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# SOCIAL AND ECONOMIC GEOGRAPHY

BY

**L.BRETTLE**

MA. (OXON), B.LITT . F R G S, **F.R.Met.8.**

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# PREFACE TO THE SECOND EDITION

SINCE **this book first appeared, while the physical environment of man's activities has become better understood and appreciated, great changes have taken place in the use made by man of nature's opportunities.**

**Social and economic conditions throughout the world have been greatly disturbed by the depression in industry and trade of reoent years, by wars in three continents and by the greatly increased political interference in the economic sphere, particularly in those countries where drastic nationalistic policies have been enforced. Air transport has developed remarkably.**

**To secure great accuracy and improved presentation of the facts of to-day, the whole text has been revised and in parts rewritten, some of the maps and diagrams redrawn and much new material incorporated. In particular all statistics have been revised and a large number of them replaced by new ones of greater reliability, interest, and usefulness. Where possible the pre-depression statistics have been retained for comparative purposes.**

**No serious alteration has been made in the general plan, scope, and purposes of the book.**

**L. B.**

# PREFACE

THE peculiar sphere of *Social q,nd Economic Geography* is the establishment, explanation, and appreciaticm of the relationship between man and his environment, locallind world-wide, human and physical. In the ordering of the economic life of a region man who is only significant as a member of a group or society is quite as important a factor as physical conditions, although these are more fundamental and change less from generation to generation. Succeeding generations of men, however, may and do within broad limits make different uses of the same opportunities provided by nature.

I have aimed at presenting a suggestive rather than exhaustive treatment of the more important relationships existing between man and his environment in different characteristic parts of the world, and between one part of the world and another.

It is assumed that readers using this book have both reached matriculation standard in their geographical studies and acquired the essential habit of constant reference to a good atlas.

Students preparing for examinations in geography, and in economics, commerce, banking, or other branches of study where a knowledge of the subject is required, should find this book both helpful and stimulating, since much information not readily accessible has been brought together and presented concisely.

All the principal means by which geographical facts are presented have been used and co-ordinated. The maps, pictures, statistics, and diagrams form just as integral a part of the book as the letterpress and the index.

The maps drawn specially for the book by myself are intended to summarize facts and features not usually available in a convenient form in even the more expensive atlases or the " gazetteer " type of textbook. In some maps towns are indicated by their initial letter only and thus the continual use of an atlas becomes indispensable.

The statistics have been selected as representative and characteristic rather than as merely up to date. Should the need arise they can be supplemented by consulting the usual books of

reference, year books, statistical abstracts, published* by our own and foreign governments, and by trade and business organizations.

The pictures, too, are representative and are intended to replace long descriptive passages in the text. Since they present related facts at a glance a critical examination of them offers an interesting and instructive exercise in deduction and inference. Those to whom picture study is a new experience will find *Geography through Pictures* (with *Outlines of Answers)* a helpful introduction.

The Questions, Exercises, and Topics for Discussion offer the reader an ample choice of a wide variety of geographical problems rather than mere exercises. The choice of question and mode of attack is left to the discretion of the reader or teacher.

The letterpress is divided into two parts. The first portion deals more particularly with the inter-relation of relief, climate, vegetation, animal life including man himself, in the major natural regions of the world and the manner in which representative groups of men in these regions have made use of their own local opportunities. The second portion treats more especially of the relationships existing between different regions and of the means whereby contact between them is maintained. Since trade statistics usually refer to political units, these relationships have had to be treated rather on a national and international than a geographical basis.

Should this book succeed not only in imparting profitable information in a way both interesting and understandable, but also in fostering the faculty of sound judgment, critical analysis, and also intelligent imagination in its readers, its object will have been achieved.

In preparing this book I have been more especially indebted to the works of the following British and foreign authors: C. E. P. Brooks, G. G. Chisholm, H. J. Fleure, J. G. Frazer, M. Hardy, A. J. Herbertson, W. G. Kendrew, F. H. King, L. W. Lyde, F. Mann, Lord Monkswell, J. Murray, M. I. Newbigin, R. I. Purden, G. Adam Smith, G. Taylor, E. G. R. Taylor, J. F. Unstead, B. Karlgren; J. Hann, Kirchhoff, A. Oppel, Ratzel, A. F. W. Schimper, J. Brunhes, E. de Martonne, P. Vidal la Blache, A. L. Bishop, A. E. Gregory, E. Huntington, A. G. Keller, J. Russell Smith; to the publications issued by our own, the dominion, and foreign governments, international industrial and commercial organizations and the Press, particularly *The Manchester Guardian Commercial,*

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Grateful acknowledgment is made of my debt to my former teachers and tutors, particularly Professor H. H. Swinnerton, D.Sc, University College, Nottingham, and Mr. J. Cossar, M.A., the School of Geography, University of Oxford, to whose enthusiasm and example this book is a tribute. Acknowledgment is gladly made to those who have been good enough to provide the photographs for the illustrations, the sources of which are indicated in each case. I wish to express my sincere thanks to friends and relatives at home and overseas, especially to Mr. J. A. Williamson, D.Litt., and to Mr. P. G. Wilson, M.Sc, Head of the Day Department, City of London College, who have generously given me valuable assistance in various ways; and, lastly, to my wife for the writing of the greater part of the manuscript, the reading of the proofs, and the compiling of the index.

L. BRETTLE.

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# SOCIAL AND ECONOMIC GEOGRAPHY

**A SYNOPSIS IN MAPS, PICTURES, STATISTICS, DIAGRAMS, AND LETTERPRESS OF SOCIAL AND ECONOMIC GEOGRAPHY BASED ON THE NATURAL REGIONS OF THE WORLD**

## CHAPTER I

## INTRODUCTION

### GEOGRAPHICAL PROBLEMS

A L L over the world people in different places differ in the way they live and get their living. The majority of people work to satisfy, directly or indirectly, for themselves or other people, the material needs common to all men of (1) food, (2) clothing, (3) shelter, (4) tools and weapons, (5) means of transport. A smaller number of people earn their living by satisfying man's higher needs, such as (1) government, (2) education, (3) science and art, (4) religion. It should be borne in mind that men regard their needs differently. To a native of the tropics clothing is a luxury, to the Eskimo a necessity. Such a factor necessarily alters the aim of man's work. Man's wants, whether they are necessaries, comforts, or luxuries, lead to efforts to satisfy them.

They also differ in the way they perform their various kinds of work. Some have more energy, others a greater desire for work; some are more skilful, others have better openings. As a result of such efforts in different circumstances, they eat various kinds of food, do not wear the same sort of clothing, live in different kinds of dwellings, and use a variety of tools, weapons, and means of transport. These differences arise largely because the geographical conditions of the places where they live are not the same. Although

differences in their social and economic life are often more marked between groups of people living in different countries of the world, there are often quite significant differences between neighbouring groups in different parts of any particular country. One village frequently presents a contrast to another, and in many of our towns and cities there are marked contrasts between the "east" and the "west" ends, between dormitory and residential districts and the business quarters. It is true that historical causes, man-made institutions, the spread of ideas evolved by individuals, cultural and economic intercourse, the selective effect of voluntary migration, and similar factors contribute to the states of affairs existing in different parts of the world, but it is not always recognized that these factors themselves are the outcome ultimately of the interplay of geographical conditions past and present, and man's differing response to them. Examples of this basic geographical influence are mentioned below in connection with the regions where they are of special prominence. Here then is a series of problems, such as why Eskimos are fishermen and not farmers, why the people of the Steppes in Central Asia are nomadic, ignorant cattle raisers, while those of London are a highly civilized, settled, commercial, and manufacturing people, or why there are differences between your own and adjacent localities in the way people live and get their living.

**Geographical Material and its Use.**

The ideal way to find the answer to geographical problems is to study them on the spot. When this cannot be done, information about foreign peoples and places can be got at second hand from people who *have* seen them. Such information is given in—

1. Many different kinds of maps showing information about various subjects in different ways.

2. Books containing accounts, descriptions, and statistical data.

3. Illustrations of various types.

In order to make the best use of these sources of geographical knowledge, their particular advantages and disadvantages have to be considered by the person using them.

Maps provide a most convenient, compact, and scientific means of presenting by one method or another a description of the whole or

part of the surface of the earth, considered in its diverse elements, be they physical or human. Their limitations need to be borne in mind. Since the earth is a geoid, having a curved surface, and map is flat, neither the whole nor a part of the earth's surface can be truly shown on a flat surface (quite apart from any reduction of scale) but can only be represented according to some particular convention. Different projections based upon mathematical calculations have been devised so that the distortion of distances, areas, and shapes, or changes of direction in different parts of the same map, may be avoided. The graticules in common use in atlases are mostly in the nature of compromises, and examples of these will be found in the maps given in this book. Inevitably the number of facts which can be inserted upon a large scale map is limited, even when space-saving symbols and conventional signs are employed. No map ever shows more than a selection of facts chosen by the map-maker, and the need to get accustomed to the interpretation of symbols is most essential, e.g. in using Ordnance Survey, Land Utilization and weather maps. Because maps can be made to show true area relationships they are a useful medium for showing distributions, e.g. crops, stock, population, but however carefully prepared such maps can never be more than approximately correct. The most reliable are those based on carefully chosen statistics indicated by dot or shading methods, factors having a bearing upon the particular distribution shown being taken into account. Small scale maps in atlases and books cannot, owing to the limitations of space, serve as more than broad guides to distributions.

Examples of the more common types of maps, cadastral, topographical, including Ordnance Survey, weather, climate and distributional maps, appear in this book.

Books containing accounts and descriptions by competent travellers and trained investigators supply a valuable and necessary complement to our atlases. Statistical data can be misleading unless its basis and method of compilation is known. Statistics may be actual or standardized, expressed as units or averages and given in ordinary figures, percentages, indices or in diagrammatic form. Where representative data is all that is required, averages are usually quoted. For comparative purposes and where disparate movements in point of time or direction require to be shown, individual units in the form of percentages or indices are useful

provided that the basis of the figures and the subject-matter to which they refer are the same throughout.

Pictures are as invaluable sources of information as maps. Although compared with maps they are easier to understand, the technique of picture-reading, like map-reading, needs to be acquired if full use is to be made of them (p. 428). While still pictures, preferably coloured, are more useful in studying what have been called "the fixed elements" of a man's relationship to his environment, films are especially helpful in presenting processes, activities, and sequences. Good films of processes and natural phenomenon can often be more instructive than actual observation because the time factor can be controlled, and extraneous matter reduced to a minimum.

Each source of knowledge is important in its own way but because of its limitations needs to be used with care.

## Method of Classification of the World into Major Natural Regions with their Sub-Regions.

Throughout the world differing combinations of different natural conditions, e.g. position, relief, climate, sources of power and mineral wealth together with soil, plant and animal life, including man, offer varying possibilities for the satisfaction of man's needs. In order to facilitate the study of these differing possibilities and the ways in which man is using them various systems have been devised for the division of the world into "natural regions."[1] A completely satisfactory basis for such a division which will suit ail objectives has yet to be found. Among other causes this is partly due to the fact that no single element of man's natural environment is of comparatively equal significance in all parts of the world and partly to the inter-relationships of the elements of man's environmental complex varying from place to place and from time to time. Although man himself too is, in one sense, part of his environment his reactions to his surroundings are essentially changeable. Hence it seems well to indicate in broad outline the scheme of classification adopted in this book.

Of all the elements blended to form a natural complex or environment of man in any part of the world, climate, structure,

[1] **A summary of the more important of these is given in *Geography,* June, 1037.**

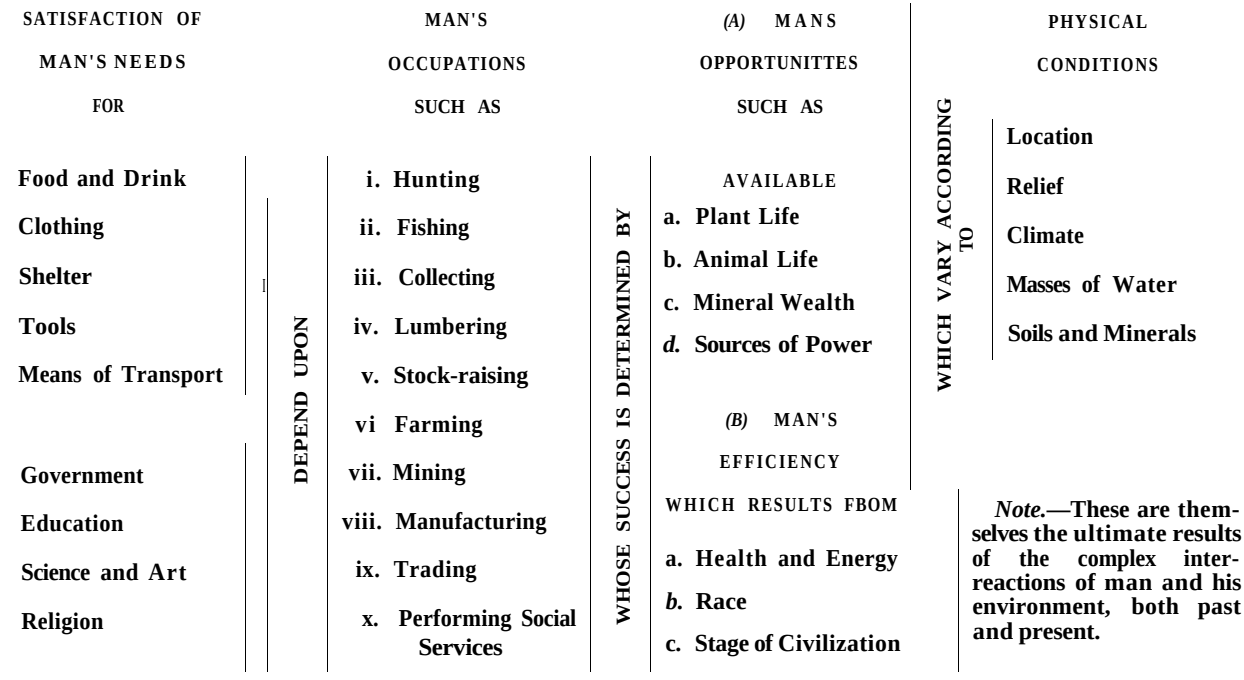

SATISFACTION OF MAN'S NEEDS FOR
Food and Drink
Clothing
Shelter
Tools
Means of Transport
Government
Education
Science and Art
Religion
DEPEND UPON
MAN'S OCCUPATIONS SUCH AS
i. Hunting
ii. Fishing
iii. Collecting
iv. Lumbering
v. Stock-raising
vi Farming
vii. Mining
viii. Manufacturing
ix. Trading
x. Performing Social Services
WHOSE SUCCESS IS DETERMINED BY
(A) MANS OPPORTUNITTES SUCH AS
AVAILABLE
a. Plant Life
b. Animal Life
c. Mineral Wealth
d. Sources of Power
(B) MAN'S EFFICIENCY
WHICH RESULTS FBOM
a. Health and Energy
b. Race
c. Stage of Civilization
WHICH VARY ACCORDING TO
PHYSICAL CONDITIONS
Location
Relief
Climate
Masses of Water
Soils and Minerals
Note.—These are themselves the ultimate results of the complex interreactions of man and his environment, both past and present.
THE FACTORS WITHIN EACH OF THESE GROUPS MAY AND OFTEN Do INFLUENCE ONE ANOTHER

FIG. 1

and relief may be regarded as the more constant or permanent physical phenomena; their derivatives, soils, vegetation, and animal life, including man, as the more inconstant and variable elements; and mineral wealth and sources of power as accidentals.

A relative degree of uniformity of climatic conditions (in themselves the products of many variable factors—temperatures, precipitation, winds, sunshine, cloudiness, humidity and others) occurs over much wider areas of the earth's surface than is the case with any other element of man's environment. Moreover, to a large extent uniform climatic conditions are usually reflected in uniformity of vegetation and soils notwithstanding local modifications arising from moderate variations of relief and differences in the basic geological material from which soils are formed. In the great lowland and upland areas of the world, areas also of concentrated humanity, therefore, climate has been regarded as the dominant element of man's natural environment and climatic conditions have been used as the basis for the division and classification of these areas into *major natural regions.*

Contrary to the impression a line on a map may give, nature seldom presents clearly defined boundaries between regions.

While climatic data representing average weather conditions over a long period of time have been necessarily used as a convenient basis of division, sight should not be lost of the importance of abnormal and actual weather conditions such as the occurrence of long and severe frosts or droughts or lack of sunshine which may override for the practical affairs of man the value of mean conditions. Agriculturists in particular have to plan their activities so as to allow for the incidence of abnormal weather conditions which in parts of Canada, U.S.A., and Australia may occur as frequently as one year in five with far-reaching effects upon production and trade. The importance of these variations is out of all proportion to the frequency of their occurrence, e.g. a single late frost will do irreparable harm to a fruit crop of Kent, as in May, 1935; the delay in spring rainfall may ruin the cotton crop of the U.S.A.; deficiency of sunshine may bring about a decrease in the sugar content of the sugar-beet crop of East Anglia. The wool industry of Australia by drought in 1901-2 suffered an estimated loss of £127,000,000.

Further, through recent studies in micro-climatology (or better, micro-meteorology), the study of extremes rather than means, it is

becoming increasingly apparent that even in a small area, local variations of relief, aspect, plant cover and soil type do, particularly when calm weather conditions prevail, have a greater influence upon vegetation and the possibilities of agriculture than had hitherto been thought. Modern research is tending more and more to picture the lowest few feet of the atmosphere, in which the majority of man's crops complete their life cycle and in which all plant life begins its development as a climatic realm on its own, especially under calm conditions. Mean Monthly Temperature tables show nothing of the magnitude of temperature and humidity changes experienced within this lowest stratum—literally beneath the notice of the instruments in the Stevenson screen on whose records the tables are based. Mean Monthly Rainfall tables are based upon the actual amounts of rainfall as recorded by rain gauges. By reason of variations in evaporation, run-off, porosity of soil or plant covering *effective* rainfall available for plant use may be very different from the recorded rainfall, e.g. in parts of South Africa and Australia it may be as much as one-third less.

In the highland areas of the world, relief and structure have been regarded as distinguishing criteria for classification although since changes in altitude like those in latitude give rise to changes in climatic conditions, climate is still a most important element. Climate may be the dominant characteristic in a highland region as for example in Turkestan, where the highlands are of sufficient altitude to produce during the winter climatic islands because they penetrate the upper, warm, moist westerly winds whilst the adjoining lowlands are situated in the intensely cold, dry north-easterly winds.

An attempt has been made to divide the photic zone of the oceans into major natural regions according to depth and temperatures. The fortuitous distribution of the world's mineral wealth and sources of power which may be found in any region is treated separately.

In any region where natural conditions affecting human life are fairly homogenous, the possibilities for man's activities and mode of life also tend to be uniform. The use made of the possibilities afforded man in any natural region varies markedly according to the capabilities and inclinations of its inhabitants—or even according

**to** the dictation of people living outside its boundaries. Man is not so much a creature of circumstance as other living things and thus within limits he can adapt himself and his environment to suit his convenience, e.g. the natives of the Amazon forests collect rubber latex from widely scattered trees growing wild; the native planters of Java obtain rubber from trees grown in plantations on scientific lines. The Indians of North American Prairies hunted wild bison while their European successors keep large herds of cattle in ranches or grow field crops. The planter and rancher have adapted themselves the more successfully to their environment and made greater use of it. In considering man's ways and means of livelihood it is worth remembering that all cultivated plants and domestic animals are the descendants of wild ones and can best be grown or reared in their original home regions or in places where similar natural conditions exist. The rubber plantations of Malaya, the pastoral industries of Australia and South America, the wheat and cotton belts of North America, the potato crops of Europe, the maize production of South Africa, and the tea industry of India are but a few witnesses of man's adaptation of nature. Intelligent man by large scale irrigation can make parts of barren deserts productive, e.g. in the Punjab; by clearing temperate forests substitute agriculture for lumbering or trapping; by drainage and other methods improve the occupational value of a region, e.g. in Panama Canal Zone. Should man however by his adaptations upset the natural equilibrium between physical conditions and organic Ufe, serious consequences may follow, e.g. in those parts of the United States where through deforestation, overgrazing of natural grass land and cereal growing under unsuitable soil conditions the problem of soil erosion has now become acute. With primitive peoples interference by man is usually localized and immaterial compared with the large scale interference by civilized peoples with their vastly greater resources, for good or ill, of power, machinery and knowledge.

Thus within any *major natural region* by reason of man's adjustments or adaptations there can be distinguished *sub-regions* in which the human factor is of critical importance, e.g. mining, industrial, administrative, recreational, or other areas in which man's activities are specialized. Space forbids more than mention being made of outstanding examples in the succeeding chapters,

and since this book aims at presenting a suggestive treatment of the more important of man's adjustment to and adaptation of his environment in different characteristic parts of the world no attempt is made to delineate the limits of a multiplicity of sub-regions to be found in one "major natural region" or even in the reader's own district. These theatres of human activities and modes of life have their distinctive individualities whose natures however are more subject to change because of man's actions than those of major natural regions. Such differences may arise from the accidental disposition of sources of power and mineral wealth or because more or better use is made of them in one sub-region than another. The population of one sub-region may differ from that of another in race or the stage of civilization attained. The degree of inter-accessibility between sub-regions is another factor.

These sub-regions or *geographical regions* do not exist in isolation but are loosely or closely linked together and influence each other by means of transport, communications and trade. Thus in a sub-region man has not only his own native environment but also, as it were, the possibilities of foreign environments at his disposal. The more specialized man's activities become and the more highly organized his mode of life, the more the use made of the home and foreign environment tends to become integrated and the more groups of men living in different regions of the world tend to become dependent upon each other. The second portion of this book deals more particularly with the inter-relationships existing between different regions of the world.

## Importance of the Study of the Home Region.

Direct observation can be most easily and profitably carried out in the place where we live. In our home region geographical processes can be observed, the results of the changing interaction between man and his environment in the past as well as the present can be studied and the regional unity of geography appreciated. A thorough study of local physical conditions, occupations, customs, habits of the inhabitants, and the history of the locality not only helps to create a geographical outlook but also to build up a method of solving geographical problems, and should lead to the better understanding and interpretation of the geography of regions less

accessible and farther afield. Regarded as a whole our local geographical environment will be seen to be made up of related parts, feach. of which can be analysed separately with the object of seeing how it fits into the whole. Fig. 1 gives a generalized scheme which has been found useful in studying a selected region. The extent to which the physical environment at any particular period of time has influenced the economic life of the district, the degree to which this in turn has influenced the social life and character of the people themselves, and the part played by social inheritance as a factor in economic development can often be traced. A study of local history will reveal the fact that geographical conditions have exercised a different emphasis at different times. An understanding and appreciation of such factors as these are essential if social and economic progress is to be maintained. At home considerations such as these have to be taken into account when schemes for town planning are under review, or the choice of sites for the expansion of old industries or the establishment of new ones in a district is considered. Similar factors have to be taken into account when schemes for the development of newer countries are worked out and applied. Every district or region presents its own particular problem in its own special way. Below, the main outlines of the inter-relations of man and his environment in and about Nottingham are given as an example illustrating local geography. In all such studies the use of maps, old and new, and particularly Ordnance Survey maps, is essential and should be combined with field work. Exercises in map reading in a rural area in Yorkshire are given on pages 25-27, and those on a single city street will be found on page 427. These examples of a city area, a rural district, and a street provide suggestive rather than exhaustive illustrations of the possible treatment of local geography.

### The Evolution of a Town in Historic Times: Nottingham and District.

It will be seen (Fig. 2) that there is a convergence of geological formations towards and into the city itself of outcrops of the lower Carboniferous and Permian from the north-west and of the Trias from the north-east. The more important substances of economic value offered by the rocks of the systems mentioned are respectively coal with fireclay, limestone and sandstone for building stones,

soft earthy sands for foundry purposes, and well water for drinking purposes, brick earth and gypsum used for plaster of Paris and brewing industries. The area north of the valley of the Trent is one of low hill ranges and broad valleys following the trends of the outcrops. Owing to the general absence of glacial drift there is a

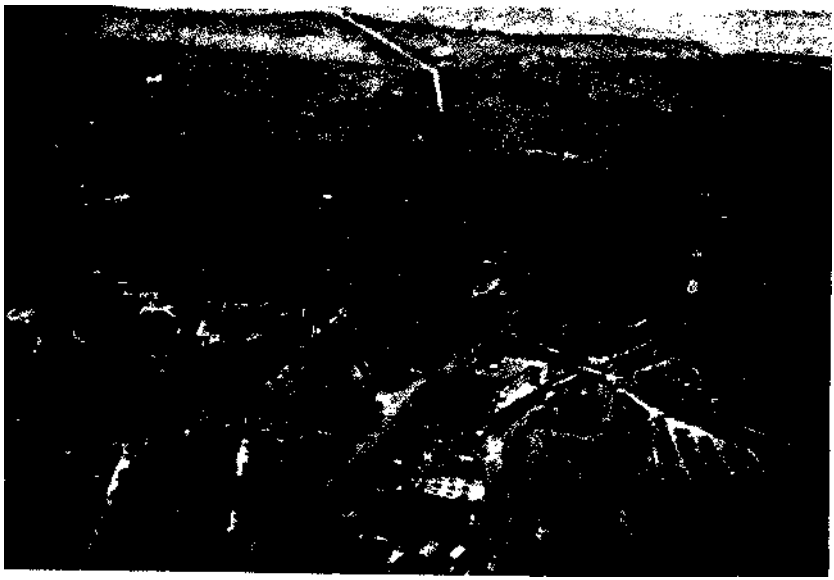


*Photo* *C. F. Shaw, Esq. (Nottingham)*

FIG. 3. NOTTINGHAM FROM THE WEST, 1925

The Castle, the River Leen (canalized), and the Midland Railway can be seen in the foreground the " Lace Market" in the middle distance, and Carlton Road in the background

close relationship between the outcrops of the coal measures, limestones, sandstones, and clays, and their overlying soil formations. For agricultural purposes the soils associated with the two first-mentioned types of rock are poor for arable farming but provide short, fine grass pasturage, the Bunter sandstone and pebble beds in Sherwood Forest still carry the remains of their forest growth, while the clayey Keuper marls make good arable land and mixed farming country. The many streams and ponds which are a special feature of only the marl country provide suitable habitat for geese and duck rearing. South of the Trent valley of alluvium with its rich meadow pastures periodically fertilized by flood water, to the

south-west lies the compact upland of the Ashby coal-field and Charnwood. The latter area is composed of volcanic conglomerates and tufts associated with quartzites and slates mantled by Triassic clays and sandstones. The quarries on the rugged hills of Charnwood Forest offer Mount Sorrel granite (road setts), Swithland slates

*Thoto supplied by* *The Central Aerophoto Co., Ltd.*

FIG. 4. THE " LACE MARKET," NOTTINGHAM

**The general plan of the " English " Borough on the hill crowned by St. Mary's Church (square tower) still exists, and the streets shown may be identified from Fig. 5. Note the Great Northern Railway is carried on a viaduct across Leenside (top and right) and then tunnels under the hill. Part of the square, Weekday Cross, is shown (bottom left)**

and Charley Forest honestones, while the hillsides provide sheep pastures. To the south-east of Nottingham lies the fertile clay Vale of Belvoir, succeeded by a belt of low hills or " wolds " often capped by boulder clay rising to the Jurassic Scarplands. Economically this south-eastern area corresponds to the Keuper marl area north of the Trent. It is a region of mixed or dairy farming. The sharply contrasted geological areas of the hinterland of Nottingham offer a variety of possibilities for mineral extractive industries and for farming together with their subsidiary industries.

The actual site of Nottingham possesses some interesting and significant topographical features. The city appears to have developed along and extended outwards from a saddle-shaped ridge, roughly in the form of a crescent whose concave and scarp slope faces towards a southerly salient in the channel of the Trent. The western horn of the crescent culminates abruptly in the sandstone crag on which stands the Castle and the eastern horn ends similarly in a slightly less elevated but larger sandstone bluff, Malin Hill, crowned by St. Mary's Church. Except for a ledge or shelf immediately south of the centre of the crescent partly occupied by Upper Parliament Street, the lower ground enclosed between the arc of the ridge and the chord of the River Leen was as late as 1751 swampy and consisted of a " Broad Marsh " and a " Narrow Marsh " as the present-day names indicate. Prior to 1844, when Carrington Street was made, the main approach to Nottingham from the South was along the appropriately named London Road. Almost enclosed between the Leen and the Trent lies the roughly semicircular area of alluvial flats formerly liable to floods, significantly named the " Meadows " district. It is only within living memory that habitable Nottingham on the Leen extended to its borough boundary on the south and in fact and name became Nottingham on Trent.

Before surveying the way in which the inhabitants of Nottingham have at different historical periods availed themselves of the opportunities presented by their local geographical environment, mention must be made of their facilities for contact with the rest of England and farther abroad. From the earliest times the valleys of the Trent and its tributaries the Derwent, Ere wash, Soar, and Leen have provided natural lines of communication by land and by water (the Derwent by land only). These natural route ways with those provided by the Witham and Sleaford Gaps in Lincoln Edge to the east make Nottingham, almost on the southern extremity of the Pennine Chain, a focal point for the routes of the East Midland area. Reference to a relief map of England will show, however, that the city is off the main topographical lines from London to the North via York or via Manchester; the former route crossing the Trent at Newark 20 miles away to the east and the latter proceeding via Derby 16 miles away to the west. Whether or not it is true that Nottingham was known to the Britons as Tiugobauc, the

habitations of the caves, the western sandstone crag in which it was easy to excavate caves offered a hill suitable for habitation, defence and offence, and commanding the natural routes between seaboard and interior through the Middle Trent Valley Gateway at a point where the pre-Roman trackways were compelled to converge to avoid the swamps of the meandering Trent on the south side of the valley and the dangers of the forested southern end of the Pennines to the north. The Trent itself was fordable at this point. The northern forested hinterlands provided both a hunting ground and a line of retreat, while the Leen no doubt offered fish. Thus the natural nodality of the site of Nottingham appears to have been early recognized, and except during the time of Roman Britain to have persisted as a factor in the growth of the city up to the present time. The Roman neglect of the sit? of Nottingham is shown by the fact that the Fosse Way between Leicester and Newark passes four miles away along the higher ground by the south side of the Trent valley. With the coming of the seafaring Angles working their way up the Trent, the larger Malin Hill and Hollowstone (sandstone) found favour as a site for a settlement. The Angles were farmers and colonists, emigrants rather than military invaders. With a precipitous southern side overlooking the River Leen, with marshes on its eastern and western flanks and a falling slope on its north side, the eastern horn of the crescent offered a better site than the Castle Rock to the west. The evidence of excavation indicates that the natural defences of the site were strengthened by a stockade and outer ditch to the west, north, and east sides. Moreover, such a position was within easy reach of the Trent water-way, was in contact with other Angle settlements to the east, and overlooked the adjacent clay vales of Sneinton (masked from the river) to the north and east and the water meadows to the south where farming activities could be carried on. Whereas the Britons* outpost of the Pennine fastnesses had faced south, the stockaded frontier settlement of the Angle settlers from the east, faced west.

When the Danish sea rovers, also approaching up the Trent Valley, conquered Snotengaham of the Angles, they established a military post on the Castle Rock. Nottingham became one of the Five Boroughs—the strategic centres of the Danelagh, that eastern part of England between the Tees and Thames which had been

assigned to Danish rule by Alfred the Great at the Treaty of Wedmore. Castle Rock was fortified in A.D. 886, and closer contact between Nottingham and the south was made by bridging the Trent about A.D. 919-924.

The value of the rich agricultural lands of the Trent Valley, the hunting facilities of Sherwood Forest, and the strategic position of Nottingham, were all appreciated by the Normans. A Norman borough came into being under the protection of the Castle, a wooden structure which was replaced by one of stone by the time of Henry II, 1153. The French borough including the parishes of St. Peter and St. Nicholas had its town hall near the present Moot Hall, and the English borough of St. Mary's parish had its own hall at Weekday Cross. It was not until 1714 that the last distinction between the Norman and English boroughs disappeared and the two were merged into a single unit with common laws, privileges, and customs. Even the Market Place, the largest open air one in England, used to be divided by a wall separating the English and French sections. During this period the foundations of many of Nottingham's industries were laid, and the city became established as a market town and commercial centre, particularly during the thirteenth and fourteenth centuries. Malting and brewing industries based upon the excellent barley of the Vale of Belvoir and the peculiar brewing qualities of Nottingham water, due to the presence of the gypsum beds, had already been established by the hard-drinking Angles. Local supplies of wool from the Pennines, Charnwood Forest, and Lincoln Edge, and pure hard water suitable for dyeing purposes provided the basis for woollen and dyeing industries, the forerunners of the hosiery and finishing trades of to-day. By a charter of Henry I, the burgesses of Nottingham received the monopoly of cloth dyeing within 15 miles of the city as well as the control of the navigation of the Trent and the right to hold a weekly market. By the end of the twelfth century Nottingham had its own wool weavers' guild, a woollen merchants' guild, and towards the end of the next century Nottingham had established a system of Free Trade with Derby, Coventry and other towns. Nottingham goods could circulate throughout England without risk of seizure for debts unless the burgesses of Nottingham were personally involved. Italian wool merchants visited " Montingam " and district to buy wool and woollen goods direct instead of through Flanders,

the chief European wool market at that time. The street names Warser Gate (warsele—bundle, probably of sheep skins), Woolpack Lane, Lister Gate (littester—dyer), Pilcher Gate (pilcherer—a mantle maker) still bear witness to the early beginnings and original location of Nottingham woollen industries. Judged by our standards the trade of those days was very small. The yearly sale of wool in Nottingham was only eleven bales, and those offered by other Notts wool centres only totalled forty-seven, including Lenton ten, and Shelford twelve bales.

Metal working, the antecedent of Nottingham's cycle, motor, and engineering industries, arose in Danish times to satisfy the demand for agricultural implements, domestic hardware, weapons and accoutrements, and equipages for horses. It was based on the local supplies of charcoal from Sherwood Forest, the brown iron ore of the middle lias, and possibly the nodular layers of clay ironstone of the coal measures and the foundry sands of the Bunter country. The Smiths of Nottingham came to have their own special quarters in Griddlesmith and Bridlesmith Gates as early as 1304, while nearby in Wheeler Gate the wheelwrights, and in Smithy Row the shoeing smiths later followed their occupations. During Tudor and Stuart times bell-founding was an important industry with its centre at Bellar's Gate.

The particulars we have of one of Nottingham's annual fairs, institutions dating back to the twelfth century, show how important was the woollen industry of the city. In 1300, when the duration of the fair was reduced from eight to four days, cloth merchants, apothecaries, pilchers, and mercers paid 12 pence, other traders 8 pence, except those selling iron, for booths—8 ft. square arranged in rows in the open fields—probably in the natural amphitheatre on the shelf of higher ground near the site of the Old Market Place, where business could be carried on under the protection of both crown and church, represented respectively by the Castle and St. Mary's Church.

Supplies of hides and skins from the cattle rearing areas to the north-east, east and south, bark for tanning from oaks of Sherwood Forest to the north-west and an adequate water supply provided for the development of tanning, leather and allied industries during the Middle Ages. Nottingham tanners had their own hall in 1551. Butchers appear to have congregated in Fletcher Gate (flesher—a

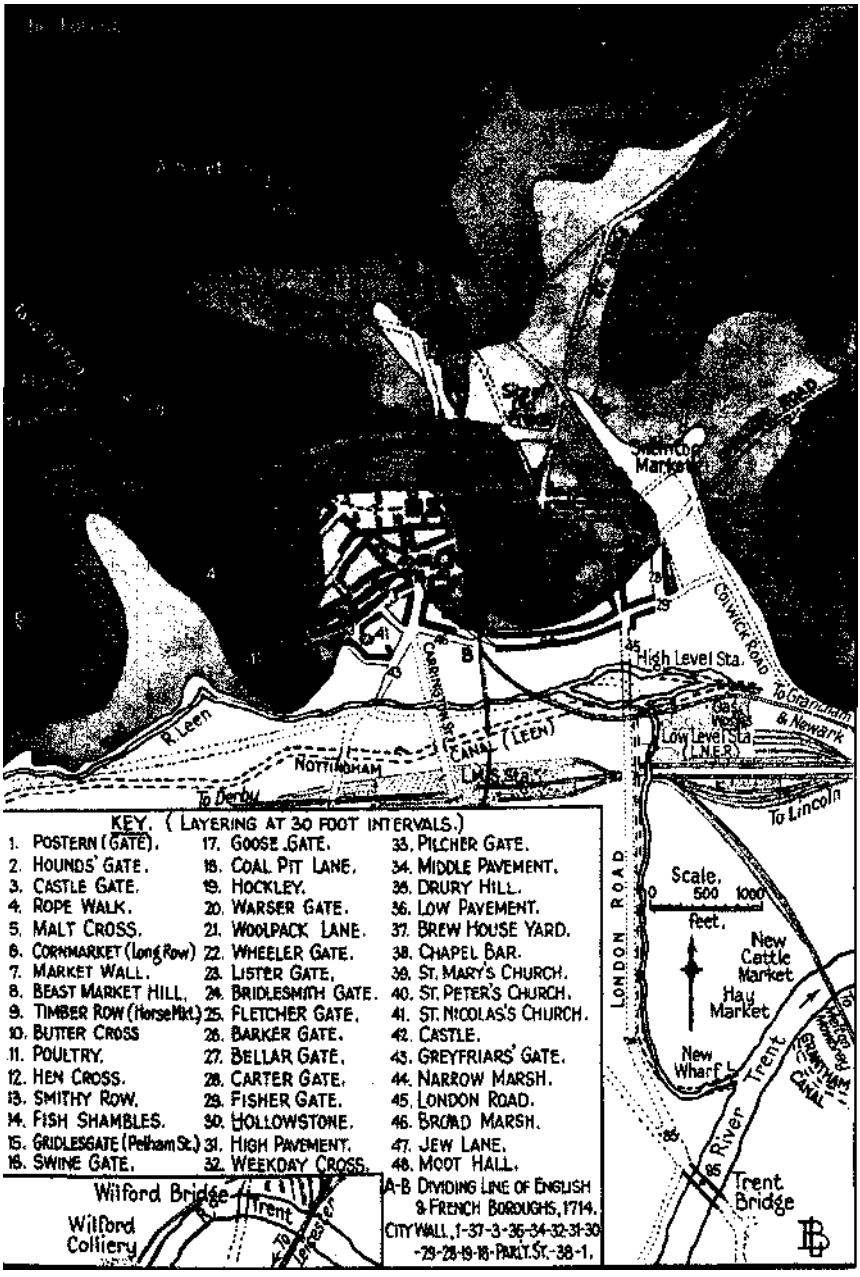
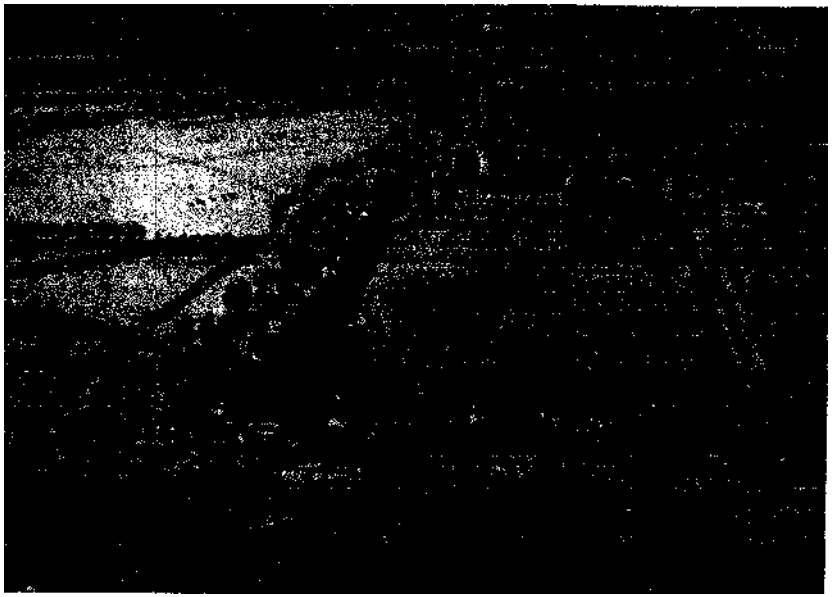



FIG. 5. NOTTINGHAM ABOUT 1700

**Later developments in what is now only part of Nottingham are shown in broken lines**

butcher; but earlier an arrow maker using goose quills; cf. Goose Gate nearby) and tanners in Barker Gate. The present hide and skin market is still in this quarter. The weekly cattle and horse markets, with geese at Michaelmas, may have been held at one time in Hockley (Stockley) near at hand, and in Norman times onwards



*Reproduced from " In and About Notts " by kind permission of R. A. Mellorfi, Esq.*

FIG. 6. NOTTINGHAM FROM THE EAST, ABOUT 1090
The S-like course of the Trent can be seen in the top left-hand corner. The Castle, St. Mary's Church, and the London Road spanning the River Leen can easily be identified

to the nineteenth century was held at Beastmarket Hill and Timber Row (South Parade). Both sites were easily approached from the marl stock-raising districts to the north-east. Probably owing to the marshy nature of the ground there was no approach from the east along the Trent Valley until the era of turnpike roads, and then Colwick Low Road had toll gates until about the present century.

The stall-holders in Nottingham market at the close of the Middle Ages are given as 30 mercers, 20 drapers, 2 tanners, 10 shoemakers, 2 smiths, 6 ropers (to which industry the Rope Walk testifies to this day), 32 butchers and 8 fishers—fishmongers (a feature in the time before the Reformation). Thus down to Tudor times Nottingham

had three staple industries with their subsidiaries based upon local resources. These were mainly centred in and around the old English borough and in those quarters nearest the sources of raw materials. The same directional significance is also shown in the street name Goose Gate and Fisher Gate, leading respectively to the clay country with its ponds and the River Leen. Nottingham " Lace Market " in the same quarter of the city perpetuates the tradition of centuries. The weekly market to which some country folk still bring their produce and meat has only recently been transferred from the Old Market Place and the Shambles under the old Exchange to the new covered-in Central Market. As regards the constituent sections of the annual fair held at Michaelmas and officially declared open by the Mayor (Lord Mayor since 1928), the woollens section dwindled away during Stuart times and the cottons section after the Industrial Revolution. The cattle, hay, and cheese sections still survive in the New Cattle Market.

The Goose Fair, at which geese were marketed for Christmas, has within living memory ceased to exist except in name, and as an amusement fair has been transferred to the " Forest " (in Norman times " the waste land," a racecourse until 1890, and now a recreation ground). A new Council House has replaced the Exchange Buildings rebuilt in 1814, and the old Market Place has been laid out as an open space.

During the seventeenth and eighteenth centuries, the more important changes affecting the social and economic conditions in Nottingham were the introduction of cotton as a basis for Nottingham's textile industries, and the invention of textile machinery worked by man power. In 1589, the Rev. William Lee of Woodborough, invented a manual stocking frame capable of knitting woollen goods. The fabric had twelve loops to every 3 in. compared with 200-300 loops in modern seamless hose. Although at first neglected the invention was taken up during the seventeenth century and a company of framework knitters was incorporated. The use of cotton as a textile fibre appears to have been introduced by Low Country refugees in Stuart times. Foreigners were not the only people who found refuge in Nottingham where inventions and the introduction of new materials and business methods were more welcome, than in the more prominent textile centres like Manchester, Norfolk, and London. Need of Nottingham joined Strutt

of Belper in exploiting the latter's invention (1758) for making ribbed hosiery, and they both gave practical encouragement to Hargreaves and Arkwright, who both found a more favourable reception in Nottingham than Manchester for the working out of their inventions for spinning and the co-ordination of the processes of carding, drawing, roving, and spinning respectively. The frame-workers in Nottingham were in close touch with the invention of Paget of Loughborough in connection with woollen hosiery, and of Compton, the inventor of Compton's Mule. In 1769, it is claimed, Arkwright set up " the first cotton mill erected in the world between Stockley and Woolpack Lane," and by 1773 material manufactured entirely of cotton was produced. Inherited skill and a spirit of independence and enterprise among the inhabitants were quite as important factors contributing to the establishment of Nottingham's domestic hosiery trade as ease of access to yarn supplies from Derbyshire and Lancashire, and a favourable position for supplying the expanding markets at home and abroad. Long experience in woollen hosiery manufacture, and the less equable and less humid weather conditions of an inland position prohibiting the use of any but strong cotton yarn, were two factors underlying Nottingham's specialization in cotton hosiery.

