geology and Minerals.

Columbia and Colorado; in many places these ancient rocks are naturally highly mineralised, and yield vast quantities of *copper, gold, silver, lead, zinc,* and *aluminium;* and along the Alpine slopes, notably in California, lie a number of rich **oilfields.** The Central Plains are largely composed of sedimentary rocks, often associated with **coal** and **oil.** The Appalachian Mountains in the east are also associated in many places with various **metalliferous minerals** and **coal** (for details Ch. VI-VII.). The United States is the richest mineral producer in the world, and in this has no rival except only the U. S. S. R. It is deficient only in less valuable minerals such as tin, nickel, chromium, and



THE METALLIFEROUS MINERALS OF THE UNITED STATES.

manganese. Some of these minerals are required for the production of steel, and thus despite its large mineral resources the U. S. A. is not wholly independent of foreign supplies. The climate is, on the whole, continental: the Rocky Mountain System almost completely cuts off the westerly winds, and so also does the Appalachian System with regard to the easterly winds. But on the north the Central Plains are open in winter to Arctic influences.

Climate.

Nearly 43 per cent of the total area of the Union is under *forests,* and both *softwoods* and *hardwoods* are fairly evenly distributed over the forest regions. About 38 per cent of the surface is classed as *grassland,* of which the *Prairies* alone account for nearly five-sixth. Desert and semi-desert lands cover about 14 per cent of the entire land surface, and a little over 5 per cent is classed as scrubland. But strangely enough the United States is now largely dependent on foreign supplies of wood-pulp and paper. These are obtained mainly from Canada. The vast Prairies of the U. S. A. (and of Canada) were once the great haunt of bison and buffalo; but these have been nearly totally exterminated long since. The *fisheries* of the U. S. A. are, however, of very great importance (p. 154). United States is rather erroneously believed to be pre-eminently an industrial country; but the truth is that despite the importance of its manufactures agriculture is still very important, and it would be more accurate to describe it as half agricultural and half industrial. The main agricultural regions lie in the eastern half of the Union, where precipitation is fairly abundant. The western half is too arid for crops, are devoted to *sheep-rearing* and *stock farming.* There are five main agricultural belts: (a) *The Spring Wheat Belt* occupies the north-west of the agricultural region; it is continuous with the Spring Wheat Belt of Canada. (b) *The Corn Belt* lies south-east of the Spring Wheat Belt. (c) *The Corn and Winter Wheat Belt* lies south of the Corn Belt. (d) *The Cotton Belt* lies south of the Corn and Winter Wheat Belt. (e) *The Sub-Tropical Coast Belt* of sugar and rice lies along the Gulf of Mexico. East of the Spring Wheat Belt lies the principal region of mixed farming and dairying, and beyond the sheep-farming lands of the west lies a small wheat belt and an area of mixed farming in the north, and the grain and fruit belt in the south. (For production of crops see pp. 95, 149). The leading industries of the U. S. A. are (a) *food industries*

Vegetation.

Animal life.

Agriculture.

Industries.

such as meat-packing, fruit-canning etc., (b) *textile industries,* (c) *metal industries* including those connected with ship-building, and (d) *miscellaneous industries* including the motion-picture industry. The chief industrial centres and ports have already been delt with (p. 293). The United States now possesses more than a quarter of a million miles of railway (p. 265), a million miles of metalled roads (p. 261), and the largest airways (p.283).

MEXICO AND CENTRAL AMERICA

MEXICO is quite a large country, but very much troubled by internal dissentions. The country is rich in minerals, and more than 66 per cent of all the exports are minerals—*mineral oil, silver, lead, zinc,* and *copper,* to name only the principal ones. Other items of export consist chiefly of agricultural products such as *cotton* and *coffee* and some *bananas.* In return the country imports manufactured goods. About 90 p.c. of the export trade is with the U. S. A. **Mexico** is the capital and principal city of the republic.

The Central American Republics include **Guatemala, Hondurus, San Salvador, Nicaragua, Costa Rica,** and **Panama.** These are small states, economically of little importance, and largely undeveloped owing to frequent revolutions.

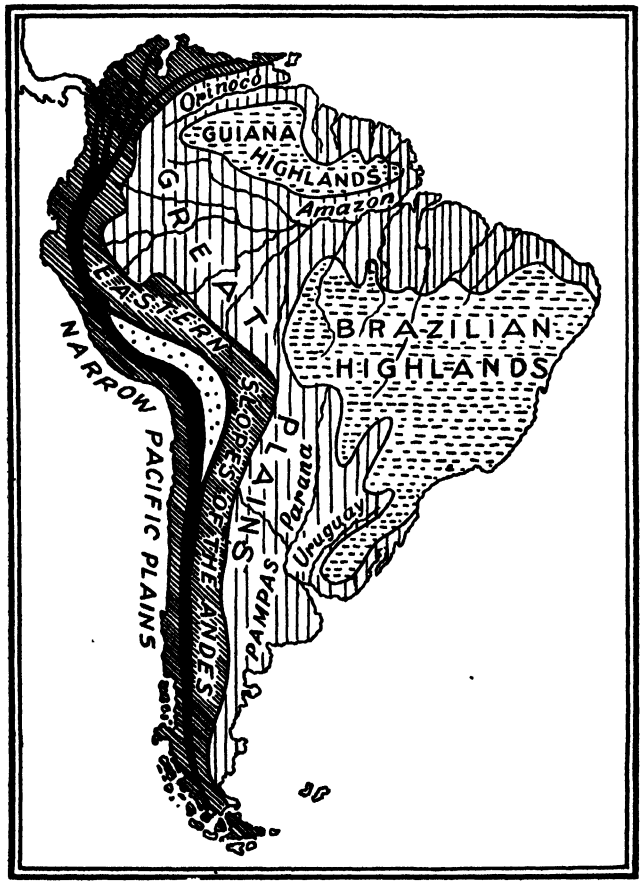
Of the numerous islands of the **WEST INDIES** only three are important—**Cuba, Porto Rico,** and **Haiti.** Cuba has a large output of *sugar* and *tobacco,* and being in alliance with the U. S. A. exports most of its products to that country.

SOUTH AMERICA

Area.

Position and Size.—The continent of South America has an area of some 7 million sq. miles. Its position is best

defined by three lines of latitude and one line of longitude: the **Equator** passes through the mouth of the great River Amazon; the **Tropic of Capricon** cuts through the middle



THE PRINCIPAL PHYSICAL FEATURES OF SOUTH AMERICA.

of the continent; the latitude of **50°S.** passes a few degrees north of Cape Froward, the most southerly point of the mainland, the central meridian of the continent is formed by

the longitude of **60°W.** It is not always realized, however, that the South American continent does not lie exactly south of North America,—it is to the south-east of the latter. It is a wedge-shaped land mass, tapering towards the south; more than two-thirds of the continent therefore lies within the tropics. But for the narrow Isthmus of Panama, which connects it with the North American continent, South America would be the largest island in the world: the Isthmus has, however, been actually cut through by the Panama canal.

Position.

Physical Features.—The continent of South America falls into three broad physical units: (a) **The Andean System** of the west lies, like the Rocky Mountain System of North America, close to the Pacific coast. The Andes are a fold mountain system enclosing a number of plateaus in the middle, but narrowing into one main range in the south; in the north the main range is broader, and ultimately it branches out into at least four important subsidiary ranges and one lesser range passing into the Isthmus of Panama. An extremely narrow coastal plain flank the Andean System on the west. (b) **The Central Plains** lie immediately east of the eastern slopes of the Andes, and consist of at least four major divisions; in the north is the Basin of the Orinoco River; then there is the great Basin of the Amazon; farther south lies the Basin of the Parana-Paraguay Rivers; and in the south are the Argentine Pampas and the Patagonian Plateau (desert). (c) **The Eastern Highlands** consist of two great blocks—the Guiana Plateau in the north and the Brazilian Plateau in the south.

Andean System.

Central Plains.

Eastern Highlands.

Climate and Vegetation.—Only the southern third of the continent lies in the S. Temperate Zone, by far the greater part being tropical. The northern two-thirds is under the influence of the Trade Winds—the N. E. and the S. E. Trades; and the southern third only lies in the N. W. Anti-Trades Belt (North Westerlies). In the north-west

Wind Systems.