Simultaneously with the great development in textile machinery went the search for new motive power. Owing to the specialized nature of its textile industries, the need for power-driven machinery was less acutely felt than in Derbyshire, Lancashire, and the West Riding, where water-power was exploited for industrial purposes. Nottingham had no such source of power, but when in the eighties of the eighteenth century the use of steam power became possible, the easily worked coal measures of Nottingham and district became a vital factor in the economic and social life of the area. The out-crop of the coal measures had been worked by surface workings in the Erewash Valley at Cossal, 1348, and Selston, 1483, while Wol-laton pit was producing coal in 1549. The first steam-driven cotton mill was opened at Papplewick, 7 miles from Nottingham in 1785. The introduction of steam-driven machinery brought about not only an economic but also a social revolution. Down to 1780 the framework knitter had enjoyed comparative freedom from super-vision and regulation. Whether villager or town dweller, he worked in his own time, often on a hired frame, in his own home with other

members of his family. When he wished he could attend to his garden, his poultry, and other live-stock, and so supplement his earned income. Allotment gardens have been a feature of Nottingham's domestic economy since about 1700. Usually completing

*Reproduced from " In and about Notts." by kind permission of R'A. Mellors, Esq.*

FIG. 7. NOTTINGHAM FROM THE SOUTH, 1846

The two sandstone bluffs crowned by the Castle and St. Mary's Church can be picked out. At their bases are the River Leen spanned by a bridge of two arches, and the Midland Railway with train (left) and station (right). The " Meadows " occupy the foieground. Other features may be identified by referring to Fig. 5. The chimney stacks indicate the location of Nottingham's factories and the general use of coal-raised steam-power

orders for different classes of goods on a piece-work basis, and handling his goods from the yarn stage to the finished product, the stockinger found his work both varied and interesting. Except in a few villages round Nottingham where little change has taken place, this scheme of domestic industrial economy disappeared with the substitution of coal power for hand-power as a basis of Nottingham's industries. Except for high-grade goods, specially made to order, which are still made on manual frames, machine-made goods rapidly ousted hand-made goods. Large productive units, the factories of capitalist employers, took the place of the small stockinger shops often of owner occupiers. The traditional skill of

the workers became of little value in the age of machinery. Crowded tenement dwellings for wage-earning factory hands replaced the cottages of master craftsmen. Much of the intimacy of family life and the human relationship between employer and employed tended to disappear. That Nottingham escaped the worst social effects of the Industrial Revolution was partly due to the foresight and wisdom of the municipal authorities, and partly to the fact that the scarcity of sites for factories within the city boundaries of those days led to the building of factories in the surrounding villages particularly at Radford, Lenton, and Sneinton. Down to 1845 the built-up portion of Nottingham (see Fig. 5) was nearly surrounded by a belt of open spaces, the Lammas Fields over which the citizens had rights from August to February, and the private owners during the rest of the year.

The first three-quarters of the nineteenth century witnessed many improvements in steam-driven textile machinery—by Heathcote, Jacquard, Paget, and Cotton in particular, an increasing development of the Nottingham coal-field and the improvement of Nottingham's communications by water, road, and by railway after 1840. Between 1801 and 1831 the population of the city increased from 28,861 to 50,727, and by 1871 totalled 86,621. In 1877 the adjacent villages of Lenton, Sneinton, and Carrington were taken into the city. The city area increased from three to seventeen square miles, and the population within the new boundaries numbered about 200,000.

Since 1877 Nottingham and district has made steady progress despite booms and depressions in the lace and hosiery trades. Many associated, subsidiary and new industries and trades have been established or expanded, notably tobacco, fine drugs and chemicals, soap making, furniture making, electrical and motor engineering, beet sugar, and artificial silk. Communications by road, rail, water, and air have been extended and improved, particularly during the last ten years, e.g. the building of Victoria Station (L.N.E.R.) and the opening of the Great Northern Railway trunk line in 1877, the opening of the Great Central Railway in 1900, the improvement of the Trent waterway after 1915, the post-war development of regular bus services to the surrounding townships and villages, and the opening of the municipal air port in 1928. Since the improvement of the Trent waterway the tonnage carried increased from

68,040 tons in 1925 to 230,514 tons in 1936. Facilities for banking and commerce have also been developed. There is a local Chamber of Commerce and Stock Exchange. Some £30,000,000 per annum in cheques are cleared by the Nottingham Clearing House. The new University College buildings at Highfields mark yet another step

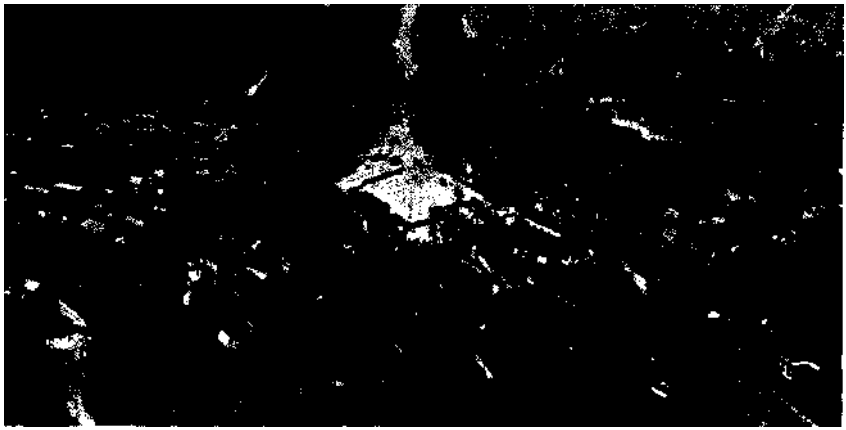


*Photo* *C. F. Shaw, Esq. (Nottingham)*

FIG. 8. NOTTINGHAM FROM THE EAST (LACE MARKET), 1925
Note the spacious open air Old Market Place with Derby Road leading over the hill to the Leen Valley beyond. The Castle Rock stands out (left middle)

forward in Nottingham's progress as the educational centre for the East Midlands. The population of Nottingham itself, the eleventh city in England, grew from 239,743 in 1901 to 281,856 in 1935, and the population of the adjoining townships and villages has increased even more rapidly owing partly to the establishment of industries just outside the city boundaries where rates are lower, and partly to the growth of residential areas.

Separate figures relating to the occupations of the people living in and around Nottingham are not completely available, but a fairly good idea of the activities of the people of this area can be obtained from the table given on page 25.

*Note.* Compared with Nottinghamshire, Nottingham and the adjoining urban and rural districts of Arnold, Basford, Beeston, Carlton, and West Bridgford have, of the persons engaged in the metal industries, 50 per cent; in the textile industries, 40 per cent; in mines and quarries, 30 per cent; of the transport workers, 50

***Photo supplied by*** ***Mexsrs. Aerofilms, Ltd.***

FIG. 9. CARLTON ROAD ESTATE, NOTTINGHAM, 1929

**Carlton Road (Nottingham to Newark) runs left to right across the photo. The excavations of the brickyards (bottom left and top right with kiln) and the allotment gardens (top left) are clearly shown. The lay-out of the Council Housing Estate should be contrasted with Fip. 4**

per cent; and a very large percentage of those employed in the smaller industries, viz. tobacco, leather, paper, chemicals, and wood-working, besides those working in business offices, banks, and warehouses. Members of professions and employees of public authorities are about equally distributed between Nottingham and district and the rest of the county, while the latter claims a much larger proportion of agricultural workers and persons engaged in personal service.

The percentage distribution of working population (census classification 1931) of Greater Nottingham shows a fairly close conformity to that for England and Wales.

DISTRIBUTION OF EMPLOYMENT IN NOTTINGHAMSHIRE, 1930

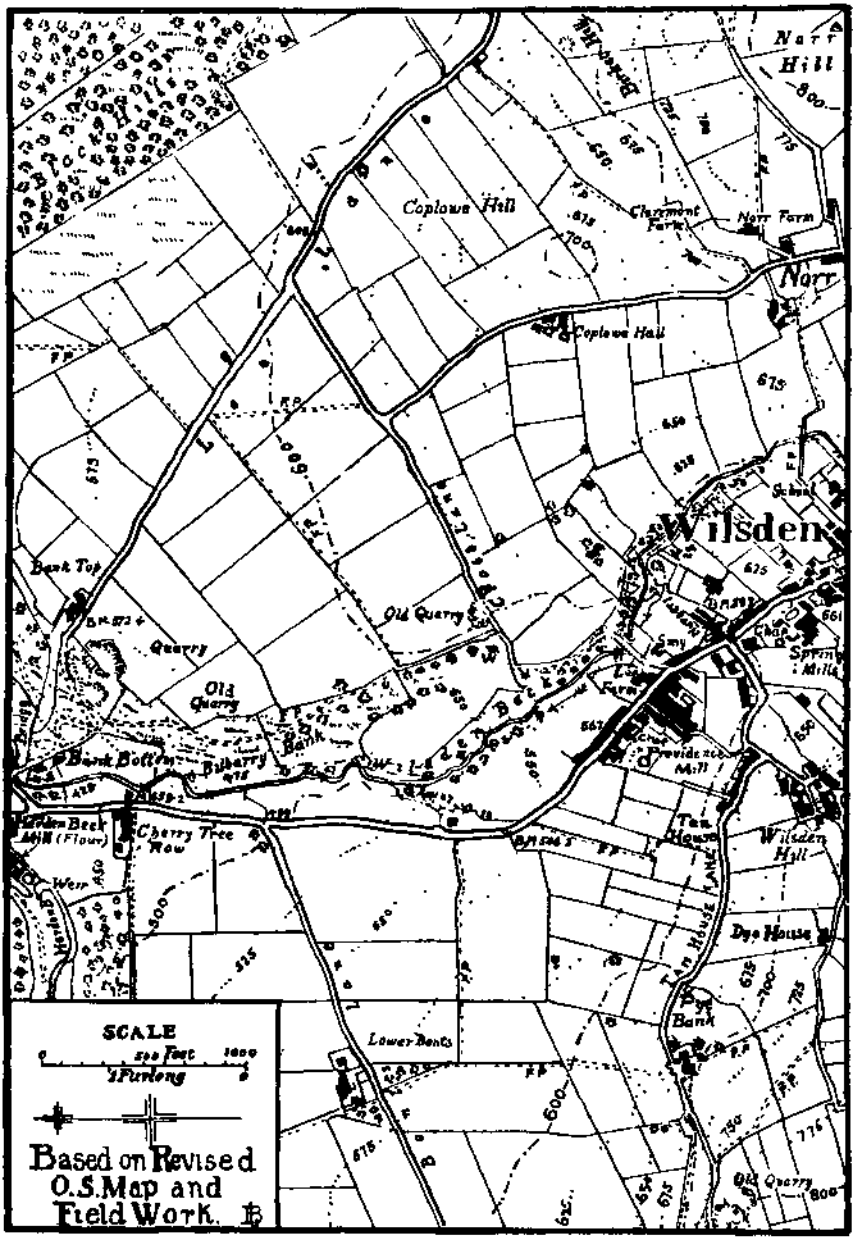
| TRADE OR OCCUPATION | *Males* | *Females* | *Total* |
|---|---|---|---|
| Agriculture | 16,700 | 902 | 17,602 |
| Mining and quarrying and subsidiary- | 50,975 | 55 | 61,030 |
| Textiles— | | | |
| *Hosiery* (knitted goods, fabrics in wool, cotton, silk, and rayon. All processes) | 7,357 | 11,963 | 48,052 |
| *Lace* (all processes) | 2,973 | 9,902 | |
| *Other goods* (under and outer wear, millinery, brellas | 2,965 | 12,892 | |
| Metal Industries— | | | |
| *Metal workers* (all processes) | 22,103 | 1,814 | \ 26,869 |
| *Electrical apparatus, fitters, motor engineers* | 2,848 | 112 | |
| Building and building materials | 11,796 | 140 | 11,936 |
| Wood, furniture, basket-making, turnery | 8,286 | 589 | 8,875 |
| Paper, box-making, printing, book-binding, etc. | 2,692 | 2,127 | 4,819 |
| Food, beverages, confectionery | 3,397 | 1,011 | 4,408 |
| Leather (all processes and manufactures) | 2,015 | 703 | 2,718 |
| Tobacco, cigars, cigarettes, snuff, etc. | 869 | 1,500 | 2,369 |
| Chemicals, dyes, paints, chemical processes | 695 | 323 | 1,018 |
| Commercial, financial, insurance | 17,285 | 7,231 | 24,516 |
| Transport and communications | 18,956 | 1,285 | 20,241 |
| Clerks, typists, etc. | 7,235 | 5,942 | 13,177 |
| Warehousemen, storekeepers, packers | 3,940 | 3,120 | 7,060 |
| Personal service | 4,544 | 19,672 | 24,216 |
| Professional | 4,022 | 4,766 | 8,788 |
| Public administration | 4,435 | 816 | 5,251 |
| Others, including watch, clock, scientific and musical instrument makers, brush makers, sports and entertainment, etc. | 19,406 | 3,541 | 22,947 |

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

**1. Write a description of your local area (town or parish) under headings given in Fig 1. Give sketch maps.**

**2. Compare dwelling houses in your own district with those shown in one of the pictures in this book. How do they illustrate the effect of environment on *(a)* building material available, (6) method of building houses to meet climatic conditions, (c) occupations of the people, *(d)* taste ? If you find those belonging to progressive people much the more difficult to explain, give reasons why.**

**3. On Fig. 10 find the exact position from which the photograph Fig. 11 was taken and mark off the scene shown, excluding distant hills. Is your nearest skyline a straight line or an arc of a circle centred on the position of the photographer ?**




Fro. 10. PORTION OF THE PARISH OF WILSDEN, YORKSHIRE (W.H.)

4. On the map identify the slope where the cows are and the slope in the field beyond. Draw enlarged sections south to north from Tan House Lane, and say what you have discovered about the lay-out of the contours on *(a)* concave and (6) convex slopes.

5. Draw to scale (horizontally and vertically) a section of the

*Photo* *L. Brettle*

FIG. 11. PYE BANK, WILSDEN, YORKSHIRE (W.R.)

main road through Wilsden to Harden Beck. Is there any difference between the distance measured on the map and the actual distance measured on your section ?

6. Except that ordinary buildings as well as churches are shown solid instead of shaded, the symbols are those used on the 6-inch O.S. map. Compile a list of them and their meaning.

7. Summarize the comparative advantages and disadvantages of the photography and the map for giving a stranger information of this piece of countryside.

8. Under the headings given in Fig. 1 write an account of the area shown on the map, Fig. 10.

**POPULATION**

| Density per sq. mile | | |
|---|---|---|
| Over512 | Highly developed areas. Mining, industry, commerce, horticulture (including hot monsoon). | Very dense |
| 266-612 | Less highly developed productive regions as above. | Dense |
| 128-256 | Progressive farming, commercially developed. | Fairly dense |
| 64-128 | Unscientific agriculture ; progressive stock raising. Forestry commercially devoloped. | Thin |
| 32-64 | Backward agriculture; herding, forestry, and areas recently opened up. | Very thin |
| 16-32 | Herding and primitive agriculture, undeveloped regions. | Sparse |
| 1-16 | Hunting, collecting, and occasionally very primitive agriculture. | Very sparse |
| Less than 1 | Hot and cold deserts, virgin forests and high mountain zones. | Virtually uninhabited |

16. Summarize the merits and demerits of the different sources of geographical information.

17. State clearly what you understand by the term " natural region."

*Note.* In interpreting climatic tables similar to those given in this book, the characteristics most useful in identifying the world position of an unnamed place for which climatic statistics are given are: the mean annual temperature, which gives a clue to the latitude of the place; the hottest month, which indicates in which hemisphere it lies; the annual range of temperature, which serves as a guide to deducing the nearness to or distance from the sea. The total amount and seasonal character of rainfall during the year should confirm the inferences drawn from the statistics relating to monthly temperatures.

18. Figs. 12 and 13 show a "vertical" air photograph and the partially completed map constructed from it of the same area. Study these illustrations carefully and identify the common features of each.

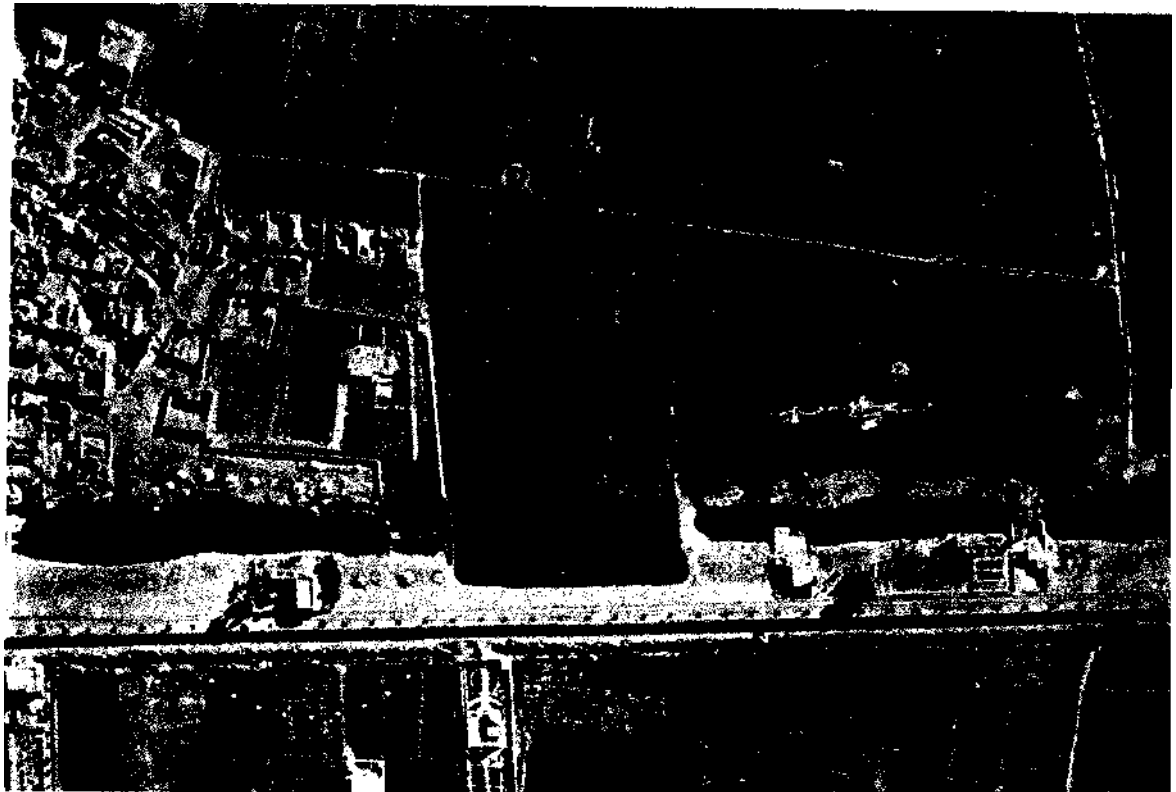
**Note on Reading Air Photographs.**

Several air photographs are reproduced in this book. Whether the photographs are verticals or obliques care should be taken to study them from the correct viewpoint. The photographs should be turned round until the shadows point towards the reader.

**Note on Air-Photographic Mapping.**

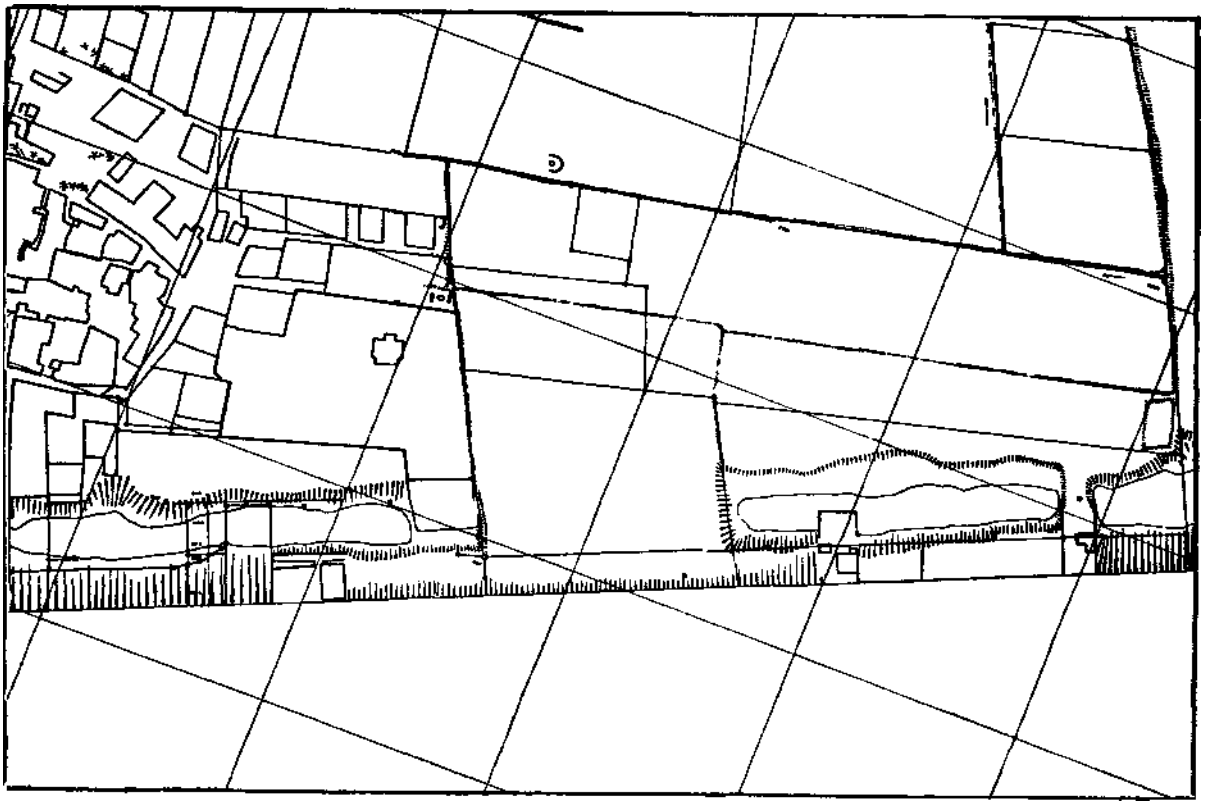
Surveying by air is of comparatively recent origin. This method of survey is cheaper, quicker, and in some cases, e.g. in country difficult of access by land such as tropical forests, deltaic swampy areas, the only practicable means by which a detailed topographical map can be produced, provided that a degree of accuracy greater than 97 per cent or 98 per cent in the measurement of short distances is not required, and also that the variations in the relief of the country do not vary more than about 10 per cent of the altitude from which the photograph is taken. An air photograph from a given height gives a perspective view of the ground which is rarely parallel to the plane of the photographic plate. Provided some form of ground control, e.g. a traverse or the relative positions of a network of points on the ground (see white dots on Fig. 13) is available, the difficulty of perspective can be overcome by rectifying distances on the photograph so that they correspond with the measured distances on the ground. Perspective distortion arising from tilt can be eliminated if the angle between the plane of the photographic plate and the plane of the ground at the time of exposure is known. The smaller the area and the flatter the ground, the greater the degree of accuracy with which the area can be mapped from the air. This is admirably exemplified in Figs. 12 and 13, which are reproduced on a scale of 1 to 3,333. By assembling individual rectified photographic prints on a common scale it has been possible to build up mosaics or composite photographs of fairly large areas, e.g. the Irrawaddy Delta in Burma, parts of the Nile Valley in Egypt, the Laurentian Plateau in Canada.

In air photographic mapping the unit is more often the overlap—the stereographic pair of photographs—rather than the single photograph, and a number of photogrammetric plotting machines have been invented for producing maps from air photographs.



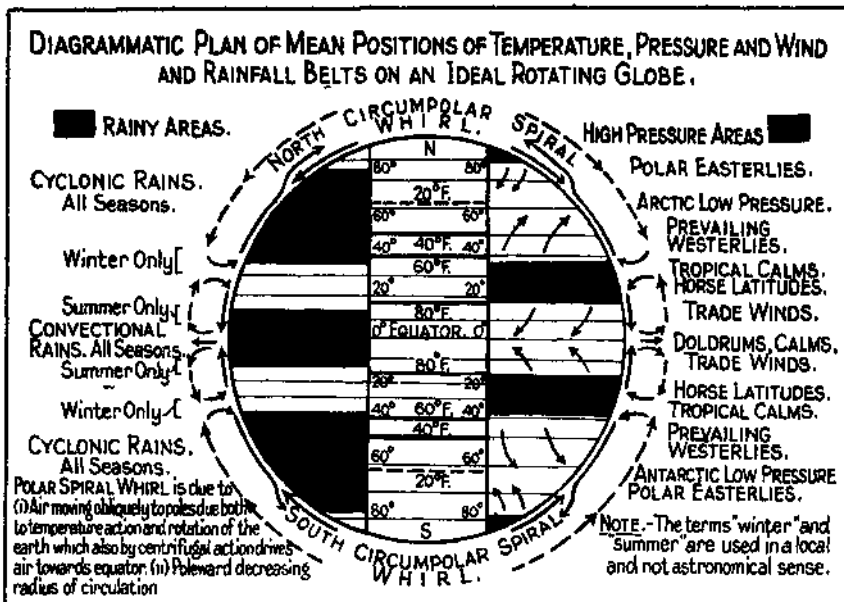
*By courtesy of* *The Air Survey Co., Ltd.*

FIG. 12. A PORTION OF EL KOM EL AKHDAR, NEAR CAIRO, EGYPT



*By courtesy of* *The Air Survey Co, Ltd.*

FIG. 13. PARTIALLY COMPLETED MAP MADE FROM FIG. 12




*Modifications of Ideal Distribution* arise mainly from the inclination of the earth's axis, the revolution of the earth, the relative distribution of land and sea, relief of the land, and the influence of ocean currents.

I. The revolution round the sun of the earth with its axis inclined at an angle of about 66 J° to the plane of the ecliptic causes all belts to swing about 6° N. and S. of their mean positions by July and January respectively, thus creating zones of an intermediate character at latitudes 10°-20° and 30°-40°.

II. As the distance from the sea increases (owing to the unequal heating of land and water), temperatures rise in summer, fall in winter; pressures decrease in summer and increase in winter; and rainfall tends to decrease in amount and to occur during the summer half of the year.

III. Warm ocean currents tend to raise the temperature and to decrease the pressure of air moving over them. The eftect of cold ocean currents is entirely reciprocal.

IV. Temperatures decrease about 1° F. in still air and 1 -6° F. in ascending air for every 300 feet ascent. Pressure decreases about 30 millibars or 0-9 inches per 1,000 feet of elevation at low altitudes. Rainfall as under.

## SOME TYPES OF RAINFALL

I. In all latitudes air elevated by crossing higher ground expands, cools, and, if the cooling is sufficient to cause the limit of saturation to be passed, precipitation occurs on the windward slopes and a rain shadow is produced by the descending, warming, drying winds on the leeward slopes of the higher land crossed. . . . . .OROGRAPHIC OR RELIEF RAIN

II. In all latitudes air rising over a heated area expands, and, if sufficiently cooled, precipitation follows. . . . SUMMER THUNDERSTORM (in fine weather) and CONVECTIONAL RAIN

III. In cyclones where warm moist Equatorial air of lesser density is cooled sufficiently by being elevated above cooler Polar air of greater density, precipitation occurs . CYCLONIC RAIN

IV. In tropical regions, as a result of well-marked seasonal differences of temperature due to the unequal and rapid heating and cooling of land and sea surfaces, in summer the low pressure on land and high pressure on sea are intensified, whilst in winter the reverse is the case. Inflowing winds from the sea to the land in summer bring rain. . . . . .MONSOON RAIN

V. Precipitation may also follow a fall in temperature brought about *(a)* by air moving horizontally polewards, *(b)* by a definite flow of cooler upper air over warmer surface air, and (c) by rapid diurnal heating and cooling, e.g. heavy drizzles or Scotch-mists, some thunderstorm rains, coastal showers. . . . . .RELEASE RAINS

FIG. 14. INTERRELATIONSHIP OF TEMPERATURE, PRESSURE, AND WIND AND RAINFALL; WORLD

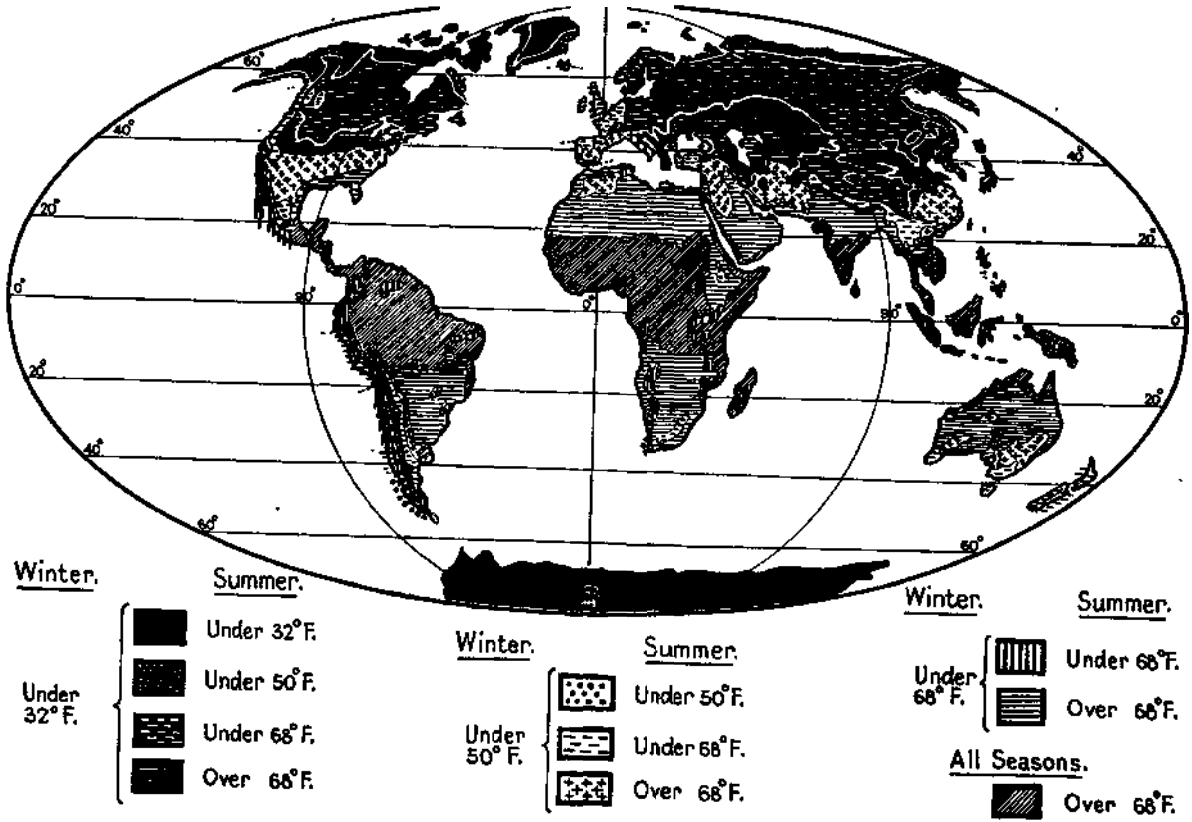



FIG. 15. THE WORLD: MEAN ANNUAL TEMPERATURES

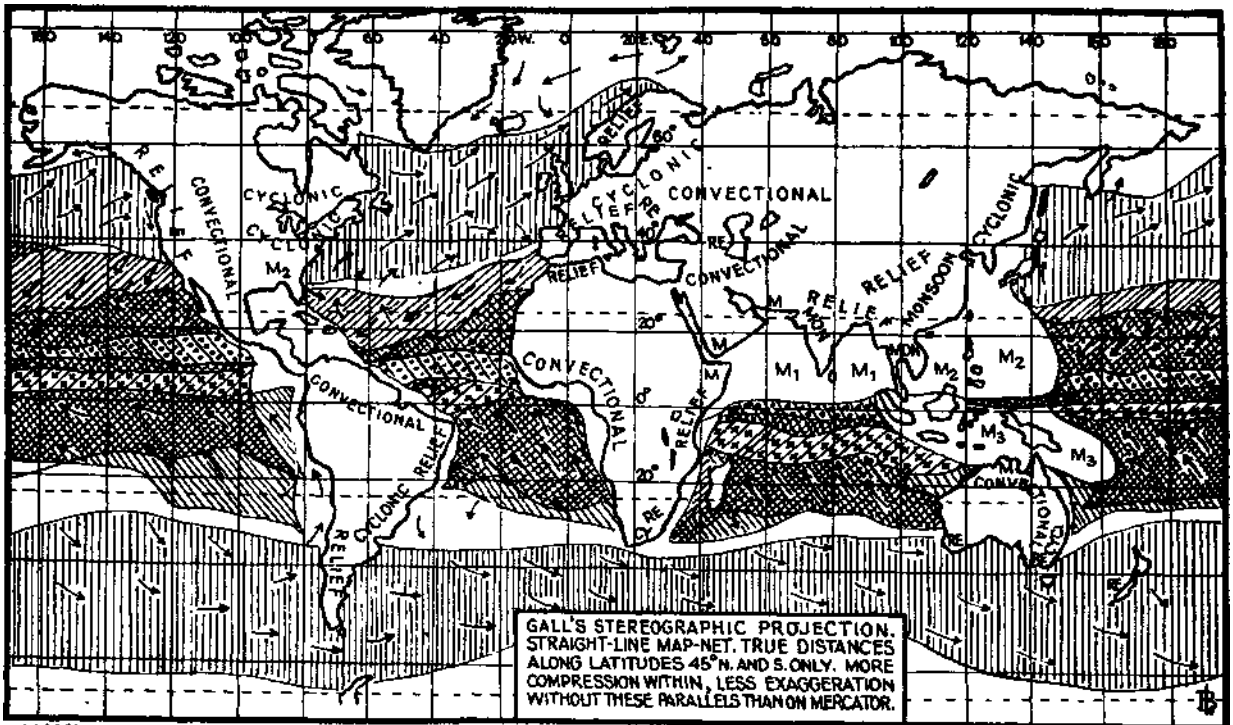
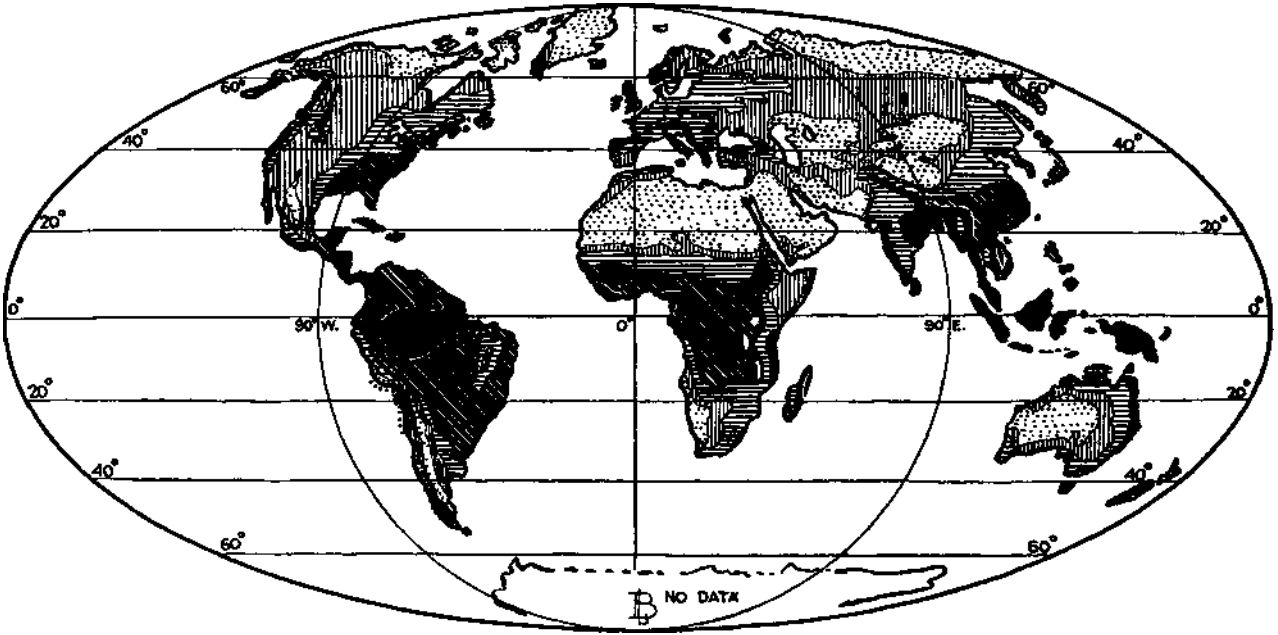



FIG. 16. THE WORLD: WIND BELTS AND TYPES OF RAINFALL




Under 10 Inches

10 to 20 Inches.

*20 to 40* **Inches**

**40 to 80 Inches**

Over 80 Inches.

FIG. 17. THE WORLD: MEAN ANNUAL PRECIPITATION

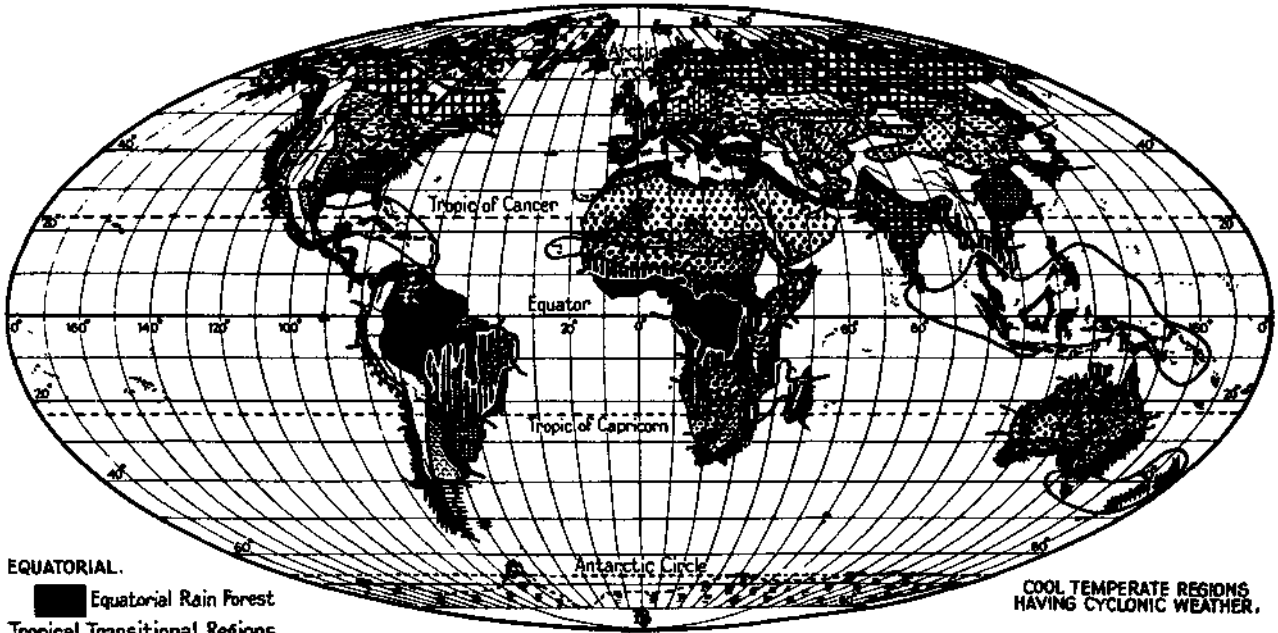



FIG. 18. MAJOR NATURAL REGIONS OF THE WORLD

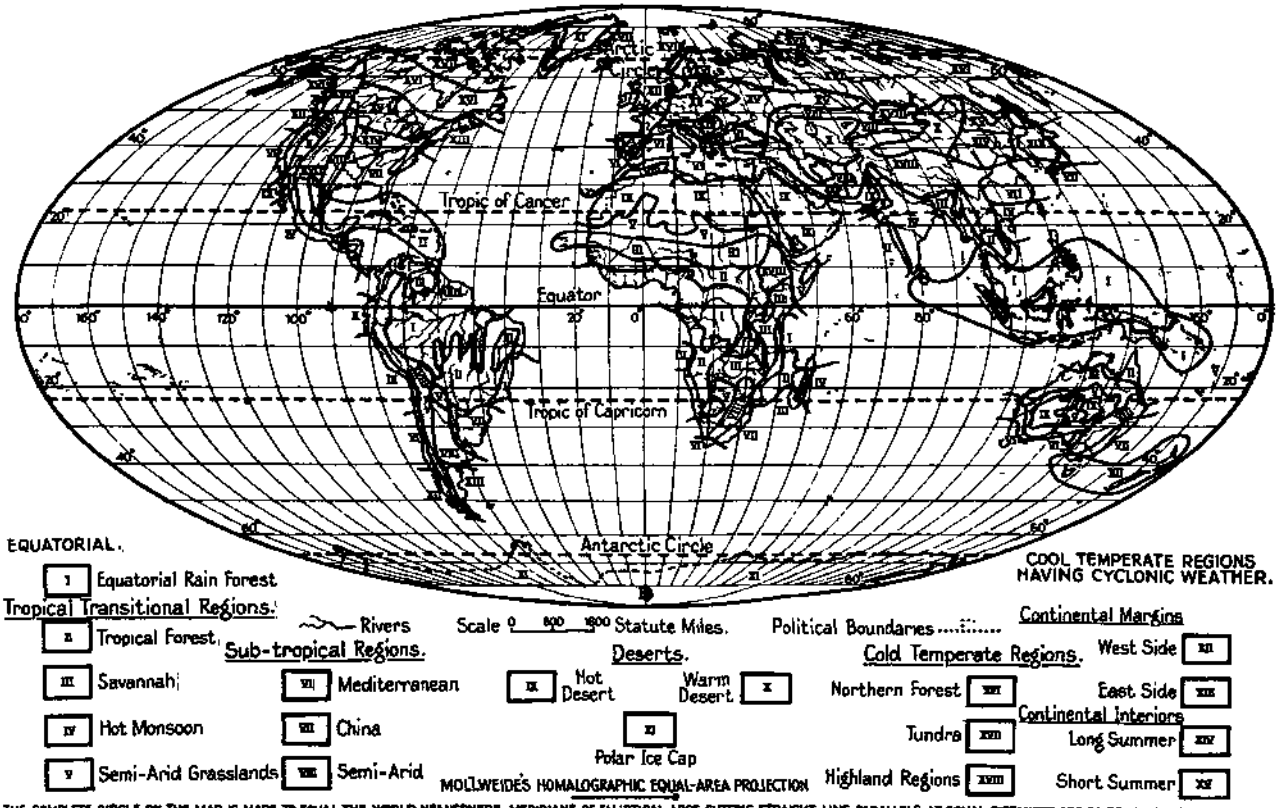
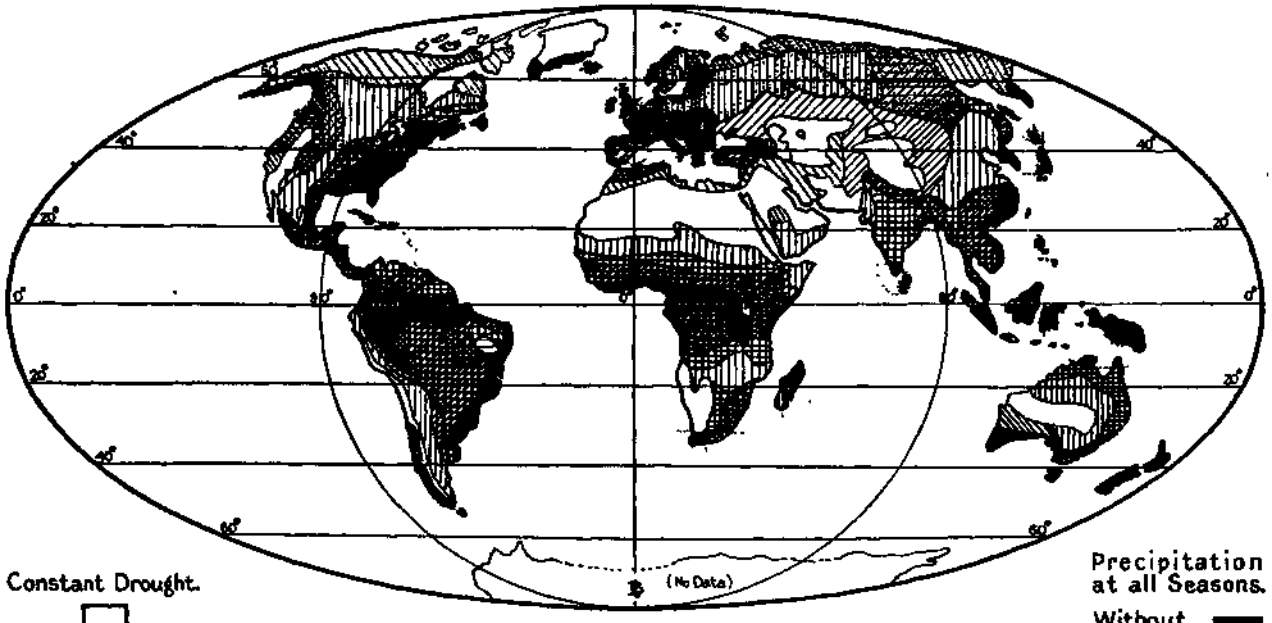



FIG. 19. MAJOR NATURAL REGIONS OF THE WORLD: IDENTIFICATION MAP




Constant Drought.

Less than six days on which rain falls in any month.

Periodic Precipitation.

Spring Summer Autumn Winter

Precipitation at all Seasons.

Without Droughts

With Droughts

In regions having Precipitation at all Seasons the rulings indicate the season or seasons of Maximum Rainfall.
A drought is a period of fourteen consecutive days without ·01 inch of precipitation on any one day.

FIG. 20. THE WORLD: SEASONAL PRECIPITATION

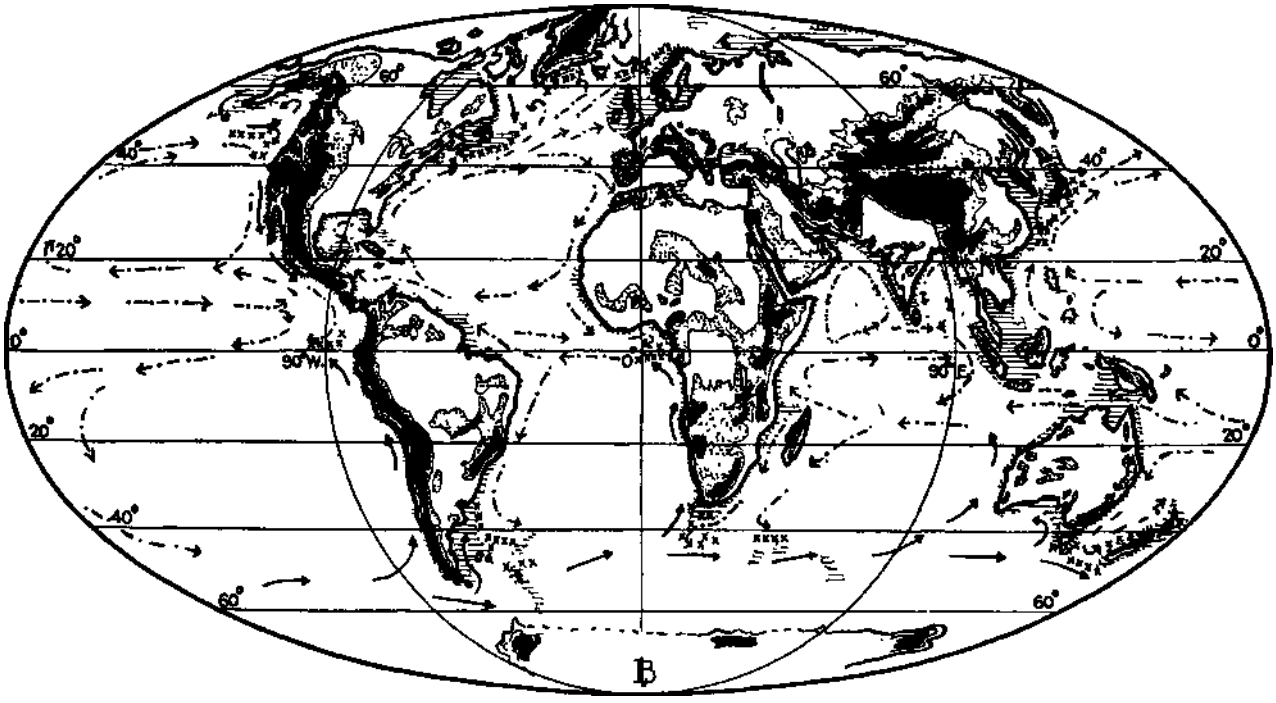



FIG. 21. THE WORLD: PHYSIOGRAPHIC REGIONS AND FISHING AREAS

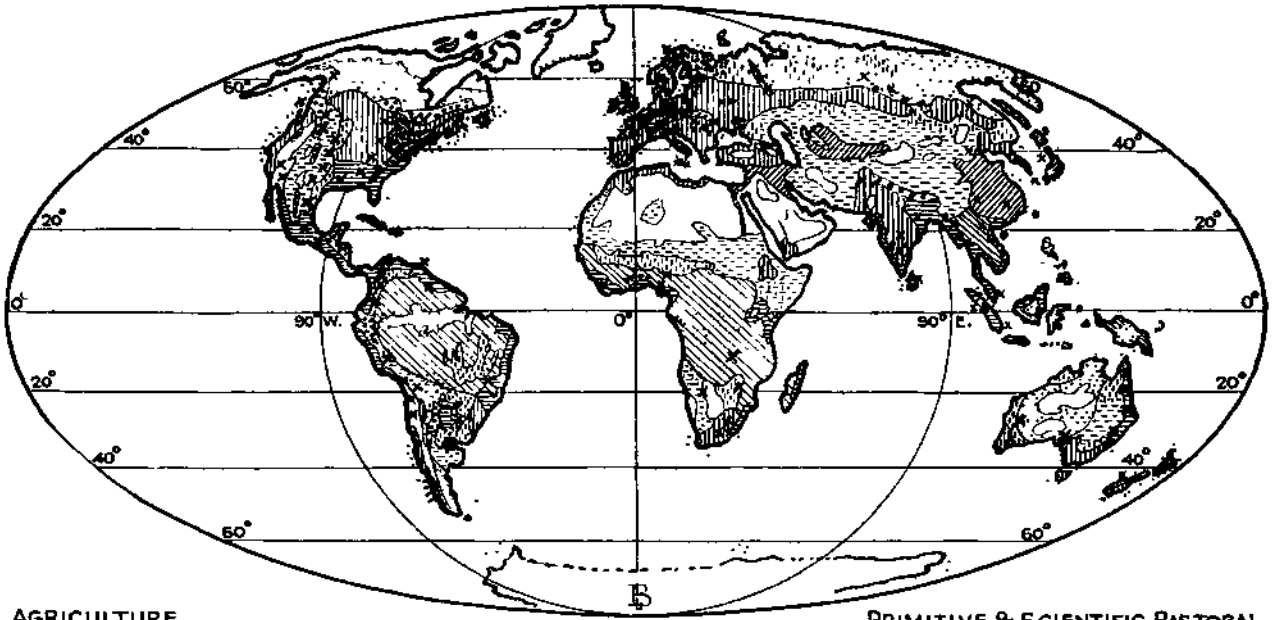



FIG. 22. THE WORLD: PRINCIPAL OCCUPATIONS

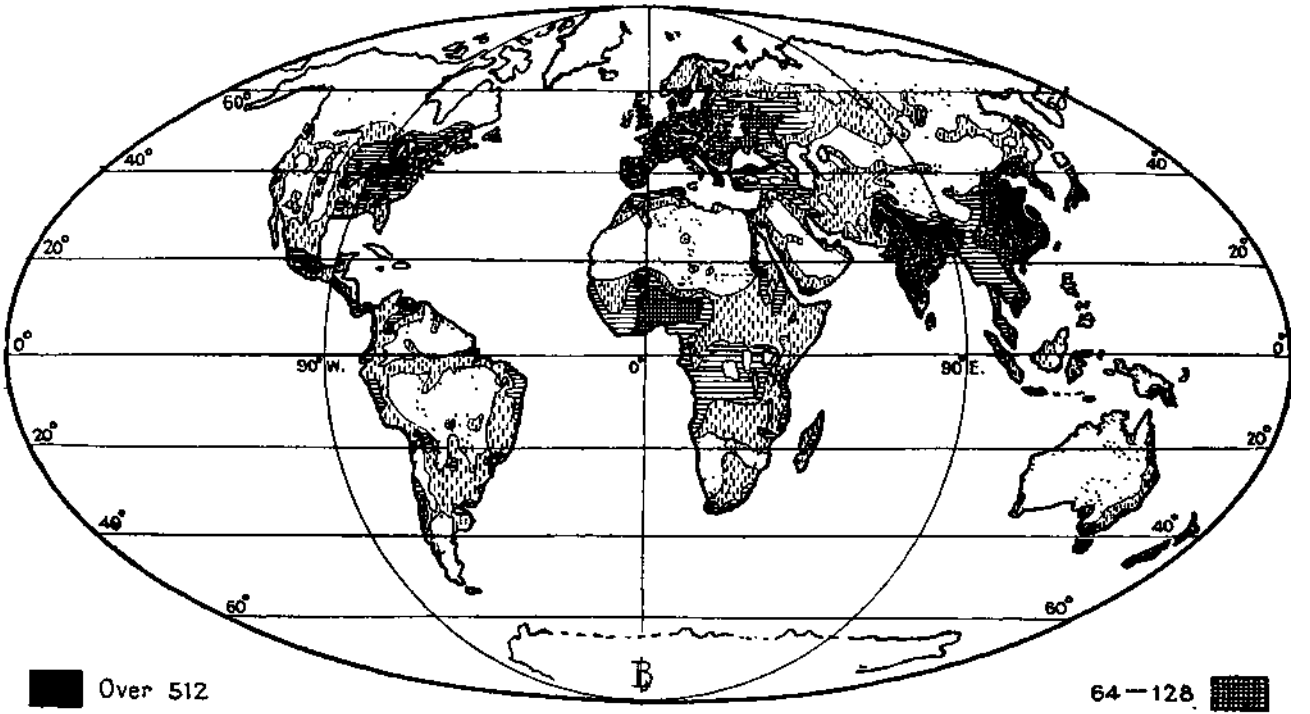



FIG. 23. THE WORLD: DENSITY OF POPULATION

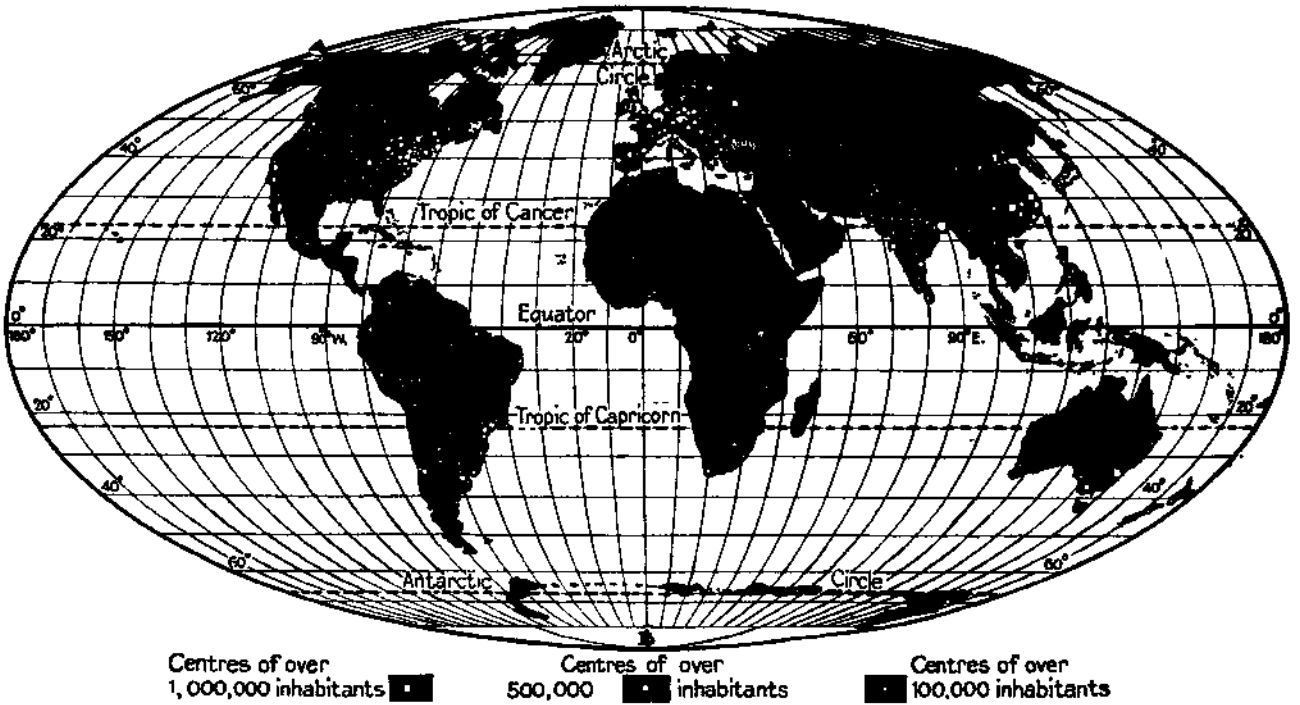
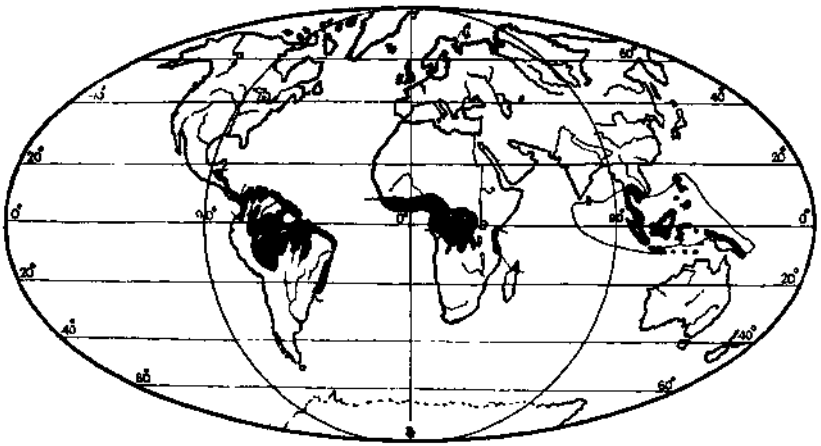



FIG. 24. THE WORLD: DISTRIBUTION OF PRINCIPAL URBAN CENTRES OF POPULATION

CHAPTER II

# EQUATORIAL RAIN FOREST REGION



Equatorial Rain Forest

## Location and Extent.

AMAZON Basin, West Coast Equatorial Africa, Borneo.

## Climate.

MEAN MONTHLY TEMPERATURES ($t°$ F.) AND RAINFALLS ($r''$)

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manaos. *148'* | 3° 0' S. 60° 10' W. | $t$ | 80·6 | 80 4 | 80·4 | 80·4 | 80·4 | 80·8 | 81·1 | 82·0 | 82·4 | 82·9 | 82·6 | 81·0 |
| | | $r$ | 9·2 | 9·0 | 9·6 | 8·5 | 7·0 | 3·6 | 2·2 | 1·4 | 2·0 | 4·1 | 5 5 | 7·7 |
| Nouvelle Anvers *1,230'* | 1° 36' N. 19° 19' E. | $t$ | 79 | 80 | 79 | 78 | 79 | 78 | 76 | 76 | 77 | 77 | 78 | 78 |
| | | $r$ | 4·1 | 3·5 | 4·1 | 5·6 | 6·2 | 6 1 | 6·3 | 6·3 | 6·3 | 6·6 | 3·0 | 9 3 |
| Singapore *70'* | 1° N. 103° 30' E. | $t$ | 77·2 | 78 4 | 79·3 | 79 9 | 80·6 | 79·9 | 80·2 | 79·7 | 79 5 | 79·7 | 79·0 | 78·3 |
| | | $r$ | 9·7 | 7·1 | 7·3 | 7·8 | 6·5 | 7·0 | 6 7 | 7 8 | 6 9 | 7·9 | 10·1 | 10·4 |

These regions lie permanently within the equatorial hot belt, with its consequent low pressure system of ascending air streams and convectional rains. As the vertical sun migrates north and south

of the Equator the zone of maximum heat and rainfall does likewise. Consequently, in this region places have two peaks of heavier rainfall in the year. The differences between maxima and minima conditions are small, because the sun is never far from vertical at any time of the year.

The climate of these regions is marked not only by uniformly high temperatures, but also by cloudy skies and abundant rains at all seasons. The diurnal range of temperature, though small compared with that experienced by us, is often greater than the annual range. This is partly due to the fact that day and night are of about equal duration all the year round, and the transitional periods of twilight at dusk and dawn are much shorter than in our part of the world. It has given rise to the saying that " night is the winter of the tropics." To us the weather would seem sweltering, muggy, and stifling.

Vegetation.

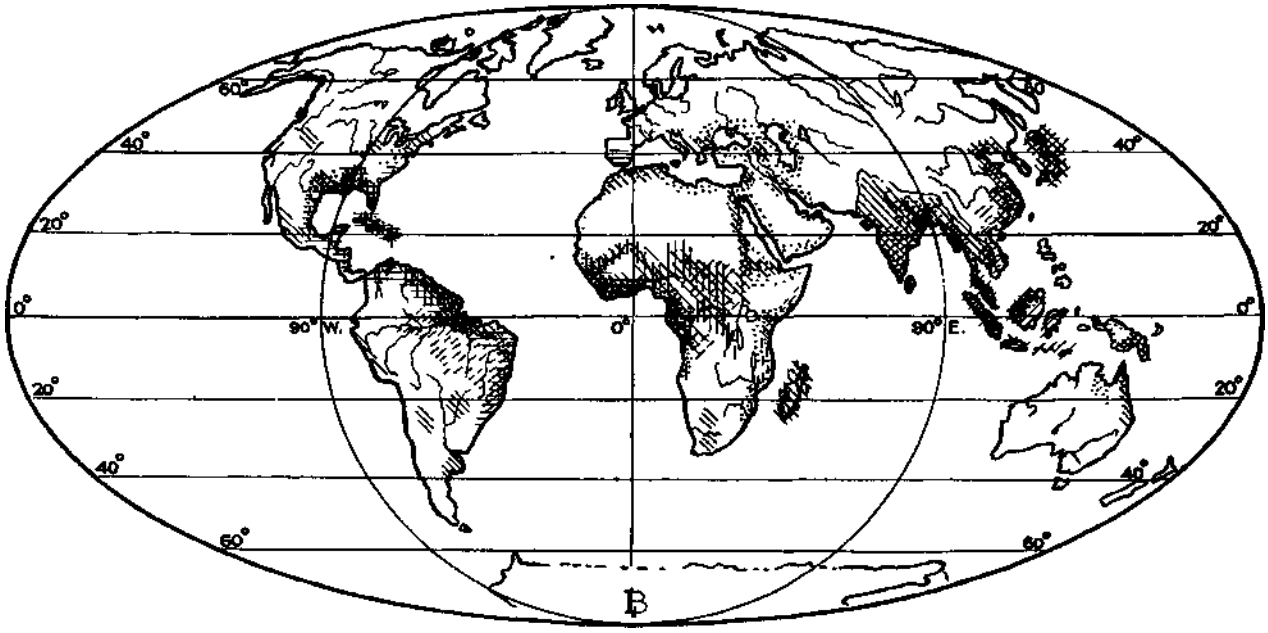
Since the climate affords ideal conditions for maximum and uninterrupted plant growth, dense tangled evergreen forests of trees of many and widely scattered species occur. Trees grow high, and their well developed foliage in the upper branches forms a dense canopy beneath which it is damp, musty, and gloomy. Owing to the competition among plants for sunlight, creepers and lianas which festoon the trees are numerous. Except in the more open areas on higher ground and along river banks, undergrowth of brushwood and of grasses is scanty and of a shade-loving type. Much as the flora may differ in different parts of the world, three peculiar types of the equatorial rain forest are distinguishable. The riverine lowlands, subject to floods, are covered with the igapu (or caa-gapu, Amazonian name), remarkable for its rank and dense growth of shallow-rooted trees, overgrown with an unbroken drapery of creepers. Many kinds of palms and the Para rubber tree flourish in this type of forest. On firmer ground, beyond the limits of these flood forests, lie the typical selva or caa-guazu, with larger trees of more solid structure, e.g. the para (Brazil) nut tree, Guiana greenheart, mahogany, ebony, chicle (chewing-gum tree, S. America), fewer palms but more varieties of lianas, such as those from which varieties of pepper (mostly in S.E. Asia), vanilla, and sarsaparilla are obtained. Shade-loving coffee shrubs and cacao trees grow wild

in the undergrowth. Where the rain forest extends to low-shelving coasts tangled mangrove swamps occur.

**Animal Life and Man.**

Except for fruit-eating members of the monkey family and bats, mammals are largely crowded or starved out by plant life, but birds, reptiles, and insects, being able to move about and find ample food supplies, abound. Mammals show adaptations to life in trees, such as long arms and short legs, prehensile tail, thumb, and greater freedom of limbs. They are mostly non-furbearing and cannot be usefully domesticated. Even representatives of the powerful and intelligent flesh-eating animals, such as the leopard and the S. American jaguar, are good tree climbers, and in swampy regions may be almost purely arboreal in habit. For the most part birds are thoroughly arboreal, e.g. brightly coloured parrots with well developed climbing feet, short legs, and strong hooked bills, which can be used in climbing as well as in cracking nuts. Animals and reptiles, notably pigs, worthogs, tapirs, crocodiles, lizards, snakes, frogs, and their allies, are specially adapted to life in damper and more swampy parts of the forests.

In Tropical Africa, the natives themselves, despite considerable variations, show physical modifications to moist, hot conditions. Generally speaking, the character of their skin shows adaptations to heat dispersion by the development of blood vessels and sweat glands to a larger extent than in our skin. Augmented secretions keep the skin soft and moist, and larger sweat glands with loose pores permit easy perspiration, thus providing a valuable supplement to the function of the kidneys, which do not act well in hot climates. The various gradations of rich chocolate brown skin tints appear to be connected partly with the large development of skin blood vessels and partly with the presence of a brown pigment which seems to be developed to make the skin able to withstand an excessive and harmful absorption of the sun's chemically active rays (cf. when we get suntanned and sunburnt). The inferior activity of the lungs and the generally low state of health resulting from the difficulty and incompleteness of the adaptation of the human body to moist hot conditions, may also be connected with the skin nigrescence. Broad flat noses, which assist the intake of air, projecting



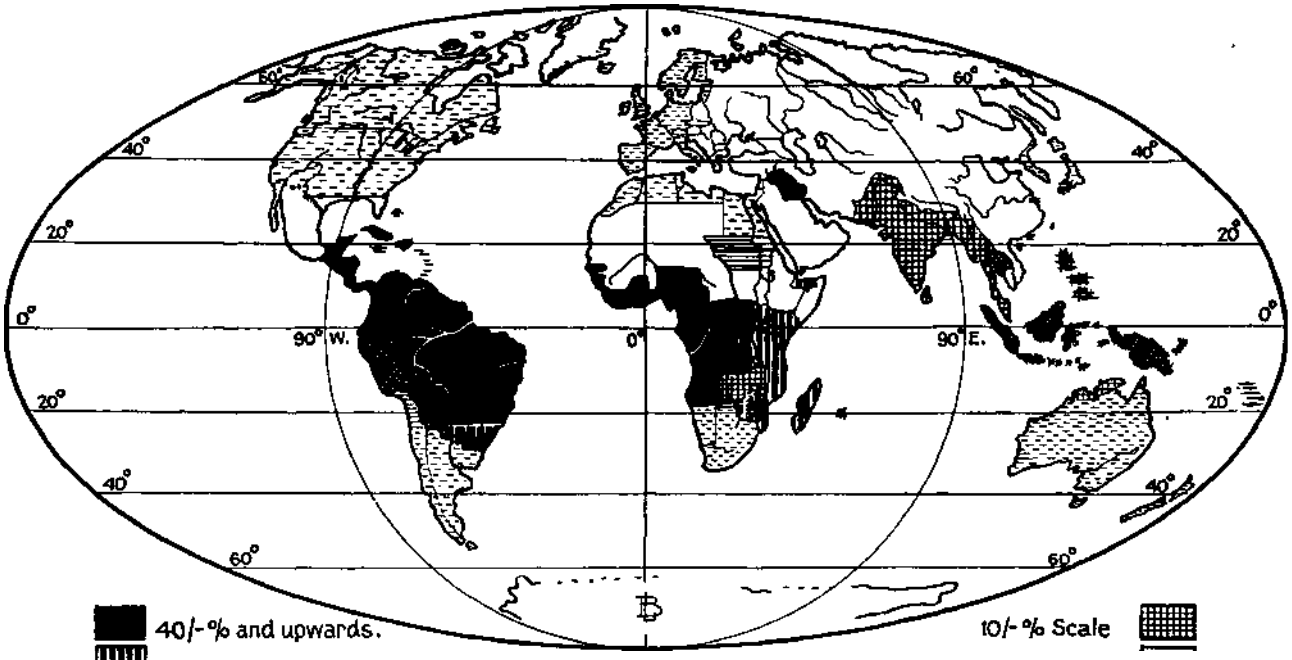

**Blackwater Fever** **Malaria** **Beri-Beri**

**Yellow Fever** **Cholera** **Dysentery**

Cancer, Pneumonia, Rheumatism, Typhoid Fever, Tubercle and Leprosy have world-wide distribution. Diphtheria is mainly found in temperate climates. Liver Abscess, Skin Diseases, e.g. Tropical Ulcers and Oriental Sores, and Filarial Disorders, e.g. the Guinea-worm, are mostly confined to tropical latitudes.

FIG. 25. THE WORLD: DISTRIBUTION OF SOME DISEASES

to

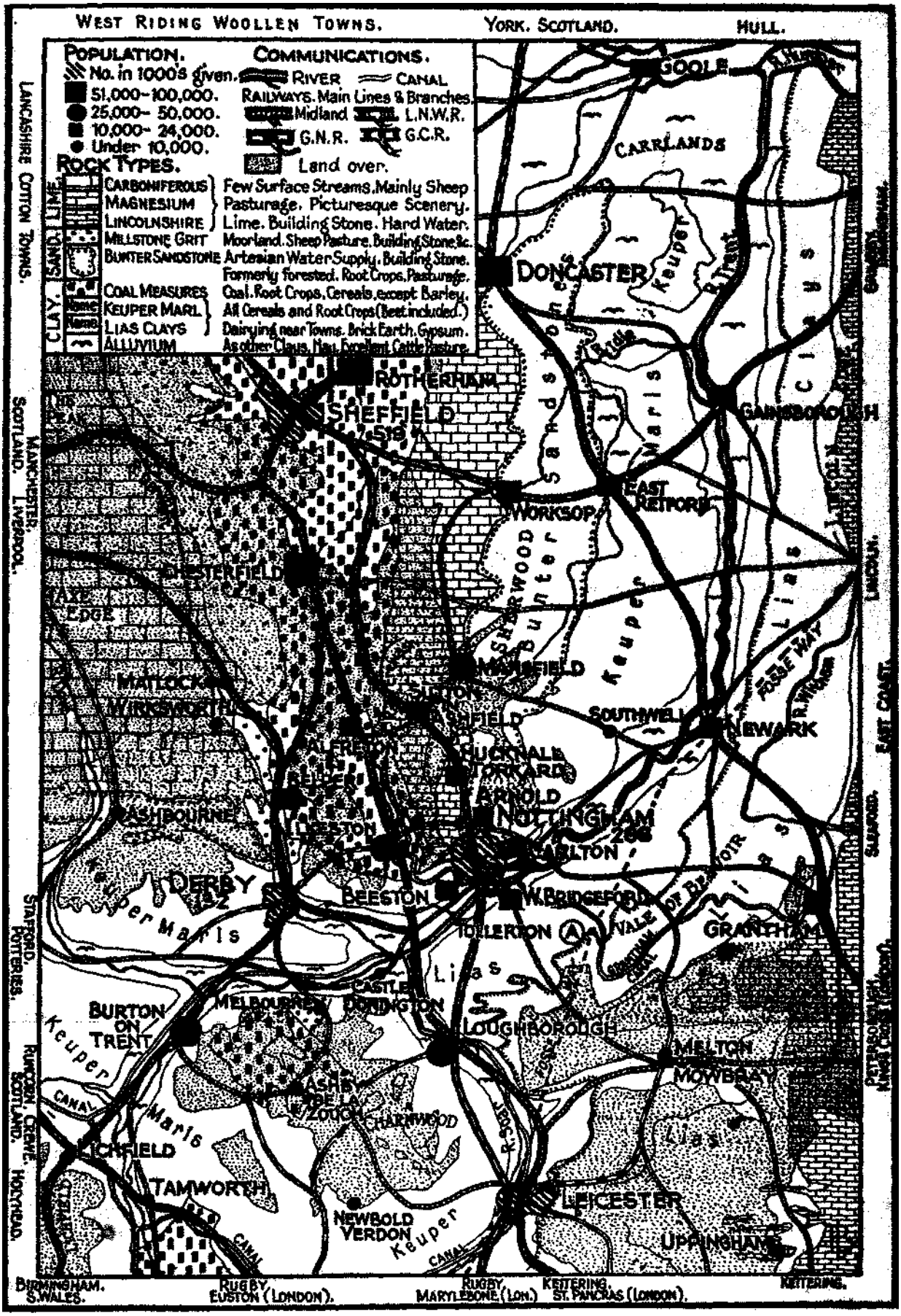



*MM* 15/-% Scale.

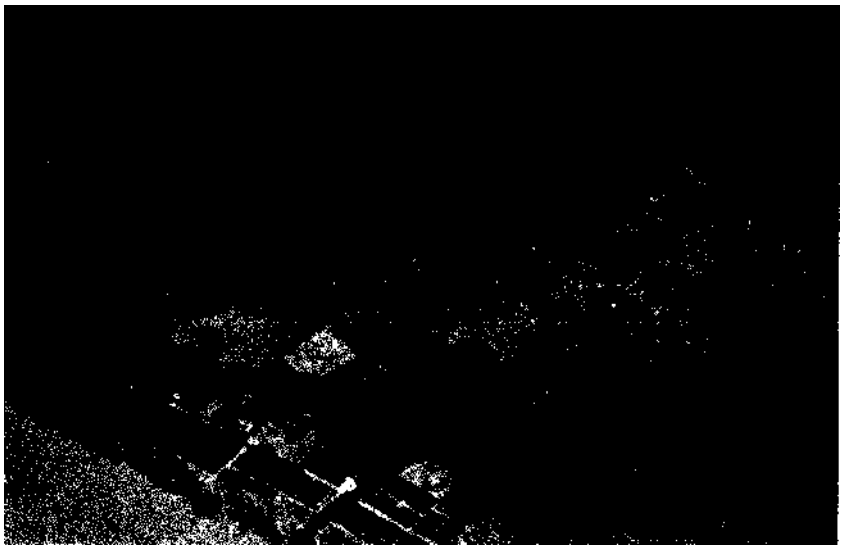
Usual Free Limits

FIG. 26. EXTRA PREMIUMS CHARGEABLE FOR FOREIGN RESIDENCE FOR FIRST-CLASS LIVES (EUROPEAN) BY A LEADING BRITISH INSURANCE COMPANY

**These extras are payable for the first 10 years abroad on whole life policies when the person insured is not over 50 years of age, intends to remain in one place and follows a normal occupation under normal circumstances. In exceptional cases, e.g. doctors, clergymen, and planters, a lower rate may be accepted**


WEST RIDING WOOLLEN TOWNS.
YORK.
SCOTLAND.
HULL.
POPULATION.
No. in 1000's given.
51,000–100,000.
25,000– 50,000.
10,000– 24,000.
Under 10,000.
COMMUNICATIONS.
RIVER
CANAL
RAILWAYS. Main Lines & Branches.
Midland
L.N.W.R.
G.N.R.
G.C.R.
Land over.
ROCK TYPES.
CARBONIFEROUS
MAGNESIUM
LINCOLNSHIRE
MILLSTONE GRIT
BUNTER SANDSTONE
COAL MEASURES
KEUPER MARL
LIAS CLAYS
ALLUVIUM
Few Surface Streams. Mainly Sheep Pasturage. Picturesque Scenery.
Lime. Building Stone. Hard Water.
Moorland. Sheep Pasture. Building Stone &c.
Artesian Water Supply. Building Stone. Formerly forested. Root Crops. Pasturage.
Coal. Root Crops. Cereals, except Barley.
All Cereals and Root Crops (Best included.)
Dairying near Towns. Brick Earth. Gypsum.
As other Clays. Has Excellent Cattle Pasture.
LANCASHIRE COTTON TOWNS.
SCOTLAND. MANCHESTER. LIVERPOOL.
STAFFORD. POTTERIES.
RUGBY. CREWE. SCOTLAND.
HOLYHEAD.
GOOLE
CARRLANDS
DONCASTER
ROTHERHAM
SHEFFIELD
519
GAINSBOROUGH
EAST RETFORD
WORKSOP
CHESTERFIELD
MATLOCK
WIRKSWORTH
ALFRETON
MANSFIELD
SOUTHWELL
NEWARK
ARNOLD
NOTTINGHAM
RADCLIFFE
ASHBOURNE
DERBY
152
BEESTON
W. BRIDGFORD
TOLLERTON
GRANTHAM
BURTON ON TRENT
MELBOURNE
CASTLE DONINGTON
LOUGHBOROUGH
MELTON MOWBRAY
ASHBY DE LA ZOUCH
CHARNWOOD
LICHFIELD
TAMWORTH
LEICESTER
NEWBOLD VERDON
UPPINGHAM
KETTERING
BIRMINGHAM. S.WALES.
RUGBY EUSTON (LONDON).
RUGBY MARYLEBONE (LON.)
KETTERING ST. PANCRAS (LONDON).
Keuper Marls
Keuper
Lias
Bunter
Sandstone
Millstone Grit
Coal Measures
CANAL
TRENT
R. WITHAM
R. TRENT
R. TRENT
R. TRENT

rusts, and other plant pests exist. Soaking rains and rapid evaporation impair the fertility of the soil, and over exposure of decayed vegetation to the high chemical power of the sun's rays destroys its manurial value. Such clearings as the natives are able to make by felling and firing have to be abandoned after two or three years'



*By courtesy of*

FIG. 27. OPENING UP FOREST LAND IN BORNEO

Since rivers provide the easiest lines of communication, the country is usually opened up from rivers outwards. In the photo, four pioneers have staked claims along the water front, built their little jetties and huts and brought a strip of cleared land along the river side under cultivation as gardens to supply foodstuffs. Behind the buildings lies the newly planted land and beyond that the latest portion of the forest to be cleared. The fallen logs (shown) and brushwood will probably be burnt before this area is planted up

primitive plantation cultivation and left to be overwhelmed by a poorer and less useful type of forest growth.

4. *Difficulty of Transport and Communications,* Impenetrable vegetation and lack of beasts of burden, except man, make land traffic very difficult. Roads and railways, unattended to, become smothered in two or three years. Wherever conditions of navigation permit, rivers afford the easiest lines of communication. Rank aquatic vegetation, floating or submerged logs, the frequent subdivision of rivers into numerous channels forming intricate and

confusing networks of waterways and swampy riverine areas, are a few of the additional difficulties which hamper communication by water in these regions. Although the absence of suitable landing grounds limits the use of aeroplanes, the use of hydroplanes on the larger rivers and lakes is possible. Intercourse, and consequently the spread of ideas, is seriously hampered. Useful species of plants do not occur in numbers together, and this adds to the difficulty of exploiting plant resources.

**Influences of Environment on the Occupations of the Inhabitants.**

*Natives of Interior Districts, e.g.* Matto Grosso (Brazil), 0-8 people per square mile. Everybody has to take an active share in the search for food, and small groups are engaged in collecting forest products, fishing and hunting. *Natives of River Banks and Forest Aisles,* e.g. Para (Brazil), 4-4 people per square mile; Gabun 4-0 per square mile. Such people are engaged on similar work, but make a better living, especially where they come in contact with more highly civilized people, who supply " trade " goods, e.g. pots, cloth, knives, in exchange for products collected in the forests, such as wild rubber and vanilla. Some natives systematically collect such products or do hard-wood lumbering under the guidance of more civilized peoples chiefly in Central America, British West Africa, and Further India. Greenheart, like teak, is valuable because it resists the attacks of the teredo worm and of white ants in hot climates, and can be used in contact with iron without causing the iron to rust. A primitive form of agriculture, in which shoots are planted by means of a digging stick and then left until ready for eating, is practised.

**Influence of Environment on Mode of Life.**

**1.** *Civilization* is generally very low. The natives are little more than intelligent animals; they possess few domestic utensils, practise no arts, except weapon-making, have little idea of family life, traditions, or religion. Constant migration spells high mortality among children, the infirm and aged, and thus there is little progress from generation to generation.

2. *Food* is scarce and hard to come by, so the forest dwellers

*By kind permission of* *The Booth Steamship Co., Ltd.*

FIG. 28. COLLECTING STATION FOR WILD RUBBER, AMAZON, SOUTH AMERICA
Balls of smoked rubber can be seen on the landing stage. The dense forest right to the river bank is to be noted

*By kind permission of* *The Booth Steamship Co., Ltd.*

FIG. 29. NATIVE FISHERMAN ON THE AMAZON, SOUTH AMERICA

live in a state of chronic starvation. Their diet is largely vegetal, and comprises roots, berries, leaves, birds' eggs, and occasionally a little fish or flesh, which is eaten either raw or cooked.

3. *Clothing,* owing to climatic conditions and the need for quick

*By kind permission of H.M. Eastern African Trade and Information Office*

FIG. 30. NATIVES SEPARATING CLOVES FROM STEMS, ZANZIBAR

Cloves are dried unexpanded flower buds. The clove tree prefers the well drained alluvial soil of confined valleys where the plantations are protected from high winds

movement, is very scanty, or non-existent. Leaves and grass, and cloth where obtainable by barter, are used.

4. *Dwellings,* for protection against rain, are little more than crude temporary affairs of leaves and branches, owing to the constant need to migrate in search of food. Natural caves are sometimes used and the riverine peoples have semi-permanent shelters built of local materials.

5. *Tools and Weapons.* Those most commonly used are spears, clubs, poisoned arrows, nets, traps, and a pointed digging stick. Cooking utensils of iron, knives, and matches are used by natives in places reached by traders.

**Contributions to the Needs of the Outside World.**

*Wild Products.* Wild rubber, gutta-percha, mangrove bark, palm kernels, nuts, copal gum, chicle (chewing gum), quinine, sarsaparilla, vanilla, coco (cocaine), hard woods, dye woods.

*Cultivated Products.* In the more open and accessible districts of all the forest belts, plants of commercial value are being cultivated in plantations run by natives, with or without white supervision, and the products from these play a small part in world trade.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. Rainfall in the Equatorial region is of the " convectional " type. Explain why this should be so, and point out the inter-relationship of pressure, temperature, and rainfall.

2. Why do not these natural regions extend right across the land masses ? Explain why they are only the hottest in the world sensibly and not actually.

3. Describe the vegetation and animal life of the Congo or Amazon Basin and point out how they are adapted to their geographical conditions.

4. In what ways does vegetation affect agricultural development, transport facilities, and the working conditions of (a) natives ; *(b)* whites ?

5. Is the density of population the same in all regions of this type of climate ? Give reasons for your answer.

6. " Pygmies of Central Africa are wandering hunters and collectors from necessity, not choice." Expand and explain this statement.

7. Why did the Gold Coast once deserve the title " The White Man's Grave.'' ? How has it been made reasonably healthy for whites ? (See Fig. 25.)

8. Draw an outline map of these regions, insert and name the chief political units and towns. What do you notice about the political control of these regions and the location of their chief towns ?

9. To what extent do these regions contribute to the needs of the rest of the world ? Select one of the following countries and examine its production and export trade : British Guiana, Belgian Congo, Java, Borneo. Classify the commodities shown as (1)

vegetable, wild; (2) cultivated crops; (3) animal products; (4) mineral products, and account for their proportionate quantities and values.

10. Give the origin, chief source, and uses of the following: chicle, mandioca, onca skins, vanilla, tagua, balata, rosewood, sapan, paloacero, egret feathers, bird of paradise plumes, Peruvian balsam, sarsaparilla, carnauba wax, Brazil nuts, piassava.

11. TOTAL EXPORTS OF PLANTATION AND WILD RUBBER, 1936
EXCLUDING RECLAIMED AND SYNTHETIC RUBBER

| Country | Tons Allowance made for Moisture | Percentage of World's Total | Percentage of World's Plantation Acreage |
|---|---|---|---|
| British Malaya . . . . | 359,000 | 43 | 57* |
| Dutch East Indies | 315,000 | 36 | 2,">i |
| Ceylon (South) . . . . | 50,000 | 6 | 12J |
| S. India and Burma | 15,000 | 2 | 0-2 |
| | 15,600 | 2 | |
| Congo, W. Africa, Bolivia and others | 7,000 | 1 | 2 |
| World Total (Restricted) | 870,000 | | |

**U.S.S.R. production synthetic rubber, 40,000 tons; U.S.A. output reclaimed rubber. 170,000 tons**

Mark in these areas on an outline map and show percentages by means of bars drawn to a suitable scale.

12. From the above table find the world proportion of wild to plantation rubber. Compare it with these figures and account for the difference; 1900, world production 55,000 tons; all wild except 5 tons.

13. About what proportion of the world's supply of rubber is produced inside the British Empire? Ownership of plantations in the East in millions of acres: London under Managing Agent system, 1-1; Dutch, French, Belgian and Swiss companies, 0-8; Asiatics, 0-8; local companies and resident European proprietors, 0-8; American, 0·1. Compare Britain's territorial and financial control of the rubber industry. Estimated consumption in lbs. per capita, 1935: U.S.A., 8-2; U.K., 8-0; France, 3-2; Germany, 2-0; Japan, 1-9; Italy, 0-5. How do these facts account for American protests as regards the restriction of supplies, partly to maintain prices, by the International

Rubber Regulation Committee, on which British influence predominates?

14. Examine the following tables relating to U.S.A. and point

*By kind permission of* *The Trade Commissioner for India*

FIG. 31. BAMBOO RAFTS ON KASALONG RIVER, BENGAL, INDIA
Bamboo is likely to prove of use as a source of wood pulp

out any connections between them. Name some other industries which would absorb rubber.

| | Imports of Crude Rubber in Millions of lb. | Numbers of Motor Vehicles, Millions | Exports of Electrical Goods, Million $ |
|---|---|---|---|
| **1914** | 131-9 | 1-8 | 25-5 |
| 1918 | 389-6 | 6-1 | 60-2 |
| 1922 | 674-4 | **12-4** | 53-1 |
| 1935 | 1,052-8 | 26-4 | 91-3 |

15. The value £ 1000s and quantity (1000s cub. ft.) of mahogany imported by the United Kingdom in 1935 was Nigeria 101 (560), Gold Coast 79 (436), British Honduras 11 (35), French W. Africa

*By courtesy of* *The West India Committee*

FIG. 32. GREENHEART LOGGING CAMP, BRITISH GUIANA

**Note the native huts, with their roofs heavily thatched with palm leaves and little or no walls, designed to give both protection against torrential rains and ample ventilation**

*By courtesy of* *The United Africa Co., Ltd.*

FIG. 33. SCORING A MAHOGANY LOG, NIGERIA

**The log shown was one of five from the same tree**

24 (135), U.S.A. 3 (6), otheivs 34 (246); draw a bar graph to illustrate this information.

16. Give an account of the special qualities and uses of teak and rattans.

17. Suggest explanations of the following facts. "In 1936, by

*By courtesy of The Air Surrey Co., Ltd.*

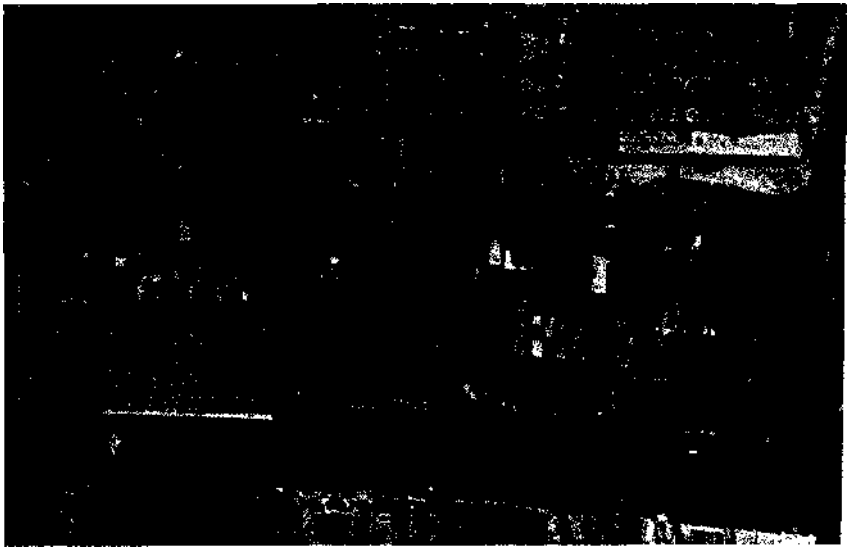
FIG. 34. SARAWAK

Much evidence of the changes brought about by Europeans in tropical lands can be seen in this photo, e.g. better buildings and better town-planning, the introduction of good roads and road transport, railways (from quay—going right) steamships, telegraph, hospitals, schools

value, British West Africa bought twice as much British goods as the Iberian Peninsula, a native of Nigeria bought 50 per cent more than an inhabitant of U.S.A. from Britain, and an inhabitant of the Gold Coast six times more British goods than an American."