North-west coast.

of the Pacific coast the rainfall is governed mainly by Monsoon Winds in summer, and the region is covered by dense evergreen forests. The climate being hot and humid and

A GENERAL RAINFALL MAP OF SOUTH AMERICA

owing to the nearness of the sea, it is possible here to cultivate such crops as cocoa and sugar-cane. The rainfall is progressively less and less towards the south till at last one

reaches the long and extensive desert region in the centre of the Pacific coast. This actually is the Chilean Desert, regarded so important economically for its huge deposits of nitrates and allied minerals. South of the Desert of Chile the belts of the Trade Winds and Anti-Trade Winds meet, and it is here that we find the Mediterranean region of South America—in the neighbourhood of Valparaiso and Santiago. Obviously it is a region of Mediterranean fruits and wine. South of this lies the cool temperate region traversed by the Westerlies. The rainfall is more or less uniformly distributed all the year round, and the natural vegetation is deciduous forest. But the region lies undeveloped for various reasons. It is similarly possible to subdivide the Andean Chain into a number of climatic areas:

Andean Chain.

portions of the Northern Andes lie in the belt of the N. E. Trades, and have copious rainfall. Here lies the fertile valleys of the Cauca and the Magdalena, with their tropical products; higher up the slopes grow such sub-tropical products as coffee; and it is sometimes possible to cultivate temperate crops on the mountain ridges. The Central Andes also lie in the Trade Winds Belt—partly in that of the N. E. Trades and partly in that of the S. E. Trades. The mountain chains have enclosed a plateau rich in certain minerals. There are poor pastures here, and the facilities for cultivation are limited. Southern Andes are essentially a divide between the east and west, beyond the S. E. Trade Winds Belt. The mountain chains, on the other hand, cut off the N. W. Anti-Trades from blowing east into Patagonia. The Central Plains fall into four climatic sub-divisions: in the north is the Orinoco Basin lying on the right flank of

Central Plains.

the N. E. Trades. It is a large grassy plain, often called the Llanos. It is rather an undeveloped region yet. Then there is the vast Amazon Basin, the largest region of equatorial forests or the *Selvas* in the world. The whole of it lies in the N. E. Trades Belt, and enjoys heavy showers all the year round. The Amazon Basin is the original home

of the rubber tree (p. 173). Enormous tracts of the Amazon Basin are liable to floods, and the region still lies little developed (pp. 19—26). The Basin of the Parana-

THE PRINCIPAL NATURAL REGIONS OF SOUTH AMERICA

Paraguay lies partly in the belt of the S. E. Trades; it is, on the whole, a temperate region, covered in the north by

warm temperate forests and in the south by grasslands or *Pampas,* as they are called. The grasses have now largely yielded place to crops, especially in the Argentine Republic. South of the *Pampas* lies the dry, cool, temperate Desert of Patagonia. It is in the rain-shadow of the Southern Andes, and very sparsely inhabited. A few sheep are, however, kept here by the local inhabitants. The Eastern Highlands fall into two climatic sub-divisions: the highlands of Guiana and Venezuela lie in the N. E. Trade Wind Belt, and are covered partly by the *Selvas* or *Montana* (equatorial forests) and partly by savana or grassland. The Brazilian Highlands are partly in the N. E. Trades Belt, and partly in the rain-shadow of the edge of the plateau itself, which prevents the S. E. Trades from blowing inland; the south-eastern coastlands, however, are under the influence of the S. E. Trades. The vegetation therefore differs from dense equatorial forests to scrub. There are warm temperate forests in the south, where the soil is of volcanic origin and consequently rich. And this is naturally the best developed part of Brazil with its enormous production of coffee.

Eastern High-lands.

THE SOUTH AMERICAN STATES

Amazon Basin.

BRAZIL is the largest state of South America, with an area comparable with that of Canada or the U. S. A. It falls into three broad divisions: (a) *The Amazon Basin,* as already noted, is the largest equatorial region in the world, but little developed as yet. The only product of note obtained from this region is *Para rubber;* but the production has diminished considerably owing to extensive exploitation in the past. The Amazon, with its numerous tributaries, affords practically the only means of communication with the interior. The river is navigable by ocean-going vessels of 10,000 tonnage up to a thousand miles from its mouth. **Manaos** is the collecting centre for rubber from

the forests, and ocean-going vessels ply between this collecting centre and the port of **Para** at the mouth of the Amazon. (b) *The Brazilian Highlands* are believed to be rich in minerals, but the output at present is quite small. The coastal tracts, extending from the port of Para to **Sao Paulo**, are, however, fairly developed. The climatic conditions over this long but narow sub-region are naturally rather varied; in the north the climate is equatorial, in the south tropical; but everywhere it is tempered by oceanic influences. A corresponding variation in the products is also obvious: the chief crops of the north are *cotton, sugar-cane, rubber, cocoa, maize,* and *manioc;* those of the south are *coffee* and *cotton.* Half the world's total coffee is produced in the region around Sao Paulo (p. 135). (c) *The Parana-Paraguay Basin* occupies the southern portion of Brazil, which adjoins the territory of Uruguay. The chief product is *maté* tea; and this is the great *cattle farming* area of Brazil. The capital and chief port of the republic is **Rio de Janeiro.** Farther south lies **Santos,** the chief coffee port. **Pernambuco** and **Bahia** or **San Salvador** are the ports of the northern part of the coastland along the Brazilian Highlands. **Rio Grande do Sul, Pelotas,** and **Porto Alegre** are minor ports along the coast of the Parana-Paraguay Basin; all these are accessible by vessels of small draught because of a bar at their entrance. The main line of inland communication is the great Amazon system; but most of the ports are connected by rail with the centres of production near by. The principal system of railways, however, is around Sao Paulo; there is thus direct railway communication between Sao Paulo, Rio de Janeiro, and Santos, and the system is linked with that of Uruguay. The inhabitants of Brazil number about 43·3 millions; they are mainly of Portuguese descent, but there are large numbers of immigrants chiefly from Italy, Spain, Germany, Austria, and Russia. The native Red Indians are in hopeless minority. The principal items of export are *coffee, sugar,*

Brazilian Highlands.

Parana-Paraguay Basin.

THE WHEATLANDS OF THE ARGENTINE AND SOUTH AMERICA.

THE CATTLELANDS OF SOUTH AMERICA.

THE SHEEP-LANDS OF SOUTH AMERICA.

cotton, leather, cocoa, meat, and *rubber.* And the imports consist mainly of *machinery, iron and steel, wheat, cotton goods,* and *coal.* The balance sheet of the foreign trade is extremely unsteady; in 1923 the imports were valued at £50·5 million, while the value of exports in the following year (1924) was £95·1 million. During the quinquennium of 1926-30, again the exports were valued at £10·1 million more than the imports, while the quinquennium of 1931-35 shows an adverse balance of £22·3 million.

ARGENTINA is said to be the most progressive state of South America. It occupies the greater part of the south, and has large tracts suitable alike in soil and climate for wheat. In the north it includes a part of the Parana-Paraguay Basin, covered largely by Tropical Forests, and not yet much developed, the only products being *maté* and *tannin.* Then there is the rich grassland region, centred mainly on the La Plata River, the main estuary of the Parana-Paraguay, with a rather varied type of climate; the warmer and damper north-eastern parts of this region are suitable for *maize* and *flax,* the more temperate south-eastern parts eminently suited to *wheat;* this is also the principal *cattle-farming* and *sheep-rearing* region of South America; and Argentina, besides being one of the great granaries of the world, is also one of the principal exporters of meat to the great industrial countries of Europe. Lying between the grassland region and the Andes there is, again, a small area adjoining the Mediterranean lands of South America, and it serves as the *fruit* farming and *wine* producing region of the republic; some *sugar, cotton, tobacco,* and *hemp* are also produced in this warm sheltered region. South of the grassland, however, stretches the cool temperate desert of Patagonia, once believed to be of little economic value. But on the comparatively grassy slopes of the Andes there are rough sheep *pastures;* and what is more important, small *oilfields* have recently been discovered in the desert tracts

Parana-Paraguay Basin.