18. Using the questionnaire given on page 428, state what you can discover from Figs. 28 and 29 concerning the environment and mode of life of the Amazonian Indian.

19. What evidence do Figs. 29 and 49 give to support the



*By courtesy of The Air Survey Co.. Ltd.*

FIG. 35. CHINESE QUARTER OF GEORGETOWN, PENANG

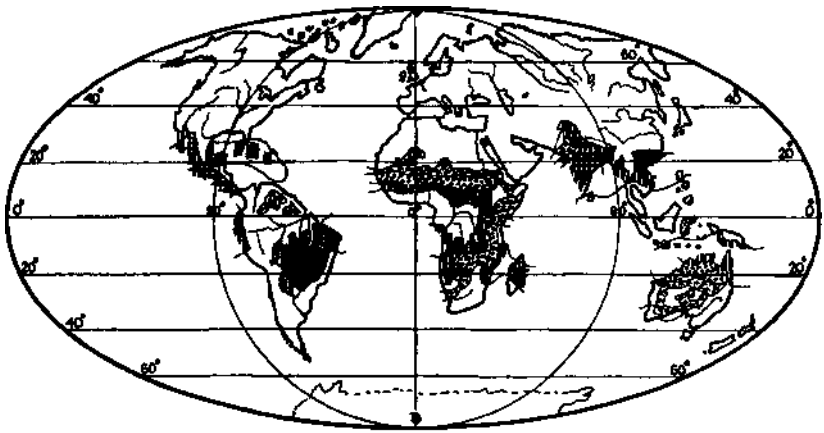
Note the thatched roofs of steep pent, and the overhanging eaves of the houses in a part of the world where rain is frequent and heavy and a tierce sun makes shade welcome. The narrower streets are practically roofed over. Coconut palm trees are recognisable.

statement that arable farming or stock raising is impossible in regions of the Hot Wet Forest type ?

20. After a thoughtful examination of Fig. 33, write an account of lumbering in tropical forests compared with similar work in temperate forests.

CHAPTER III

# TROPICAL TRANSITIONAL REGIONS



Tropical Forest

WW Hot Monsoon Semi-Arid Grasslands paSSI

*(a)* Tropical Forest, bordering Equatorial Rain Forest.

*(b)* Savannah, bordering Tropical Forests.

(c) Hot Monsoon Regions of S.E. Asia and Pacific coast of Central America—a special type of *(a)* and *(b).*

*(d)* Semi-Arid Grasslands of the zones lying between the Savannahs and Hot Deserts.

**Climate.**

TROPICAL FOREST, SAVANNAH, AND SEMI-ARID GRASSLANDS RESPECTIVELY

MEAN MONTHLY TEMPERATURES (t°F.) AND RAINFALL *{r")*

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June.] | July | Aug. | Sep. | Oct, | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mandalay 250' | 21° 59' N. 96° 8' E. | *t* *r* | 68-8 0 1 | 73-8 0-1 | 82-1 0-2 | 89 2 1 1 | 88-5 5 8 | 85 4 5 5 | 85-2 3 3 | 84-7 4 6 | 83-5 5-7 | 82 5 4-7 | 75 9 1-6 | 69 5 0-4 |
| Zomba . *3130'* | 15° 20' S. 35° 50' K. | *t* *r* | 72-9 1 1 1 | 720 10-7 | 71-2 8 5 | 69 3 4 0 | 65-7 1 0 | 63 0 0-6 | 621 0-3 | 64 9 0-4 | 69 4 0 4 | 741 1-5 | 75-6 5 7 | 73 0 11-1 |
| Cloncurrv *700'* | 20° 40' S. 140° 3'E. | *t* *r* | 87 5 1 | 85 4 9 | 83 2-7 | 78 0-9 | 71 0-4 | 64 0-3 | 61 0-5 | 67 0 1 | 72 0 5 | 83 0-5 | 85 1-1 | 88 3 0 |

HOT MONSOON TYPE

MEAN MONTHLY TEMPERATURES *{t°* F *)* AND RAINFALL *(r")*

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Calcutta *21'* | 22° 32' *N.* 88° 28' E. | *t* | 65-2 | 70-3 | 79-3 | 85-0 | 85-7 | 84 5 | 83-0 | 82-4 | 82 6 | 80-0 | 72-4 | 65-3 |
| | | *r* | 0 4 | 1 1 | 1-4 | 2-0 | 5-0 | 11-2 | 12-1 | 11-5 | 9 0 | 4-3 | 0 5 | 0-2 |
| Hue . *23'* | 16° 26' N. 107° 33' E. | *t* | 69-1 | 67 5 | 74 1 | 80 2 | 83 3 | 85 1 | 84 2 | 85 1 | 813 | 77 7 | 73 0 | 70-3 |
| | | *r* | 4-0 | 4-8 | 1-8 | 2 4 | 3-6 | 2 8 | 3-4 | 4 0 | 16 2 | 26 3 | 22 4 | 10-2 |
| Rio de Janeiro *216'* | 22° 59' S. 43° 7'W | *t* | 77 8 | 78 1 | 770 | 74-2 | 71-2 | 68 9 | 68-0 | 68 9 | 69 6 | 70-7 | 73-2 | 76 3 |
| | | *r* | 5 0 | 4 4 | 5 3 | 4 2 | 3-2 | 2 2 | • 1 7 | 1-8 | 2 8 | 3-3 | 4 1 | 5-5 |
| Port Darwin *97'* | 2° 28' S 130° 51' E. | *t* | 83 8 | 83-4 | 84-0 | 84 I | 81 8 | 78 9 | 77 4 | 79 4 | 82 6 | 85 3 | 85 8 | 85 1 |
| | | *r* | 15 9 | 13 0 | 10 1 | 4 1 | 0 7 | 0 1 | 0 1 | 0 1 | 0 5 | 2 2 | 4 8 | 10 3 |

The variation in the amount and seasonal distribution of rainfall is the deciding climatic feature in all these regions, and chiefly accounts for the differences of vegetation, which in turn affect animal life and man's mode of life. The differences in precipitation are due to the migration of belts of low pressure, winds, and convectional rains within the tropics, produced by the migration of the vertical sun north and south of the Equator. The marginal Monsoon lands have heavier rainfall and a more clearly marked summer rain season. This is due to the presence of vast neighbouring land and sea masses intensifying and interfering with the normal planetary wind circulation in winter and creating inflowing winds in summer. This is particularly the case in India. Broadly speaking, from October to May the dry and steady north-east trade winds prevail over most of India, except in the north-west, where they are interrupted from time to time by the arrival of rain-bearing cyclones which have strayed down the Mesopotamian passage from the Mediterranean. During April and May, as the vertical sun approaches the Tropic of Cancer over India, particularly on the Indo-Gangetic lowlands and Thar Desert areas, temperatures rise, pressure falls, and the north-east trade winds decrease in intensity. The weather has now changed from being cold and dry into being hot and dry. Partly resulting from the summer heat and low pressure over the interior of Asia as well as over the Northern lowlands of India, and partly because the high mountain walls enclosing India on the north and west force inflowing air to rise on reaching Northern India, by early June pressure over Northern India has become lower than the normal planetary low pressure belt of the Doldrums over the Indian Ocean. An inflow of air heavily charged

with water vapour which provides the rainfall of the south-west monsoon now sets in, and the rains spread inland northwards by east, beginning in Ceylon in late May or early June and reaching the north-west by the end of June. As the vertical sun returns southwards, the westerly winds gradually die down and the normal planetary wind circulation is gradually resumed.

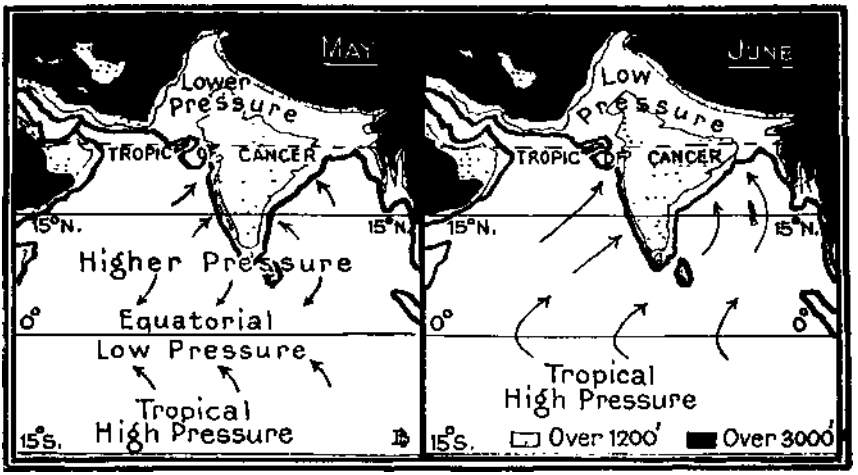



FIG. 30. DEVELOPMENT OF THE S.W. MONSOON ; INDIA

**Tropical Forest (Africa), Monsoon Jungle Forest (South-East Asia, and North Australia), Coatingas Forest (Brazil).**

*Natural Vegetation,* Compared with the Equatorial Rain Forest, vegetation is less luxuriant, undergrowth is thicker, and the stand and density of trees is less. Deciduous forests of broad-leaved trees which lose their leaves during the dry season replace evergreen forests. The bamboo is a typical product of these regions. It sheds its leaves in the dry season, grows rapidly in the wet season, and can resist drought for short periods by drawing upon water stored in the spongy interior of its stem.

*Animal Life.* Tree-climbers, such as monkeys, lemurs and sloths, fruit-eaters like apes and bears, rhinoceroses which feed on leaves and twigs, and animals like rodents, wild pigs and antelopes, which feed on the always abundant vegetation, abound. The antelopes, with their small spread of horns and narrow, compressed bodies, and the ponderous shade-loving elephants are specially equipped

*By courtesy of* *Messrs. Elders & Fyffes,* ***Ltd.***

**FIG. 37. CUTTING DOWN BUNCHES OF BANANAS ON A WEST INDIAN PLANTATION**

**The trees are also cut** down **after** the bunches have **been gathered**

respectively for gliding through or bursting a way through thick undergrowth. Flesh-eating tigers and leopards are typical of Tropical Forest and Savannah regions. Owing to the high temperatures, there are very few valuable furbearing animals. Bird life is represented by parrots, cockatoos, humming birds, and

*By courtesy of* *The Air Survey Co., Ltd.*

FIG. 38. TYPICAL NATIVE HUTS, EAST INDIES

pigeons, while insects and reptiles, whose eggs are hatched by sun heat, are plentiful.

*Man.* Native life is easy because food in the shape of coconuts, bananas (now almost universally grown), manioc (South America), wild rice (Siam), bread fruit (Pacific), sago (Malaya), is easily obtained. It is said that six bread fruit trees will support a family. The coconut supplies all the needs of primitive life, food and drink from the flesh and milk of the nuts, whose shells are made into cups and bowls, fibres for mats, fabrics and ropes, leaves for thatching, stems for the framework of houses and boats. Vegetal food is more abundant, greater in variety, and more nourishing, than in

the Equatorial Rain Forest region, and so tends to promote development. Climatic conditions also make life more liveable, for the dry and sensibly less hot season gives a respite from humid heat. The ease, however, with which food is come by, combined with the high temperatures, still fosters indolence, and gives little incentive to effort. There is little need to take thought for the morrow. Clothing is a luxury, not a necessity. The forms and material of the scanty native dress vary with localities, e.g. in Nigeria a loin cloth of native-grown and woven cotton; an apron of plaited reeds in Hawaii; and of tapa bark cloth in the Solomon Islands. Huts are constructed of local vegetal materials, such as palm tree trunks, bamboo canes and saplings, thatched with leaves. Although the shape, varying according to tribal customs and districts, may be beehive, conical, or rectangular, the huts are built so as to give a good run-off from heavy seasonal rains, ventilation, and shade from the sun.

*Occupations.* Cultivation from shoots is practised in addition to hunting, fishing and collecting valuable vegetable produce, e.g. gutta percha, palm oil nuts, spices, coconuts, gums, resins, lac, sarsaparilla, myrobolans.

(i) The lowest type of agriculture is performed mainly by women on the forest edges and along water courses, while the men hunt and fish. They mostly grow food-bearing plants, such as coconut palms, bananas, bread fruit, and starchy tubers like yams, sweet potatoes, cassava and manioc for their own use only.

(ii) In a higher type of cultivation both men and women take part. By hacking down undergrowth, ring-barking trees, or by firing the bush in the dry season, a patch of jungle is cleared and cuttings planted with a crude dibble. Only a little rough weeding is done until the young plants can fend for themselves. Owing to the rapid exhaustion of the soil, the prevalence of tough grasses, the lack of domestic animals, the abundance of insect pests, rusts, and blights, and the native lack of scientific knowledge, agriculture by natives is difficult, and the cultivators need to move from clearing to clearing every year or so, a wasteful and harmful practice.

**Savannah (Africa), Campos (Brazil), Llanos (Colombia).**

*Natural Vegetation.* As the amount of rainfall diminishes and the length of the dry season increases, " park " country replaces tropical

forests. Tall grasses, such as elephant grass and manilla, sisal hemp, and flowering plants, spring up in dense tufts during the wet season. Trees, such as acacia, palms, and baobabs, form open woods along water courses and occur in twos and threes, scattered widely

*By kind permission of H.M. Eastern African Trade and Information Office*

FIG. 39. AN IVORY SAFARI, UGANDA, BRITISH EAST AFRICA

A mode of transport now only used in the more outlying areas. An elephant licence (1st) costs £50, (2nd) £100, and the shooting of elephants in British territory without a licence is illegal. A tusk weighs about 100-200 lbs.

apart in the open grasslands. The African baobab shows close adaptation to geographical conditions. To flourish, it demands space, air, and light. It protects itself against the dry season in the same way as the bamboo. Its typical umbrella form is a protection against excessive transpiration brought about by winds.

*Animal Life* is represented by grass eaters like the buffalo, zebra, antelope, gazelle, and giraffe, and flesh-eating beasts of prey, such as lions, tigers, and leopards. Myriads of birds live upon a teeming insect life which make life a torment that often ends in death for animals not immune from their attacks, e.g. English horses die off in Kenya and cattle cannot live inside the tsetse fly belts. In

Africa the " Big Game " country is located in the Tropical Forests and Savannahs.

*Man* supplies his needs by hunting, herding, collecting, primitive agriculture, or combinations of these pursuits. The standard of living of the parkland tribes, especially in pastoral communities, is

*By couttesy of the* *South African Railways and Harbour Board*

FIG. 40. PART OF A NATIVE KRAAL, BASUTOLAND, SOUTH AFRICA
Note the native beehive thatched huts and the characteristics of the high veld

higher than that of the inhabitants of the Tropical Forests. While the men do the special work of tending the cattle, hunting and fishing, along with any other rough work, the womenfolk indulge in elementary agriculture, collect wild edible food products and do any light work of a general character. Dwellings are more substantial structures, better furnished with grass mats, wicker-work baskets, leather and bone utensils. Both the structure of individual dwellings and the layout of a group settlement show response to geographical conditions. A typical kraal often situated on a slight eminence, usually consists of three concentric rings; in the centre a thorn-fenced cattle-pen, surrounded by a circle of circular huts, which are

in turn enclosed in a circular thorn stockade. Where timber is not abundant, the circular form is economical of material, and even the grass thatching of a circular chimneyless hut is easier than that of a rectangular one. The outer circular palisade makes defence as easy as possible, while, similarly, the shape of the cattle-pen offers

*By kind permission of* *The Trade Commissioner for India*

FIG. 41. PLOUGHING IRRIGATED RICE FIELDS, INDIA

After being ploughed and harrowed the plots are carefully levelled into soft mud in which the young rice plants are planted out. Counting land cropped twice, the area per annum under rice in India is greater than the area of the British Isles

no corners into which weak cattle or calves can be crowded, crushed, or even trampled to death.

**Hot Monsoon Regions (India, Cochin-China).**

The greater part of these regions once had natural vegetation and animal life very much like the Tropical Forest and Savannah regions. To-day remnants of these conditions are found only in the more inaccessible parts, where relief makes farming impossible.

*Cultivation from seeds* is a special feature of the monsoon regions. In Southern China the hand and spade cultivation of rice, millets, maize, fruits and tea, occupies so much ground that except in the

Yangtse Valley it leaves no space for pasture. In India, with its more diversified relief, about half the land is cultivated and the rest forest or waste which provides pasture for stock. More than three-quarters of its cultivated acreage is devoted to the growing of rice,

*Photo supplied by* *Will. F. Taylor*

Fio. 42. CHINESE BOY DRIVING THE FAMILY'S FLOCK OF GEESE AND DUCKS TO A FRESH PASTURE

Illustrates one way of overcoming the shortage of butchers' meat in densely populated monsoon countries where pasture land is scarce. The irrigation canals and their banks are made to contribute to man's food supplies by serving as feeding grounds for his poultry, sites for his fruit, nut and mulberry trees, and as his fishing ground

wheat, cotton, linseed, rape, mustard and sesame seeds. Jute, indigo, sugar cane, tea, spices, and miscellaneous crops of local importance are grown on the remaining quarter. Over three-quarters of the people are directly engaged in agricultural pursuits.

Compared with the wandering life of hunters and collectors, the settled life of agricultural people is moderately secure. Cultivation from seed demands more constant attention, labour, ingenuity and foresight, than does cultivation from shoots. Partly for this reason, and partly because of the pressure of population on the land, better methods of tillage, improved implements, the use of manures,

schemes of drainage and irrigation are evolved. Moreover, unlike hunters, collectors, and miners, agriculturists increase natural sources of supplies. Further, with cultivation from seeds, it pays to keep farm animals for draught and food purposes. Animals also provide valuable manure and can usually be fed on the unwanted parts of crops, such as leaves and stalks. In India buffaloes and oxen serve as draught animals and provide milk when alive and leather when dead. Goats and sheep are also reared for their milk and skins. The tame, harmless, hardy and fecund pig, and poultry are typical meat animals in China and other grain-growing lands where there are no religious scruples concerning their use. This form of agriculture can support a dense population, which results in a greater exchange of ideas, and it is possible for one cultivator to profit by the experience and improvements of another. The well-marked seasons of the Monsoon regions compel the cultivator to look ahead and plan his work accordingly. Such conditions promote civilization. China and India developed civilizations which have been reinforced at intervals from middle and higher latitudes centuries before Europe.

In India the influence of climate is exceptionally far-reaching. The greater part of India has a well marked rhythm of seasons ; the North East Monsoon with its cold weather period (Jan.-Feb.) and hot weather period (March-mid. June), and the South West Monsoon season having times of general rains (mid. June-mid. Sept.) and of retreating Monsoons (mid. Sept.-Dec). As a result of these seasonal variations of climate, three groups of crops are usually raised each year, those of the rainy season, such as rice, cotton and sorghum, those of the dry season, with or without irrigation, such as wheat and barley, and those like sugar cane and cotton, which grow throughout the year and need irrigation in the dry season. Whether ordinary, dry, or irrigation farming methods can or have to be used is primarily controlled by weather conditions. The system of cropping adopted by the Indian ryot is on the whole well adapted to the behaviour of the weather, whose vagaries explain why he so strongly prefers quick-growing, hardy crops and has such a variety of these on his small and scattered holding. Such a system is practically his only method of insurance. The general standard of living is low in India, very largely because millions of cultivators, through the fickleness of the weather and its attendant consequences

of famine, diseases, pests, and flood havoc, gain a precarious livelihood. Silk, cotton, jute, tea, and copra industries, the handling and transportation of goods, and business arrangements are affected by climate conditions. Even the Indian Budget has been described as a gamble in rain, and official weather bulletins and crop forecasts affect the world prices of commodities like wheat, rice, sugar and jute.

The growth of the caste system, the organization of rural India on the basis of village communities, and the fatalistic outlook on life of the Indian cultivator, reflect the strong influence of geographical environment, past and present.

The insistence of the Holy Books of Hinduism upon the sacredness of the cow can be traced back to the time when the economic future of the early Aryan pastoralists of India's savannahs was bound up with the preservation of their cattle. Although with the rise of cultivation this early necessity has long since vanished, so tenacious is tradition that the whole creed of cow worship with its elaborate ritual and legends still persists. A religion which once aimed at promoting the survival and betterment of its devotees now under changed conditions hinders the material progress of India's agriculturists. Owing to religious scruples concerning breeding, control and slaughtering, stock-raising on modern scientific lines for milk, beef, or even for hides and tallow only, is almost unpractised. In India there are more than twice the number of cattle in the United States and Canada alone, yet except for erratic and meagre supplies of milk they are no use as a source of food. As draught animals their value has been depreciated by centuries of uncontrolled breeding and lack of care and attention, and when dead, either through old age or disease, their hides are small and inferior in quality. Allowed to wander at will they are a nuisance to the farmer and his crops.

Excepting cash crops, like jute and cotton, most of the field crops of India are grown principally for home use. Punjab wheat and Burma rice are exported in large quantities, but India's external trade in agricultural produce is very small compared with her internal trade.

*Food, Clothing and Shelter.* There are marked differences in these respects between the areas of stationary agriculture, mainly in the forest areas, and those of progressive agriculture in the Savannahs, and especially in the Monsoon regions. Where man is engaged

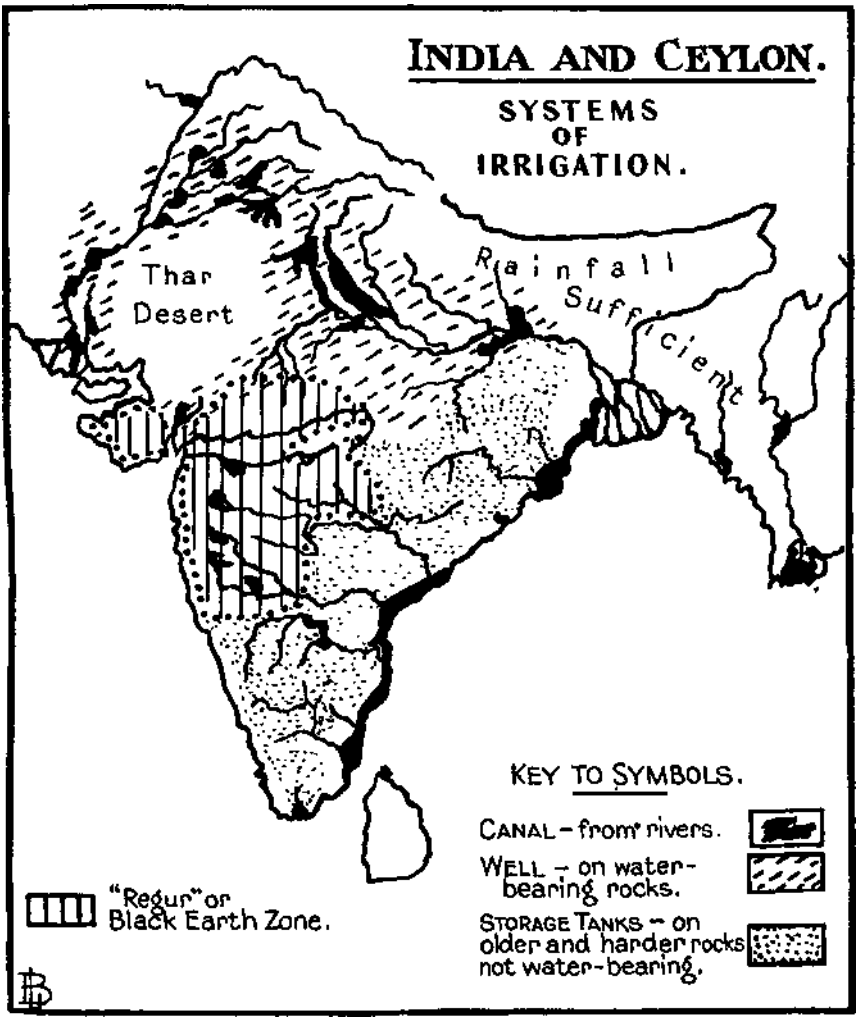



FIG. 43. SYSTEMS OF IRRIGATION: INDIA AND CEYLON

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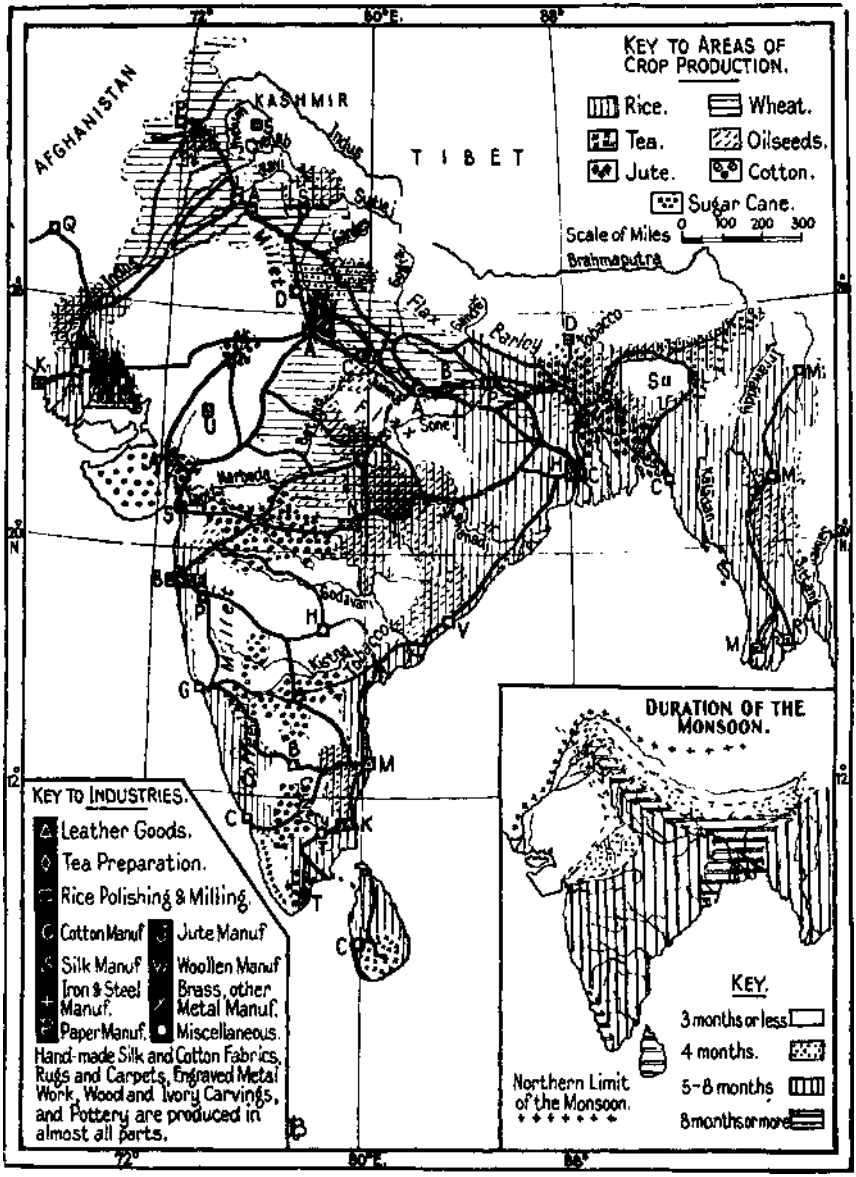
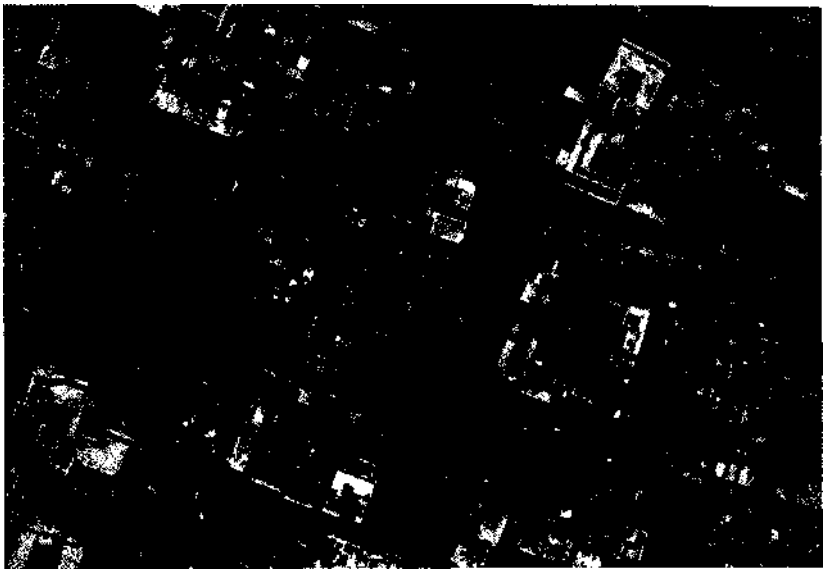



FIG. 44. INDIA: CROP PRODUCTION AND INDUSTRIES WITH DURATION OF THE S.W. MONSOON

in cultivating a particular piece of land all the year round, better buildings, constructed of more durable materials, such as sun-dried adobe (Africa), sun-dried bricks and stories (India), and stout timber, take the place of palm, bamboo, and grass shelters. Groups of people settle in permanent villages. Market towns and administrative centres arise. Roads replace tracks and paths, arts



By courtesy *of* *The Air Survey Co., Ltd.*

FIG. 15. NATIVE QUARTER, CALCUTTA, INDIA
This view should be compared with those of Kafr el Gamus and Penang

connected with clothing, shelter, and implements rapidly develop in grain growing regions, and division of labour between sexes and classes becomes necessary in production, trade, and administration. Centuries before we did, the people of China and India learned to manufacture and make up silk, cotton, and leather goods, to build wonderful buildings, and to make the tools called for by such work. Concurrently, social, political, religious, and economic systems evolved and grew, e.g. the caste system in India. Thus very complex societies grew up. Food, clothing, and shelter all reflect geographical influences. Man's diet is mainly vegetal, his clothing

consists of loose, light cloths rather than clothes, and his dwelling is designed to give shelter from storms and burning suns.

**Semi-arid Grasslands.**

Regions of this type lying between the Savannahs and hot deserts have expanses of coarse grasses with here and there patches of scrubby thorn bushes with small leaves which give little shade. Plant life freshens and grows during the rains and then withers in the dry season. Animal life is much the same as that of the Savannah regions, except that it is less abundant.

In these regions life is not easy. Tillage, usually by hoeing, is difficult, because of the short season of scanty rain and the toughness of the sods. Millet and other quick growing drought-resisting crops are grown in small quantities. Most of the people supply their few needs by herding cattle, goats, camels, and woolless sheep. Population is sparse because Nature is niggardly. Since water supply and pasture depend upon the rainfall, the flocks and herds follow the north to south migrations of the "rains." Meat and milk with a little grain form the staple diet. The Masai (Africa) use ox blood, tapped from the live animal, for food. The more primitive nomads wear little or no clothing and dwell in grass huts, which afford sufficient protection from hot days, cold nights, and scanty rainfall. The more progressive pastoralists wear loose cotton robes (Manchester goods obtained by barter), protective head-dresses and foot-gear. They dwell in tents made of leather and furnished with home-made carpets and rugs.

Flocks and herds are usually owned by groups, generally related by blood, and grazed on tracts of pasture defined by custom and use. Animals form the basis and standard of wealth. Although diseases like rinder-pest, pleuro-pneumonia, and East Coast fever, drought and beasts of prey, from time to time work havoc with the stock, wealth in the form of young animals tends to increase. The accumulation of household goods and utensils becomes possible, because beasts of burden make the transport of such property possible. Life for such pastoral tribes is midway between the precarious life of hunters and collectors and the more secure position of cultivators.

The aborigines of the Australian semi-arid grass lands never became pastoralists, because this isolated continent had no animals

which could be domesticated, or agriculturists because there were no native cereals. To these two vital deficiencies, which made the getting of food difficult, may be traced the origin and evolution of the aborigines' system of tabu—a system devised to reserve for special crises sources of food relatively easy to obtain.

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FIG. 46. TYPICAL BUNGALOW OF A PLANTER, MALAYA

**White Men in Tropical Regions.**

White men do not as a rule " settle down " permanently in these regions of lesser debilitation. With the help of holidays at " hill-stations " and sanatoria, sea-trips and furloughs in pleasanter climes, a white man can live for periods of varying lengths in tropical countries. His work there is only supervisory in character, not manual, and usually restricted to the cooler hours of the day. He adapts his dress so as to get the largest amount of comfort and to safeguard his health. His workaday outfit usually consists of a light-weight pith helmet, giving protection against sunstroke, a loose, light-coloured drill suit, light-weight underclothing, often with a cholera belt of wool, and stout leg and foot protection. His bungalow shows adaptation to local conditions. One story high, with

a shady verandah around the sides, it has a high roof to give plenty of air space inside and a good run-off for tropical downpours. Against the latter and also as a protection from insect pests, the floor is raised off the ground. Well screened and curtained night cubicles with plenty of doors and window spaces, and other offices,

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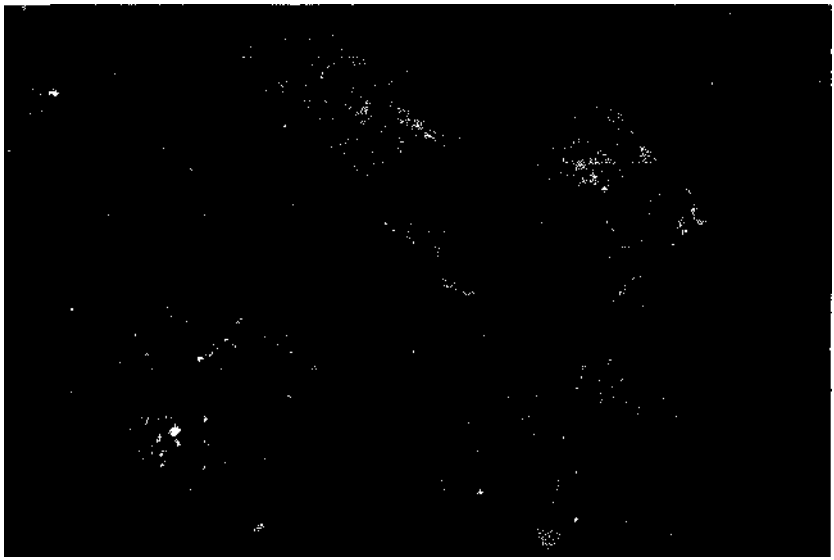
FIG. 47 TAMIL TAPPING TREES ON A RUBBER PLANTATION, MALAYA

usually surround a central, and therefore cooler, reception room. The bungalow is often built of local materials like the natives' huts, but is usually a larger, more substantial structure. More care is given to sanitation, water supply, and other amenities of civilized life. Because of insect pests, cheap or easily replaceable furniture, such as that made of bamboo, takes the place of the upholstered furniture of our homes.

**Occupations.**

*Plantation Cultivation* is often started by Europeans with the idea of producing in bulk sub-tropical food stuffs, fibres, drugs, and dye

stuffs for the use of people living in temperate regions. Tea, coffee, cocoa, cane sugar, bananas, coconuts, spices, hemp, rubber, cinchona, formerly luxuries, now necessities, are typical plantation crops, cultivated by natives, but financed and managed by Europeans. Plantation culture under white supervision tends to raise the general



*By courtesy of* *The Air Survey Co., Ltd.*

FIG. 48. PORTION OF A RUBBER ESTATE, MALAY PENINSULA

The planter's bungalow in its own grounds, the plant nursery nearly opposite, and the coolie lines (bottom left) all adjoin the road, with telegraph line passing through the estate. To the left of the road is "Old" rubber, to right of the nursery "Young" rubber, and to the bottom of the nursery, coconut palms can be seen

level of the natives' standard of living, especially as regards housing and sanitation. The natives learn new methods of cultivation, how to use machinery, and get into the habit of steady work. Population increases as prosperity increases, and this pressure on the land also makes it less easy to get a living without settling down to work. This has actually happened under Dutch rule in Java.

Since many tropical regions are wholly or partially under the political control of white races, whites are employed in various departments of government, e.g. Indian Civil Service, Chinese Customs Service. Other whites are engaged in trade, transport, banking, medical, and missionary work.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

**1. Explain these two statements : *(a)* " in the tropics there is practically no twilight" ; (6) these regions have wet and dry seasons.**

**2. " Tropical regions are regions of debilitation." Discuss the truth of this remark.**

**3. In what parts of South America and Africa is the sun overhead at noon on 21st March and 21st December respectively ? Select two places in each continent and give their local time at noon, Greenwich time, on those dates. (Time changes 4 min. fast or slow for every degree of longitude east or west of Greenwich.)**

**4. What is a monsoon ? Explain how the S.W. monsoon of India is caused.**

**5. Draw a map showing tropical regions. On it shade the areas which come into the belt of calms (a) for part of the year; (6) all the year; (c) at no time of the year. In which zone would wind power be most rehable ? Suggest uses for this kind of power and compare its advantages and disadvantages with other sources of power, e.g. wood alcohol, petroleum, hydro-electric power, steam power raised from crushed sugar stalks.**

**6. Compare your rainfall maps with the one showing natural regions. Draw a map showing the semi-arid areas where crops are grown by irrigation. Name the regions, principal centres, and crops grown.**

**7. " I n probably no other land is the livelihood and welfare of a people so dependent upon climatic conditions as in India." Discuss this statement.**

**8. " *Tidal loaves* often accompany *hurricanes* and *typhoons* from which these regions suffer." Explain the italicized words.**

**9. Examine the following tables and point out and explain their interrelationship.**

BAY OF BENGAL

| | Jan. | Feb. | Mar. | Apr. | May | Jun. | July | Aug | Sep. | Oct | *Nov.* | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Frequency of Tropical Storms . | 1 | 1 | 1 | 5 | 9 | 2 | 4 | - 5 | 8 | 12 | 0 | 5 | 62 |
| Insurance Rates % for Goods sent by Sea . | 1½ | 1½ | 1½ | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | |

**10. Write a short account of the vegetation and animal life of one of these : campos, llanos, savannas.**

**11. How do the vegetation and animal life of the Tropical Forests differ from those of the Equatorial Rain Forest ?**

**12. From time to time prospectuses for tea, rubber, or cane sugar companies appear in our daily papers. Examine one carefully and note what geographical advantages are mentioned.**

**13. "Climate by its control of food supplies largely determines the density of population in tropical regions." After consulting climatic, vegetation, and density of population maps, give your own opinion, with full reasons whether you agree or disagree with this statement.**

**14. What is meant by plantation agriculture ? Explain your interpretation by reference to one plantation crop.**

**15. Compare and contrast the mode of life of the white and coloured population in either India or Venezuela.**

**16. How do Europeans adapt their way of living to suit tropical conditions ?**

**17. Many tropical regions are wholly or partially under the control of the white races. Draw a sketch map showing the world distribution of these regions, name the political units in which they lie, give the principal towns and ports and indicate which portions are independent and which are under foreign domination.**

**18. " Careful rice culture is a distinct help in promoting civilization.'' Discuss this statement with special reference to either Java or South China.**

**19. " On many Pacific islands in the tropics the coconut palm is the natives' universal provider." Expand and explain this statement.**

**20. Give an account of the mode of life of the Masai of the African savannas.**

**21. Tropical products are not extensively grown in the northern areas of Australia. To what extent does the policy of " White Australia " account for this ?**

**22. The production of coffee as exported in the commercial year June-July, 1935-6, was 2,567 million lb., distributed as follows: Brazil 1,652, other South American States 292, Central America 161, Dutch East Indies 113, Mexico and West Indies 96, India 15, others 138. Find the percentage of the world's**

production for the leading countries. To what extent is production or export restricted? Why are the statistics given for a "double year"?

23. The consumption of coffee in lb. per head per annum in various countries is as follows: Sweden 17, U.S.A. 14-6, Belgium 12, France 9-6, Holland 9, Germany 4-5, United Kingdom 0-5.

*By permission of the Director, Gold Coast Govt. Commercial Intelligence Bureau*

FIG. 49. TRANSPLANTING YOUNG CACAO PLANTS, GOLD COAST

The vegetation in the background is typical of that by which uncultivated forest clearings are obliterated in less than a year

Estimate how far the following factors account for these facts: (1) Nearness to source of production; (2) political control of supplies, e.g. by trade agreements, currency restrictions; (3) climatic conditions in the country of consumption; (4) tariff duties in favour of other nationally controlled beverages; (5) competition with tea and cocoa.

24. In 1936 Brazil's exports, valued at £39,100,000, of which coffee accounted for £22,300,000, were one-third those of 1925. Brazil obtains 70 per cent of its revenue by an export tax upon coffee. Discuss the advantages and disadvantages of

the economic, financial, and political dependence of Brazil upon coffee.

2*5. The United Kingdom's imports of raw cocoa in thousands of cwt. were in 1935 from British West Africa 1,758, British West Indies 80*0, Ceylon 9-0, others 84. From what other countries did we obtain supplies of cocoa?

*By courtesy of* *The Wett India Committee*

FIG. 50. A CACAO PLANTATION, TOBAGO, WEST INDIES

Tin; men arc slashing open the pods and scooping out the sticky white pulp containing the beans—about 40 to a pod. Women and boys are separating the beans from the pulp. After fermentation the beans are dried and graded ready for export. Note (centre) that as is so often the case with tropical trees, fruit is borne on the old bark of the trunks, and (left) the banana grown as a shade plant

26. Find what percentage of the world's production of cocoa, 14,260,000 cwt., was consumed by the United Kingdom. To what extent do our tropical possessions supply our needs for cocoa products?

27. Copra exports in 1000 tons, 1935: Philippines 509, Java 486, Singapore 182 (for Malaya, Borneo, Siam), Ceylon 138, New Guinea 57, Fiji 27, Solomon Isles 18, Samoa 13, Zanzibar 12, Jamaica 0

(23 before tornado havoc, 1933), Trinidad 7, Gilbert and Ellice Isles 7, Seychelles 4, Gold Coast, Mauritius, and India (Malabar) under 2. Express diagrammatically.

Find the location of these places and from your climatic and relief maps verify or disprove the following statement. "The

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FIG. 51. HUSKING COCONUTS ON A COCONUT PLANTATION, MALAYA

A fortnight after harvesting, the nuts are husked, split in half and exposed to the sun until the kernel can be easily removed

coconut palm thrives on the salty, alluvial or sandy soils of lowland areas situated between latitudes 17° N. and 12° S. It requires a mean annual temperature of 75° to 85° F., over 50 in. rainfall annually, ample sunlight and immunity from strong winds."

28. In 1935 Ceylon exported the following coconut products in millions of units: fresh coconuts, 0-4 cwt., mainly to the United Kingdom; copra, 1-0 cwt., mostly to Italy, Denmark, the United Kingdom and Germany; coconut oil, 1-1 cwt., principally to Germany and the United Kingdom; desiccated coconut, 0-6 cwt., chiefly to

the United Kingdom and U.S.A.; poonac, 0-1 cwt., nearly all to Belgium; coir fibre, 0-2 cwt., two-thirds to Europe. Find out the commercial uses of each of these products and show how these explain the destinations of the different commodities. Explain the comparative differences in the prices of these commodities.

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FIG. 52. A TAMIL COOLIE REMOVING THE "MEAT" FROM COCONUTS, MALAYA

The kernel, either sun-dried or dried in kilns, is known as copra, which contains about 70 per cent of oil, used in making soaps, edible fats, etc., and the residue is made up into food-stuffs for cattle

29. The coastal regions of West Africa were the sole pre-war source of supply for palm kernels, and shipped 300,000 tons annually, mostly to Liverpool. What are the prospects and output of tho post-war plantations in the Netherland E.I. and Malaya? What are the principal uses of palm oil?

30. The Netherlands output of margarine was 99,000 tons (1921), 130,000 tons (1924), 60,000 tons (1935). What bearing has this fact on the Sumatra experiment, and the rise of Britain as the world's largest producer with output of 183,700 tons (1935)?

31. ROUGH RICE:* 1934-35 (in billions of pounds)

| Percentage of World Production (China excluded) | | Rice Exports | | Rice Imports | |
|---|---|---|---|---|---|
| India and Burma | 51-6 | India and Burma . | 3-6 | China . | 2-8 |
| Japan | 130 | Indo-China | 3-5 | Korea . | 2-6 |
| Dutch East Indies . | 60 | Siam | 3-2 | Ceylon . | 1-5 |
| Siam | 5.4 | Singapore | 0-4 | Singapore | 1-4 |
| Korea . | 4.2 | Dutch East Indies . | 0-4 | Dutch East Indies | 1-1 |
| Philippine Isles | 2.3 | Netherlands . | 0-2 | Formosa | 0-7 |
| Formosa | 2.3 | | | Germany | 0-4 |
| Rest | 150 | | | Netherlands . | 0-3 |
| | | | | United Kingdom | 0-2 |
| | | | | Japan . | 0-06 |

**Statistics relating to "husked rice" adjusted by means of coefficients supplied by countries concerned**

Find the percentage of the world's production, excluding China, produced in South East Asia. Explain why—

(1) Singapore and Netherlands export rice which they do not produce; (2) Singapore and Dutch East Indies both export and import rice; (3) India and Burma, which produce ten times more rice than Siam, only export about as much.

32. How far do climatic conditions and the following estimates explain why so little rice is produced outside Asia ?

| Cultivated Acres of Swamp Rice per Labourer | Cost of Labour per Acre (in shillings) |
|---|---|
| India (Ryot hand labour) 3 | 20-35 |
| Egypt (Fellahin hand labour) 4 | 20-40 |
| Italy (Italian hand labour) 5 . | 40-60 |
| U.S.A.—Carolina (mostly negro hand labour) 8 . | 60-75 |
| Mississippi (mostly negro hand labour) 10 | 60-70 |
| Louisiana—Texas (white and negro labour using machinery) 8 0 . . . . | 10-15 |

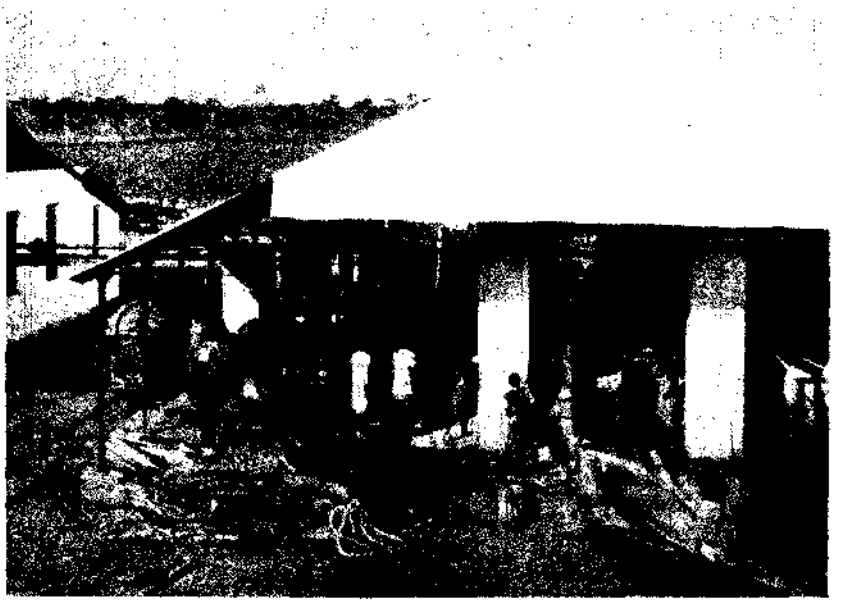
33. Compare the amount of work and wages of different rice cultivators. What effects has the use of machinery in rice culture **had?**

34. STAPLE CROPS OF INDIA IN MILLIONS OF UNITS

| | Production | | | | Exports | | |
|---|---|---|---|---|---|---|---|
| | 1895–1900 | 1910–15 | 1924–25 | 1931–36 | 1899–1900 | 1924–25 | 1931–36 |
| Rice (tons) | 21·5 | 28·4 | 31·1 | 31·6 | 1·6 | 2·3 | 1·9 |
| Wheat (tons) | 6 | 9·7 | 8·7 | 9·3 | 0·5 | 1·1 | 3·8 |
| Tea (lb.) | 158 | 290 | 375·3 | 403 | 175 | 340 | 344 |
| Cotton (bales) | 2·3 | 4·4 | 6·1 | 4·6 | 0·8 | 3·3 | 2·2 |
| Jute (bales) | 5·8 | 9·1 | 8·1 | 6·5 | 2·7 | 3·9 | 2·7 |
| Oil seeds (tons) | 1·6 | 2·9 | 3·7 | 1·5 | 0·8 | 1·3 | 1·4 |

On a map of India and Burma shade in the areas principally devoted to these crops. Find out the particular requirements as to climate, soil and relief of each crop. Insert and name one town in each producing area.

35. Say what changes have taken place during the twentieth century in the quantities of the different crops produced and try



*By kind permission of* *H.M. Eastern African Trade and Information Office*

FIG. 53. SISAL HEMP DECORTICATOR BUILDING, MAGUNGA FACTORY, TANGANYIKA

Bundles of the largo rush-like leaves are shown in the foreground, and on the truck being unloaded on to a conveyor table by means of which the leaves are fed regularly into the decorticator (centre). In this machine the skin and fleshy parts of the leaf are torn away from the ilbre which is also thoroughly washed at the same time. The clean wet fibre is placed on lines (right) to dry, after which it is brushed and baled

to find out the chief reasons for them, such as increased home consumption due to increased population, rise of manufacturing industries, foreign demand, etc. (Refer to preceding table.)

36 COMPARATIVE STATEMENT SHOWING THE DISTRIBUTION OF TEA FROM PRODUCING COUNTRIES IN MILLIONS OF LB., 1935

| Destination | India Assam Travancore Darjeeling | Ceylon Kandy | Java and Sumatra "Preanger" | Japan Hondo Formosa | China Hunan Kiangsi | B.E. Africa | Total Imports |
|---|---|---|---|---|---|---|---|
| United Kingdom | 270·1 | 142·0 | 38·7 | 3·8 | 8·3 | 9·3 | 476·5 |
| United States | 9·8 | 13·2 | 16·4 | 21·9 | 7·3 | — | 85·8 |
| Australia and N. Zealand | 2·2 | 22·2 | 24·9 | 1·2 | 1·2 | — | 56·1 |
| Canada | 20·8 | 11·4 | — | 2·5 | 0·3 | 0·1 | 34·2 |
| Irish F.S. | 16·5 | 0·4 | 5·3 | 0·05 | 0·1 | 0·2 | 22·1 |
| U.S.S.R. | — | — | — | 13·1 | 25·3 | — | 50·7 |
| Netherlands | 3·0 | — | 25·5 | 0·05 | 1·5 | — | 28·7 |
| Egypt | 0·9 | 2·4 | 9·4 | 0·4 | 0·08 | — | 13·4 |
| Italy | | | | small amounts | | | 0·3 |
| Total Exports | *323·7 | *211·2 | *162·9 | 35·3 | 83·6 | *3·5 | 988 |
| Production | 398·4 | 218·2 | 167·1 | 100·3 | c. 1000 | 12·5 | |

* Participating in International Tea Restriction Scheme (1933).

*By courtesy of the* *South African Railways and Barbour Hoard*

FIG. 54. CUTTING SUGAR CANE, ISIPINGO, SOUTH COAST, NATAL

**The cane stalks are topped and stripped of their leaves before being loaded for transport to the sugar central. This operation, like the cutting, has to be done by hand. Sugar-cane cultivation requires casual or extra labour**

**From your temperature, rainfall, and relief maps find out what conditions favour tea growing in the places mentioned.**

**37. On a map mark the comparative production of tea in the regions named. Using the scale — for 5,———for 2, . . for 1 millions of lb., indicate by lines following ocean routes the flow of tea from producing to consuming countries. Suggest reasons for the differences shown.**

**38. Find the proportions of the world crop produced anc, consumed inside the British Empire.**

**39. Find the approximate consumption of tea per head in the different countries and suggest reasons for the differences.**

**40. For a pound of Ceylon tea the average cost of production is 7-9d., the selling price f.o.b. at Colombo 8»5d., freight to the United Kingdom 0-25d. to 0-5d. Since it is retailed at 30-0d. in England, account for the difference of 21.0d.**

41. WORLD CANE SUGAR PRODUCTION IN THOUSANDS OP TONS*

| | 1880-1 | 1914-15 | 1924-25 | 1935-36 | Percentage of World Produce |
|---|---|---|---|---|---|
| West Indies and British Guiana | 226 | 253 | 285 | 133 | |
| Mauritius | 87 | 277 | 221 | 250 | |
| British India . | — | 2,460 | 2,537 | 3,600 | |
| Australia | — | 246 | 436 | 457 | |
| Fiji . | — | 96 | 70 | 110 | |
| Natal and others, S. Africa | .57 | 177 | 144 | 326 | |
| Java . . . . | Not available | 1,514 | 2,293 | 503 | |
| Cuba . . . . | | 2,290 | 4,583 | 2,554 | |
| U.S.A. . | | 311 | 300 | 283 | |
| Hawaii . . . . | | 567 | 594 | 777 | |
| Porto Rico | | 363 | 390 | 689 | |
| Brazil . . . . | | 38 | 34 | 117 | |
| Total World . | | 10,178 | 14,701 | 9,399 | |
| Total British Empire | | 3,509 | 3,693 | 4,876 | |

* Molasses and raw sugar output converted to refined sugar.

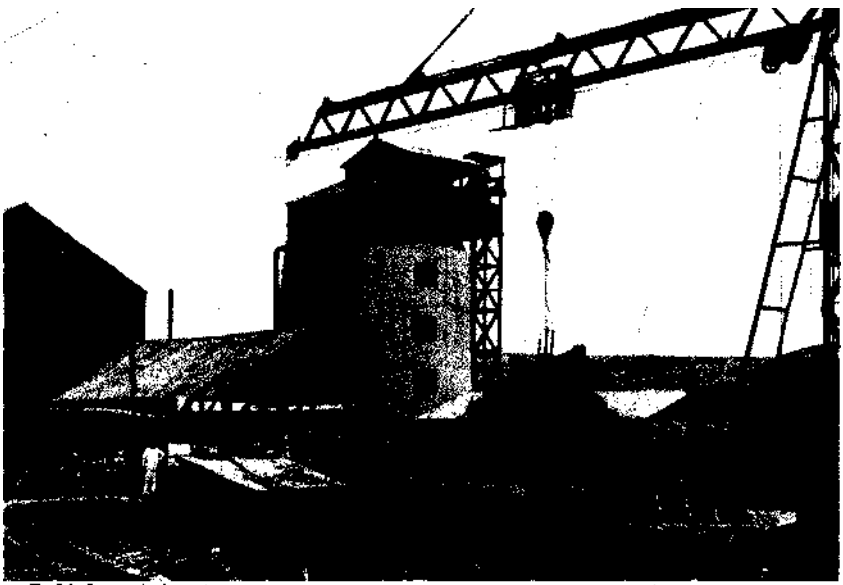
**Complete this table and on an outline map of the world mark and name the principal cane sugar producing areas and indicate by bars or rectangles the percentage of the world production they contribute.**

**42. Arrange the countries in order of production at the outbreak of, and after, the Great War. What changes do you see ?**

43. Exclude India, which consumes its supply of sugar, and find out whether the rest of the British Empire is holding its own in production.

44. UNITED KINGDOM, CANE SUGAR, GENERAL IMPORTS
(in thousands of tons)

| | 1880-1 | 1914-15 | 1923-24 | 1935 |
|---|---|---|---|---|
| W. Indies and British Uuiana | 196 | 70 | 55 | 143 |
| Mauritius | 6 | 69 | 124 | 185 |
| British India | 35 | 21 | 32 | — |
| Australia | — | 9 | 44 | 240 |
| Other British Possessions | 3 | 1 | 34 | 232 |
| Cuba | 358 | 1,578 | 258 | 550 |
| Java | | | 252 | 17 |
| Others | | | 860 | 63 |
| Total | 598 | 1,748 | 1,659 | 1,892 |
| Total, British Empire | 240 | 170 | 289 | 802 |



*By kind permission of* *The Natal Estates, Ltd.*

FIG. 55. DERRICK AND GRAB LOADING SUGAR CANE ON TO CARRIER, SUGAR CENTRAL, NATAL

The conveyor belt or carrier which feeds the crushing rollers inside is shown on the left background. To the right is the weigh house through which the cane passes to the carrier. The lime tower is to the right of the main building

*By permission of the* *Director, Gold Coast Govt. Commercial Intelligence* ***Bureau***

FIG. 56. CLIMBING AN OIL PALM TO COLLECT THE FRUIT, GOLD COAST

Cacao trees in the background

Find to what extent the United Kingdom is dependent upon foreign cane sugar. Are we getting more, or less, dependent upon non-empire supplies ?

45. How has our apparent consumption of cane sugar varied during the last 50 years or so ?

*By -permission of ike Director, Gold Govt.. commercial Intelligence Bureau*

FIG. 57. NATIVE METHOD OF EXPRESSING PALM OIL FROM THE PERICARP OF PALM NUTS, GOLD COAST

Much of the palm oil produced on plantations managed by Europeans is obtained by using power-driven crusliing machinery

46. The figures given are for " General Imports," not " Special Imports." Find the meaning of these two terms and show why, in interpreting trade statistics for the United Kingdom, it is important to bear in mind the difference in meaning.

47. Tanganyika has about 250,000 acres under sisal, producing 85,000 tons per annum, valued at the port of shipment at £1,140,000, and yet the production of this crop can only be successfully undertaken by farming companies able to invest considerable capital. What peculiar conditions give rise to this state of affairs ?

48. Other tropical products entering largely into world trade are

oil seeds, shellac, and hides and skins. Consult an encyclopaedia or *Statesman's Year Book* and find out which tropical countries are the largest producers and exporters of these commodities.

49. " Our Indian Empire is a development of a luxury trade—Spices." Discuss this statement. Find out from your reference

*lly kind permission of* *The Trade Commissioner for India*

FIG. 58. TEA FACTORY WITH HILLSIDE TEA GARDENS, ASSAM, INDIA

The native lines are on the left of the factory where, in the case of black tea, the plucked leaf is allowed to wither on " Tats," then rolled to give colour, flavour and strength, fermented, dried by hot air, graded and carefully packed in practically airtight chests lined with lead or aluminium. Green tea is steamed before rolling and not allowed to ferment

books the regions from which we obtain pepper, pimento, cloves, cinnamon, nutmeg, mace, and ginger.

50. The value in £1000 of ivory imported by the United Kingdom in 1935 was: Kenya 21, Zanzibar and Pemba 10, Tanganyika 6, Northern Rhodesia 6, Southern Rhodesia 1, Sudan 0-6, other British countries 3, Belgian Congo 9, Belgium 2, others 3. On a map mark the areas named and draw scale diagrams showing their contributions.

51. Using the information to be deduced from Figs. 32, 33, give an account of lumbering in a tropical forest, pointing out why working methods differ from those used in temperate forests.

52. Why do civilized peoples go to the trouble and expense of extracting timber from tropical forests while temperate forests remain to be exploited?

53. Using the questionnaire, describe the scene in Fig. 37.

*By kind permission of* *The Trade Commissioner for India*

FIG. 59. PLUCKING TEA, ASSAM, INDIA

This operation can only be done by hand and a cheap labour supply is essential. Requiring practice and careful supervision, plucking is mostly done by women and older children, the men doing heavy labour such as pruning, forking, cutting drains. Usually only the bud and two leaves are plucked. The bushes are carefully and systematically pruned to produce regular, frequent, and plentiful "flushings"

54. Describe how natives in Nigeria collect palm fruit, and express palm oil and palm kernel oil.

55. Write a reasoned description of the scene on the cacao plantation in the West Indies. (Fig. 50.)

56. Under what conditions of climate, soil, labour supply, and business organization is cane sugar produced in Natal?

57. Answer Question 56 for coffee beans.

58. Give the conditions, physical and human, most suitable for the profitable growing of cotton.

59. "Much intelligence, foresight, patience, and concentrated effort is needed in order to carry out successfully the rigorous and

exacting routine of rice cultivation." What evidence to support this statement can be found in Fig. 41 ?

60. "The cultivation of rice, unlike that of any other cereal, is capable of supporting a dense population." Expand and discuss,

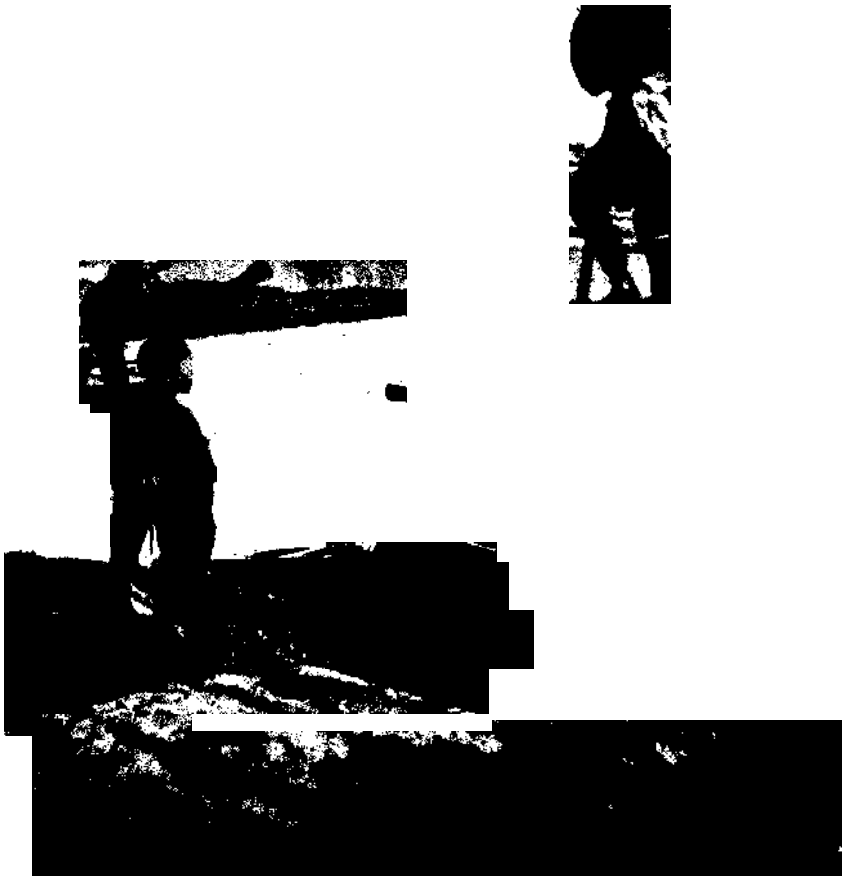


*Photo supplied by* *Messrs. Keystone View Co.*

FIG. 00. JAPANESE FARMER IRRIGATING HIS RICE FIELDS

The water wheel is operated like a tread-mill

**61. What evidence does Fig. 60 give to support the statement that the Japanese are careful, skilful, intelligent cultivators who make the most of their opportunities for agriculture ?**

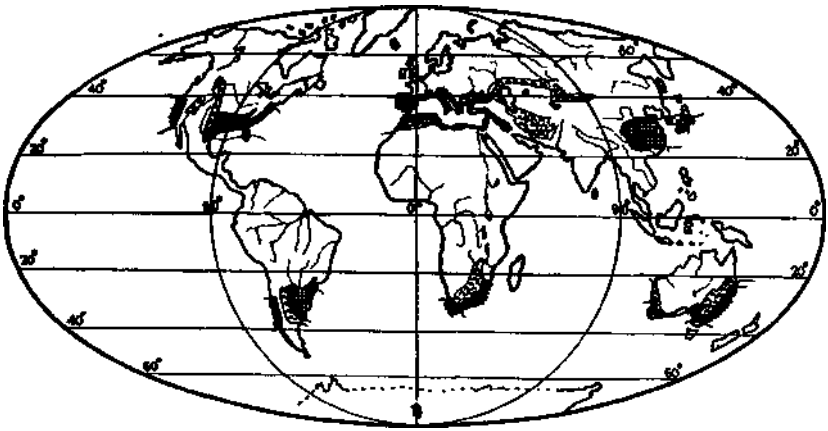
**62. Give a reasoned description of the everyday dress of a Japanese farmer and a woman worker in an Indian tea garden.**

**63. Point out in what ways, spoken or written, languages reflect the environment and occupations of the persons using them.**

**64. "The banana, a native of India and Southern China, is unquestionably the most important of tropical plants." Discuss this with reference to (1) the banana as a staple article of diet in the countries where grown, (2) its ease of cultivation as a factor in perpetuating the inert and careless temperament of natives in the tropics, (3) its comparatively recent entrance into international trade and (4) the influence of banana cultivation on a commercial scale in plantations upon the social and economic life of the peoples of the tropics, especially round the Caribbean Sea. (Note. Exports [1 ton = 50 bunches] in 1,000 tons, Jamaica 400; Honduras, 320; Mexico, 220; Brazil, 215; Colombia, 150; Canaries, 145; rest of world about 700.)**

CHAPTER **IV**

# SUB-TROPICAL REGIONS



**M i Mediterranean** **EftflSl Semi-Arid** **China M M**

## Location.

Latitudes 20°-40°.

*(a)* Mediterranean. West margins of Continents.

(b) China type. East margins of Continents,

(c) Semi-arid type. Interior of Continents.

## MEDITERRANEAN TYPE

## Climate.

MEAN MONTHLY TEMPERATURES (t°F.) AND RAINFALL *(r")*

| PLACE. | Position. | | Jan | Feb. | Mar. | Apr. | May. | June | July | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Palermo *231'* | 38° 6' N. 13° 19' E. | t | 50 5 | 52 2 | 54 7 | 58 6 | 64 0 | 70 7 | 76 3 | 76 6 | 73 4 | 67 3 | 59 4 | 53·4 |
| | | r | 3 0 | 3 3 | 2 8 | 2 6 | 1·3 | 0 6 | 0 3 | 0 6 | 1·5 | 3 9 | 3·9 | 4·5 |
| Valparaiso *135'* | 33° 6' S. 71° 40' W | t | 63 7 | 63 1 | 61·3 | 58 1 | 55 6 | 52·3 | 52·3 | 53·1 | 54·1 | 56·7 | 60 1 | 62·4 |
| | | r | 0 0 | 0 0 | 0 9 | 0 1 | 2 7 | 6·0 | 5 4 | 3 4 | 0 4 | 0·5 | 0·3 | 0·0 |
| San Francisco *207'* | 37° 47' N. 122° 26' W. | t | 49 4 | 51 4 | 53 0 | 54·3 | 55·5 | 57 2 | 57·3 | 57·8 | 59·9 | 58 9 | 55·5 | 50·6 |
| | | r | 4 8 | 3 8 | 3·0 | 1 6 | 0·7 | 0 1 | 0 0 | 0·0 | 0·2 | 1 0 | 2·4 | 4·5 |
| Cape Town *33'* | 33° 56' S 18° 29' E. | t | 69 9 | 70·3 | 68·1 | 63 2 | 59 0 | 55·7 | 54 7 | 55·6 | 57·9 | 61·2 | 64·4 | 67·9 |
| | | r | 0·7 | 0·6 | 0·9 | 1 9 | 3·8 | 4 5 | 3·7 | 3 4 | 2·3 | 1·6 | 1·1 | 0·8 |
| Adelaide *140'* | 34° 57' S. 138° 38' E. | t | 74·2 | 74 0 | 70 0 | 64·0 | 57·7 | 53·4 | 51 5 | 53·8 | 57·0 | 62 0 | 67·0 | 71·0 |
| | | r | 0·7 | 0·7 | 1·0 | 1 8 | 2·8 | 3·1 | 2·7 | 2 5 | 2·0 | 1·7 | 1·2 | 1·0 |

Normally, regions of this type have mild, rainy winters and warm, dry summers and autumns. There is a local saying in San Francisco that overcoats are worn in summer and lilies bloom in December.

Light but seldom killing frosts occur in the cool season in poleward and highland districts. Thunderstorms are rare. In Chile

*Photo< Kindly lent by The Trade Commissioner for Cyprus*

FIG. 61. CHARACTERISTIC AGRICULTURAL SCENE, SARACLON, CYPRUS

Note the shepherd's mixed flock of sheep and goats sheltering under the carob (locust bean) tree; the olive trees on the hillside; and the farm animals and implements of the farmer. Carob beans are used in the preparation of animal feeding stuffs

the people are as frightened by them as by earthquakes. The daily range of temperature, varying from 15° F. to 20° F. is large, and consequently the relative humidity of the air varies considerably during twenty-four hours.

**Plant Life.**

Vegetation can grow almost all the year round, and owing to seasonal and local distribution of precipitation varies from scrubby evergreen forest to scrub and grasslands. Plant life is provided against summer drought and strong sunlight by having thick

leathery leaves (e.g. laurel), bulbous or long roots (e.g. lilies and mimosa or vine and esparto grass respectively), thorns or spikes (e.g. prickly pear), and reduced leaf surface (e.g. acacia). The eucalyptus reduces transpiration by turning its leaves edgeways to the sunlight. The best known characteristic plant is the olive with its large and widely spread root system, thick corky bark, and small leathery, silvery leaves. It grows all the year through, often without irrigation and on otherwise uncultivable hill sides. In the inhabitants' diet olive oil, expressed from the ripe fruits, occupies the same place as butter in ours. The cork oak, sweet chestnut, mulberry (for silk worms), orange and lemon are among the largest and most useful native trees. Spaced farther apart than the trees in our woods they grow best in valleys. Deciduous fruits, like peaches, apricots and tomatoes, which need watering in the dry season, and the vine, are typical perennial crops. Cereals, like wheat and barley, are grown as winter crops, planted at the beginning of the rains and harvested n the following dry season.

**Animal Life.**

In the civilized transitional regions this shows no very marked characteristics. Just as many useful plants can be grown in them, so many animals useful for food and transport can be kept. It should be remembered that in the case of both plants and animals there have been very successful interchanges of native stock between the different regions of the Mediterranean type, e.g. European vines to California, Australia, and South Africa; Australian eucalyptus to Italy.

Horses, cattle, sheep, and pigs are reared where conditions are suitable ; e.g. pigs in the chestnut and cork oak forests, sheep on sparse, well drained, upland pasture, and cattle, raised mainly for meat and not for milk, on better watered lowlands. Asses, mules, and goats are more typical animals. They can stand the heat and dryness of summer better and are less particular about their " feed." In drier parts camels are reared.

**Man.**

Regions of the Mediterranean type have been termed Regions of Increment, because in these parts Nature bountifully rewards man's efforts. Moderate effort is needed to gain a living from

the land. Abundant return for such work makes a settled life possible. Success encourages the cultivator to try new methods and bring about improvements in his crops and herds. Security of life and property becomes a necessity, and more or less settled forms of government arise. Seasonal conditions compel man to

*Photo C. Noble, Esq., M.B.E.* *Kindly lent by The Trade Commissioner for Cyprus*

FIG. (52. DISTILLING " ATTAR OP ROSES," CYPRUS
The preparation of essential oils is a typical industry of the Mediterranean countries

show care and forethought in his work on the land. His struggle for existence, however, is never severe enough to occupy all his working hours. There are hours of leisure for intercourse, exchange of ideas and intellectual development. History tells us how in early days men lived here in organized societies and reached a high degree of civilization ; e.g. Crete, Greece, Carthage, and the Roman Empire. All regions of the Mediterranean type are to-day inhabited by medium or highly civilized peoples, such as the Latin peoples, native in Southern Europe and settled in Central Chile, and the more progressive Teutonic settlers from North Europe in California, Cape Colony, and South-West Australia.

**Food, Clothing, and Shelter.**

Nature provides man with an abundant, varied, and mixed diet, especially in respect of fruit, vegetables and cereals and this fact

is reflected in his physical well-being. Because of high temperatures, cow or goat's milk will not keep good so long as in England, and much is made into cheese, e.g. Parmesan and Gorgonzola (both from Lombardy, Italy).

Climatic conditions are the pleasantest in the world. On a summer's day, although the thermometer records high temperatures, sensible temperatures are fairly low ; summer nights are cool and often misty. In winter, temperatures seldom fall much below freezing point. Under such conditions heavy or close fitting clothing or elaborate heating systems in buildings are not necessary for the safeguarding of bodily comfort, health and energy. Even in winter cloudiness seldom exceeds an average of 5 (tenths of sky). Plenty of sunshine makes outdoor life a pleasure at all seasons. Man needs to conserve his energy at midday, especially in summer, and so has got the " siesta " habit.

While houses differ in their architecture, planning and building materials, according to the taste and wealth of their owners, they show adaptation to weather conditions. A low pent or flat roof is sufficient to carry off the light winter rains. Indoors, ventilation combined with coolness is obtained by wall apertures covered with gratings or lattice work and windows fitted with shutters or blinds such as Venetian blinds ; outdoors, colonnades, cloisters, and balconies provide equally pleasant conditions during the hotter part of the day. Many houses have their buildings arranged so as to shade an interior quadrangle, e.g. Spanish patio, which usually has a fountain in it. Public fountains and open squares are common features of the towns.

**Occupations.**

The cultivation of field, orchard, or garden crops provides a living for the majority of people. Skill in production varies considerably. In the Mediterranean proper, cultivation of fruits and vegetables by men, women and children is typical. Such cultivation is usually confined to the better watered valleys. Sheep and goats are raised on land unsuitable for cultivation or fed on the stubble left on crop land. California, with its less precarious rainfall, more scientific irrigation schemes, and more enterprising and business-like population compares favourably with South Spain or Italy. California and South-West Australia both illustrate the

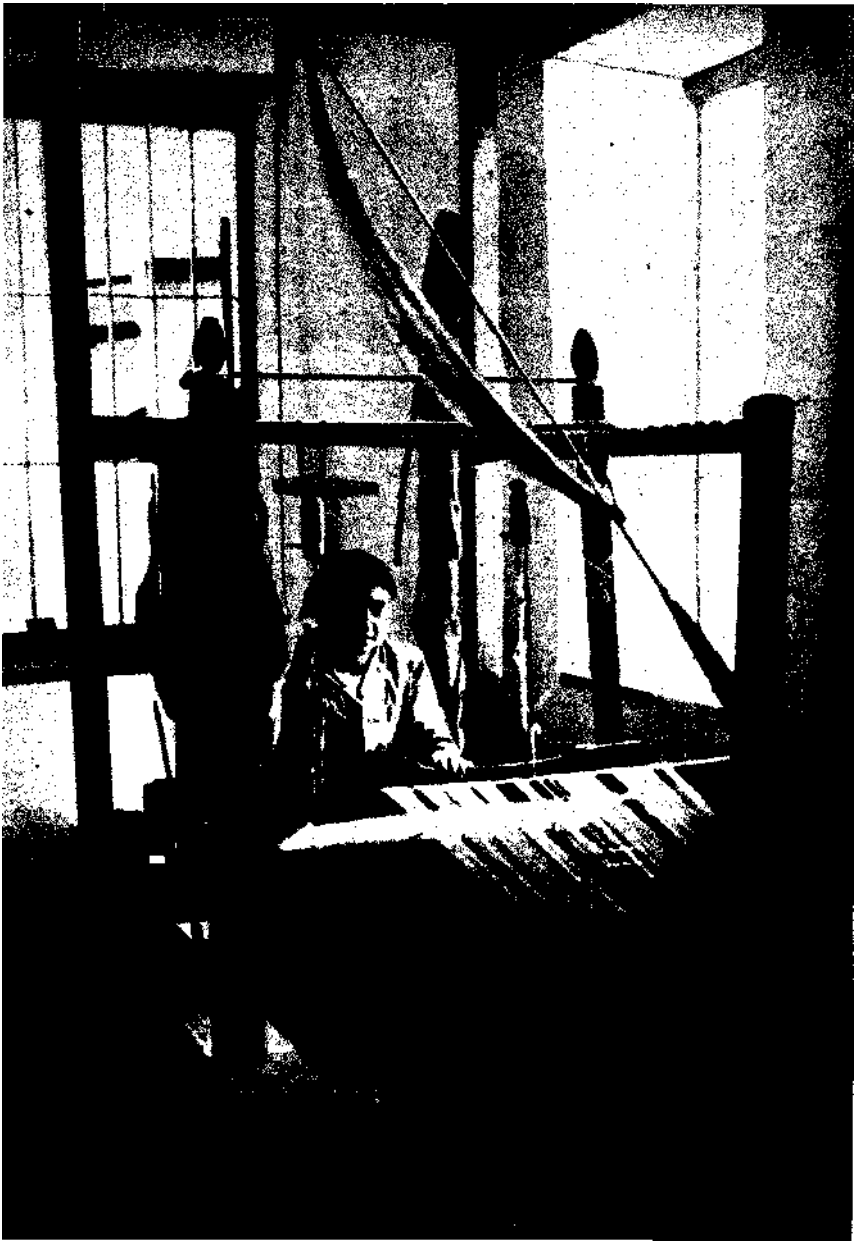


***photo*** *Manyoian* ***Bros,*** ***Kindly lent*** *by The Trade Commissioner for Cyprus*

FrG. 03. WEAVING ON A HAND LOOM, CYPRUS

**This method should be contrasted with that shown on Fig. 104**

three successive stages of progressive agriculture through which a region newly opened up passes. In the newest developed areas cattle, sheep, and goats, are scientifically bred and raised on grass lands which provide good green fodder in spring and natural hay in summer. As the country develops, population increases and large cattle ranches give way to smaller wheat farms, which in their turn are later replaced by yet smaller holdings for fruit growing. In this last stage, in progressive areas, attention is concentrated upon producing grapes, oranges, plums, peaches, apples, pears, olives, figs, apricots, of special excellence or selectiveness, for trade rather than for home use, provided labour, power, and transport are available. Dried fruits like currants (a corruption of Corinth), raisins (French for grapes), and prunes (dried plums) are notable products of regions of the Mediterranean type of climate.

Ancillary industries, such as wine and jam making and drying or canning fruits as well as packing, arise. Specialization leads to dependence upon other regions for food and other necessities of a civilized life. On the other hand, canning processes, by removing the time limit on perishable agricultural produce, has given to these goods access to the world markets. The Californian, South African, and Australian fruit farmer, while more prosperous, is more dependent upon outside sources of supplies than the Spanish or Italian cultivator. Soap (olive oil), gloves (goat skins), corks (cork oak bark), are also made, and silk manufacturing, based on silkworms fed upon mulberry leaves, is carried on. In many areas the silk industry is a part time occupation. Many goods are still made by hand ; e.g. Magnaneries of the Rhone Valley. At some centres modern industrial plants depending upon coal power or electric energy have been established and machine-made factory goods are manufactured, e.g. silk manufactures made from local and imported raw material at Lyons ; textile and engineering industries based upon home and foreign raw materials and hydro-electrical power at Milan. In some cases native industries have attracted others, e.g. Milan now produces goods of artificial as well as real silk, motor-cars and clocks as, as well cutlery. (See Fig. 87.)

Throughout the regions of the Mediterranean type a small number of people are engaged in forest industries such as lumbering for jarrah timber in South-West Australia, stripping cork from the cork oak in Portugal, and the collecting of fruits of forest trees.

*Photo G. Vassiliou Kindly lent by The Trade Commissioner for Cyprus*

FIG. 64. PRIMITIVE OLIVE PRESS, HELIOMILOS, CYPRUS

**The olives are crushed in the mill in the foreground, placed in rush bags and have their oil squeezed out in the press in the background. Note the fig tree in fruit**

Mining is done wherever mineral deposits occur; e.g. oil and gold in California, Carrara marble and sulphur in Italy.

## CHINA TYPE, EAST MARGINS OF CONTINENTS

### Location.

West Indies, Central China, South U.S.A., Uruguay, New South Wales, Natal.

### Climate.

MEAN MONTHLY TEMPERATURES (t°F.) AND RAINFALL (r")

| PLACE. | Position. | | Jan. | Feb | Mar. | Apr. | May. | June | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shanghai S.L. | 31°15'N. 121° 19' E. | *t* | 37 8 | 39-4 | 46 0 | 56 2 | 65-5 | 73 4 | 80 4 | 80-3 | 73-0 | 63 5 | 52-0 | 421 |
| | | *r* | 20 | 2-3 | 35 | 36 | 36 | 73 | 60 | 5-7 | 4-4 | 3-2 | 21 | 14 |
| Buenos Aires *72'* | 34° 37' 8. 58° 22' W. | *t* | 73-6 | 72 5 | 68-7 | 613 | 35 0 | 49 6 | 48 9 | 511 | 55 0 | 59-8 | 65 8 | 70-9 |
| | | *r* | 31 | 2-7 | 44 | 3-5 | 29 | 25 | 2*2 | 2-5 | 30 | 3-5 | 31 | 3-9 |
| Charleston . *4H'* | 32° 47' N. 79° 50' W. | *t* | 49 8 | 31-2 | 57 5 | 64 0 | 721 | 78-1 | 80-6 | 80 0 | 76-2 | 67 0 | 57 8 | 51-0 |
| | | *r* | 31 | 3-3 | 3-4 | 29 | 3-4 | 4-8 | 7-1 | 6-7 | 50 | 36 | 24 | 2-9 |
| Durban *250'* | 29° 58' S 30° 57' E | *t* | 76 3 | 76 8 | 74 9 | 718 | 67 8 | 64 8 | 64-3 | 65 8 | 67 6 | 69-5 | 72 0 | 74 6 |
| | | *r* | 46 | 49 | 5 4 | 3 4 | 20 | 12 | 1-2 | 1-7 | 32 | 51 | 5-0 | 51 |
| Sydney *150'* | 33° 52' S. 151° 11' E. | *t* | 71 6 | 71 0 | 69-2 | 64 5 | 58 6 | 54-3 | 52 3 | 54-8 | 58 3 | 63 4 | 67 0 | 71-2 |
| | | *r* | 36 | 4-3 | 48 | 56 | 5 2 | 4-8 | 4-7 | 30 | 29 | 32 | 28 | 2-9 |

The differences between the Mediterranean and China types of climate are due to the direction of the prevailing winds in relation to land and sea masses. The development of alternating warm, rainy summers with cold, drier winters arises out of the difference in the rate of heating and cooling between land and sea. In winter, over the colder land, pressure is high and anticyclonic conditions prevail. In east marginal regions winds are accordingly equatorward and their continental origin makes them cold and drying in character. In summer low pressure systems develop over the hotter land, and the prevailing winds in eastern coastal districts are poleward and, coming from the sea, are warm and wetting. Barometric depressions develop over the heated lowlands and moving inland bring rain. Summers are sultry and close since most rain falls during the hot season, and in winter short spells of frost occur. Rain occurs at all seasons, but since most cultivated plants become inactive when temperatures fall to about 40° F., plants do not continue growth all the year round. Torrential thunderstorms are

frequent in summer; in winter, drizzles and falls of snow. Winds, usually stronger in summer, are variable. The West Indies are occasionally visited by violent hurricanes, Central China by havoc-working typhoons. From time to time the sultry, enervating "Zonda" blows in Argentina, and crops are injured by the raw, violent, freezing "Norther" in Southern U.S.A., and by the Southerly Burster, bringing its sudden large drop in temperature, in New South Wales.

Most of these regions have been cleared of their natural forests, which change polewards from evergreen broad-leaved trees, allied to those of the tropical forest, to deciduous broad-leaved trees, and, finally, to coniferous trees, with much undergrowth throughout. These forests provide man with timber for constructional and ornamental purposes, particularly bamboo, cedar, camphor, and eucalyptus. The bamboo figures extensively in the domestic economy of the Orient.

The agricultural possibilities of the cleared regions are unequalled, because rainfall comes when most needed by plants. Spring-sown crops, like rice, maize, sugar, cotton, tobacco, that thrive in long wet summers, are grown in Southern U.S.A. and Central China. Where the winters are mild, water supply adequate, and the soil is sufficiently fertile, autumn-sown crops, such as wheat, barley, millet, and oil seeds may be grown as a second crop on the same land. Double cropping is only practised in the very densely peopled parts in China and Japan. Perennials like the mulberry (China) and tea (China, Natal) are typical plants of this region and citrous fruits such as oranges and grape fruit (Natal, Florida) can be grown on the equatorward margins.

**Man.**

His food, clothing, shelter and means of livelihood show adaptation to geographical and social conditions in the different regions.

(i) *In Central China* clothing of native silk or imported cotton is loose fitting and light in weight. The head and the spinal column are usually protected against sunstroke and the stomach against chills. Were every other means of support except bamboo and rice to fail, these two plants would supply the necessaries of existence. Houses, agricultural implements, domestic utensils, furniture are principally fashioned from bamboo. Its green shoots are prized

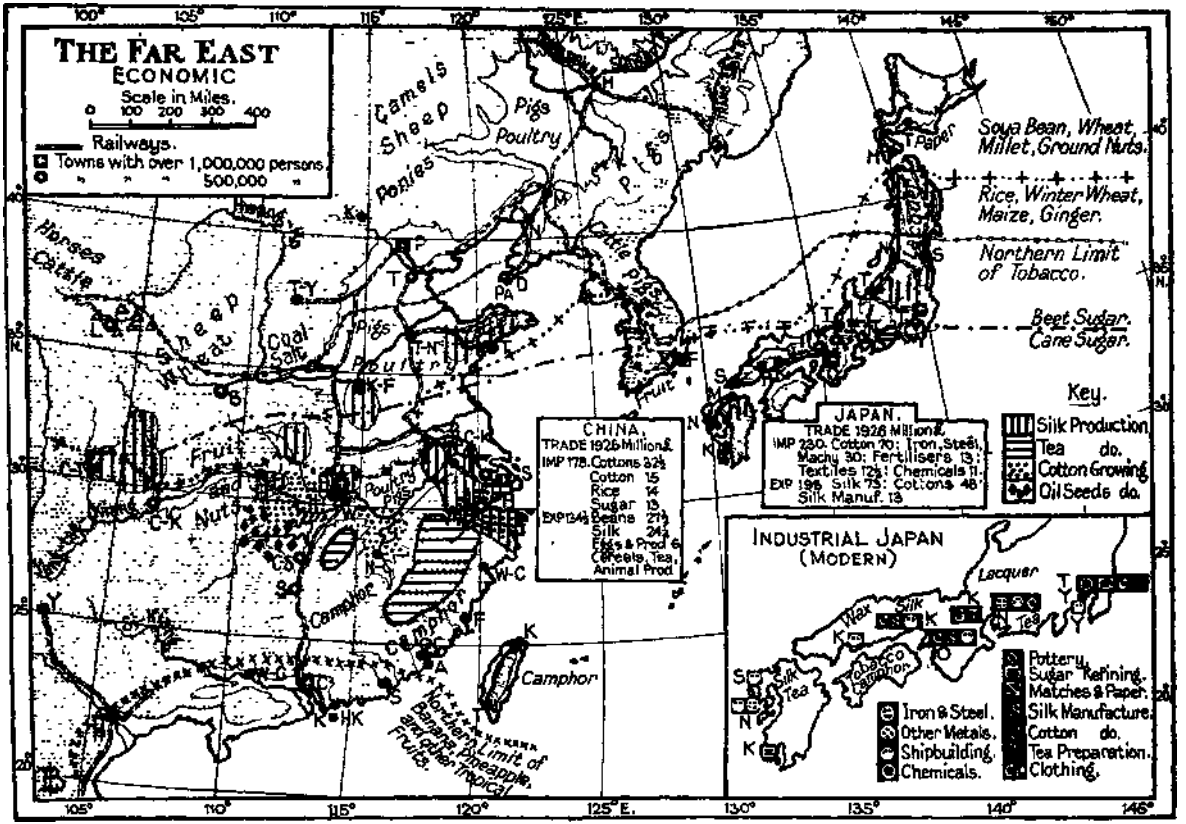



FIG. 65. THE FAR EAST; ECONOMIC DEVELOPMENT

for food. The rice plant is equally useful. Its grain is a nourishing food and forms the basis of a fermented drink (Japanese saki) ; its straw is plaited into hats, baskets, mats, etc., and made into paper.

The peculiar characteristics of swamp rice and its methods of cultivation have made possible the existence of dense population in the lowland area of Central China and Southern Japan. Subject to few insect pests, the plant itself is quick growing, and two or three crops can be harvested in a year. Moreover, the yield per acre of a single crop compares favourably with that of wheat. The harder rice grains also keep well under the climatic conditions of monsoon lands. The necessary irrigation of the fields helps to preserve the fertility of the soil not only by the deposition of silt, but also by making possible the deep working of the soil even during the dry season. Thus the soil of land devoted to rice as compared with wheat cultivation suffers less exhaustion and makes the use of fertilizers less necessary. Sufficient organic fertilizer is available on the Chinese rice-farmer's small holding, although cattle are not kept. What would otherwise be pasture land is thus available for intensive arable cultivation. Although the Chinese supplement their normal diet of rice with fish, poultry, beans and similar proteid-providing foodstuffs, it is not well balanced and contains too large a proportion of carbohydrates. To satisfy hunger large quantities of starchy rice have to be consumed, and though less liable than the natives of the tropics to diseases such as beri-beri, many Chinese suffer from protruding abdomens.