Grass-land Region.

Mediterranean Region.

Towns.

including the Andean chain. The capital and chief port is **Buneos Aires** on the River Plate; it lies in the region of the wheatlands of the Republic. Other ports of this region are **La Plata, Rosario,** and **Bahia Blanca,** all of which, including Buenos Aires, have been provided with artificial harbours. **Tucuman** is the seat of the sugar industry, and **Mendoza** of wine industry.

Communications.

The Argentine is rather well served by railways. The Chilé-Argentine Railway (p. 266) connects Buenos Aires with Valparaiso (Chilé), and a great network of railways join all the inland centres of production with the leading ports. Moreover, the Parana and Paraguay are—or have been made—navigable through Argentina to the state of Paraguay.

Population.

The population of Argentina is 12·2 millions, consisting mainly of the descendants of the early Spanish settlers; but in recent years there has been a large influx of immigrants chiefly from Italy. The native Red Indians are as usual in hopeless minority, and they live chiefly in the northern tropical forests.

Foreign Trade.

The principal items of export are *wheat, maize, beef, linseed, hides and skins, butter, mutton,* and *wool.* The foreign trade of the Republic has been showing a steady increase in value since the closing decades of the last century: the export trade has expanded nearly four times during the last three decades or so, the import trade has multiplied nearly five times. But all through this long period the balance sheet has never recorded an adverse trend,—there has always been an excess in the value of exports over imports.

PARAGUAY lies mainly between the Parana and Paraguay Rivers. It is quite a small republic north of the Argentine, and occupies a part of the tropical forests of that republic as well as a small stretch of grassland on the east of the Brazilian Plateau.

Products, etc.

The chief exports are *tobacco, maté* (Paraguay tea), *organges, timber,* and *skins.* Timber, however, is the chief commercial

product, and *cotton* has made a good beginning. The capital is **Asuncion,** on the Paraguay River; it is accessible to small ocean-going vessels. The state is still very undeveloped and sparsely peopled, and the population consists mainly of Red Indian and half-castes of Spanish descent. There is railway communication between Asuncion and Buenos Aires (Argentina).

URUGUAY is another small republic; it lies between the La Plata estuary and Brazil. In general characters it resembles the rich grasslands of the Argentine. The principal products are *maize* and *wheat;* some *linseed* is also grown; and large areas are devoted to *cattle farming.* The chief items of export are *wool, meat,* and *hides and skins; wheat and flour* and *linseed* also enter into the export trade. The country has been rapidly developed, and the balance of the foreign trade is in favour of the republic. The capital and chief port is **Monte Video,** which has a finer harbour than Buenos Aires (Argentina), and the harbour has been considerably improved. Fray Bentos and Paysandu are meat-packing towns on the Uruguay. There are railways linking Monte Video with the meat-packing centres.

Products, etc.

CHILE occupies a long narrow portion of territory on the west of the Andean Chain. It readily falls into three well-defined regions: (a) *The Northern Desert* (Atacama Desert) is economically valuable for various minerals, especially *nitrates, copper, silver,* and *gold.* (b) *Mediterranean Region* occupies the heart of the country. The chief products of this region are *wheat, barley,* and various *fruits,* and also *wine.* Large tracts are devoted to *cattle* and *sheep.* (c) *The Forest Region* of the south is essentially a *dairy farming* and pastoral country. But the region is very sparsely populated owing to extremely heavy precipitation and the lack of suitable land for settlement. It is interesting to learn that it is only in this region of Chile in the whole of

Natural Regions.

South America that a small *coalfield* has been discovered. The capital is **Santiago,** and its port is **Valparaiso;** both of them are in the Mediterranean region of Chile. Valparaiso is the main port for imports. **Iquique** and **Antofagasta,** both in the Desert Region, are the leading ports for export, the bulk of which naturally consists of nitrate and guano. *Nitrate* of soda and *copper* together constitute about 84 per cent. of the exports of the republic, while nearly 67 per cent of the imports consists of various manufactures. The balance of the foreign trade is in favour of the country.

Characteristics and Resources.

BOLIVIA is a large but rather undeveloped inland state. Its western region is remarkable for the elevation of the Plateau of Titicaca, comparable only to that of Tibet. It is rich in minerals, especially *tin, copper,* and *silver.* Bolivia is said to contribute nearly a quarter of the world's total output of tin, and the wealth of the country comes almost solely from its minerals. The eastern region gradually slopes down to the Amazon Basin, and has the same type of vegetation on the whole. The population is about 3 millions, nearly two-thirds of which consists of Red Indians. The capital is **La Paz,** situated in the plateau region near Lake Titicaca.

Towns.

But **Sucre** on the east is the legal capital. Bolivia has no port and no coast-line. But La Paz has direct railway communication with the port of Arica (Chilé); this is the shortest sea-connection, although the minerals are sometimes exported also through the Chilean port of Antofagasta or the Peruvian port of Mollendo. The natural outlet of the eastern region of Bolivia is through Brazil by river or through Argentina by railway. Beyond the Andes, however, there is a large tract of territory in the Gran Chaco, for the possession of which Bolivia and Paraguay waged a long but indecisive war from 1932 to 1936, because the region is believed to be rich in oil.

Communications.

PERU lies north of Chile, and falls into three divisions: (a) *The arid coastal region* where *cotton* and *sugar-*

canes are grown on tracts irrigated by the waters of the Andean rivers; (b) *The Sierra,* an agglomeration of valleys and tablelands enclosed by the Andes, where the only crop is *quinoa,* a native cereal, if occasional barley and other crops be left out of consideration; (c) *The Montana* on the eastern slopes of the Andes, where the only notable product is *rubber.* But the Andean region is rich in minerals, especially *copper* and *silver;* some *oil* is also obtained from the northern part of the coastal strip and here we find the llama and the alpaca yielding valuable *wool,* and the llama also serving as a transport animal. The capital of the republic is **Lima,** and its port is **Callao. Mollendo,** though in Peru, serves mainly as the port for Bolivia. The principal items of export are *sugar, petroleum, metals and ores, llama, vicuna* and *wool.*

Natural regions and products.

Towns.

ECUADOR is a small country north of Peru, and lies across the Equator; hence the name of the country. The country falls into two broad divisions: (a) *a costal strip* producing *cocoa* as the chief commercial product; and (b) the *Andean plateau* which covers the greater part of the country. Another important product is mineral *oil.* The capital is **Quito,** almost on the Equator, but being on a height of 9,000 feet it is the abode of perpetual spring. The principal port is **Guayaquil.**

Regions and Resources.

COLOMBIA lies north of Equador, at the northern end of the principal chain of the Andes. The coastal plains and the main valleys lie between the Andean Chains. The most notable of the valleys are those of the Cauca and Magdalena. The climate is equatorial, and the chief products are *cocoa, sugar, cotton,* and *bananas.* On the slopes of the mountain spurs grow *coffee* and *maize;* on higher elevations, *wheat.* The mountainous tracts are rich in minerals, including *gold* and *silver;* and important *oilfields* have recently been discovered near the coast. The capital is **Bogota,** and the leading ports are **Cartagena** and

Regions and Resources.

Baranquilla. **Medellin** is a large mining centre on the Andes. The Magdalena and Cauca severe as the main highways.

Regions and Resources.

VENEZUELA lies north-east of Colombia, and consists of a number of natural regions: (a) *The Coastal Plains* of the north are important for *cocoa* and *sugar,* and the recently discovered *oilfields* around the shallow gulf of Maracaibo. (b) *The Coastal Range,* actually an offshoot of the Andes, where the chief products are *coffee* and *maize.* (c) *The Llanos* or grassy plains of the Orinoco Basin is a region sparsely peopled but largely devoted to *cattle* and *horses.* (d) *The Guiana Highlands* are still in an undeveloped stage. The capital of the republic is **Caracas,** and its port is **La Guayra.** There is railway connection between the two. **Valencia** is another inland town, and its port is **Puerto Cabello;** these two are also connected by rail. With the increase in the output of *oil* the country has been developing rather rapidly; about 75 per cent of the total export has consisted of oil since 1926; prior to that *coffee* was the leading export. The foreign trade has been showing a progressively favourable balance since 1923.