*Occupations.* Although the humid summer heat tends to sap man's energy, its beneficial effect upon plant growth has spurred him on to use every available bit of ground. By intensive culture the land supports a dense population. Hill sides are terraced and few cattle are kept, because one cow needs four to five times as much land for its support as a human being. Hence the Chinese farmers keep pigs and chickens, which need no pasture and eat refuse. A holding of two or three acres made to produce two or three crops a year, often by irrigation and manuring, suffices to support a family of six or seven persons. Flooded paddy fields are often stocked with fish, and silk worms are reared on the leaves of mulberry bushes grown on the embankments. Men, women, and children all work on their garden-like farms, whence come

most of the food they eat, clothes they wear, the dwellings they live in, and the utensils and implements they use. Such support furnished by Nature has yielded that surplus upon which an advancing civilization could be based and this region possessed a civilization of a high order when England was a land of barbarism.

Developed from very ancient indigenous forms of drawings of objects the unique literary language of China, understood at sight but not by hearing alone, serves as a written esperanto between the millions of people inhabiting this vast country. It contains among its word picture characters many *IMAGES* which depict economic and social conditions in China both past and present.

A few examples of Chinese script (modern form in block capitals, very ancient form in italics) are given in Fig. 66, and their interpretation is given below.

*T'lEN* is a simple but adequate drawing of the Chinese farmer's carefully embanked fields in which he cultivates his quick-growing *MI,* a picture of the all-important sprouting plant, rice, with its ears of grain. *SHEN,* human body, with its protruding abdomen, clearly shows one of the consequences of living almost exclusively on a diet of rice. Equally clear and significant is the word picture *SANG,* mulberry tree, which shows the tree, *MU,* whose leaves are picked by the hands *Y U* of all members of the farmer's family for feeding the silkworm grubs. The typical farmer's dwelling is depicted in *KIA,* home, which is made up of *YEN,* a roof, symbolizing the first floor living rooms, underneath which the *SHI,* pigs, are usually kept. This state of affairs emphasizes the fact that in a densely populated country every possible piece of cultivable ground is cropped, and land needed for building, roads, and other purposes, including pasture land which produces comparatively less foodstuffs than arable land, is reduced to a minimum. Both *MEI,* beautiful, made up of *TA,* great, and *YANG,* ram, and *TSIAO,* to roast, giving a picture of *CHUEI,* a bird over *HUO,* the flames of a fire, emphasize the general exclusion of pasture land from the agricultural economy of Chinese cultivation, and consequently the lack of butcher's meat in the everyday diet of the ordinary people. We associate " roast " with beef, the Chinese with poultry, while to the partakers of infrequent feasts at religious and other festivals, fat mutton, even more prized than beef or pork, is a beautiful sight and a welcome treat. On such occasions the farmer host would need

to supplement his normal fare of home produce by purchasing foodstuffs at the local market, *HO SHIH,* the place where the weighing out of goods marketed against cash payments takes place. *SHIH* is easily recognizable as a pair of balance scales, while *HO* splits up into three elements—*JEN,* an artless picture of a man, *PEI,* which means money and is actually a simple picture of the kind of shells formerly used as currency, and the indicator *CH'I,* which here indicates not the numeral seven, the greatest united, i.e. indivisible, digit, but the abstract idea of counting by using the abacus with its seven columns. Thus *HO* has come to mean goods obtained in return for currency and not for other goods.

The people are economical to a degree, but their environment does not continually encourage inventiveness. Herein lies one reason why native Chinese manufactures and industries are confined to a few localities whose products possess special excellence, e.g. Nanking cotton goods and Bohea tea. This, too, partly accounts for the slower progress made by the yellow races of China and Japan than by the Western white races. Japan has only within living memory attained a civilization comparable with our own. China is only yet awakening. Contact with Western civilization has only accelerated rather than brought about these changes. Originally sprung from the same racial stock as the Chinese, it is possible that the Japanese have developed into a more energetic, progressive and venturesome people, partly because the necessary migrations from the mainland had a selective effect upon the type of settler, and partly because their compact island home has offered better security and opportunities for economic and cultural development. Somewhat similar causes are traceable in the racial development of our own people prior to the Industrial Revolution of the late eighteenth century. An agrarian and industrial revolution is only now taking place in Japan. Since 1911, when China became a republic, efforts have been made to improve the social and political systems, to curtail the conservative influence of Confucianism, and to bridge the gap existing between the universal written literary language and its many variant provincial pronunciations by the introduction of a new phonetic form of writing.

(ii) *South-Eastern U.S.A., Uruguay, Argentina, Natal, South Queensland, New South Wales.* All these regions of the China type **are** in possession of the white races, although the suitability of the

FIG. 66. EXAMPLES OF CHINESE SCRIPT
Illustrating Social and Economic Conditions in China

climate for people of European stock is in dispute. Negro labour is still employed on the cotton, tobacco, and fruit plantations in U.S.A. and Natal. The employment of indented Chinese labour in South Africa and Oriental and Kanaka labour in Australia is now illegal. Both areas enforce a stringent colour bar against Orientals.

*By courtesy of the South African Railways and Harbour Hoard*

FIG. 67. PICKING COTTON, E. TRANSVAAL, SOUTH AFRICA

Because of the risk of damaging the bushes and the drawback of collecting leaves and twigs with the cotton, machinery cannot be used for picking. This operation needing care and deftness of hand is usually done by women and children. Cheap labour is essential. The native overseer has copied European dress

In all these regions participation in or supervision of agriculture upon Western lines is the chief occupation of the inhabitants. The whites have retained, with modifications to suit climatic and social conditions, the habits, customs, and standard of living of Western civilization. In these newly settled lands to which voluntary and unassisted emigration has taken place, individuals of the pioneer type tend to predominate over people of an artistic and intellectual nature among the settlers. Differences of climate and of opportunities in the new lands may in course of time tend to the modification of the physical, mental, or temperamental characteristics as possessed by the original immigrants, e.g. keener eyesight,

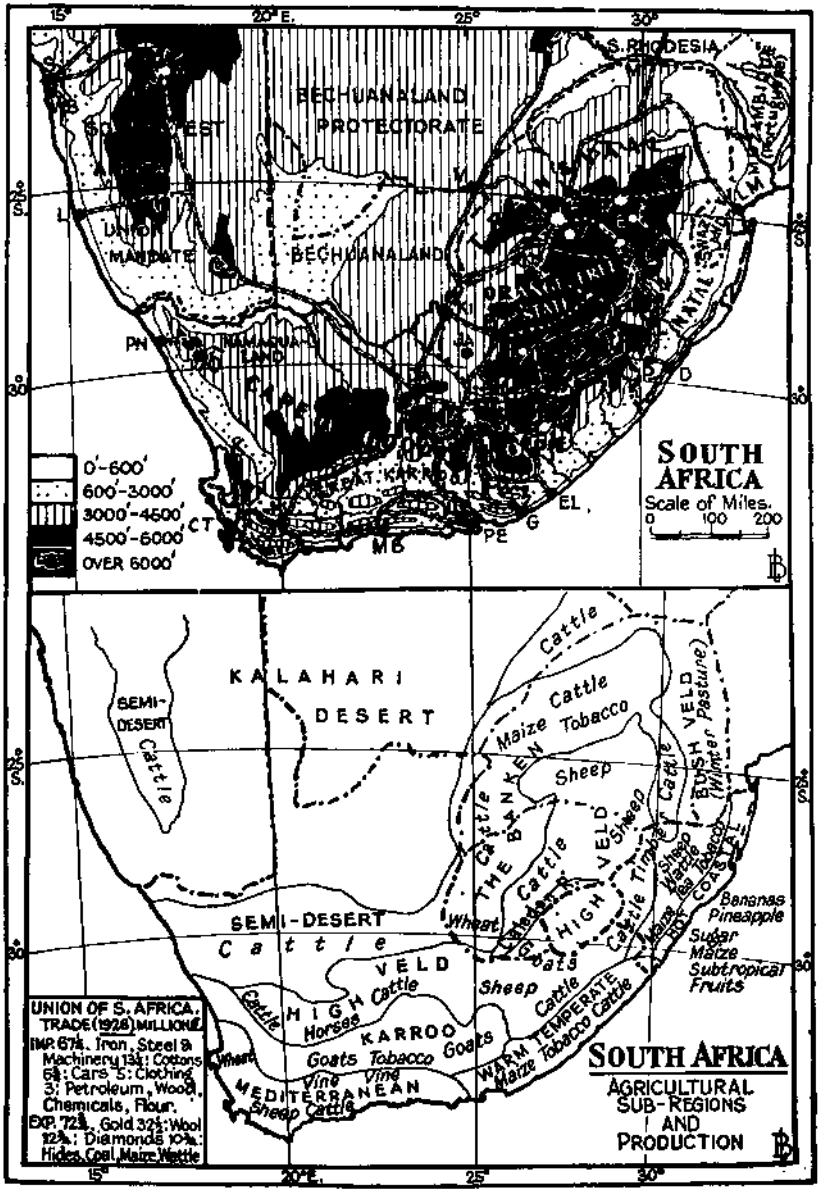



FIG 68. S. AFRICA: PHYSICAL, POLITICAL, AND ECONOMIC, EXCLUDING MINERAL RESOURCES

1936. Imports, 86: Iron, steel, machinery 23·4, cottons, woollens, clothing 11·6, cars 7·6, wood products 3·1, oils 2·8
Exports 114: Gold 81·8, wool 9·9, hides and skins 1·9, bark, coal

more muscular physique, more materialistic but less mature outlook, and more highly strung temperament. In Argentina and Uruguay the people of South European stock have adapted themselves more readily to their new environment.

## SEMI-ARID SUB-TROPICAL TYPE. INTERIOR OF CONTINENTS

### Location.

The positions of sub-regions of this type are given on the maps showing natural regions.

### Climate.

**MEAN MONTHLY TEMPERATURES (*t*° F.) AND RAINFALL (r*)**

| PLACE. | Position. 1 | | Jan. | Feb. | Mar. | Apr. | May. | June.l | July | Aug. | Sep | Oct. | Nov | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bahia Blanca *25'* | 38° 45' S. 62° 25' W | *t* *r* | 73 8 1-7 | 718 2-1 | 67 0 2-7 | 59-5 2 1 | 52 7 1-2 | 471 11 | 46-6 10 | 48 9 1 1 | 54 0 1-3 | 59-0 2*2 | 65 5 2*2 | 71-1 1-9 |
| Bourke *460'* | 30°31'S. 145° 58' E. | *t* *r* | 84 2 2 0 | 82-6 19 | 77 5 16 | 68 5 1-4 | 58 5 1 1 | 54-1 10 | 51 4 0-9 | 560 09 | 62-8 10 | 70 0 1 1 | 75-7 13 | 82 2 1 1 |
| Christchurch . *25'* | 43° 30' S. 172° 30' E. | *t* *r* | 61-7 10 | 60 8 1 1 | 58 5 18 | 531 1-4 | 48 4 15 | 450 10 | 42-4 2-0 | 43 9 30 | 48-6 40 | 52-7 1-5 | 56 2 1-2 | 60-8 10 |
| Taskent *1,610'* | 41° 12' N. 68° 52' E. | *t* *r* | 29 7 18 | 34 5 1-4 | 45 9 26 | 57-9 2 6 | 67-8 1 1 | 76-5 05 | 80 2 0 1 | 763 01 | 66-4 0-2 | 53-8 1 1 | 44 6 1-4 | 36 5 1-7 |
| Kimberley *4,042'* | 29° O'S. 24° 40' E. | *t* *r* | 76-2 25 | 74 8 28 | 70 8 29 | 63-8 1 4 | 55 9 0-8 | 50-3 02 | 50-7 0-3 | 55-2 0-2 | 61 8 06 | 67-4 1 1 | 710 1-5 | 75-1 19 |
| Denver *5,272'* | 39° 48' N. 105° O'W | *t* *r* | 30 0 04 | 31 6 05 | 390 1 0 | 47 4 2 1 | 56-7 2-4 | 67-2 1-3 | 72-2 18 | 70 9 1-4 | 62-4 10 | 50-5 1-0 | 39-2 06 | 31-6 0-7 |

Since regions of this type are found in the highland and lowland interiors of continents in the middle latitudes, the range of temperatures, varying according to the distance from the sea and to altitude, is greater than in Mediterranean and Monsoon regions. Their rainfall, which occurs mostly in summer, because of the development over land masses of winter high pressure and summer low pressure systems, varies in amount according to the distance from the sea and the relief of the land lying across the paths of the rain-bearing winds. About 25 per cent of the year's precipitation **falls** in winter, sometimes in the form of snow. This is sufficient to keep up the nutritive value of grasses.

**Vegetation.**

Natural vegetation varies from rich grasses to poor grass and scrub. The undulating Pampas with their moderate and well distributed rain and humid, moderately warm, growing season have a perfect grassland climate. Thick grass, bright in spring with flowering plants like verbena and vetches, clothes the depressions, dense tufts of feathery pampas grass cover the ridges. Shorter stiff grass intermingled with acacia bushes and flowers, e.g. marigolds, clover, lobelia, is the characteristic vegetation of the South African Veld ; the scattered mulga (acacia) and eucalyptus bushes are **a** feature of the Australian Downs country. In North America, Central Mongolia, Turkestan and those parts of Iran fringing the desert of Lut, good grassland is scarce except along river courses and arid semi-desert rolling steppe of scattered tufts of coarser grass and scrub, e.g. mesquit, sage bush and cactus, is found.

**Animal Life.**

Both wild and domesticated animal life shows adaptation to its surroundings. Grass eaters, e.g. the North American antelopes and bison, wilde beeste of South Africa, Bactrian camels of Mongolia, and the fat-tailed sheep and goats of Iran, flesh-eating beasts of prey, like the South American puma, the African lion, burrowing animals, e.g. viscachas (Pampas), wombat (Downs), marmot (Asia), and running birds, such as the South African ostrich, the South American rhea, the Australian emu, the Prairie hen, and bustards still exist in a wild state in the less accessible districts or in Government reserves. Australia, and to some extent South America, show the effect of isolation upon their animal equipment, e.g. pouch-bearing, vegetarian kangaroo of the former continent. Horses, sheep, horned cattle, camels, pigs, and fowls have been introduced successfully and profitably into all the sub-tropical grassland and semi-desert regions. Other foreign animals, like the rabbit and hare, have now become serious pests rather than the anticipated boon in Australia and South America respectively.

**Man.**

Man is mainly occupied in the domestication and breeding of animals. The mode of living followed by the people of any region

largely depends upon natural conditions and the degree of civilization of the pastoralist. A comparison of the working methods and standard of living of the Kirghiz horseman or Mongolian shepherd, and the American cowboy or the Australian stockman, illustrates this.

In Central Mongolia and Turkestan, where much land is not waste but unfit for permanent pasturage, the only practicable life **for** some two or three million people is nomadism. One family needs many animals for its support. In poorer parts 10 acres of pasture only yields enough fodder for one sheep. The larger the family unit, the more easily can the animals be tended and protected, and the better can a family group withstand mishap to the animals upon whose well-being its own existence almost entirely depends. Polygamy and the patriarchal organization of society are the natural outgrowth of such a geographical setting. In summer the flocks and herds are driven through the highland pastures, and a return to the store of natural hay in the valleys and lowlands is made in winter. The length of stay in a district depends upon the quantity of fodder and water supply, and the movement of groups is fairly well defined. Even the method of pasturing, horses first, then cattle and camels, followed by the sheep and goats, is planned to make the most of the herbage. The flocks and herds supply most of their owners' necessities of life.

*Diet.* Vegetables are almost unknown. Normal climatic conditions and the constant shifting of encampments make cultivation impracticable. Milk is the staple food, and when drunk in large quantities is more healthful taken sour than fresh. Some milk is made into butter for immediate use and into cheese for future consumption. Less meat than might be supposed is eaten because surplus animals are few. Wastage of stock due to diseases, drought, storms, and beasts of prey, and decrease in numbers due to bartering animals for groceries, knives, and cloth have to be made good. Hand-made wool or hair rugs are a valuable means of exchange.

*Clothing and Shelter.* Both sexes usually dress in thick, padded, gown-like garments, made of wool, camel hair, or leather obtained from their animals. Extra long sleeves serve as gloves. Such outer clothing is needed for protection against large daily and seasonal changes of weather. High leather boots are needed for walking in wet grass among the cattle.

*From a photograph kindly lent by* *Miss Ella* **C.** *Sykes, F.R.G.S.*

FIG. 09. DRESS OF THE KIRGHIZ AND FRAMEWORK OF AN " AKOI "

The "Yurts," or circular summer tent, covered with felt or leather, has expanding lattice-work sides, to which is coupled a conical roof. The sides can easily be closed when a summer thunderstorm occurs suddenly, and as easily opened again in the sunshine. This comfortable, commodious, durable dwelling

*From a photojraph kindly lent by* *Miss Ella C. Sykes, F.R.G.8.*

FIG. 70. KIRGHIZ LOADING A YAK

The Yak in the foreground, like the pony in the background, is equipped for riding. Note the nature of the country-side and the "akoi"

can be put up or taken down in half an hour and is easily moved from place to place. Furniture and utensils are as portable and indestructible as possible, such as rugs, very little crockery or heavy furniture, and leather bottles, bags, and buckets. Stoves are counted too heavy to carry about, and a minimum of cooking is done over open fires of hay, grass, and dung. The patriarchal family groups of herdsmen sometimes prefer to winter in riverside encampments of reed-thatched huts made of plaited willows and mud. The horse is important alike for riding and for transport.

The white ranchers and stockmen of the Americas, South Africa, and Australia, have not reverted to pastoral habits, though they have returned to a pastoral life. They work from a fixed settlement

as centre and move their animals from one pasture to another within the limits of the owners' large enclosed estates. Being weak, defenceless and stupid, sheep need more care than cattle which can shift for themselves. Herders with guns and sheep dogs protect the flocks, which are often put in corrals at night. Supplies

*By kind permission of* *The High Commissioner for Australia*

FIG. 71. SHEEP RUN AND SHEARING SHED, WESTERN AUSTRALIA

are sent to these men at times and places which have been pre-arranged. Some Australian sheep farms occupy 10,000 acres, or one-ninth of the area of England's smallest county. A 7,000 acre alfalfa ranch on the Pampas will easily and safely carry 3,000 cattle. Drier grasslands like the Australian Downs, South Africa Veld and Patagonia are ideal for sheep runs. On damp pastures sheep suffer from foot-rot. In drier parts the grass is usually finer and shorter in growth and so seed heads do not get entangled in the sheep's wool and reduce its market value. The sheep's fleece degenerates in hotter parts, and in Australia this tendency is overcome by the constant import of fresh breeding stock from England.

Cattle thrive on the larger and more luxuriant grass of the better

watered and warmer lands, e.g. Uruguay, Rhodesia. In times of scarcity natural fodder is supplemented and artesian wells and wind pumps add to the water supply needed by the stock. Unless their meat can be marketed, cattle yield only hides and tallow, of relatively less value than the non-perishable fleeces, skins and tallow of sheep.

*By kind permission of* ***The High Commissioner for Australia, New South Wales***

FIG. 72. SHEEP SHEARING BY MACHINERY, NEW SOUTH WALES, AUSTRALIA

Access to markets is more important in the case of cattle than of sheep raising. Breeding and rearing of animals is conducted like a business concern. By selection, scientific breeding and attention, with these pastoralists the cow has become little more than a beef factory, the sheep a provider of wool and mutton. Beef cattle, after spending a year or two on the grasslands, are sent in U.S.A. to the maize belt, in Argentina to the alfalfa belt, to be fattened for a month or two prior to being slaughtered.

The stock raiser's food, clothing, implements, and even wooden or corrugated iron dwellings, **are** mostly bought from the outside

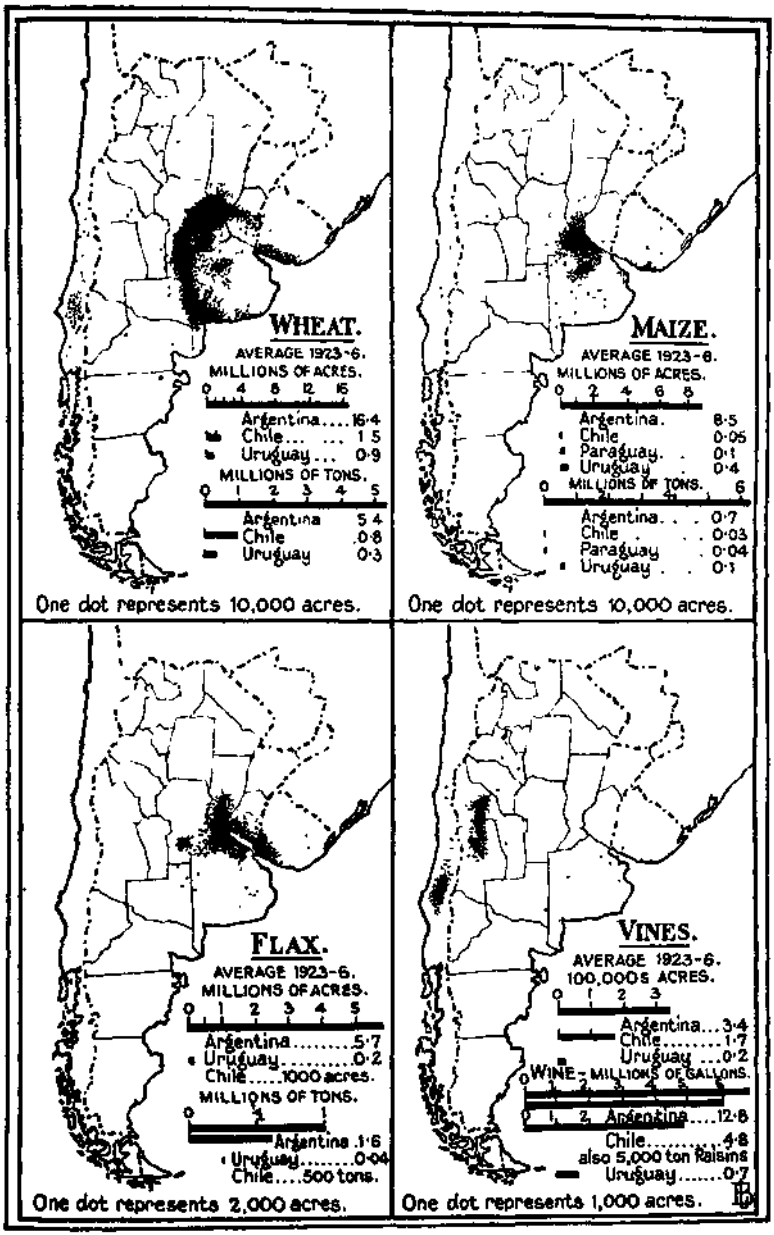



FIG. 73. DISTRIBUTION OF PRINCIPAL CROPS IN EXTRA-TROPICAL S. AMERICA

world out of the proceeds from the sale of their animals or the products of their herds and flocks. The maintenance of a standard of life much like our own has been made possible by improvements in communications and transport. Railways mitigate isolation, serve as avenues to markets, and make readily available supplies for man and beast from other regions.

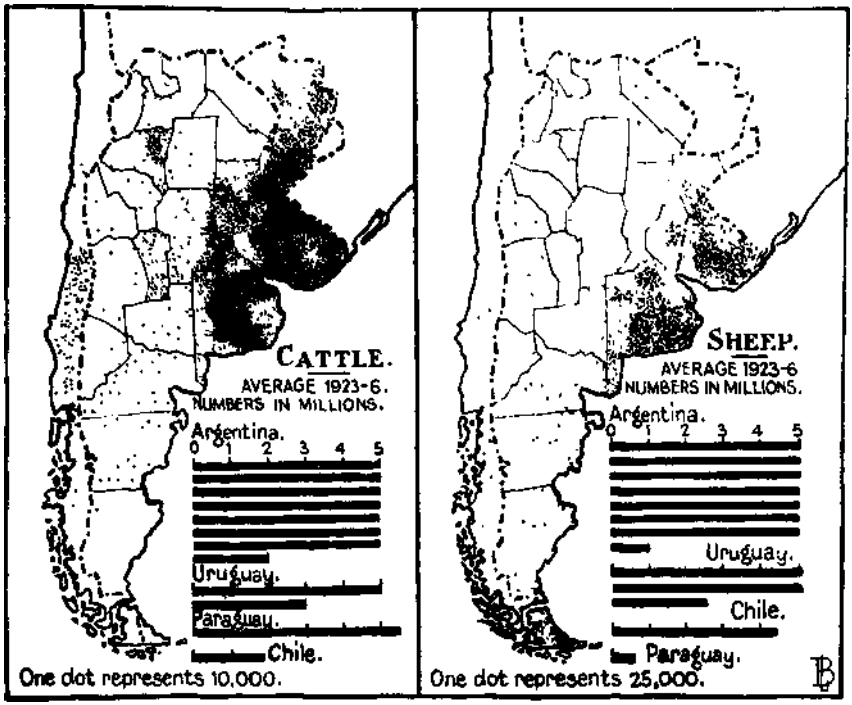



Fig. 74. DISTRIBUTION OF SHEEP AND CATTLE IN EXTRA-TROPICAL S. AMERICA

## Other Occupations.

*(a) Agricultural.* In all these regions of the sub-tropical grassland and semi-arid type agriculture is replacing stock raising in the more favoured districts. Chinese cultivators are penetrating South Mongolia ; estancias or arable farms are occupying the canados or better watered depressions on the Pampas. In South Africa, Australia, and North America, the richer lands are coming under the plough and producing cereals such as maize, wheat, and barley.

In some of the drier parts settled agricultural pursuits have been made possible by irrigation from artesian or ordinary wells and rivers, e.g. Denver, Mendoza, Mildura, and Bokhara. Cereals, Mediterranean fruits and cotton are also grown. In other regions, e.g. Texas, Arizona, Idaho, crops are raised by "dry farming." The chief points of this kind of tillage are deep ploughing to increase the rate and depth of permeation by precipitation, frequent tillage of the top layer of the soil to reduce or prevent evaporation, clean fallowing of the land from time to time to allow the water of several seasons to accumulate, and the custom of sowing seeds thinly and planting them deeply to prevent overtaxing the soil moisture.

*(b) Industrial.* Industries are mainly connected with pastoral occupations. Hand-made woollen rugs, carpets, and leather goods are produced in the Old World grassland regions, e.g. Bokhara. The more progressive pastoral regions used to be more concerned in the production of wool, tanned hides, tallow, bone, beef extracts and "jerked" beef, which is specially suitable for food in hot wet countries. Since the introduction of meat packing and refrigeration about 1880-90, animal industries, especially in the Southern hemisphere, have changed in character. In most areas attention is now centred upon providing frozen meat, cheese, butter and condensed milk, for manufacturing peoples. Australia, owing to its precarious pasture, continues to produce wool rather than mutton. Meat packing, refrigerating, and wool washing plants have been established in or near all the progressive pastoral regions at convenient collecting and distributing centres, e.g. Chicago, Kansas City, Buenos Aires, Fray Bentos, Wellington, N.Z., Melbourne, Sydney.

**World Influence.**

In the past the nomads of the sub-tropical grasslands of the Old World have from time to time invaded and settled down in more favoured neighbouring lands, e.g. the Magyars in Hungary, Turks in Asia Minor, the Rajputs in Northern India, Mongols in China, and Bechers in North Africa. It is thought that periodic changes in climatic conditions at long intervals, or recurrent over-population, caused these migrations which greatly influenced the history and development of Eurasia and North Africa.

To-day the grasslands of the New World, Africa and Australasia,

help to feed and clothe millions of people besides their own inhabitants. Articles such as Australian frozen mutton, Fray Bentos " bully " beef, Libby's and other brands of evaporated and condensed milk, Bovril, cornflour (maize flour) for blancmanges, many of our articles of attire, our rugs, carpets, bedding, which contain wool (merino especially), horse hair, camel hair, and leather, serve to remind us of our dependence upon these far off lands.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. How comes it about that Mediterranean lands have warm, wet winters and hot, dry summers ?

2. Account for the marked seasonal variations of temperatures and rainfalls of regions of the China type.

3. Summarize the principal consequences of the marked seasonal rhythm of temperature and rainfall on *(a)* agricultural activities ; (6) human health and energy of the people in subtropical regions. Examine your climatic, vegetation and population maps and find out whether the variations of temperature or rainfall are the more important.

4. The actual temperature over most of the Union of South Africa is at least 10° F. lower than those shown on the isotherm maps in your atlas. Account for this difference.

5. Find the latitudes of Madrid and Pekin, which have the same average temperature for July. Would it feel as hot in both places ? Give reasons, with explanations for your answer.

6. The Riviera towns are popular winter resorts. Why?

7. " The olive and vine are typical plants of regions having a Mediterranean climate." Give evidence to prove the truth of this statement.

8. In their development new lands of the Mediterranean type pass through three successive stages. What are they ? Illustrate your answer by referring to the stages reached in California (U.S.A.) and Victoria (Australia).

9. The Old Testament, and particularly the Book of Psalms, contains many metaphors suggested by the geographical condition of Palestine. Using the headings in Fig. 1, make a list of the

outstanding references to these topics and show to what extent they demonstrate a direct response to environment.

10. "The Mediterranean lands of the Old World and the monsoon lands of the Orient have been the cradles of civilization."

*By courtesy of the* *South African Railways and Harbour Board*

FIG. 75. LOADING APPLES FOR EXPORT, DE DOORNS, CAPE COLONY, SOUTH AFRICA

Insulated railway vans and cold storage accommodation on ships have made possible the export trade in fresh fruit from the Cape to Europe. Note the mule teams, a familiar sight in lands having a Mediterranean type of climate

Discuss this statement and explain why, in the latter regions, civilization developed to a point and then became stagnant.

11. " Nearly half the people in the world live between latitudes 20° and 40°, mostly on the west side of continental land masses." Verify this fact and suggest reasons why it is so.

12. Compare the density of population in the warm monsoon regions of U.S.A. and China, and account for any difference you observe.

13. " Fruits in many forms are characteristic products of Mediterranean lands." How does climate specially favour fruit growing ? Make a list of such fruits, classifying them as fresh, dried, tinned, etc., which can be bought in Britain.

14. The world production of wine for 1934-5, in millions of gallons, was: France 836, Italy 528, Spain 352, Algeria 398, Rest of North Africa 85, Greece 101 (also 213,000 tons of currants), Argentina 125, Germany 83, Hungary 57, Bulgaria 44, Roumania 23, Switzerland 22, Australia 15 (South Australia 11, Victoria 3, New South

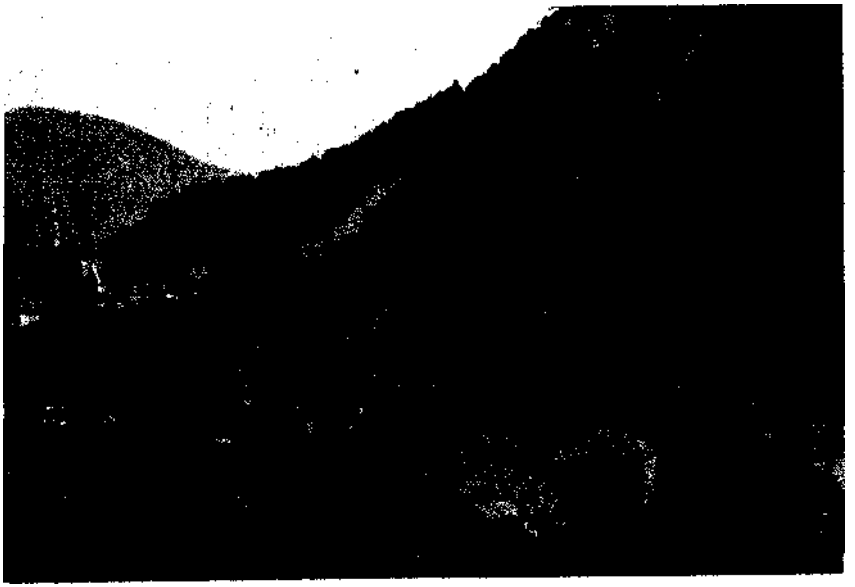


*Photo kindly lent by* *P.L.M. Railway, France*

FIG. 76. MONTHIER, JURA, FRANCE

Note the contoured vineyards in the foreground and the bush fruit and other forms of cultivation on the talus slope beneath the limestone crags. In which direction does the vineyard face? Why?

Wales 1), Portugal 13, Czechoslovakia 13, Uruguay 11, Cape Colony 29 (grapes 40,000 tons), and California now none (wine grapes 468,000, table grapes 324,000, raisins 1,270,000 tons). Draw bar graphs to show the amount of wine produced in the countries named. Scale 1 cm. for 100,000,000 gallons. Find the proportion by percentage produced by the different continents. Is all the wine produced in regions of the Mediterranean type? Point out the exceptions and explain why vine culture is possible in them. Previous to 1919, California produced 31,000,000 gallons of wine annually; why does it not do so now? Find out for what household purposes "argols," by-products of the wine industry, are used."

15. " The range of the vine as a wine plant is fixed by climatic and soil conditions, the lie of the land, and commercial and other considerations/' Discuss this statement and give examples of the influence of each of these factors.

16. With the exception of California, U.S.A., the production of

*By kind permission of* *The High Commissioner for Australia*

FIG. 77/ PICKING CURRANTS IN THE VINEYARDS, MILDURA, VICTORIA, AUSTRALIA

**The** grapes **are** dipped in the dipping trays before being dried

olive oil is confined mainly to lands round the Mediterranean Sea. The output in millions of gallons in 1936 was: Spain 144, Italy 65, Greece 19, Algeria 16, Portugal 13, France 2, Yugo-Slavia, small quantity. Draw a map of the Mediterranean region, and name the countries. Shade the areas having less than 25 in. rainfall per annum. These are the chief areas devoted to olives. Insert bars (on a suitable scale) representing the output of olive oil for the countries marked.

17. " Olive oil is of great importance in those lands which are not able to produce butter." Amplify and explain this statement.

18. In one of the reference books find out what proportion of the total area and of the forest area of Portugal is occupied by cork oaks. Calculate the yield and value of raw cork per acre and find out why it is profitable to devote to cork production so large an area of land fit for other purposes.

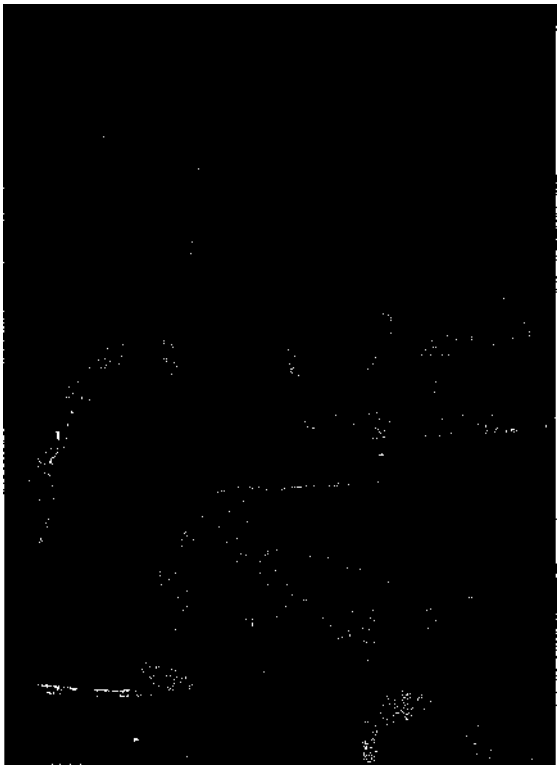


FIG. 78. WINE MAKING WITH A PRIMITIVE PRESS, ITALY

19. "The Plain of Lombardy has undergone an industrial revolution during the last fifty years." To what extent is this development due to geographical factors?

20. *In The Statesman's Year Book,* in the section dealing with production and industry of Italy, look up the acreage devoted to cereals, olives, vines, orchard fruits, other crops, and forests. Express the different acreages as percentages of the total area of Italy. Make a note of the districts famous for macaroni, oranges, olive oil, lemons and chestnuts.

21. "In the value of its agricultural products and manufactures, California ranks third and eighth respectively among the states of U.S.A. The people of this state own twice as many motor-cars and are twice as wealthy as the average American citizen." How do these facts justify Mediterranean regions being called "Regions of Increment"?

22. It is estimated that over £24,000,000 was spent on film

production in California in 1936. How has the climate of this state favoured the growth here of the largest film-making industry in the world ?

23. In Australia the South-east corner is the most densely peopled and its ports handle two-thirds of Australia's shipping tonnage. How far do these facts reflect geographical conditions ?

24. Would you expect grazing to be an important occupation in regions of the Mediterranean type ? Give your reasons and say which of man's useful animals are specially fitted to live in such regions.

25. NUMBERS OF SHEEP, 1935

**In millions, by countries, grouped according to the type of region in which the majority of their sheep are reared**

| Mainly semi-arid areas | | Partly in semi-arid areas | | Other regions | |
|---|---|---|---|---|---|
| Australia | 113 | United States | 52 | New Zealand | 30 |
| Russia* | 50 | Argentina | 39 | United Kingdom | 25 |
| Union of S. Africa | 35 | Canada | 3 | Uruguay | 20 |
| Balkan States | 31 | | | France | 10 |
| India | 25 | | | Germany | 6 |
| Spain | 17 | | | British E. Africa | 4 |
| Turkey | 10 | Estimated Total of the World | | | 700 |
| Italy | 10 | | | | |
| Chile | 6 | * Includes goats. | | | |
| Algeria | 5 | | | | |
| Mexico | 4 | | | | |
| Portugal | 3 | | | | |
| Egypt | 2 | | | | |

Draw a map to show the world distribution of sheep as given in the above table.

26. In what kind of regions are the bulk of the world's sheep reared ? Why should this be so ?

27. " Sheep are raised for their wool, their flesh, and in certain regions for their milk." For which of these purposes are sheep reared in Spain, Italy, Persia, Australia, New Zealand, and U.S.A. ?

28. " Sheep rearing for wool is an extensive type of farming which tends to disappear as population increases and land becomes dearer." Explain why this should be so and point out any notable exceptions, giving your reasons.

29. Look up pre-war statistics for Australia, Italy, Uruguay, New Zealand, France, and compare them with those given above, and account **for** any changes you may find.

30. " In remote areas sheep rearing is much more profitable than arable farming or cattle ranching." Say why this is so.

321. ESTIMATED WOOL* PRODUCTION IN MILLIONS OF LB. 1934-5 SEASON, OR THE LATEST AVAILABLE

| | | | |
|---|---|---|---|
| Australia | 900 | Continental Europe | 423 |
| New Zealand | 287 | Argentina | 316 |
| South Africa | 227 | Uruguay | 101 |
| United Kingdom | 99 | Chile | 22 |
| India | 90 | Rest of South America | 71 |
| Canada | 18 | U.S.A. and Mexico | 410 |
| Falkland Islands | 4 | Central America | 9 |
| | | Rest of Asia | 197 |
| Total, Empire | 1,625 | Rest of Africa | 104 |
| | | Total foreign production | 1,787 |

* Shorn and skin wool only; computed on a "greasy" basis.

Total World Production 3,412.

What percentage of the world's wool is grown within the British Empire? Express the above statistics in map form.

32. What proportion of the world's wool is produced in semi-arid regions?

33. In the same season Australia had 113, Argentine 39, South Africa 35, New Zealand 30, India 25 millions of sheep. Find the average yield in lb. per sheep in each country and suggest reasons for the differences you find.

34. Of the United Kingdom's imports, 1935, of frozen mutton and lamb New Zealand provided 1*0 and 2-6, Australia 0-4 and 1-4, Argentine 0-15 and 0-8, Chile 0-09 and 0-1, Uruguay 0-01 and 0-1, and Brazil 0*003 and 0-006 million cwt. Compare these countries as regards the number of sheep and exports of wool and frozen meat.

35. Compare and contrast the economic activities of man in regions of the Mediterranean and China sub-tropical types.

36. Why does manufacturing other than of the domestic type not flourish in sub-tropical regions?

37. "In Honan and Kiang-Su, China, *intensive farming* is the rule; in the Mediterranean lowlands, *garden and orchard farming*; in the upland areas of the Mediterranean countries and of China, e.g. Shantung, *pastoral farming, sericulture* and other pursuits associated with forestry are practised." Explain what is meant by these terms and give illustrations.