Regions and Resources.

THE GUIANAS lie east of Venezuela. The region is believed to be rich in minerals especially *gold* and *diamonds,* but the output at present is small, and the whole region still lies in an undeveloped state. It is divided into a region of lowlands and a region of plateau. The minerals are from the plateau regions, while the agricultural products such as *sugar, rice,* and *cocoa* are the products of the lowland regions.

Divisions.

The capital of British Guiana is **Georgetown;** that of French Guiana, **Cayenne;** and **Paramaribo** is the capital of Dutch Guiana or Surinam.

TRINIDAD is a small island off the mouth of the Orinoco River. It is a British possession, and the largest producer of *petroleum* in the British Empire. There is the

famous pitch lake, from which *pitch* or asphalt is obtained for road making.

THE FALKLAND ISLANDS, to the east of the Straits of Magellan, also belong to Great Britain. The climate is damp and foggy, and the rearing of sheep and cattle forms the chief occupation of the people. The island of South Georgia is an important whaling base.

STUDIES AND QUESTIONS

1. What are the main sources of exportable commodities in Chile, Argentina, and Brazil? 'The main exports of these countries show contrasts largely dependent on climatic differences in the three areas.'—Elucidate this statement.

2. Give a general description of the Amazon Basin. What possibilities of commercial development the region may have?

3. Give an account of the foreign trade of South America.

4. Discuss the nature of trade between India on one side and South American states of Brazil, Argentina, and Chile on the other. In what way do you expect this trade to be modified in the near future? (C. U., B. Com.' 35).

CHAPTER IV

INDIA

The Sub-continent

Area.

Introductory.—India is a sub-continent with a total area of 1,542,600 square miles—almost the same size as that of China, perhaps the only other true sub-continent on the face of the earth. But she is a sub-continent not for her size; for there are many countries in the world with far vaster areas than India can ever boast of. True, the country is full of contrasts both in physical features and in climate, and she is also a vast ethnological museum. But there are several countries in other parts of the world with as varied—or nearly as varied—characteristics, and yet none of them, except only China, can be regarded as a true sub-continent. We are so prone to take the word 'sub-continent' lightly or as a mere poetical metaphor that even to us, sons of the soil, the true geographical nature of our mother country remains obscure. But it was no sealed book to our forefathers. With their keen perception they could readily grasp the geographical nature of the mother country, and called her *'Bhārata-barsha,'* which meant (for it can scarcely be said to mean to us to-day) the 'Sub-continent of Bharata', the term *'barsha'* meaning precisely the same thing as is indicated by the word 'sub-continent.' Like the words 'continent,' 'country,' 'peninsula', etc., sub-continent also denotes a definite geographical conception. A region which resembles a continent in its varied features but at the same time exhibits a synthesis of them like a country is called a *'barsha'* or 'sub-continent.' It is no mere poetical expression for

The sub-continent of India.

Bhārata-barsha.

the vastness and varied features of a region; it is a definite geographical term. Even a casual glance at a physical map of India will convince one of the fact that "there is no part of the world better marked off by nature as a region by itself..... It is a region, indeed, full of contrast, in physical features and in climate,.... but the features that divide it as a whole from surrounding regions are too clear to be overlooked."[1] These physical contrasts, however, are fully reciprocated in the varied characteristics of India's vast population. Every provincial race resembles a distinct nation in India as do the various nationalities of a continent. The Bengalis, for instance, are so different from other provincial races of India in tradition, language, manners and customs as to deserve treatment as a distinct nation. But at the same time they draw from the common reservoir of tradition and culture as do all other provincial races, and therein do they exhibit the common characteristics of the great Indian nation. The type of national unity manifest in the common tradition, culture and history of a nation to be found in the national characteristics of the Englishman or the Frenchman, for instance, is by no means lacking in India. And yet each of our provincial races is comparable in respect of national consciousness, tradition, history, culture, language—in fact in all the factors that go to constitute a distinct nationality—with the nations of different countries like England, France, etc. To overlook these points is to misread and mis-interpret India and the Indian nation altogether.

Underlying unity of physical features.

The Indian Nation.

Physical Features.—India is bounded on the north and north-west by a vast mountain rampart. There are the lofty **Himalayas** and **Karakoram** ranges guarding her northern frontiers; on the north-west are the **Sulaiman** and **Khirthar** Mountains. Then there are the western *deserts* and the *eastern mountain* chains and *valleys*. Elsewhere she is bounded by the **Indian Ocean**, the

Mountain rampart.

[1] Chisholm.

Arabian Sea and the *Bay of Bengal.* South of the mountain ramparts is the vast **Plain of Hindoostan** formed by the basins of the three great rivers of Northern India—the Indus, Ganges, and Brahmaputra. **Peninsular India** is a vast tableland, bordered on the north by the **Vindhya** and the **Satpura** Mountains and by the **Western** and **Eastern Ghats,** on the west and east respectively. The junction of the two Ghats is formed by the lofty **Nilgiris.** The mountains of Peninsular India, however, are actually the different edges of the great plateau. Traversing the plateau are various rivers—the *Narbada, Tapti, Godavari, Krishna, Cauvery* and *Mahanadi.* The rivers of Northern India are fed by the melting snows of the Himalayas and ensure a constant supply of water that can be used for irrigation. In their lower courses they traverse broad flat plains of very fertile alluvium, and are generally navigable for considerable distances. The rivers of Peninsular India, however, rise in the hills of the plateau and are fed by the periodical rains only. Many of them go dry during the dry season, and none of them are navigable for long distances. Moreover, their valleys are not very suitable for irrigation.

Central Plain.

Deccan Plateau.

Geology and Minerals.—The close correspondence of the principal physical features of India with the geological structure of the land is obvious. The mountain rampart of the north consists mainly of folded sedimentary rocks of the Alpine age. The great plain of Hindoostan is composed entirely of alluvium, and so are also most of the coastal plains. The plateau of Peninsular India, however, consists mainly of pre-Cambrian crystalline rocks resistant to later Alpine folding. Nearly the whole of the north-west of the plateau is covered by thick sheets of lava, and the Deccan lava region is one of the most extensive lava regions in the world. The island of Ceylon, although politically outside the 'Indian Empire,' is structurally a detached mass of the Deccan Plateau.

Geology.

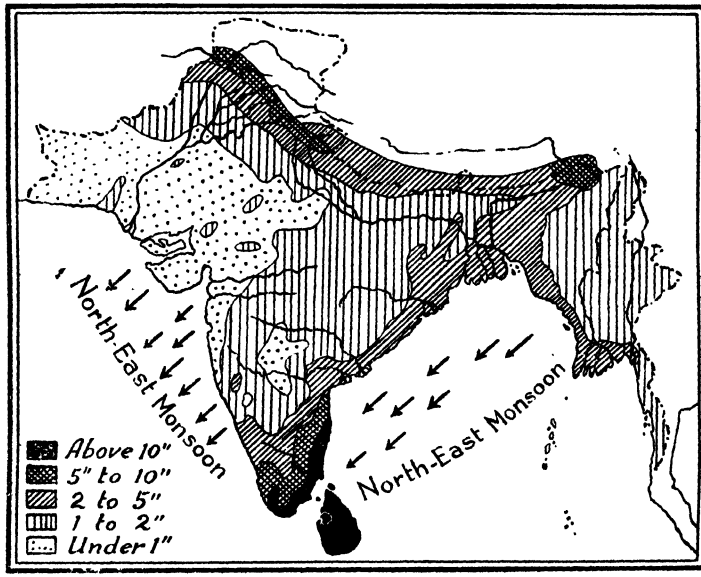
India, however, is vaguely supposed to be rich in mineral resources; but the truth is that her mineral wealth is only 'tolerably abundant'. **Coal** is, no doubt, of wide distribution; but the most productive coalfields are in the region between Bengal and Bihar, especially in the valley of the Damodar River which lies in the larger basin of the Hooghly. Nearly 90 per cent. of the actual output of coal comes from this region. The principal coalfields are those of *Jheria, Raniganj,* and *Daltonganj.* For a long time Raniganj was the chief centre; but it has now been eclipsed by Jheria. Other important coalfields lie in the Deccan such as those of *Umaria,* which lies east of Jubbulpore in Central India; of *Warora,* in the valley of the Wardha river in the C. P.; and of *Singareni,* in the state of Hyderabad.In Assam and the Punjab there are deposits of lignite and brown coal. The total output of coal at present is about 20 million tons a year. **Iron** ore is also of wide distribution. The principal iron-fields are in the district of *Singhbhum,* Bihar; at *Barakar,* near the Raniganj coalfield; and in the state of *Mayurbhanj,* Orissa. The ores of Singhbhum are of excellent quality (hematite) and often yield more than 60 per cent. of pure iron. Magnetites are obtained in Chota Nagpur. The total output of pig-iron is well over a million tons a year, and that of steel is about a million tons. India is definitely poor in **mineral oil.** The principal oilfields are at Khaur in the Punjab, and Digboi in Assam. The refineries of the Punjab are, however, at Rawalpindi. But India is the second largest producer of **manganese** (after the U. S. S. R.) in the world. The mineral is widely distributed in the Deccan plateau. The bulk of of the output is from Madras and the Central Provinces; Sandur in Madras is the largest producer. The annual output of **gold** is between 300,000 and 400,000 ounces, and nearly the whole of it is from the Kolar goldfield of Mysore. Silver and lead are practically non-existent in India proper. **Copper** is obtained mainly from the

Minerals.

Singhbhum district of Bihar; the copper deposits of the Himalayas are not worked now. **Mica** is also of wide distribution in the plateau region; the most important fields are in the Nellore district of Madras. **Chromite** is obtained mainly from Singhbhum, Baluchistan, and Mysore. The Salt Ranges of the Punjab are the principal source of **rock-salt** in India.

Basic facts.

Climate.—The Tropic of Cancer, we have seen, cuts through India from west to east, so that while one half of the sub-continent lies in the Temperate Zone, the other half is located in the Torrid Zone. Yet India is commonly

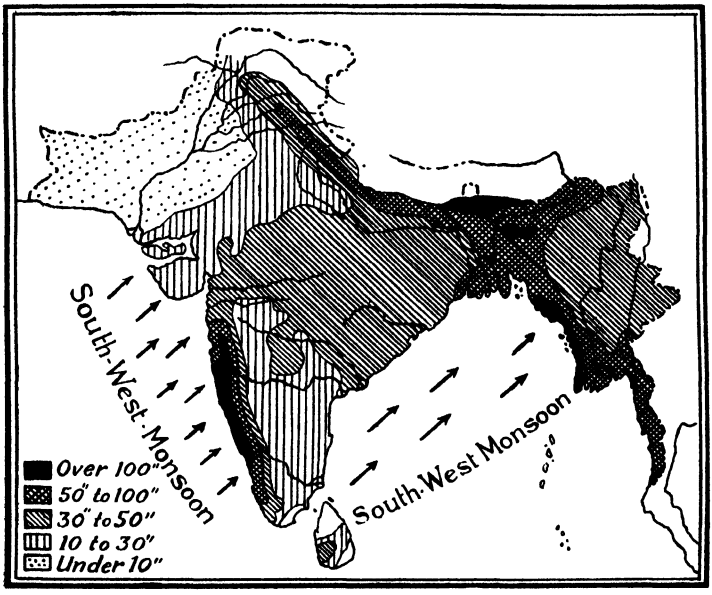


WINTER RAIN AND WINDS

regarded as a tropical country. In summer the sun is vertical—or nearly vertical—over a large part of the country, which in consequence gets very hot: at this season the Punjab plains are among the hottest regions of the world.

But this heat generates various low-pressure centres over the plains of the Punjab, and thus draws in cooler winds from the sea. As a consequence of this other parts of India are not as hot as it should be. The July average for north-west India is considerably above 90°F; in north-east Bihar and north Gujarat it is between 85° and 90°F. Towards east and south temperatures are lower: in Bengal and Central India it is between 80° and 85°F; in Bombay and adjoining tracts the temperature is between 70° and

Temperature



SUMMER RAIN AND WINDS

80° or even lower. Madras, however, has higher temperatures (80°-85°) as the winds there blow from the land. In winter, on the other hand, when the sun is considerably south of the Tropic of Cancer, it is cooler and cooler from south to north: the January average for the Punjab plains is between 40° and 60°F; over the greater part of Central

India it is between 60°—70°F, in Bombay, Hyderabad, Mysore and the adjoining regions it is beween 70° and 75°F; in Madras, however, the temperature rarely sinks below 75°F. India lies in the North-East Trade Wind Belt. These winds, however, begin to blow over the country from the last week of October or so and continues till February or March. These are what are commonly described as the North-East Monsoon. About May or June the land mass of Northern India, however, gets very hot, and the low pressure centres thus generated draw in the South-West Monsoon from the Indian Ocean, and India receives most of her rainfall from these winds. The direction of the winds as well as the distribution of rainfall is, however, governed by topography. The actual distribution of rainfall is shown in the accompanying maps.

Rainfall.

Natural Vegetation.—Combining the above facts we may easily divide the country into a number of vegetation belts:

(a) *Evergreen Forests* occur in areas having more than 80″ of rain annually, *i.e.*, mainly along the slopes of the Western Ghats, the eastern Himalayas up to 5,000 ft. and in Assam.

The lowlands of such areas of heavy rainfall have largely been cleared of their natural vegetation, and are now generally under rice; but these equatorial or semi-equatorial forests are still found on the hills as, for instance, on the slopes of the Western Ghats, in the wetter areas of the Himalayas up to 5,000 feet, and in Assam.

(b) *Monsoon Forests* naturally are found in areas having more than 40″ of rainfall annually. The trees are deciduous and hard-wooded, and they shed their leaves in the hot season. The two most useful trees of such forests are the **sal** and the **teak.** The teak is now obtained mainly from the western parts of Peninsular India, the sal from the

north-east of the Deccan and the lower slopes of the Himalayas.

(c) *Scrubland* occurs in regions with less than 40″ of rain annually. The few trees that grow in such a region are generally very thorny. The **cutch** is the most useful tree; from it a yellow dye is made.

(d) *Desert and Semi-Desert* tracts are found in areas having less than 20″ of annual rainfall. The characteristic plants have thick fleshy stems to store up water and extremely long roots to reach underground moisture.

(e) *Mangrove Forests* grow in the river deltas and along the sea-coast where it is flat and muddy. The *Sundarbans* of the Ganges delta are typical mangrove forests.

(f) *Grassland* is rare in India; small areas of grassland are found on the hills of the Monsoon Forests.

(g) *Mountain Forests* of evergreen trees like those of Temperate lands are found on the Himalayas above 3,000 feet and on the mountainous tracts of the Deccan above 5,000 feet. Some of the trees belong to the oak species (broad-leaved), some to the coniferous type (needle-shaped pine).

(h) *Alpine Vegetation* represented by short grass and small bushes grow on the higher elevations of the Himalayas, up to about 18,000 feet (snow-line), beyond which it is the abode of perpetual snow.

Agriculture.—India is essentially an agricultural country. More than 85 per cent of the population depend directly or indirectly upon agriculture for their subsistence. The total area of British India, including Burma,[1] is 667,610,000 acres. It is classified as follows:

Net area sown	.. 34 p.c.	Waste ..	.. 22·5 p.c.
Fallows ..	.. 7·5 „	Not available	.. 23 „
Forest ..	.. 13 „		

[1] Complete statistics for India exclusive of Burma are not available yet. Many of the native states, again, do not supply any statistics.

The total area of the native states, which supply statistics, is 134,312,000 acres. It is classified as follows:

Net area sown ..	47·6 p.c.	Fallows	10 p.c.