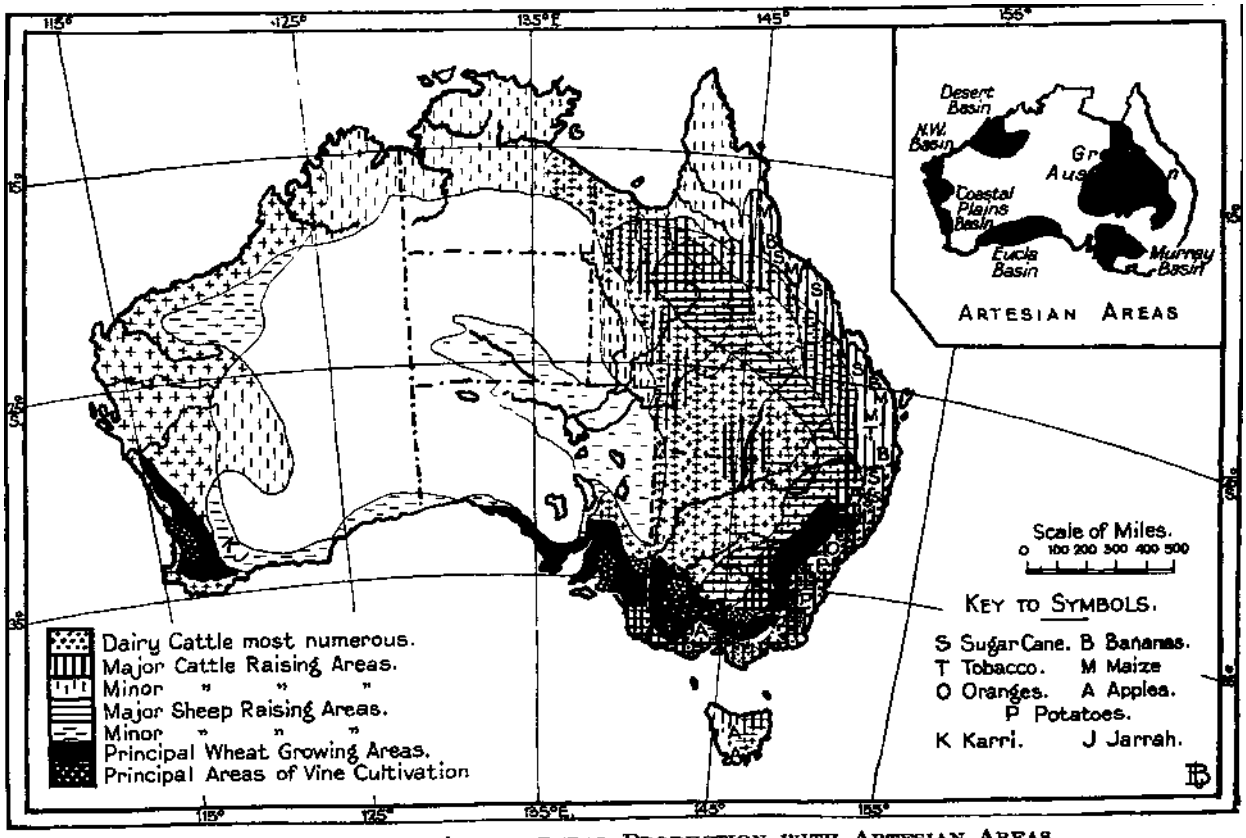



FIG. 79. AUSTRALIA: AGRICULTURAL PRODUCTION WITH ARTESIAN AREAS

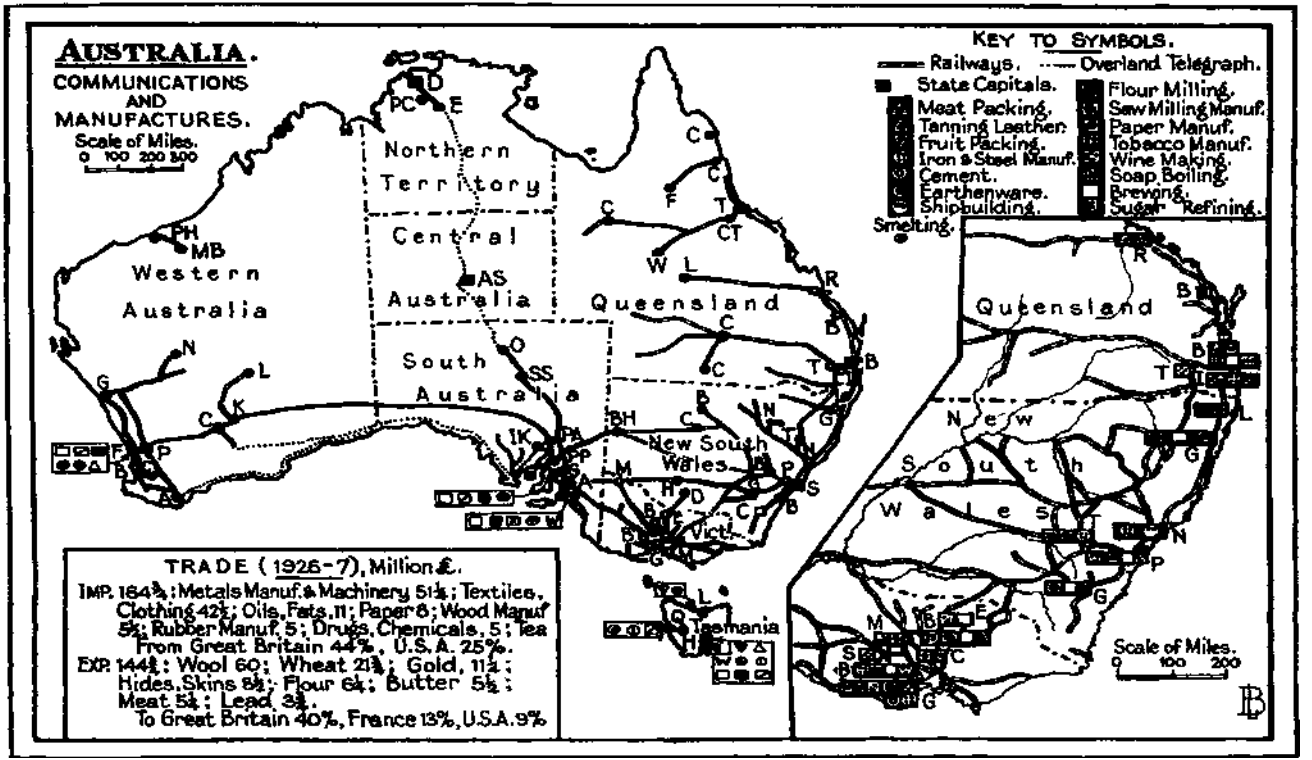



**Fig. 80. AUSTRALIA: COMMUNICATIONS, MANUFACTURES, AND TRADE**

1935: Imports 85-2: Cars 6-5, cottons 4-3, petroleum 4-3, electrical goods 3*3, chemicals 3*4, silk, metals, paper, tea
From O.B., 45 per cent; U.S.A., 3 per cent.
Exports 107-8: Wool 52, wheat 14, gold 12, Butter 9, meat 8, hides 5, flour 4, sugar 2, fruits 2
To G.B., 52 per cent; U..S.A., 3 per cent; France, 5 per cent; Japan, 10 per cent

*By kind permission of* *The Trade Commissioner for Tndia*

FIG. 81. PRESSING COTTON INTO BALES FOR SHIPMENT, BOMBAY, INDIA

On the left is shown raw cotton which remains after the cotton seeds have been removed by " ginning " the hand-picked cotton tufts or " floss." A bale of raw cotton secured by steel bands is shown on the right

**38. COTTON PRODUCTION BY PERCENTAGE** OF WORLD'S TOTAL

| Country | Average 1 Pre-war | 1923-24 | 1934-35 |
|---|---|---|---|
| U.S.A. South | 58 | 42 | 42 |
| India, West Central | 13 | 12 | 17 |
| China, Central and South-west | 16 | 8 | 13 |
| Egypt (Nile Delta) | 6 | 6 | 7 |
| | 2 | 4 | 5-4' |
| | No data | 1 | 1-3 |
| | | 07 | 0-8 |
| | ,, 4 | 0.7 | 0-5 |
| Turkestan and Trans-Caucasia | No data | 0-6 | 0-7 |
| | | 0-5 | 0-8 |
| | ,, | 0-3 | 1-3 |
| | ,, | 0-2 | 0-8 |
| Anglo-Egyptian Sudan . | ,, | 0 1 | 0-1 |
| Paraguay . . . . | | | |

Consult the maps and climatic tables relating to the principal cotton-growing areas given in the above table, and find out what geographical and economic conditions favour cotton cultivation.

39. Account for any changes shown in the above table.

40. In what latitudes is cotton chiefly grown, and why?

41. What races are mainly employed in cotton cultivation? Why?

42. During the last 25 years strenuous efforts have been made to increase the quantity and improve the value of East Indian and Egyptian cotton. Why ?

43 RAW COTTON CONSUMPTION, 1935
(All staples, in thousands of metric tons)

| | American Cotton | E. Indian Cotton | Egyptian Cotton | Total Consumption by Countries | |
|---|---|---|---|---|---|
| | | | | 1920-25 | 1934-35 |
| **U.S.A.** | 556 | 6-2 | 13-7 | 1,456 | 639 |
| **U.K.** | 273 | 68-7 | 110-4 | 681 | 519 |
| **Japan** | 345 | 312 | 32 | 593 | 721 |
| **India** | 10-6 | 260 | 20-5 | 505 | 302 |
| Germany | 100-7 | 28 | 39 | 263 | 234 |
| France | 110-4 | 42 | 46 | 256 | 206 |
| China | 27-6 | 21 | 5-5 | 363 | 495 |
| Spain | 57-0 | 11-4 | 24 | | 96 |
| World total consumption | 1,467 | 857 | 385 | 5,233 | |

NOTE.—The estimated value of cotton yarn and manufactures, 1936, in £100,000 was: U.K. £260, U.S.A. £200, Japan £92 and India £44.

By countries explain the differences of consumption and the comparative differences in the value of their manufactured goods.

44. Which of the cotton manufacturing countries largely supply their own needs? (Refer to the above table.)

45. Which import all their raw cotton ? From what countries and in what proportions? (Refer to the above table.)

46. Why do cotton producing countries import as well as export raw cotton ? Which countries do this ? (Refer to the above table.)

47. Find out what is meant by " staple " and make a note of the general differences in staple between the three varieties of cotton mentioned in the table above.

48. What effect has the length of staple upon the uses to which the cotton can be put and the value of the cotton goods made ?

49. Why is it profitable to import raw cotton and make it up into various goods ?

50. Give as many reasons as you can why Britain excels as a producer of cotton goods.

51. It is stated that 1 per cent of the world's cotton manufactures will supply the needs of either 30,000,000 Hindoos, or 12,000,000 Germans, or 4,000,000 Americans, or 3,000,0002British. Why is there this difference in the amount required ?

*52.* What other articles of commerce does the cotton plant provide besides raw cotton ?

*Photo by Permanent Exhibition Committee, Jamaica*
*Reproduced by kind permission of The West India Committee*

FIG. 82. CIGAR FACTORY, KINGSTON, JAMAICA

The cigars are rolled from the leaf by hand and graded to size by a measurement chart (right). The platted straw hat (left) is of native manufacture. The hair and facial features of the workers give evidence of negroid stock

53. Of the world's tobacco production of 4,862,000,000 lb., the following countries contributed these percentages: India and China 30, U.S.A. 25, Russia 7*8, Brazil 5, Japan 3, Greece 3, Dutch East Indies 2-5, Turkey 2, Italy 2, Philippines, Bulgaria, France and Germany 1-5 each, Hungary 1, Korea 1, Cuba, Algeria, Czecho-slovakia and Canada 0-8 each, Roumania, Jugo-Slavia, Argentine, Mexico and Porto Rico 0-5 each, South Africa, Chile, Nyasaland, Dominica, Belgium, Formosa, a little each. In what natural regions is the bulk of the world's tobacco grown ?

54. Is the tobacco from the different places mentioned likely or not to differ in quality and the uses to which it can be put ?

55. Although U.S.A. produces and exports more tobacco than

*Photo supplies Messrs. Keystone View, Co.*

FIG. 83. MACHINE REELING SILK FROM COCOONS, JAPAN
Note the strands of silk being unwound from cocoons placed in vertical holders after the cocoons have been de-gummed by immersion in hot water

any other country, her imports of unmanufactured and manufactured tobacco are considerable. Suggest reasons for this apparent anomaly.

56. Account for 11 per cent of the population of U.S.A. being negroes. In which parts do they live and why ?

57. In 1934, in so far as statistics are available, the world's supply of raw silk was 120,000,0001b. Of this quantity Japan contributed approximately 83 per cent, China (exports only) 7 per cent, Italy 5 per cent, Korea 3 per cent, Syria, Cyprus, and France 0-15 per cent each, India (no data, but imports exceed exports). Compare the production of Mediterranean countries with that of

the Far East, and point out how far geographical and economic conditions account for the differences you find.

58. Compare the statistics given in the preceding question with the world output of artificial silk, 1015,358,0001b. for the same year,

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FIG. 84. HAND REELING SILK PROM COCOONS, BENGAL, INDIA
The hexagonal reels are to be seen behind the workers

viz. U.S.A. 27 per cent, United Kingdom 11-1 per cent, Italy 8-3 per cent, Germany 7 per cent, France 4 per cent, Netherlands 2 per cent, Belgium 1-4 per cent, Switzerland 1 per cent, Japan 29 per cent, and suggest reasons why the world distribution of raw and artificial silk production is different.

59. Japan exports 66 per cent of the world's raw silk, sending 62 per cent of its exports to U.S.A. and the balance mostly to Western Europe. Why ?

60. Describe the processes employed in Japan by which reeled silk is obtained from silk cocoons, and point out the particular advantages women possess for carrying out these processes. Refer to Fig. 83.

61. Consult the maps given in this book and a good atlas and write a concise geographical account of those parts of Australia having the Mediterranean type of climate.

62. Using the headings given in Fig. 1, compare and contrast the basins of the San Joaquin and Sacremento Rivers, California, with the longitudinal valley of Central Chile.

63. Give an account of the industries of Mediterranean Europe and estimate how far their type and character are dependent upon natural and human circumstances.

64. What can you gather from Figs. 76 and 77 concerning viticulture, considered under the headings: the habits and peculiarities of the plant, environment conditions essential to successful cultivation, and the methods of cultivation employed.

65. Using the information to be obtained from Fig. 61 give an account of the types of agriculture found in the Mediterranean region.

66. In view of the general climatic conditions prevailing in monsoon lands and the peculiar traits of the Chinese people themselves, does the street scene shown in Fig. 1G8 come up to what you would expect to find in a picture of a street in a native quarter of a town in China, e.g. how and why do their shops and mode of displaying goods for sale differ from ours; how does the road itself, the means of transport using it, and the regulation of traffic compare with a street at home ?

67. Compare the method of cloth weaving shown in Fig. 64 with that employed in our own country. To what extent are the differences in the processes of cloth manufacture due to differences of circumstances, e.g. materials available, organization of the industry, character of the workers, the demand for and prices of carpets ?

68. Considered from the viewpoint of the suitability of circumstances both physical and human, discuss the existence of the sheep run shown in Fig. 71.

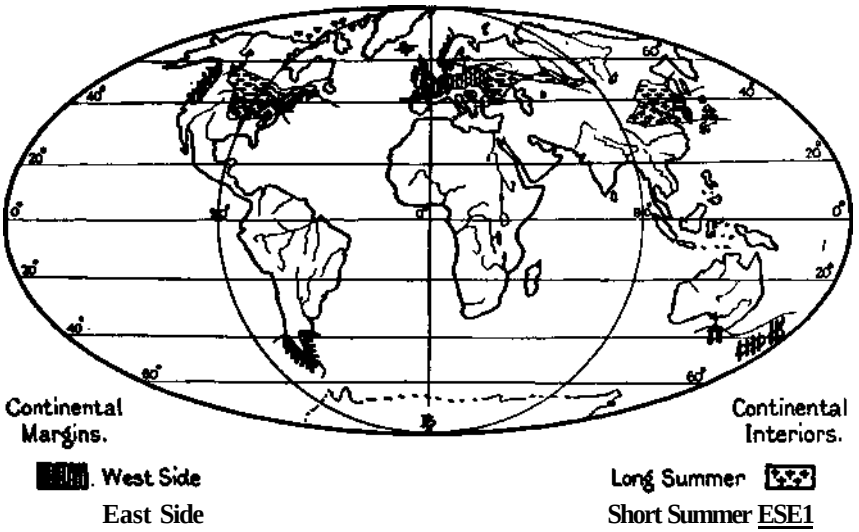
69. "Hot dry summers or only moderate summer rain and frost-free winters favour the production of sweet fruit and freedom from pests." On a map mark the fruit growing areas of the countries given in the following table and note the climatic regime of each area. What factors have stimulated production, especially in the Southern Hemisphere, in post-war years?

CITRUS FRUIT PRODUCTION, 1936
(1,000 tons)

| Country | Oranges | Lemons and Limes | Grapefruit |
|---|---|---|---|
| United States | 1,830 | 280 | 630 |
| Brazil | 470 | | |
| Porto Rico | — | | 25 |
| Spain | 910 | 55 | |
| Italy | 235 | 285 | |
| Egypt | 125 | | |
| Palestine | 265 | | 35 |
| China | 500 | | |
| Japan | 410 | | |
| South Africa | 66 | | |
| Australia | 88 | | |
| World (prob.) | 5,500 | 800 | 750 |

# CHAPTER V

# COOL TEMPERATE REGIONS HAVING WEATHER CHARACTERIZED BY DEPRESSIONS




**Location.**

**These regions occur in irregular belts in the higher middle latitudes. Four main subdivisions are distinguishable—**

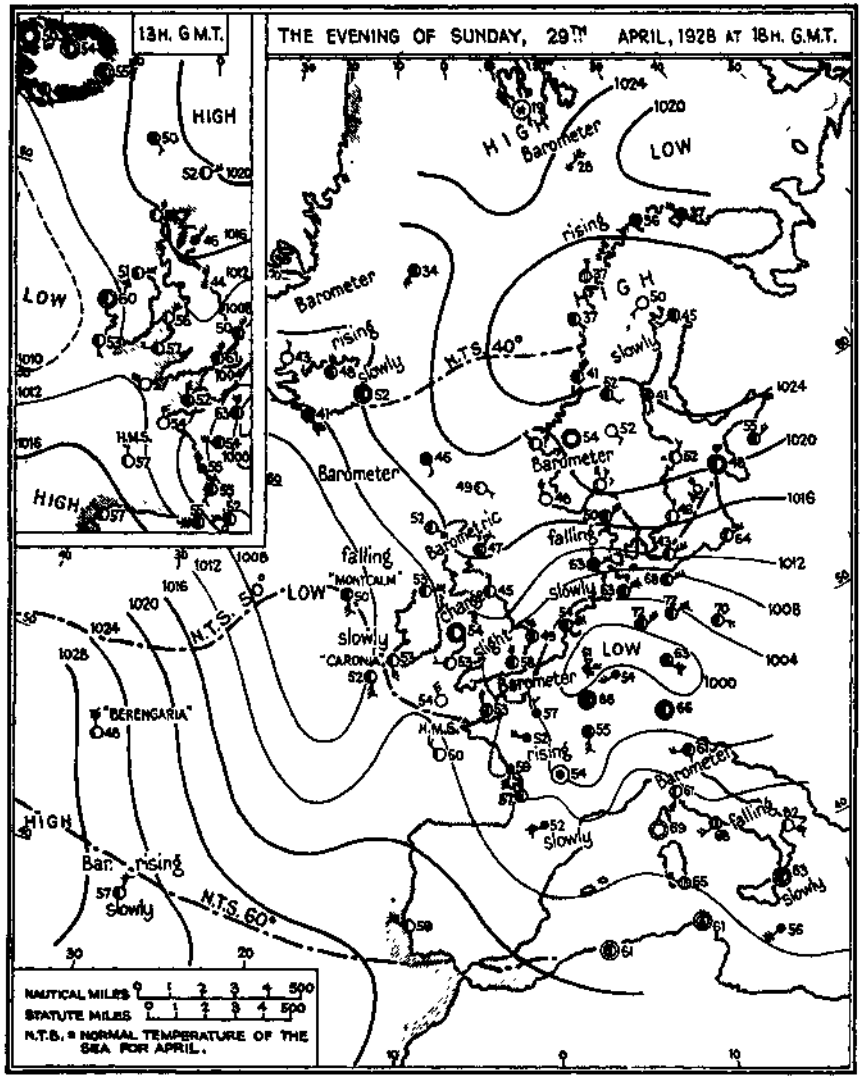
| | |
|---|---|
| *Continental Margins* | (1) *West side* |
| | (2) *East side* |
| *Continental Interiors* | (3) *Having long summers* |
| | (4) *Having short summers.* |

**Climate.**

**These regions lie in latitudes where warm, moist, relatively light Westerlies meet cold, dry, relatively heavy Polar Easterlies. The gently inclined plane of separation of these two air streams meets the earth in a wavy line called the Polar Front. Under favourable conditions it can be sometimes traced for thousands of miles across**

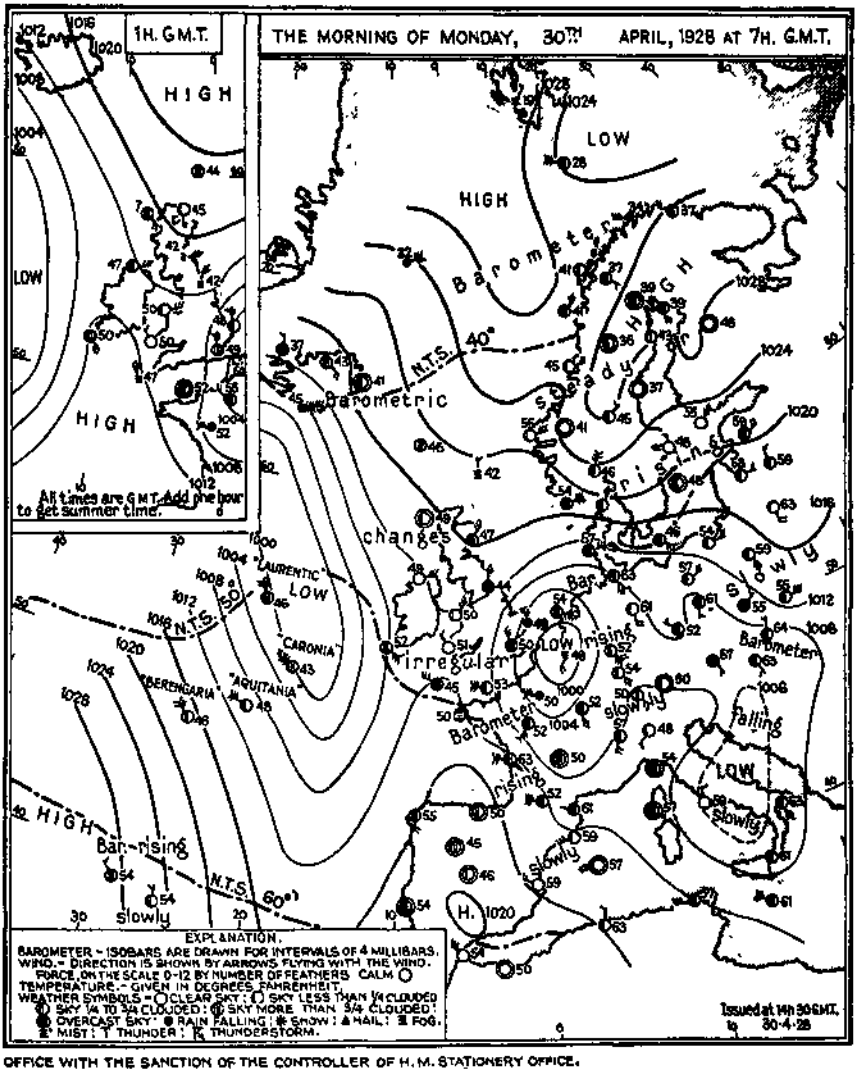
continuous areas of land or sea. Sometimes it is broken when the polar air breaks through to feed the Trade Winds and it is often replaced by a complex series of fronts or by a continuous gradient of temperature (Figs. 85-86). In the northern hemisphere the eastern edge of a tongue of equatorial air projecting into the polar air flows up over the polar air, while along the western edge the polar air drives a wedge under the warm air. These advancing edges of equatorial and polar air are called respectively the Warm and Cold Front (or Squall Line). The position of the latter may usually be recognized on a synoptic chart by rising pressure behind the front, discontinuity of temperatures, marked changes in wind force and direction and rain perhaps with thunder. Falling pressure, overcast skies and considerable precipitation in advance of the front usually mark the line of a Warm Front. Between the two fronts lies the Warm Sector, identifiable on the weather map by strong winds and closely clustered isobars which are fairly straight and which do not flow smoothly into the run of those of the Cold Sector occupied by polar air. As the simultaneous movements of the cold and warm fronts continue, pressure falls at the apex of the warm sector and on the map isobars begin to assume the form associated with a depression. The advancing cold front tends to curl counter-clockwise round this area of low pressure and the warm sector decreases in extent. Ultimately the cold front overtakes the warm front, and the warm air is lifted off the ground and the depression is said to be occluded. As the core of relatively warm air resting on the colder air cools, polar air fills in and the intensity of the "Low" decreases until the depression disappears. Such in brief outline is the widely accepted explanation of the life history of most of our depressions. Some depressions however seem to form entirely in polar air and their origin is obscure. The transfer of equatorial air polewards and of polar air towards the equator effected by the formation of depressions is an essential part of the planetary wind system.

The areas of high pressure between cyclones are one form of anticyclone. Their passage (Figs. 85 and 86) is usually marked by short spells of fine weather in between stormy periods. The anticyclones which occasionally give long spells of fine weather are due to detached portions of the Tropical High Pressure belt moving slowly polewards.




REPRODUCED FROM THE DAILY WEATHER REPORTS OF THE METEOROLOGICAL

FIG. 85. WEATHER MAP, 29TH APRIL, 1928; METEOROLOGICAL CONDITIONS ON THE "POLAR FRONT"




OFFICE WITH THE SANCTION OF THE CONTROLLER OF H.M. STATIONERY OFFICE.

FIG. 86. WEATHER MAP, 30TH APRIL, 1928; METEOROLOGICAL CONDITIONS ON THE "POLAR FRONT"

Thus the climatic conditions in these regions as a whole are by no means uniform, but all parts have the following climatic features in common : moderate rainfall distributed throughout the year, marked changes in the weather every few days, and strongly pronounced seasons. In the marginal subdivisions, on the whole, winters are rarely cold enough to benumb man's mental activities or summers too hot to make physical exertion a strain. The humidity of the atmosphere varies considerably from day to day, and though fairly high is seldom so when temperatures are high. Greater extremes in temperatures and humidity are experienced in the interior sub-zones. The specially invigorating and stimulating climate of the marginal areas is one of the conditions which has helped to make the inhabitants the most energetic, inventive, and progressive peoples in the world.

**Vegetation.**

The natural distribution of coniferous and broad leaved forests and temperate grasslands varies considerably, according to local climatic and topographical conditions and offers man many and varied means of livelihood. Over large tracts of the region, particularly in the marginal areas, the natural covering of vegetation has been almost completely altered by the constructive and destructive activities of man and his domesticated animals. The annual habit occurs chiefly among herbaceous plants which are natives of the temperate regions, because it is here that the existence of species making a fresh start from seed every year are least in danger of extermination by prolonged periods of extreme cold or heat or of excessive or insufficient moisture. Having to make all their growth in a single year, the majority of such plants are naturally either dwarf or of medium height. Our flower and vegetable gardens provide many examples of plants of annual and biennial habits.

**Animal Life.**

All the more useful of man's domesticated creatures are descended from the native wild animals of these regions. In all but the less settled areas animals of no use to man have been largely exterminated, e.g. in England. The grasslands were the original home of varieties of cattle, horses, sheep, goats, camels, asses and poultry. Some of these, with gazelles and deer, are still to be found in a wild state in

North America, Siberia, Russia, or in Government reserves in more settled areas of Eurasia and North America. Other animal life typical of the grasslands are foxes, hares, burrowing animals and rodents, e.g. marmots (Siberia), rabbits, rats, mice, running birds like grouse, bustards (Asia), and prairie hens (North America). Reptiles and insects, like locusts and grasshoppers, are common.

The forested areas, providing a better shelter and food supply, are now richer in less migratory animals than the grasslands. The Canadian elk, which cannot graze because of its short neck and long legs, the moose, beaver, bears, lynx, wolves, squirrels, weasels and the skunk (Canada only), are typical representatives of forest feeders which are still found wild in farthest Europe, Asia, or North America. Dogs and cats are the chief animals which have been domesticated. Bird life is more abundant in the wooded parts because of their greater security at breeding times. Many countries, e.g. England, have taken steps to protect their native bird and fish life.

There has been a considerable interchange of domestic animals among these regions. In some cases introduced animals have been crossed with the native animals of the same species for commercial purposes, e.g. the cattalo, descendant of the European cow and the buffalo, which can withstand the diseases and storms of the northern ranches of Canada better than the cow.

**Man's Activities in General in the Continental Margins.**

Occupying roughly only one-twelfth of the world's land surface, these regions are the home of about one-third of the world's population, including most of the progressive peoples. In a region with a cold season, as in one with a rainless season, man must work steadily and take thought for the future in order to avoid starvation. In these regions of cyclonic storms Nature rewards man's labour, but only after he has put forth much effort. They well deserve to be called Regions of Effort. In no other regions do men make better or more varied use of the gifts of Nature from their own and other lands. The greater part of the world's foodstuffs and raw materials are produced here. Of the seventeen most important food products of the world, these regions mainly supply eight, viz. wheat, potatoes, dairy products, hay, oats, rye, barley, and pork, in order of value respectively. Of the remaining nine, including

rice, millet, coffee and tea, these regions produce about half of five, viz. maize, mutton, poultry products, beef, and sugar. More horses are reared in these regions than in all the rest of the world. Turning to the world's production of raw materials, out of the seventeen chief commodities these lands have almost a working monopoly of coal, iron, lead, and zinc, and also contribute about half the world's supply of wood, hides, wool, copper, petroleum, silver, hemp, and flax. Cotton, gold, rubber, raw silk, and tin are mainly produced in other parts of the world (under white supervision), but are practically all exported to these regions to be manufactured. Climatic conditions affect plant and animal production much more than that of minerals whose occurrence is as likely in one part of the world as another. A further reason why the cool temperate lands produce so large a proportion of the world's food and raw materials is that the inhabitants of these regions have by skilful cultivation been able to make plants of other regions grow well in their own, e.g. potatoes (a native of tropical South America), wheat (Mediterranean region). The differences in size and flavour between a wild crab apple and a good eating apple illustrate how man has improved the value of native plants. Most of the crops grown are cash crops. The farmer satisfies his needs by spending the money got from* their sale. By scientific breeding man has achieved similar results with domesticated animals. Wild horses and cattle no longer exist in the British Isles. Their nearest relations, Dartmoor ponies and Highland cattle, when compared respectively with railway cart horses and Hereford cattle, illustrate what man has been able to do. In like manner, because of their greater energy and intelligence, the people of these regions have not only developed more fully their own mineral resources, but are also engaged in exploiting deposits elsewhere for their own use, e.g. tin in Malaya, petroleum in Java.

These regions include the only important parts of the world where manufactures and commerce, as well as agriculture, pastoral, and mining occupations, are followed on a large scale. Manufacturing in a modern sense can only be carried on successfully where there are easily available supplies of raw materials of home or foreign production ; good and cheap supplies of power, such as coal and oil, or water for developing electrical energy ; an energetic, enterprising, intelligent and well organized people ; easily accessible

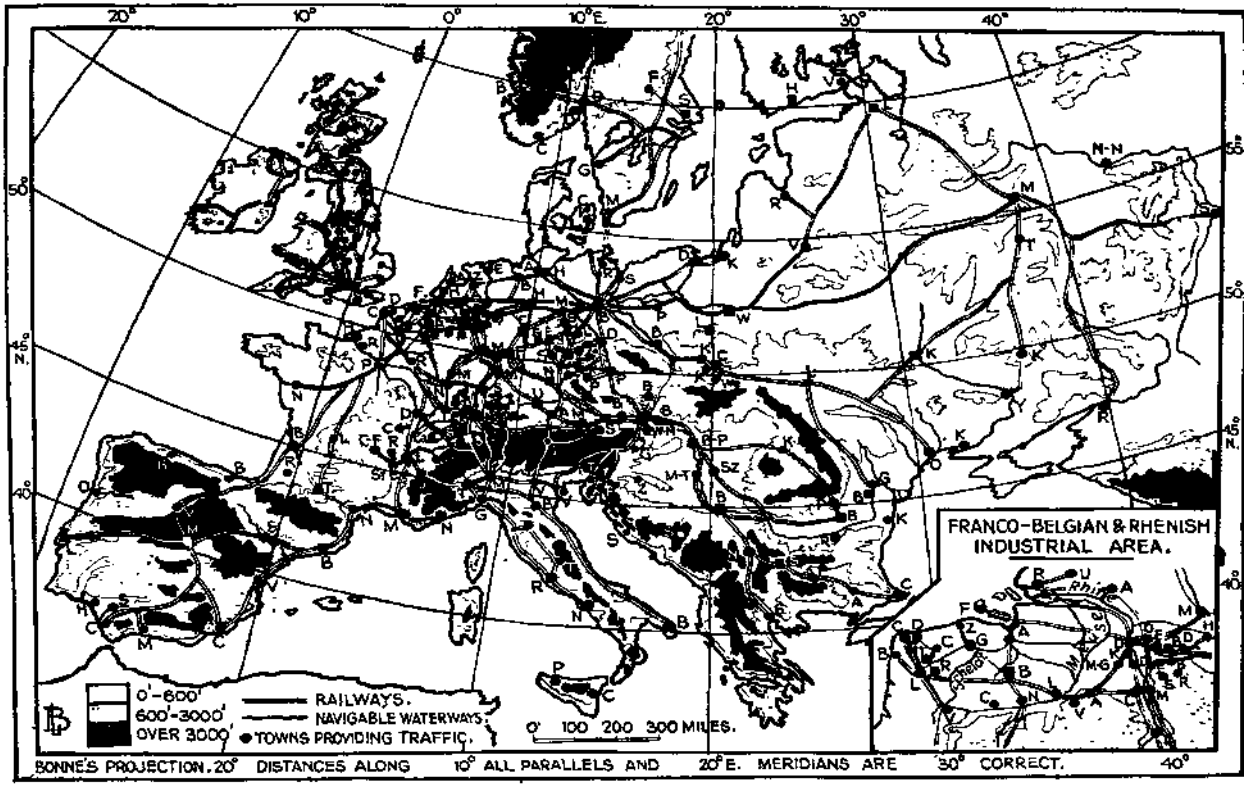



FIG. 87. PRINCIPAL ROUTES WITH CENTRES PROVIDING GOODS AND PASSENGER TRAFFIC, EUROPE

The identity of the physical features and the natural gaps used as route ways should be established by consulting an atlas. The towns should be similarly identified

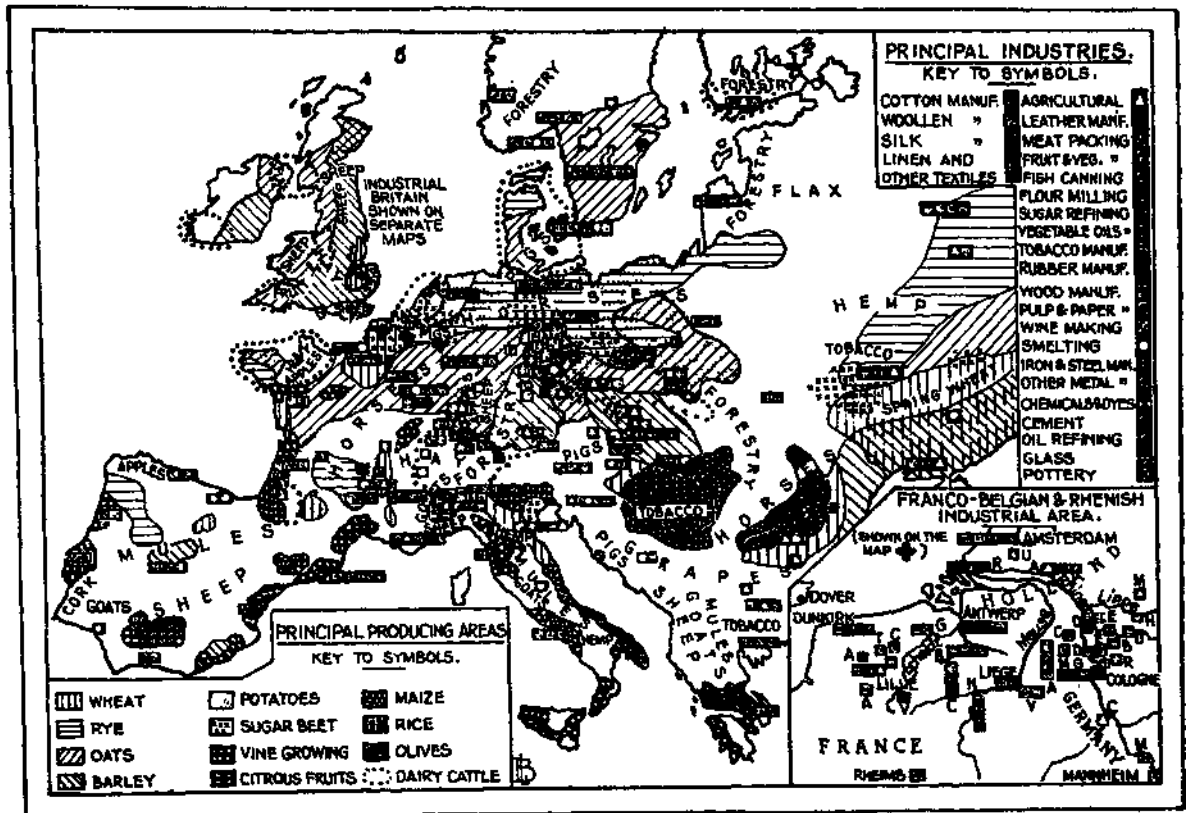



FIG. 88. PRODUCTION AND INDUSTRIES, EUROPE

markets, in which the manufactured goods can be sold, so that the people who make them may receive wages with which to buy the necessities and luxuries of life. All these conditions are found in the marginal areas of West Europe and Eastern North America, and are arising in Argentina, South Africa, East Australia and New Zealand. The same natural inventiveness of the peoples of the marginal cool temperate lands which helped them to lead the way to the use of power driven machinery, also assisted them to develop the best system of communication in the world and so, by reducing the barriers of time and space, profoundly to change their environment from local to an almost universal status. Practically all the world's manufactured articles, such as ferrous and non-ferrous manufactured goods and all kinds of machinery, textiles, chemicals, drugs, dyestuffs and leather goods, are produced in these lands. It is estimated that each individual in these regions produces five or six times as much as the average person in the other parts of the world.

Because these regions can produce foodstuffs, raw materials, and manufactures in excess of the needs of their population, and can readily exchange their surplus commodities for articles less easily produced at home, they have become the world's principal markets. It is a striking fact that the different parts of the cool temperate lands buy and sell far more from one another than from other natural regions, e.g. in 1935-36 it was estimated that more than 60 per cent of Britain's world trade was with other cool temperate lands. In the same year her trade with the 350 million inhabitants of British India was only half of that with the 80 million people of Belgium, Holland, Denmark, and Germany.

**Food, Clothing, and Shelter.**

All these conditions have made it possible for men in cool temperate lands to be the best fed, clothed and housed of any people in the world. In towns particularly, because of trade activities, plenty of food of every kind comes from all parts of the world, and a varied and well balanced diet is possible at all times of the year. Also, far more than elsewhere, food is made more appetizing and germ-proof by being, on the whole, well cooked, and meals are served at regular hours, thus benefiting health and economizing time.

Although close-fitting attire and substantial dwellings are desirable

for protection from continual changes of weather, man in these regions has a wider selection to choose from. Man's tastes, on the one hand, and his comfort on the other, are thus more easily reconciled and provided for. The high standard of comfort attainable has had a considerable bearing on the industrial efficiency, the social and political organization, and the progress and development of these sub-regions as a whole. To-day the progressive peoples of the marginal areas of the cyclonic belt give a strong lead to the rest of the world in good government, education, science, art, and religion.

To sum up then, the world-wide supremacy of the people of these regions is partly due to a climate which has favoured man's mental and physical activities, and which make possible the production of a great variety of highly nutritious food crops, and timbers and fibres useful for many purposes. Geographical conditions are equally favourable for the raising of man's most valuable domestic animals. Resourceful and skilful, the inhabitants of these lands have made great use of their own mineral wealth, especially of coal and iron. By their inventions they have been able to multiply their energy by using vast natural sources of power for industrial and domestic purposes and to produce commodities on a large scale. Good communications have been developed in order to tap the world-wide sources of food and of the raw materials of industry, and also to command the equally wide markets for finished goods. The material progress of these regions has been made possible and aided by the healthy growth of man's social, political, and religious institutions.

## CONTINENTAL MARGINS. WEST SIDE

Location.

The British Isles and most of North-West Europe, British Columbia, Southern Chile, Tasmania, and the South Island of New Zealand belong to this type of sub-region.

**Climate.**

Most of the climatic peculiarities of these regions arise from their nearness to the oceans and from the prevailing S.W. to N.E. direction

MEAN MONTHLY TEMPERATURES (i°F.) AND RAINFALL *(r")*

| PLACE. | Position. | | Jan | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manchester . | 1 British [ Isles | *t* | 39 | 40 | 42 | 47 | 53 | 58 | 61 | 60 | 56 | 49 | 43 | 40 |
| | | *r* | 2-5 | 19 | 23 | 1 9 | 2 1 | 2-6 | 33 | 34 | 2-4 | 33 | 26 | 32 |
| Sheffield | | *t* | 38 | 39 | 41 | 46 | 51 | 57 | 60 | 59 | 56 | 49 | 44 | 40 |
| | | *r* | 2-8 | 2-4 | 2-5 | 2-0 | 2-3 | 23 | 2-5 | 2-7 | 1 9 | 33 | 29 | 35 |
| Barnstaple . | | *t* | 46 | 45 | 43 | 48 | 52 | 58 | 62 | 60 | 54 | 53 | 42 | 43 |
| | | *r* | 3-2 | 6-2 | 1 1 | 2-9 | 4-4 | 0-0 | 34 | 45 | 4 1 | 46 | 37 | 41 |
| London | | *t* | 38-9 | 40-1 | 42 4 | 47-3 | 53-4 | 59 6 | 62-7 | 61-6 | 57 1 | 49-9 | 44-0 | 40-3 |
| *Under 250'* | | *r* | 1-9 | 1-7 | 1 8 | 1 5 | 18 | 2-0 | 2-4 | 2-2 | 1-8 | 2-6 | 2-4 | 24 |
| | | *t* | | | | | | | | | | | | |
| | | *r* | | | | | | | | | | | | |
| Bergen | 62° 6'N. | *t* | 34-2 | 33 6 | 35 4 | 42-1 | 49 0 | 55-0 | 58-0 | 57 6 | 52 7 | 45 1 | 38-5 | 34-7 |
| *66'* | 5° 22' E. | *r* | 8-5 | 6-5 | 59 | 4-1 | 45 | 3-8 | 5-7 | 7-5 | 8-7 | 8-9 | 8-3 | 8-5 |
| Hamburg | 53° 33' *N.* | *t* | 32-5 | 33 4 | 37 4 | 45-0 | 52-9 | 68-1 | 63 0 | 620 | 56-5 | 48 2 | 38 5 | 33-6 |
| *6,r* | 9° 59' E. | *r* | 20 | 18 | 2*2 | 1 8 | 20 | 24 | 35 | 30 | 22 | 26 | 2-0 | 2*2 |
| Paris | 48° 51' N. | *t* | 36 7 | 39 4 | 43 2 | 49 3 | 561 | 62 0 | 64 6 | 64 0 | 58 5 | 50 0 | 42 5 | 38 1 |
| *170'* | 2° 20' E. | *r* | 1-4 | 1-1 | 1 4 | 1 5 | 21 | 23 | 2-2 | 2-2 | 20 | 23 | 19 | 1-6 |
| Victoria | 49° 30' N. | *t* | 39 0 | 40 0 | 43 4 | 49 8 | 53 0 | 57-0 | 60 2 | 59 8 | 56-0 | 50 3 | 44 5 | 41 1 |
| *85'* | 123° W. | *r* | 4 5 | 3 2 | 25 | 16 | 12 | 0-9 | 04 | 06 | 1-8 | 2-4 | 5-7 | 58 |
| Valdivia | 39° 49' S. | *t* | 61 9 | 60 4 | 58 0 | 53 1 | 48 6 | 45 5 | 45 7 | 46-4 | 48 0 | 52-0 | 55 0 | 59-0 |
| *50'* | 73° 6'W. | *r* | 2 9 | 3 0 | 64 | 92 | 152 | 17 5 | 15 4 | 13 6 | 72 | 5 1 | 4-4 | 48 |
| Hobart | 42° 53' S. | *t* | 62 0 | 62 3 | 59 4 | 55*4 | 50 6 | 47 1 | 45 7 | 48 0 | 52 0 | 54 0 | 57 3 | 59 8 |
| *165'* | 147° 21'E | *r* | 1 8 | 1 5 | 10 | 1-8 | 19 | 2 2 | 2 1 | 1 8 | 2 1 | 2-2 | 25 | 19 |
| Hokitika | 42° 41' S. | *t* | 59 0 | 59 0 | 56 0 | 56-0 | 53 0 | 51-0 | 46 0 | 46 0 | 53-0 | 51-0 | 54 0 | 59-0 |
| *35'* | 170° 59' E. | *r* | 9 9 | 7 2 | 97 | 9 3 | 98 | 97 | 91 | 94 | 9-1 | 119 | 10-7 | 10 6 |

* Space for statistics of jour own locality

of travel of a continual succession of cyclonic and anticyclonic systems. Temperatures seldom remain the same for any length of time, and the daily and annual ranges of temperature are less than in the other cool temperate sub-regions, because the oceans act all the year round as regulators of air temperatures, lowering them in summer and increasing them in winter. Uncomfortably hot days in summer and long spells of frosty weather in winter are few. People can usually do without fires for heat between May and October. Precipitation comes mostly as rain, generally in light showers and drizzles, and is heaviest in winter. Snows do not stay long. Fogs occur in winter and hazes in summer because the relative humidity of the air is fairly high all the year round. Climatic conditions interfere little with man's activities out of doors or indoors. Now and again frost stops building operations, fogs dislocate traffic, rare storms cause a breakdown of communications, and hot weather makes indoor work burdensome, but man can often work out of doors while it rains.

### Vegetation.

Natural and cultivated vegetation varies with local conditions of soil and of relief, particularly in relation to the direction of prevailing winds and sunlight. Changes due to man's activities are found almost everywhere. Virgin vegetation is rare in North-West Europe because of its longer human history compared with the other west side marginal areas. Woods and forests of broad-leaved trees like the maple, oak, elm, willow, birch,, and poplar, flourish in the warmer lowlands ; coniferous trees like pines, firs, black and white spruce, do better in the cooler and damper uplands. Mixed woods, due partly to the nature of the soil, peculiarities of the trees themselves, and man's efforts in afforestation, occur generally. Compared with the evergreen tropical forest, the broad-leaved summer forest offers to the eye a more even expanse of uniform bright green colour. The trees are fewer in species, smaller in profile, and show much richer branching. Plank buttresses are rare and the smaller leaves of the trees are more varied in shape. Because of weaker light, except for scanty herbage, ferns, mosses, and fungi, undergrowth is very lacking. Except on the forest edges or near water, where ivy, honeysuckle and convolvuli are found, creepers are rare. In places where rainfall is apt to be deficient in spring, when trees especially need it, meadow grasses, because of their more rapid growth and greater hardiness, have driven out the trees.

### Man's Activities.

In North-West Europe most of the land that could be used for farming has been cleared of its natural vegetation. Rainfall, cloudiness, and moderate summer temperatures favour the cultivation of oats, rye, potatoes, beet (for sugar), many vegetables, and orchard, bush, and ground fruit. Wheat does best in the drier parts with sunnier summers. Most of the crops also have preferences for different kinds of soil, e.g. potatoes (sandy), wheat (clay), and different areas having specially favourable soil and climatic advantages specialize in particular crops. Many examples of this occur in the British Isles.