Record is thus available for a total area of 323,500,000 acres (cropped land). The principal crops are thus distributed on this area:

Food grains ..	76·5 p.c.	Oil-seeds	6·1 p.c.
Rice	25·7 „	Cotton	6·7 „
Wheat	9·1 „	Jute	0·7 „
Barley ..	2·5 „	Fodder	3·6 „
Millets ..	19·7 „	Others	2·0 „
Maize	2·4 „		
Gram	6·2 „		
Other grains and pulses ..	10·9 „		
Sugar	0·9 „		
Other food crops	3·5 „		
Total food crops ..	80·9 „	Total non-food crops	19·1 „

Conditions of Production.

Rice is thus the most important food grain of India. It is wholly a 'wet-region crop', grown mainly on flat alluvial soil where rainfall is abundant. Where, however, the annual precipitation is below 40″ it can scarcely be grown except on irrigated land. The principal areas of rice production in India proper in the order of their importance are Bengal,

Areas of Production.

Madras, Bihar, Central Provinces, Orissa, Assam, Bombay, Sind, and Hyderabad.[1] In India proper it is grown almost wholly for local consumption; India's export of rice is almost entirely from Burma.

Conditions of Production.

Wheat is the principal food-grain in the drier parts of Northern India. In our country it is a winter crop, sown after the rains and the harvest is gathered just before the heat of summer commences. The principal areas of production in the order of their importance are the Punjab, U.P., C.P., Bombay, Gwalior, Rajputana, Hyderabad, Sind, Bihar,

Areas.

and the Frontier Province. A small surplus is sometimes

[1] These are according to acreages, not necessarily according to yield.

available for export. Before the last Great War Indian wheat had a ready market in Europe; but after the conclusion of the War things were totally reversed: there was an enormous increase in yield of wheat in other exporting countries, and many of the importing countries readily took to its cultivation—often under the protection of subsidies and tariff walls. Thus there set in a fall in the demand for Indian wheat. At present the principal customers of Indian wheat are the Straits Settlements, Kenya, Aden, and Arabia. Since in India wheat is harvested when most of the countries begin to sow it, many of the importers are often forced by circumstances to buy from India. But, again, India sometimes is also forced to import some wheat from other producers, especially from Canada and Australia. Export.

Barley is very nearly co-extensive in its distribution with wheat. It is also a winter crop in India. The chief producers in the order of their importance are the U.P., Bihar, Punjab, N.W.F.P., and Bengal. Barley.

Millet actually ranks second among the food-grains. It is the staple food in nearly all the drier parts of the country. It can be cultivated even without irrigation in areas having an annual rainfall of 20″. Where, again, the rainfall is above 40″ it does not grow. There are three principal varieties of millets in India—*cholum* or *jowar, cumbu* or *bajra,* and *ragi* or *marua.* The largest acreages are in C.P., Hyderabad, Madras, Bombay and U. P. Millet.

Maize flourishes in areas having moderate rainfall. In the dry regions it is found in association with millets, in the wetter regions with wheat. But it does not grow in areas having more than 60″ of rainfall annually. The principal areas under it are in the Punjab, U.P., and Bihar. Maize.

Pulses, including gram, peas and beans, are cultivated throughout the country. Pulses.

Spices. *Spices* are cultivated mainly in the south—in Madras, Malabar, Travancore and the Western Ghats especially.

Sugar-cane. *Sugar-cane* is steadily growing more and more important, and the area under it in India is larger than that in any other country of the world. The largest concentrations are, however, found in the Punjab, Bihar and in the Upper Ganges Valley.

Tea. *Tea* is grown on the hill slopes of Assam, Darjeeling, Dehra Dun, the Nilgiri Hills. Great Britain is the principal customer of Indian tea, and it is from there that tea is re-exported to different parts of the world, including Eire, Germany, Netherlands, U.S.A., and Canada. Owing mainly to over production the price of tea fell in 1932, and the representatives of the tea industry from India, Ceylon, and Java voluntarily entered into an agreement to restrict its export as well as the extension of acreages under it. This is known as the 'tea restriction scheme.' It came into operation since 1st April, 1933, and was to continue for a period of five years. In 1938 the agreement was renewed for another five years.

Tea Restriction Scheme.

Coffee. *Coffee* was formerly important in Mysore, but a disease of the plants has wrought havoc to its cultivation.

Indigo. *Indigo* was similarly very important in the Ganges Valley, but it can now be synthetically prepared and this has dealt a severe blow to the indigo plantations.

Tobacco. *Tobacco* is distributed in various parts, but the production is not large.

Cotton. *Cotton* is the most important non-food crop in India, which now ranks second only to the U. S. A. as a producer of this important fibre crop. It is a dry-region crop and thrives best where the rainfall is less than 40" a year; but the soil is no less important. And these are the factors that have made the area of black soil in the Deccan lavas region

the best cotton ground of India. It is cultivated in Bombay, C.P., the Punjab, Madras, U. P., Hyderabad, Bengal, and Central India. Two main varieties are generally cultivated: (a) the short-stapled Indian cotton, and (b) the comparatively long-stapled American cotton.

Jute.

Jute is a plant of the low wet lands; it is cultivated in the Lower Valley of the Ganges in Bengal; there are lesser concentrations in Assam, Bihar, and Orissa. It is exported in normal times to Germany, United Kingdom, the U. S. A., and France. Japan, Italy, and Brazil are also important customers of Indian jute. India also exports manufactured jute to various countries, notably the United Kingdom, Canada, Australia, Argentina, U. S. A., Japan, and Java. But the cultivation of jute has raised serious problems in Bengal, where large acreages formerly under rice have been displaced by this fibre crop, which is generally in great demand throughout the world mainly because "no cheaper fibre is procurable for bagging agricultural produce." But various substitutes are being tried now (p. 168), and this united with the general Depression of recent years and the consequent manœuvres of the capitalistic jute manufacturers who have accumulated great stores of raw jute in the years of the Depression, has led to a fall in its demand. The revenue of the government has fallen considerably and the poor cultivators are in the direst misery. A careful scheme for the regulation of jute cultivation as well as for the fixing of a minimum price has therefore been urgently necessary. A suggestion is generally put forward; it is said that the cultivators should be made to grow rice and sugar-cane as a substitute. But the findings of the Bengal Jute Enquiry Committee are not hopeful; the Committee have disposed of the suggestion on the grounds that sugar-cane is not a seasonable crop (p. 125), and is easily perishable; moreover, the sugar requirements of the province would require only a small percentage of the total acreage now under jute.

The Jute Problem.

Other crops.

Other crops include *rubber,* grown mainly in Travancore, *cocoanuts,* concentrated along the coasts, various *oil seeds,* cultivated all over the country, and *hemp.* Oil seeds form an important item of export; the principal customers are France, Belgium, Germany, Austria, Hungary, Italy, and Britain.

Position of Agriculture in India.

The position of agriculture in India is extremely unsatisfactory; the yield per acre of nearly all the crops in India is exceedingly low (p. 100). This is generally attributed to (a) *soil exhaustion,* (b) *the export of natural manures* in the form of oil-seeds, (c) *uneconomic farming* arising out of subdivision and fragmentation of holdings due to current laws of inheritance, and (d) *agricultural indebtedness* and poverty. And the whole system of causes generally operate like a vicious circle.

Cotton Industry.

Manufactures.—The most important manufacturing industry of India is cotton weaving. The hand-loom is still largely used throughout the country, although cotton mills are steadily becoming more and more popular. The principal seat of the cotton manufacturing industry is in Bombay. There are cotton mills in various other provinces. The important centres are Bombay, Ahmedabad, Surat, Sholapur, Jalgaon, Broach, Nagpur, Madras, Coimbatore, Cawnpore, and Calcutta. The jute industry is centred in Calcutta and adjoining towns for obvious reasons just as the cotton industry is centred mainly in Bombay. The silk industry is widely distributed, the principal seats of brocaded silk manufactures being in Bengal, the Punjab, and Southern India, and of striped silk at Agra, Amritsar, Ahmedabad, Surat and Benares. The principal silk-producing province, however, is Bengal, where the industry is carried on in the Murshidabad, Malda, Rajshahi and Birbhum districts. The next biggest producer is Mysore, followed by Bihar and Orissa, C. P., Kashmir, Madras, Assam, and the Punjab and U. P. Yet India imports

Jute Industry.

Silk Industry.

much raw silk from China. The woollen industry is also important; the weaving of shawls is done mainly in Kashmir; carpet-making primarily in the Punjab, Kashmir, and the Central Provinces. Indian sugar industry is a new development, now carried on mainly in Bihar and the United Provinces. The manufacture of iron and steel is in the hands of the (*a*) Tata Iron & Steel Co., Ltd. at Jamshedpur, (*b*) Bengal Iron Co., Ltd., at Hirapur, (*c*) Indian Iron & Steel Co., Ltd., at Burnpur, (*d*) United Steel Corporation of Asia (Monoharpur), (*e*) Mysore Iron Works (Bhadravati). In the manufacture of paper the two leading provinces, Bengal and Bombay, are at par; other provinces and states engaged in it are Madras, Travancore, and the United Provinces. Besides Calcutta and Bombay the other seats of the industry are at Chittagong, Poona, Saharanpur, and Punalur (Travancore). The possibilities of the paper-making industry in India are not altogether bad from the point of view of raw materials (p. 81). The principal centres of glass manufactures are at Bombay, Jubbulpore, Allahabad, Naini, Lahore, Ambala, Bijholi, and Calcutta. Various metal-workings and the manufacture of pottery are included in the list of 'cottage industries'; and so also is the manufacture of certain types of glassware. In addition to all these there are numerous flour mills in the Punjab, oil refineries in the Punjab and Assam, saw mills in Assam, tobacco factories in Madras.

Woollen Industry.

Sugar Industry.

Iron and Steel Industry.

Paper Industry.

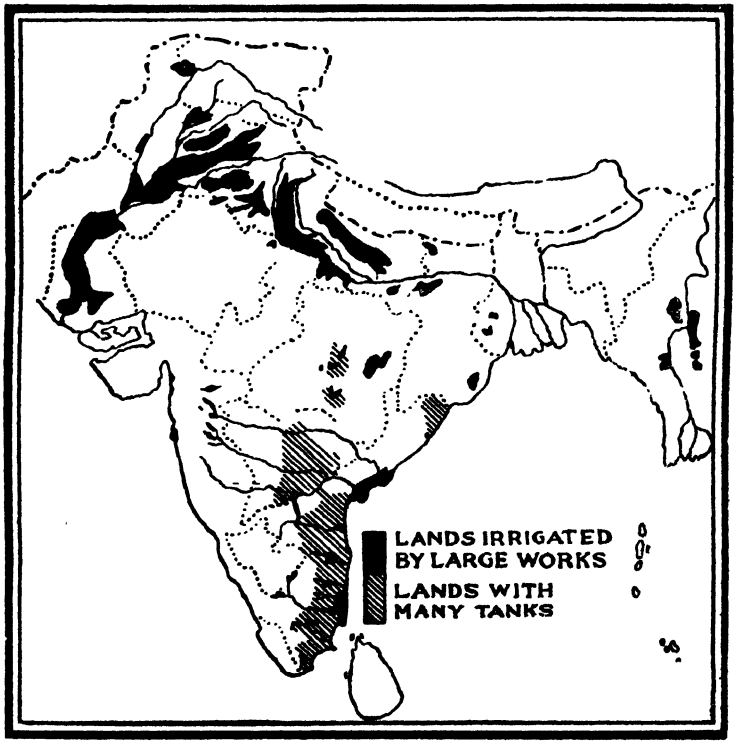
Glass Industry.

Other industries.

Irrigation.—Irrigation is essential in the areas of uncertain rainfall (Sind, Rajputana, Punjab), or where the rainfall is not well distributed as it largely is in Southern India. Certain crops, on the other hand, require more water than is supplied by the Monsoon.

The most important means of irrigation are the canals. These may be Perennial Canals, or Inundation Canals, or Storage Canals. Perennial Canals have water all the year

round as they draw from rivers having permanent flow of water. These are in operation in the Punjab, U. P., and Sind. In the Punjab alone there are six main systems:



IRRIGATION IN INDIA.

(a) *The Western Jumna Canal,* (b) *The Sirhind Canal* (drawing from the Sutlej River,) (c) *The Upper Bari Doab Canal* (drawing from the Rabi), (d) *The Lower Chenub Canal,* (e) *The Lower Jhelum Canal,* and (f) *The Upper-Chenub-Lower Bari Doab Canal.* An Inundation Canal starts from the bank of a river so that when in the flood season the river overflows water passes through the

Canal, but in the dry season the canal also dries up. Where, again, the rivers dry up for a part of the year as it largely is in the Deccan, it becomes necessary to store up water across valleys by means of dams in the dry season, and these may be released through canals to irrigate the land. These are called storage canals. This system is prevalent in the Central Provinces and Bundelkhand. A tank is an artificial storage to collect rain water for irrigation when necessary. These are, however, liable to be dried up in the hot season. This system is prevalent in Madras, Mysore, and Hyderabad. Large tracts of the Punjab, U. P., Madras, Bombay and Rajputana are irrigated by waters raised from wells; bullocks are often engaged to raise the water, but the use of water-lifts and oil engines is spreading rapidly.

Natural Regions.—The three main topographical units into which India is broadly divided are often subdivided into a number of 'natural regions' according to climate and vegetation. The basic scheme outlined by Stamp is shown in the accompanying map.

1. **The Northern Mountains** have been subdivided into six units :

Northern Mountains.

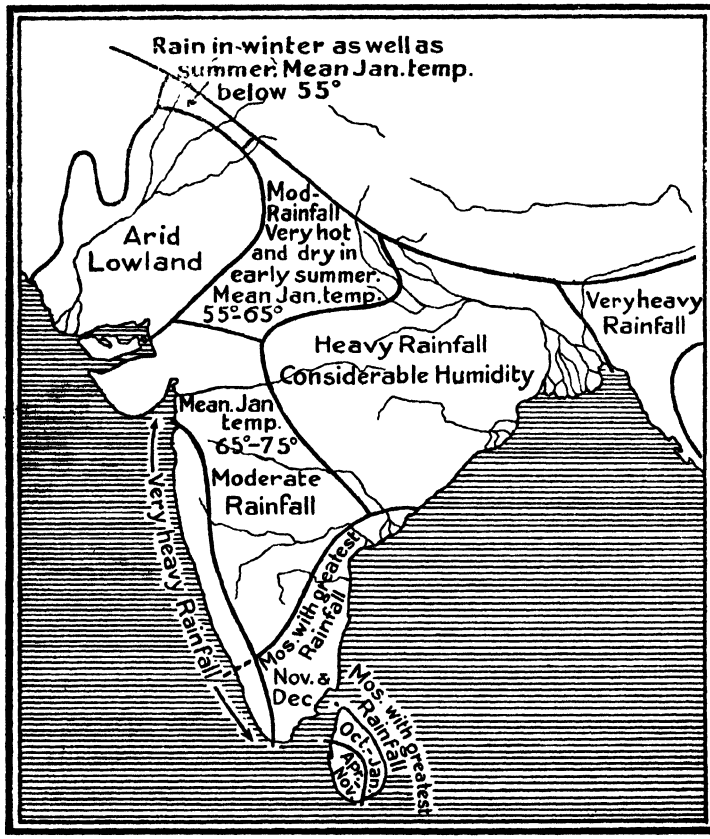
(a) *The North-Eastern Hills.* It is a region of extremely heavy precipitation and dense equatorial or semi-equatorial forest.

(b) *The Sub-Himalayan Region* comprises the lower slopes of the Himalayas up to about 5,000 feet and the foothills. It is a region of heavy precipitation and sub-tropical forest.

(c) *The Himalayan Region.* It begins from an elevation of 5,000 feet where significant changes in the character of the vegetation are first observed.

(d) *The Trans-Himalayan Region,* comprising a small fragment of the Tibetan Plateau within the borders of Kashmir. It is a region of Alpine desert.

(e) *The North-Western Hills.* It is an extremely arid region—a perfect antithesis to the North-Eastern Hills.



THE CLIMATIC REGIONS OF INDIA.

(f) *The Baluchistan Plateau,* lying in the main beyond the range of the monsoon. It is also extremely arid.

2. **The Plain of Hindoostan** is subdivided into six parts:

(a) *The Lower Indus Valley* comprising the province of Sind is a very dry alluvial plain. The rainfall is extremely irregular. Central Plains.

(b) *The Indo-Gangetic Valley West,* comprising the plains of the Punjab, is a dry alluvial plain with low rainfall.

(c) *The Upper Ganges Valley,* another alluvial plain, with an average annual precipitation of below 40". It comprises the western two-thirds of the United Provinces.

(d) *The Indo-Gangetic Plain East* or the Middle Ganges Plain is actually transitional in character, where both wet zone and dry zone meet.

(e) *The Lower Ganges Plain* or the Deltas Region comprising nearly the whole of Bengal is an alluvial plain with a moist climate.

(f) *The Brahmaputra Valley* or Assam Valley is also a moist plain.

3. **The Plateau of Peninsular India** or Deccan Plateau is similarly sub-divided into three main regions, each of which is again sub-divided into a number of smaller regions: The Deccan.

(a) *The Coastal Regions* bordering the plateau fall into four sub-divisions:

(i) *The Gujarat Region,* including Cutch, Kathiawad and Gujarat proper, is actually the transitional link between the dry Indus Valley and the Thar Desert on the one hand, and the hot wet West Coast on the other. The region itself is therefore moderately dry.

(ii) *The West Coast Region* comprises the narrow coastal plains of Konkon and Malabar as well as the slopes of the Western Ghats. The region is very humid.

(iii) *The East Coast South* which comprises the greater part of the Karamandal Coast is a moderately wet region. The rainfall occurs mainly in winter.

(iv) *The East Coast North* (Northern Circars) is also moderately wet, but the rainfall here occurs mainly in the hot season.

(b) *The Deccan Plateau* (Peninsular India) is sub-divided into three regions.

(i) *The Deccan Region* comprises the southern elevated portion of peninsular India. It is dry and barren.

(ii) *The Deccan Lavas Region* comprises the north-western part of the plateau. The climate is rather dry, but the soil extremely fertile.

(iii) *The North-Eastern Plateau* comprises the Central Indian Highlands, Chota Nagpur Plateau, Eastern Ghats, Mahanadi Valley (Chhattisgarh Plain) and the Godavari Valley. The rainfall is moderate.

(c) *Trans-Satpura Region* lying north of the Satpura Mountains is sub-divided into three regions:

(i) *The Thar Desert* lies between the Aravalli Hills and the Punjab Plains.

(ii) *The Uplands of Rajputana* lie between the Aravalli Hills and the Vindhya Mountains. It is very dry.

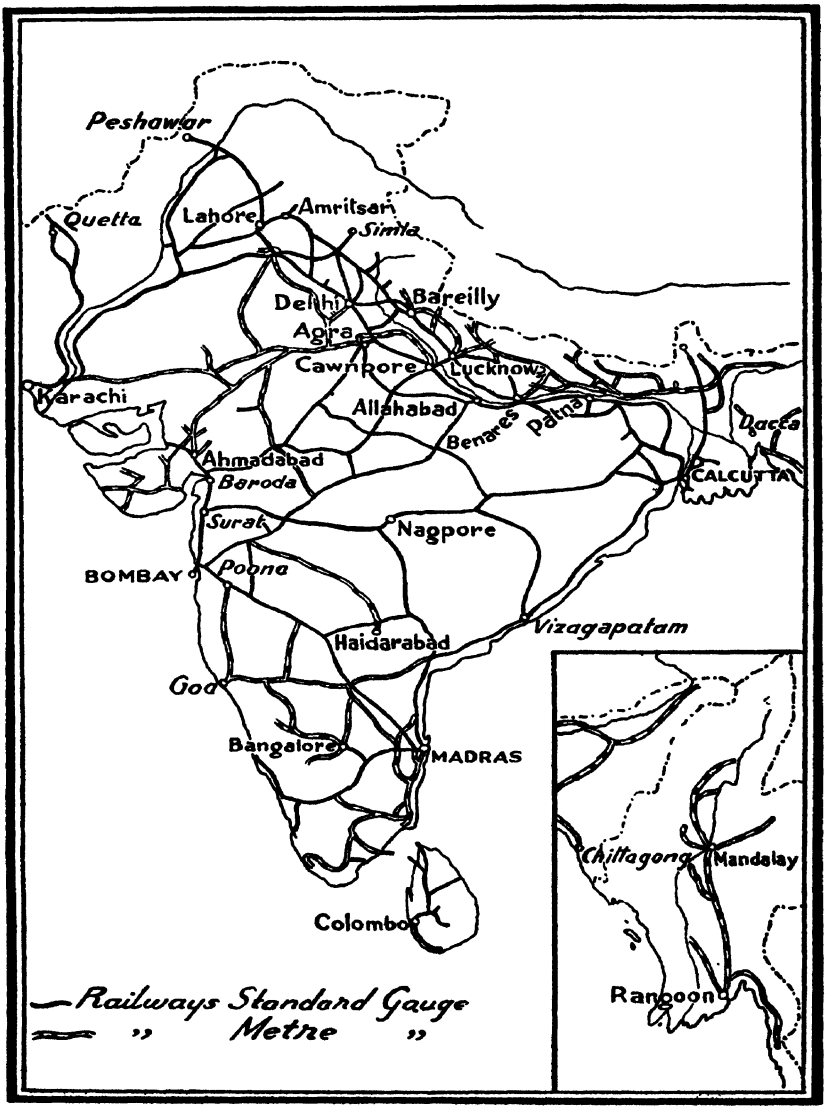
(iii) *The Plateau of Central India* lies between the Gangetic Plain and the lowland formed by the basins of the Narbada and Son Rivers.

Principal Importers of Indian Commodities

Cotton (raw)	Japan (55 p.c.), U. K. (14 p.c.)
Jute (raw)	U. K. (25 p.c.), Germany (16 p.c.)
Jute (manf.)	U. S. A. (32 p.c.)
Oilseeds	U. K. (28 p.c.), Italy (16 p.c.)
Tea	U. K. (86 p.c.)
Hides & Skins	U. K. (67 p.c.), U. S. A. (16 p.c.)

Principal Exporters to India

Cotton manufactures ..	U. K. (51 p.c.), Japan (43 p.c.)
Silk manufactures ..	Japan (73 p.c.)
Machinery	U. K. (70 p.c.)
Iron & Steel	U. K. (58 p.c.)



PRINCIPAL RAILWAYS OF INDIA WITH MAJOR PORTS AND TRADE CENTRES

Communications.—India possesses some 300,000 miles of roads, of which about 75,000 miles are metalled. The railway mileage is over 41,000, and the principal railway systems are:

From Calcutta.

1. *The Eastern Bengal Railway* which runs from Calcutta to Assam, connecting there with the *Assam Bengal Railway* which goes to Upper Assam and Chittagong.

2. *The East Indian Railway* connects Calcutta with such centres as Allahabad, Cawnpore, Delhi and Ambala.

3. *The Bengal Nagpur Railway* runs from Calcutta to Waltair and Nagpur and joins the G. I. P. R. to Bombay.

From Bombay.

4. *The Bombay, Baroda and Central Indian Railway* joins Bombay and Baroda with Delhi and Agra across Rajputana.

5. *The Great Indian Peninsular Railway* connects Bombay with Nagpur, Jubbulpore and Allahabad. It joins with the E. I. R. at Jubbulpore. At Raichur *via* Poona it joins with the M. & S. M. R. to Madras.

From Madras.

6. *The Madras and South Marhatta Railway* runs from Madras to Vizagapatam and joins with the B. N. R. to Calcutta, and with the G. I. P. R. to Bombay.

7. *The South India Railway* connects Madras with Mangalore, Cochin, Tuticorin, Trivandrum and Dhanushkodi, which is the mail port for Ceylon.

Inland water transportation is becoming less and less important. The principal channels of communication are, of course, the larger rivers of Northern India. Aerial transportation in India has already been dealt with (p. 283).

Towns of India

(Arranged according to population)

Calcutta ..	.. Port & jute manufacturing centre.
Bombay ..	.. Port & cotton manufacturing centre
Madras ..	.. Port & tanning centre.
Hyderabad ..	.. trading centre.