Cultivated grassland provides excellent pasturage for cattle, horses, and sheep. Dairy farming flourishes because good markets for milk, butter, and cheese are easily accessible. Fruit and

vegetable growing as money crops is a comparatively new industry. Cheap and rapid transport for goods in bulk has now made possible the marketing of these commodities in perfect condition.

Farming is not equally progressive in all parts of a west marginal sub-region. For example, four stages in man's economic activities as a farmer are found in North-West Europe.

In Finland and North-West Russia primitive agriculture and herding are combined wherever rainfall and summer heat are sufficient for the raising of beet, flax, hemp and hardy varieties of cereals, such as rye. At this stage of direct effort man practically supplies his own needs.

Farming in most parts of the Scandinavian Peninsula has reached the domestic stage. Men and women perform different branches of agricultural work. This division of labour between the sexes is not found between classes, e.g. the farmer has to be "a jack of all the trades " connected with farming. He is usually carpenter, blacksmith, agricultural implement maker, tanner and veterinary surgeon, as well as cultivator; his wife makes butter and cheese, woollen and leather goods, and prepares foodstuffs, such as salted or smoked meat, jam, dried herbs, for winter supply. Like the English farmer's household of the eighteenth century, that of the Scandinavian peasant farmer is, by the united efforts of its individuals, practically a self-supporting unit. The few needs for condiments, groceries, iron, and other household and personal goods are obtained by the exchange or sale of the farm products.

Mixed farming in England and Germany illustrates a third stage in economic development. Mixed farming makes crop rotation easier and the keeping of farm stock well worth while. Agricultural machinery is used for tillage, sowing, and harvesting. The farmer and his labourers support themselves partly directly, but mainly indirectly, by their combined efforts. The necessity of sharing the products of the farm or their market value demands facilities for distribution and marketing.

Denmark illustrates yet a fourth stage in the development of farming. The Danish farmer has made his farm a factory in which to produce milk for butter, pigs for bacon, and poultry for eggs. The corn, root crops, and green fodder he grows is fed to his stock at first cost. The finished article, instead of the raw material, is marketed. Groups of farmers run factories upon co-operative

lines. The products of these factories are marketed and farm supplies, such as imported fodder, fertilizers, and machinery are obtained through other co-operative societies. Such agricultural co-operation has been greatly helped by wise legislation, and by the ready way in which banks have advanced capital to co-operative

*By courtesy of* *Canadian Pacific Railway Co,*

FIG. 89. SAWMILL IN A LUMBER CAMP, BRITISH COLUMBIA, CANADA

The end of the top log which formed the lowest portion of the tree trunk shows the method of felling. On the side the way the tree is to fall and some 6 ft. above ground to clear the gnarled and useless base of the tree, the lumberjacks cut away with axes about one-quarter of the trunk. Sawyers cut through on the opposite side, inserting wedges until the tree overbalances and the centre portion snaps through

societies on the joint responsibility of their members. As a result of the complex and co-operative efforts of many groups of people, a typical 100-acre farm in Denmark provides a comfortable livelihood for the farmer and his wife, a maid and three labourers all the year, and two extra labourers during the summer and autumn. The latter are often immigrants from Poland.

In passing, it may be noted that both the east and west marginal sub-regions of the cool temperate lands adjoin the best fishing grounds in the world, and consequently large numbers of their inhabitants earn their livelihood by sea fishing.

In all the more progressive farming areas, industries connected with the preparation of foodstuffs, beverages, fibres, and animal products have arisen. Scotch oatmeal, Dundee jams, Kiel butter, Alkmaar cheese, Wiltshire bacon, beet sugar, Devonshire cider, Munchner lager, Irish linen, Witney blankets, English leather, are

*By courtesy of* *The Czechoslovak Legation, London*

FIG. 90. MAKING BENTWOOD FURNITURE, CZECHOSLOVAKIA
An industry based upon ample national resources of timber, cheap electric power and light and skilled craftsmen

a few typical products of these industries. In North-Western Europe many of them, which previously relied on locally produced raw materials, now draw their supplies from other localities, inside and outside their natural region, e.g. the wool, leather, and paper industries. Another feature connected with these industries is the way in which they have attracted others of a similar nature, e.g. jam making has attracted marmalade making, industries like butter and tallow making from animal fats—margarine, soap and candles from vegetable oils, wool—cotton and silk industries.

In the uncleared areas, e.g. Scandinavia, British Columbia, New

Zealand, logging and lumbering of pine, fir, larch and sprucewood, **and** forestry industries, such as the manufacture of matches, turpentine, wood pulp and paper, and wood working are carried on. Wherever manufacturing is possible, the tendency is to make up the raw material on the spot into a finished product. Such a procedure benefits both producer and consumer.

North-West Europe produces for its own use about a fifth of the world's crop of wheat and barley, and about half of the world's potatoes and beet sugar. It raises nearly a fifth, tenth and twelfth of the world's pigs, cattle and sheep respectively. Even so, large quantities of foodstuffs have to be imported. This region's share in the International Trade in Dairy Produce is shown by the following figures—

| | | | |
|---|---|---|---|
| World's Exports of Butter , | over 46 per cent | mostly from the agri- | |
| ,, t9 tf C/l1G086 , | 39 | „ | I cultural districts. |
| „ Imports „ Butter | 90 | „ | i mainly by the manu- |
| „ •• •• L/lieese . | 83 | „ | I facturing districts. |

The exported produce is entirely consumed inside the region, and the differences between the percentages for imports and exports represent the extent to which the region as a whole depends upon other parts of the world.

Mention has already been made of the conditions which have brought about the superiority of North-West Europe in mining, manufacturing, and transportation and commerce. The following figures, in so far as statistics are available, serve to emphasize its predominant world position in these branches of man's activities.

| *Of the World'e—* | | *Approx. per cent* |
|---|---|---|
| Production of Pig Iron . . . | N.W. Europe produces | 38 |
| „ „ Coal (excluding Lignite) | | 41 |
| Active Cotton Spindles . | has | 46 |
| „ Power Looms (Wool) . | »» »» | 58 |
| Production of Artificial Silk (lb.) | „ produces | 33 |
| * Exports of Cotton Manufactures (Value) | N.W. Europe exports | 46 |
| * „ „ Machinery (Value) | | 36 |
| * International Trade ; Imports (Value) | contributes | 46 |
| * „ „ Exports „ | | 50 |
| **Shipping, 100 Tons and Upwards—** | | |
| Steam and Motor-ships (Number) | N.W. Europe has | 53 |
| „ (Tonnage) | | 54 |
| Sailing Vessels (Number) . | | 51 |
| „ „ (Tonnage) . | | 52 |

*** These figures include internal as well as external trade between the various units of this region and this region's trade with other parts of the world.**

In addition to well developed road and inland waterway systems, this region is provided with from 10 to 20 miles of railways for every 100 square miles, or nearly double the mileage of any other region in the world. North-West Europe possesses three of the four largest industrial and commercial cities in the world and six out of nine of the world's greatest seaports, judged according to the quantity and value of goods handled. About one sixth of the population are engaged in manufacturing industries and commerce.

The establishment of industries, such as iron and steel works, and woollen mills in South-East Australia, iron works, machine shops, chemical works, and paper factories in British Columbia, show that similar conditions are producing similar results in the more recently settled west side marginal regions. Many European firms have branch factories in these younger lands.

## CONTINENTAL MARGINS. EAST SIDE

### Location.

Eastern Canada, North-East U.S.A., parts of Manchuria and the Far-East Republic, and South Argentina belong to this type of sub-region.

### Climate.

**MEAN MONTHLY TEMPERATURES (*t*° F.) AND RAINFALL (r")**

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Halifax. *120'* | 44° 38' N. 63° 36' W. | *t* *r* | 230 5-6 | 23-0 4 5 | 30-4 5-0 | 39-4 4-5 | 49-3 4 2 | 57 8 3-7 | 64 8 3-9 | 64 5 4-5 | 58 3 3-6 | 48-7 5-2 | 38 8 5 4 | 28-3 5-4 |
| New York *95'* | 40° 43' N. 74° 1' W. | *t* *r* | 30-6 3-3 | 30-5 3 3 | 38 0 3-5 | 48-5 3-2 | 59 4 3-6 | 68 5 3-4 | 73 5 4-1 | 72-1 4 4 | 66-4 3-4 | 55 8 3-4 | 44 1 3 3 | 34-3 3-3 |
| Vladivostock *60'* | 32° 10' N. 132° 0'E. | *t* *r* | 7-3 0-3 | 13 8 0-3 | 26 4 0-6 | 39 9 1 2 | 49-1 2-0 | 56 5 2 8 | 64 6 3 0 | 60-1 4-3 | 61-7 4-4 | 48-7 1-8 | 31 1 1 1 | 14-7 0 5 |
| Ushuaia *112'* | 54° 50' S. 68° 23' W. | *t* *r* | 49 6 1 8 | 49 1 2-5 | 46 8 2-3 | 40 5 1-5 | 36-7 1-3 | 33 3 2-3 | 33 6 1-4 | 35 2 0-9 | 39 2 1-5 | 43 0 1-7 | 44 4 2-0 | 49-1 2-3 |

Compared with the west side marginal sub-region, this type has a smaller amount of rainfall, which comes mostly in summer showers and thunderstorms. The less amount of rainfall is due to the fact that the winds now blowing from land to sea have given up some of their moisture in crossing the continents ; thunderstorms are due to the development of temporary summer low pressure

systems over the land mass and consequent inflowing sea winds. In winter the " westerlies " are intensified by low pressure areas developing over the oceans, and precipitation is mostly in the form of snow or sleet. Snowfall is noticeably heavier, and it often stays in drifts, which partly bury buildings and seriously interfere with traffic and outdoor work for months. Winters are much colder and summers slightly warmer. Sensible temperatures are almost as high and as low as those experienced in the continental interior sub-regions. Except when summer heat waves and winter cold waves occur, the dryness of the air makes the greater heat and cold more pleasant than would be the case in our own land. The greater annual and daily ranges of temperature and the fairly frequent occurrence of storms accompanying the passage of cyclones younger than most of those experienced in North-West Europe, appear to favour a less steady and more nervous, hustling type of human activity than in North-West Europe. In winter the ports are often icebound because the warmer surface water of the oceans is blown off shore and is replaced by colder surface water drifting from the polar seas or rising from lower ocean depths.

**Vegetation, Natural and Cultivated.**

In many parts of Eastern Canada and the adjoining area of U.S.A. land fit for pastoral or agricultural purposes has been cleared of its virgin coniferous and mixed forests. Cultivation is more narrowly limited than in North-West Europe by the coolness and cloudiness of the growing season, and agricultural work is often impossible during the four winter months. Oats, barley, and root crops, especially potatoes, are the chief field crops. Large quantities of orchard fruits, like apples, pears and plums, are grown in sheltered parts, e.g. Ontario, New Brunswick. Mixed farming and dairying are carried on almost everywhere, and most of our Canadian cheese comes from the more sheltered districts of Eastern Canada.

**Man's Activities.**

Apart from the differences already noted, the east marginal sub-region of North America provides similarly favourable opportunities for all branches of man's activities as North-West Europe. Exploited by folk of the same racial stock, Nature's opportunities

are to-day being made use of in much the same way in both sub-regions. Lumbering, farming, mining, manufacturing, and commerce are all being extensively developed on modern lines, and man's mode of life in the east marginal sub-region is essentially the same as in our own. Concrete evidence of this is found in the many articles produced in this region which are in use and on sale in Britain. Motor cars, lisle socks, men's felt hats, safety razors, locks, cameras, typewriters, soaps, tooth pastes, magazines and books, prepared foodstuffs, and a host of labour saving appliances, such as vacuum cleaners and adding machines, are a few of these articles with which we are familiar. They also illustrate the fact that one manufacturing country, as a rule, only imports the specialities of another.

In this development the inhabitants of the newer region had the two-fold advantage of being forearmed with knowledge and experience gained in the older region, and of being able to start under conditions untrammelled by complications due to centuries of historical growth, and hence without some burdensome responsibilities.

In regions of sparse aboriginal population settled in comparatively recent times by the white races, the present population, by reason partly of the selective effect of emigration, contains a greater proportion of people of the pioneer, resourceful and go-ahead type, bent upon exploiting the actual and potential resources of their land of adoption. Thus, compared with the population of the older countries, that of younger lands has a smaller proportion of the accomplished, cultured, discriminating types of individuals. Herein is to be found one possible explanation of some of the general differences of outlook and standards of values of Americans, Canadians, and Australians, and of ourselves or our continental neighbours. Broadly speaking, in newer lands offering wider opportunities the inhabitants, while showing an eagerness to avail themselves of short cuts to prosperity, may be and sometimes are shortsighted and impetuous in their actions. They show a greater readiness to adopt mechanical aids to production, transport, and commerce, and to employ labour and time-saving appliances in their homes as well as at their places of work. Typical among the many examples of such tools and appliances are the power-driven " jiggers " and band saws of the lumber camps, the " chink " of the salmon canneries, milking machines on the dairy farms,

mechanized excavators, drills and cutting machines used in mining, tractor-drawn ploughs and harvesters for arable farming, box-making machines as well as specialized power-driven workmen's tools and machinery similar to our own used in all kinds of manufacturing industries. Automatic sales machines, dictaphones, cash registers (even fountain pens) assist trade and commerce, while home life is lightened by a host of appliances ranging from safety razors to vacuum cleaners and refrigerating plants. This is only what would be expected in countries which are relatively sparsely populated and which offer greater opportunities for people to work for themselves instead of for other people. In the older countries, with their greater labour supply and lesser opportunities for large scale primary industries, where conditions have been favourable to their employment, many of these mechanical aids to greater efficiency and speed in production and business have been widely adopted. In the more recently settled countries farming is extensive rather than intensive in character. Although the average yield per acre of crops is usually lower, the average total yield per farm is generally higher, because larger farms are worked often with mechanical aids such as giant tractor-drawn disc-ploughs and " combines " or " harvesters/' Large ranches and sheep runs support huge herds of cattle and flocks of sheep respectively, but the quality of the animals is not so high as those raised in older-established stock-raising countries. Where manufacturing is carried on mass production methods are more frequently employed, and the use of special machinery tends to take the place of the highly skilled craftsmen of the countries where manufacturing has been carried on for centuries. The utility of the manufactured article is often the foremost, if not the sole, consideration. The manufactured goods of North America, in which continent alone of those settled by the white race manufacturing to an extent comparable with that of North-west Europe is carried on, provide many illustrations of contrasting characteristics of industrial organization and output, e.g. motor vehicles, machine-made watches, ready-made clothing, household requisites, even frame houses made in sections ready for erection by semi-skilled labour. On the other hand, the natural resources of the newer countries have not always been as wisely or as well used as they could have been. Unscientific cropping and the neglect to use fertilizers have impoverished soils, and in the case of

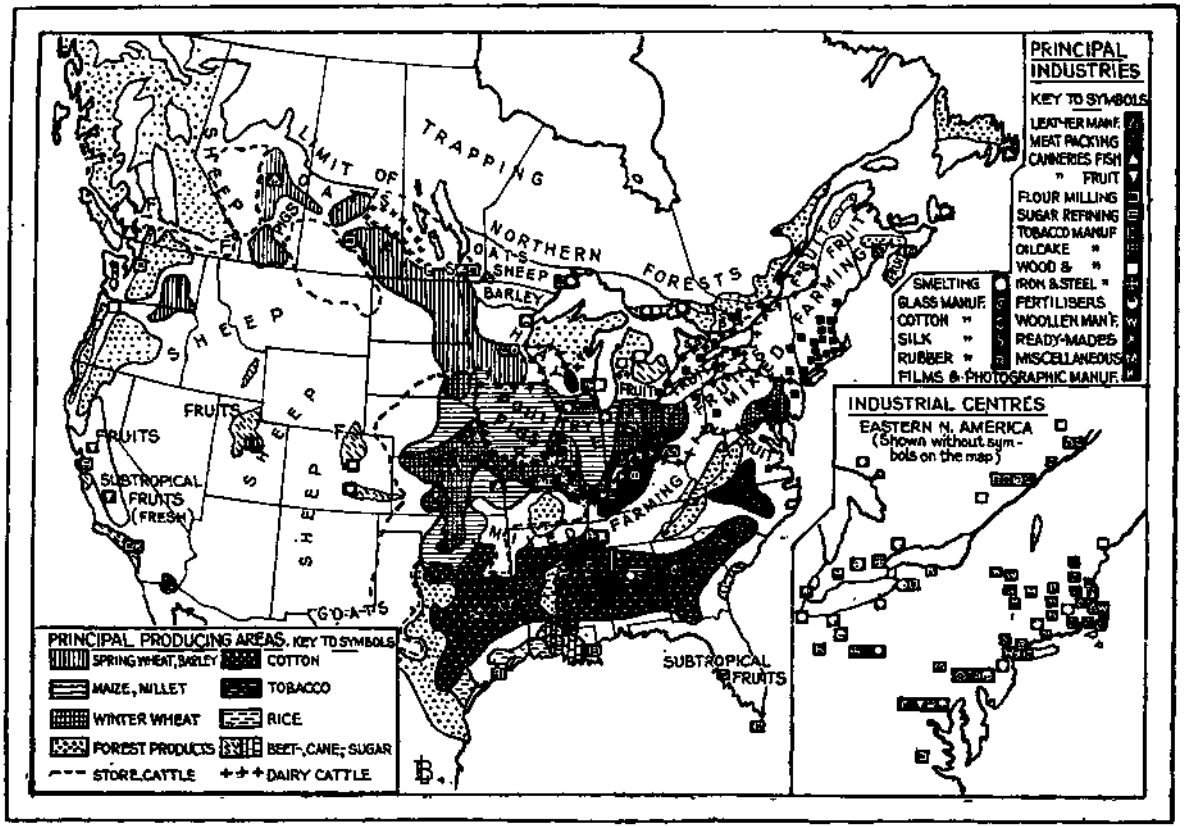



FIG. 91. PRODUCTION AND INDUSTRIES, NORTH AMERICA

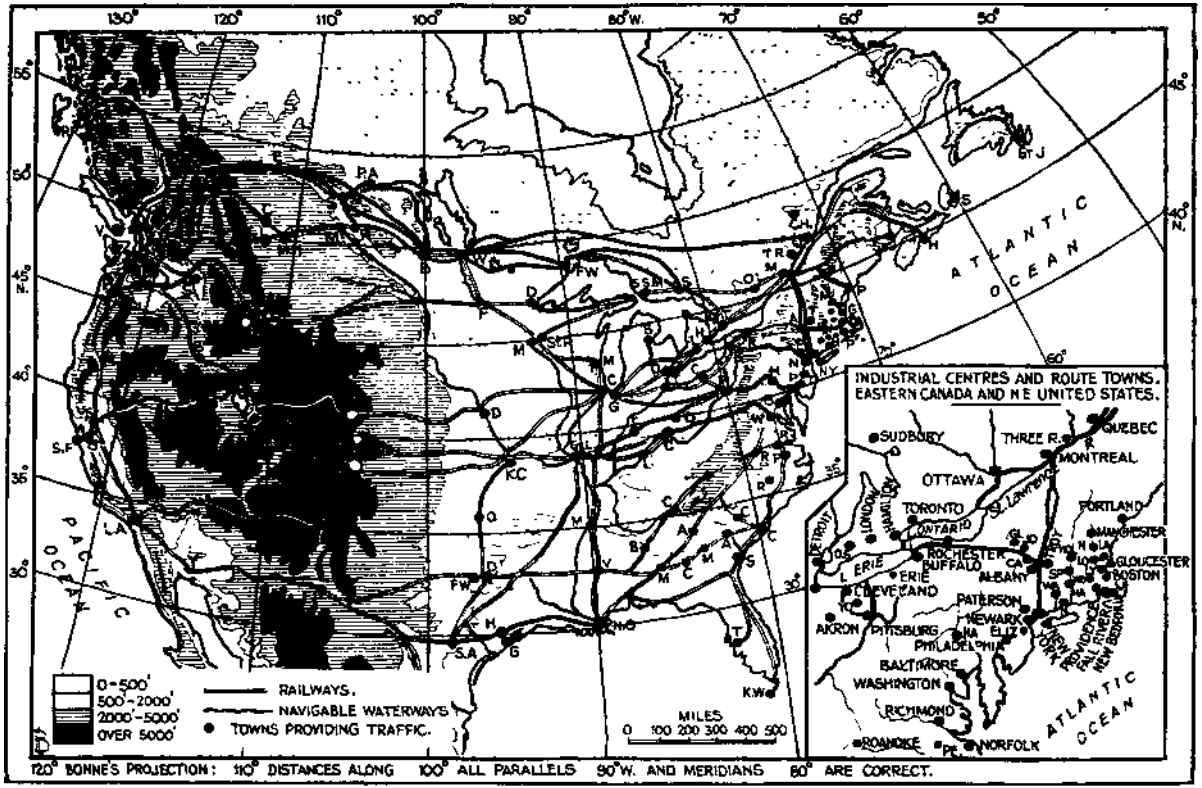



**FIG. 92. PRINCIPAL ROUTES WITH CENTRES PROVIDING GOODS AND PASSENGER TRAFFIC, AMERICA**
**The identity of the physical features, the natural gaps used as route ways and towns should be established by reference to a pood atlas**

most of the former American tobacco growing districts completely ruined the land. Without due regard to future requirements or the possible harmful effects upon local weather, water supply, and soil conditions, the forest growth of centuries has been destroyed to make way for farms, or recklessly cut to supply the passing demand for certain forest products. On the Appalachians of U.S.A. millions of good trees have been cut down for the tan bark alone and the trunks allowed just to rot. Such wasteful and extravagant use of timber, so long as ample supplies were available, is in marked contrast to the scientific forestry of European countries, where scarcity has made timber-raising on land unsuitable for agriculture as well managed as crop-raising. For example, on the sand dunes and marshes of the South-west of France, Holland and Denmark, profitable pine forests yield resin, tar, turpentine, pitprops, and sawn timber. The first three products are obtained by bleeding to death the smaller trees whose trunks provide pitprops, poles, and fence palings. The thinning process involved promotes the growth of the remaining trees to provide merchantable sawn timber. When these are cut the forest is replanted to go through another forty to fifty years' cycle of harvests. \ Fortunately, during the present century, scientific forestry has become increasingly practised in the newer countries. Similarly, the working, formerly, of only the better-paying or more easily obtainable mineral deposits involved a waste of mineral resources, but the application of more efficient mining methods, the re-working of abandoned workings, and the reclamation of mineral bodies previously rejected are to-day all making for a more complete utilization of mineral resources.

The same all-round development has not been achieved in either South Argentina or the east marginal region in Asia. In the former country mining is of no great importance, hence supplies of coal, iron, and other minerals required for the development of great metal, chemical, and textile industries are lacking. Its future lies in the steady extension of its scientific farming and expansion of its industries based on farming. Owing to paucity of mineral wealth and comparative world isolation, it seems destined to play the role of food supplier to the great manufacturing regions of the Northern Hemisphere.

The East Marginal Region of Asia is in a backward state because lack of transport, distance from the world's markets, unstable

political conditions, and a sparse population mainly composed of less energetic and less progressive Oriental colonists, all help to retard development. In the northern areas, extensive forests of poor and often stunted larch, birch, silver fir, and poplar trees, provide timber and fuel for local requirements and profitable hunting ground for the fur trapper. In the cleared areas man grows rye and root crops mainly for home use, and beans for export.

## CONTINENTAL INTERIOR. LONG SUMMER TYPE

### Location.

This type of natural sub-region is found in the Middle West of U.S.A., the plains of Hungary, Rumania, and Ukraine, and an area comprising parts of North China proper, West Manchuria and South Mongolia.

### Climate.

MEAN MONTHLY TEMPERATURES (t°F.) AND RAINFALL (r*)

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Deo. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chicago *800'* | 42° 18' N. 87° 50' W. | *t* *r* | 25*0 2 1 | 27-0 2-3 | 36-6 2-6 | 47-0 2-9 | 58-4 3-6 | 68-1 3-5 | 740 3-4 | 72-9 3 0 | 66-3 3 1 | 54-8 2-4 | 41-5 2-5 | 30-3 2-2 |
| Bukareat *280'* | 44° 25' N. 26° 6' E. | *t* *r* | 26-2 1-2 | 30-6 1-1 | 41-0 1-7 | 52-2 1-8 | 62-2 2-5 | 68-9 3-3 | 72-3 2-8 | 720 1-9 | 63-5 1-5 | 52-9 1-7 | 40-0 1-9 | 30-9 1-7 |
| Pekln . *130'* | 39° 57' N. 116° 28'B. | *t* *r* | 23-2 0-1 | 27-7 0-2 | 38-8 0-2 | 55 4 0-7 | 67-6 1-4 | 75-6 3 0 | 77-5 9-4 | 75-9 6-2 | 66-7 2-8 | 55-5 0-5 | 38-3 0-3 | 27-0 0 1 |

Compared with the *West Side Marginal Sub-Region,* climatic conditions, generally speaking, are more inconstant, the annual range of temperature is greater, and changes accompanying spells of weather are more sudden and decided. A drop of 60° F. and a rise of 48° P. within a day have been recorded at Chicago. Summer temperatures are often for days and weeks as high as those in tropical regions, winter temperatures as low as places in the tundra regions. On the average the growing season, i.e. frost free period, is five or six months long and varies according to latitude, altitude, and distance from the sea. Annual precipitation is just sufficient to support thriving agriculture, but damage to man's work is more or less inevitable owing to snowstorms and blizzards in winter and frequent destructive thunderstorms in summer.

**Vegetation.**

Natural vegetation varies from meadow land in the drier sections to deciduous forests of oak, hickory, beech, or maple in places having more rain. Almost any crops which will reach maturity in six months, e.g. maize, sugar beet, and grassy cereals, such as millet, oats, rye, wheat and barley, can be grown. Timothy grass, clover, alfalfa and other forage crops are also cultivated. The cold snowy winters and the dry late summers make regions of this type more suitable for agriculture than for grazing live stock. Horses, sheep, and cattle are reared, however, in the more sheltered areas, as on the Hungarian Plain which is screened from cold winds by the Carpathians. Farming is predominantly of the " mixed " type. A farmer grows a variety of cereals, some as winter fodder for the few cattle he grazes, and raises vegetables and fruits. After supplying his own needs, he sells his surplus produce.-^

**Man's Activities,**

The peasant farmers of Hungary and Rumania, and the non-collectivized Ukraine peasant cultivator, lack the social and economic organization and a keen desire for world trade, without which the best use cannot be made of natural resources. The stockmen of the Hungarian pusztas and Rumanian grasslands still lead nomadic lives on a slightly higher plane of civilization than their distant kinsman, the Kirghiz herdsman, while the North American rancher enjoys a settled and civilized life comparable with our own. The contrast between the farming methods and general standard of living of the peasant farmer in the older and of the progressive agriculturist in the more recently developed regions is equally well marked. Partly because the peasant cultivator, producing mainly for his own consumption, is content with small returns from the land, and partly because it would often be difficult to market any surplus produce owing to lack of good transport facilities, unscientific agriculture of the domestic type is the result. The progressive agriculturist, with unequalled transport facilities, earns his living by concentrating upon commercial farming on scientific lines. The farmer of the Middle West uses every aid modern scientific research upon the treatment of soils, choice of seeds, methods of tillage, and combating diseases and pests, can give. He employs the most efficient agricultural machinery

he can obtain. The tractor-drawn disc plough and combine (reaping, threshing, and bagging operations are all done by this machine as it moves along), and centrally situated grain elevators replace the ox-drawn plough, hand reaping, and local farm granaries of the

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FIG. 93. HARVESTING AND THRESHING IN ONE OPERATION WITH A COMBINE, CONDIE, SASK., CANADA

Note the expanse of prairie and the way the machine swathes the wheat

peasant farmer of the Hungarian alfold and the black earth region of the Ukraine outside the Soviet regime of collective farming.

In the northern parts of the American region, many farmers are so exclusively engaged in growing maize, wheat, and other cereals for export that subsidiary agricultural interests like fruit and vegetable growing, and stock and poultry keeping for home consumption, are neglected. Out of the money from the sale of their crops they supply their own needs and those of their farms, and their standard of living is similar to that of English farmers.

In the southern districts, maize rather than wheat is extensively grown, partly as food for the local population and for export, but

mainly for the feeding and fattening of cattle and hogs for slaughter. Hundreds of miles of almost level prairie are rarely varied by undulations steep enough to interfere with the extensive use of agricultural machinery or the laying out of roads and railways.

*By kind The High Commissioner for Canada*

FIG. 94. RAILSIDE GRAIN ELEVATORS, VULCAN, ALBERTA, CANADA
A variety of tractor-drawn combine is swathing wheat

The naturally fertile soil is so free from stones that the farmer can ride on his farm machinery, and so unaided can cultivate as much as forty acres. The output of grain per acre is somewhat less than on a British farm, only because intensive cultivation with its consequent expense is unnecessary and would be at present uneconomic. Each farm, in addition to maize, usually grows wheat, oats, and hay, which require the farmer's labour at different seasons **from** the maize. The scientific culture of new and better varieties of maize, the introduction of silage, and the growing use of maize at the so-called roast ear stage (i.e. not fully ripened) as a fresh or tinned vegetable, are all helping to extend maize growing into the cooler northern districts.

The fertile loess-covered lowlands round Pekin support a dense population occupied in growing maize, wheat, barley, beans, and millet, and, to a smaller extent, tobacco and cotton, almost entirely for home use. The people of this area live and raise their crops in much the same way as the garden cultivators of the adjoining Monsoon region.

In the Interior Continental Regions of the Long Summer type, towns and cities such as Chicago, Budapest, Kiev, have arisen at convenient route, collecting and distributing centres. Chicago, or, as it was then called, Fort Dearborn, was a century ago a small lakeside post almost outside the limits of civilization./ As its hinterland has developed Chicago has grown into a modern western city, covering 200 square miles, and having a population of three millions. It also has no less than twenty-seven railway systems besides steamer routes. In addition to being the greatest meat packing centre in the world (over seven million pigs alone have been packed in a year), it handles about 120 million bushels of grain yearly. It is in Chicago's " pit " that the world price of wheat is most often decided. The modern meat packing plant is a most wonderful example of speed, mechanical perfection, and the use of by-products. A procession of live pigs, cattle, or sheep go through a gate, and in a few seconds their carcasses, hanging on little trolleys are travelling through an avenue of men, who each remove some particular part of the carcass before the meat portion finally passes into cold storage. Absolutely nothing is wasted. It is truly said that the only part of the pig of which no use is made is its squeal. While many of the products of this animal industry and its subsidiaries are consumed in North America, large quantities are exported to all parts of the world.

Budapest and Kiev, on a much smaller scale, have also developed up-to-date industries arising from or dependent upon agriculture, such as flour milling, beet sugar refining, and the manufacturing of methylated spirits.

## CONTINENTAL **INTERIOR- SHORT** SUMMER **TYPE**

### Location.

Regions of this type are mostly found in the prairies and steppelands of the Northern Hemisphere.

## Climate.

**MEAN MONTHLY TEMPERATURES (*t*° F.) AND RAINFALL (r")**

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Winnipeg | 49° 53' N. | *t* | -3-9 | 0-1 | 15-0 | 37-7 | 52-5 | 62-3 | 66-4 | 63-8 | 53-7 | 40-7 | 21-3 | 5-8 |
| ***76'*** | 97° 7'W. | *r* | 0-8 | 0-9 | M | 1-5 | 2-0 | 3-1 | 3 1 | 2-2 | 2-2 | 1-4 | 1 1 | 0-9 |
| St. Paul | 44° 55' N. | *t* | 12 1 | 15-2 | 29-0 | 45-6 | 58-6 | 67-4 | 72-3 | 69-4 | 60-6 | 48-1 | 32 1 | 19-8 |
| ***848'*** | 93° O'W. | *r* | 0-9 | 0-8 | 1-4 | 2-3 | 3-4 | 4-1 | 3*4 | 3-3 | 3 2 | 2-0 | 1-4 | 1 0 |
| Moscow | 54° 41' N. | *t* | 13-6 | 16-7 | 24-6 | 38-4 | 54-9 | 61-5 | 65-7 | 61-7 | 51-4 | 40-0 | 28-0 | 18 5 |
| ***480'*** | 37° 40' E. | *r* | 1-2 | 1 0 | 1-2 | 1-5 | 1-9 | 2-0 | 2-8 | 2-9 | 2-2 | 1-4 | 1-6 | 1-5 |
| Charbin | 45° 43' N. | *t* | -1-7 | 5-4 | 24-1 | 42-3 | 56 0 | 66 0 | 72-1 | 69-4 | 58-0 | 39-9 | 21-2 | 3-2 |
| ***520'*** | 126° 40' E. | *r* | 0-2 | 0-2 | 0-4 | 0-9 | 1-7 | 3-7 | 4-4 | 4 1 | 1-8 | 1-3 | 0-2 | 0-2 |

Owing to their distance from the sea, climatic conditions are extreme. Summer temperatures are higher and winter temperatures lower than in any other region of the cool temperate type. Owing to the dryness of the atmosphere, sensible temperatures are not so high nor so low as the recorded temperatures might suggest. Summer heat is not unpleasant; the winter cold makes well built dwellings, warm clothing, and heat-giving food desirable for man's well-being. The growing season is about four months long and crops have to be spring sown because the severe winters kill autumn sown seeds. Precipitation falls mostly in summer and is light. In winter the countryside is snowed up for three or four months, and transport other than by sledge is hampered. On the Russian steppes, where roads are inherently bad and railways few in number, winter is the best season for travelling ; in Canada the reverse is the case.

## Vegetation.

Soil conditions, as well as climate, favour the existence of natural grasslands, which were once inhabited by nomadic, pastoral, or hunting tribes.

## Man's Activities.

In the sections more recently settled and more distant from markets, cattle raising is still man's principal occupation. The Canadian ranchmen of North Alberta, with their superior facilities of transport, communication, and for raising capital, are more progressive than the Russian ranchers on the Siberian steppes, and

both lead more civilized lives than the nomadic herdsmen and shepherds also of the latter region. The larger ranches in Alberta are in general owned by joint stock companies, the ranches being conducted by managers, who have usually had veterinary experience.

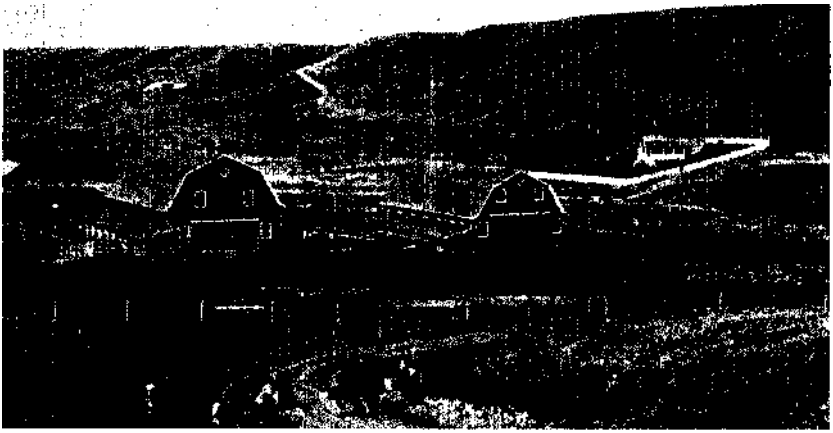

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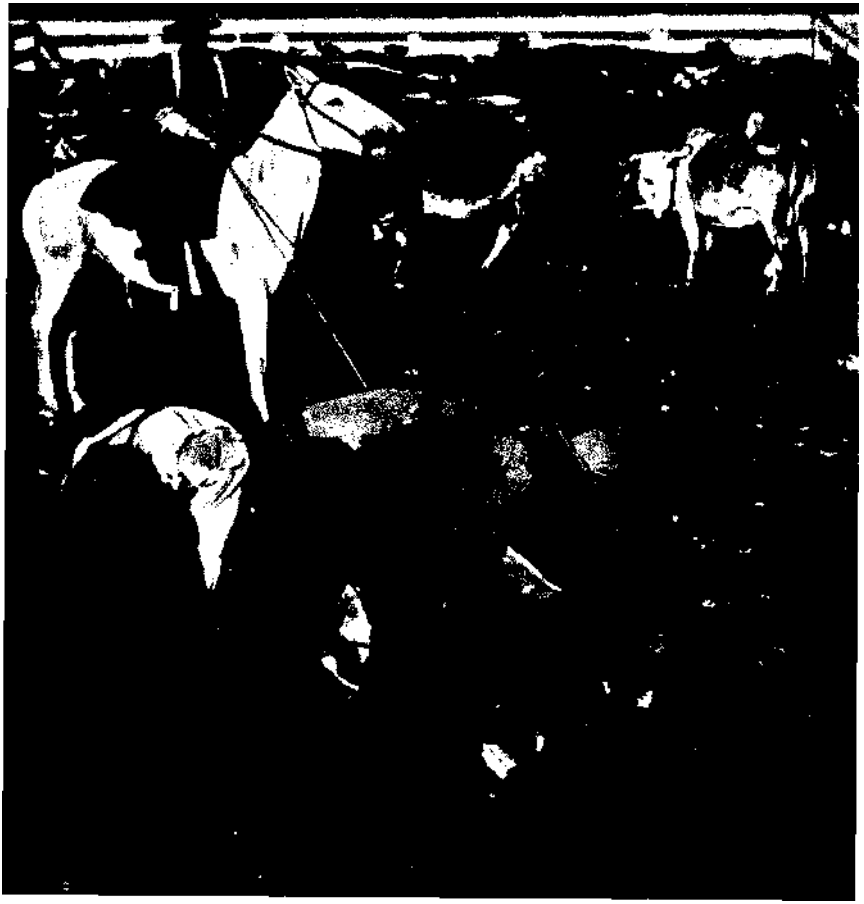
FIG. 95. CATTLE KAISTCH, CROSSFIELD, ALBERTA, CANADA

As the geographic adjustment called for by the present economic conditions in the more settled parts of the world is continually taking place, more and more of these grasslands come under the plough. In Canada cultivation is slowly creeping westwards and northwards as the railways are extended and population increases. Only one quarter of Canada's wheat land has been developed, and the discovery of a new variety of wheat which would take a week less to mature than the present varieties would open up some 40,000 square miles for wheat cultivation. Wheat, barley, rye and flax are grown in increasing quantities. Winnipeg is a characteristic product of this development. In 1870 Winnipeg was little more than a fur trading post of 200 people. As the settlement of wheat lands has followed the building of railways, this town has developed into a busy western city, with a quarter of a million inhabitants.



*By kind permission of* *The High Commissioner for Canada*

FIG. 96. BRANDING CALVES ON A CANADIAN RANCH

*

It is now the business and financial centre, wholesale distributing centre and market for the Prairie Provinces, which justly deserve their title " the Granary of the Empire." It is a large pivotal rail centre, has big stock yards, and handles enormous quantities of grain. In a good year the wheat crop alone totals from 300-400 million bushels. Flourishing subsidiary industries, such as flour milling, the making of leather and agricultural machinery, and railway machine shops are located here. Except that Chicago deals more with animal products and Winnipeg more with crops, the latter and more recent city is a replica of the former on a much smaller scale.

Owing to the same reasons as in the case of the East Marginal Region of Asia, the Siberian steppe lands are in a very backward state compared with the Canadian Prairies, but Chinese and Russian settlers are making very slow but sure headway.

About half the cultivable land of Manchuria is worked. Wheat, kaoliang, sorghum, maize, millet, rice, and soya beans are widely cultivated. Soya beans are not only the mainstay of the agricultural population and the chief export crop, but also the basis of the bean oil and bean cake export industries. Manchuria contributes more than 90 per cent of the soya beans and 70 per cent of the soya bean oil entering the world's markets. Under Japanese influence, western ideals and methods are being introduced. Harbin has flour and oil mills, Anshan and Fushan steel and shale oil works and the Ssupingkai coal liquefaction plant is producing. With an energetic and industrious Chinese population the country should develop under a stable political regime. Wild silkworms flourish on the leaves of the shrub oak in the southernmost districts, and the silk obtained from them is exported to Shantung to be manufactured into high grade tussore.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

### WESTERN MARGINAL REGIONS

1. Draw rainfall and temperature graphs of places situated in the west side of the Cool Temperate Regions. Point out and account for the chief climatic dififerences and characteristics of the four sub-regions.

2. The annual distribution of temperatures and rainfall is controlled by latitude, altitude, relief, direction of the prevailing

winds, nearness to the sea, and the character of ocean currents. What bearing has each of these factors on the climate of the four places given for the British Isles ?

3. " A marked feature of our climate is the variability of the weather within short periods of time." Explain the relation of this fact and the passage of cyclones and anticyclones. What bearing have these spells of weather upon our activities ?

4. The B.B.C. broadcast daily weather forecasts. Of what value are these to the general public, farmers, corporation officials, railway authorities, shipping firms, haulage and road transport contractors, lawyers, refreshment caterers and sports organizers ?

5. " South Eastern England and the neighbouring parts of the Continent have an almost ideal climate for white men." Explain why this is so.

6. From your own observation and experience show how the cycle of the seasons influences the kind and variety of your food, the quantity and kind of your clothing, and the scope of your outdoor and indoor activities.

7. " North-West Europe is economically and politically the foremost region of the world." Discuss this quotation and point out what geographical conditions (including man himself) have helped to create this world supremacy.

8. Give an example of each of the four stages of farming found in N.W. Europe and show how far they are the results of geographical control.

9. On the Northern Plain of Europe sugar beet cultivation is closely associated with cattle raising. Point out the advantages and disadvantages of this combination.

10. In what ways do the character and type of agriculture near manufacturing areas differ from those in non-industrial districts ? Account for the differences.

11. **AVERAGE DEATH RATE PER 1,000 IN EUROPE 1931-35**
**(Corrected for standard Population, Hungary and Russia excepted)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Austria . | 13-5 | Esthonia | 14-9 | Italy . | .160 | Russia | 19-2 |
| Belgium | 12-9 | Finland | 13.4 | Netherlands . | 8-9 | Scotland | 7-5 |
| Bulgaria | 15-5 | France. | 15.7 | Norway . | 10*4 | Spain . | 16-2 |
| Denmark | 10-9 | Germany | 11.2 | Poland . | 14-6 | Sweden | 11-6 |
| England and Wales | 8-4 | Hungary | 15.8 | Portugal . | 170 | Switzerland . | 11-8 |
| | | Irish F.S. | 140 | Rumania . | 20*6 | | |

**FIG. 97. METAL AND OTHER THAN TEXTILE INDUSTRIES; BRITISH ISLES**

FOREIGN TRADE IN £1,000,000

| | | | | |
|---|---|---|---|---|
| 1931-5. | Cardiff: | Imp. | 5. | Wheat, timber, maize, iron ore and scrap. |
| | | Exp. | 9. | Coal, patent fuel, iron and steel, coke. |
| | Bristol: | Imp. | 22. | Tobacco, petroleum, wheat, bananas, maize. |
| | | Exp. | 1. | Iron and steel, paper, hardware, leather, oils. |
| | Southampton: | Imp. | 26. | Fruit, wool, petroleum, meat, tobacco. |
| | | Exp. | 21. | Textiles and garments, machinery, tobacco. |
| | London: | Imp. | 316. | Wool, timber, petroleum, machinery, paper, rubber, sugar, leather, chemicals. |
| | | Exp. | 96. | Machinery, vehicles, chemicals, textiles, electrical goods. |

**FIG. 98. TEXTILE INDUSTRIES AND TRADE; BRITISH ISLES**

FOREIGN TRADE IN £1,000,000

| | | | |
|---|---|---|---|
| 1931-5. | Glasgow: | Imp. 19. | Wheat, dairy produce, petroleum, fruit, and timber. |
| | | Exp. 23. | Machinery, iron and steel, ships, textiles, coal. |
| | Leith: | Imp. 10. | Foodstuffs, flax, timber, paper. |
| | | Exp. 3. | Cottons, machinery, iron and steel, paper. |
| | Tyne: | Imp. 13. | Dairy produce, pig products, timber, petroleum, paper. |
| | | Exp. 12. | Coal, coke, ships, chemicals. |
| | Liverpool: | Imp. 131. | Cotton, wool, fruit, wheat, tobacco, tin, copper. |
| | | Exp. 112. | Textiles, machinery, iron and steel, oil, chemicals. |
| | Manchester: | Imp. 38. | Cotton, petroleum, wheat, paper, timber, tobacco, copper. |
| | | Exp. 12. | Cottons, machinery, iron and steel, woollens |
| | Hull: | Imp. 45. | Wool, wheat, timber, dairy produce, oilseeds. |
| | | Exp. 22. | Textiles and yarns, oil, coal. |

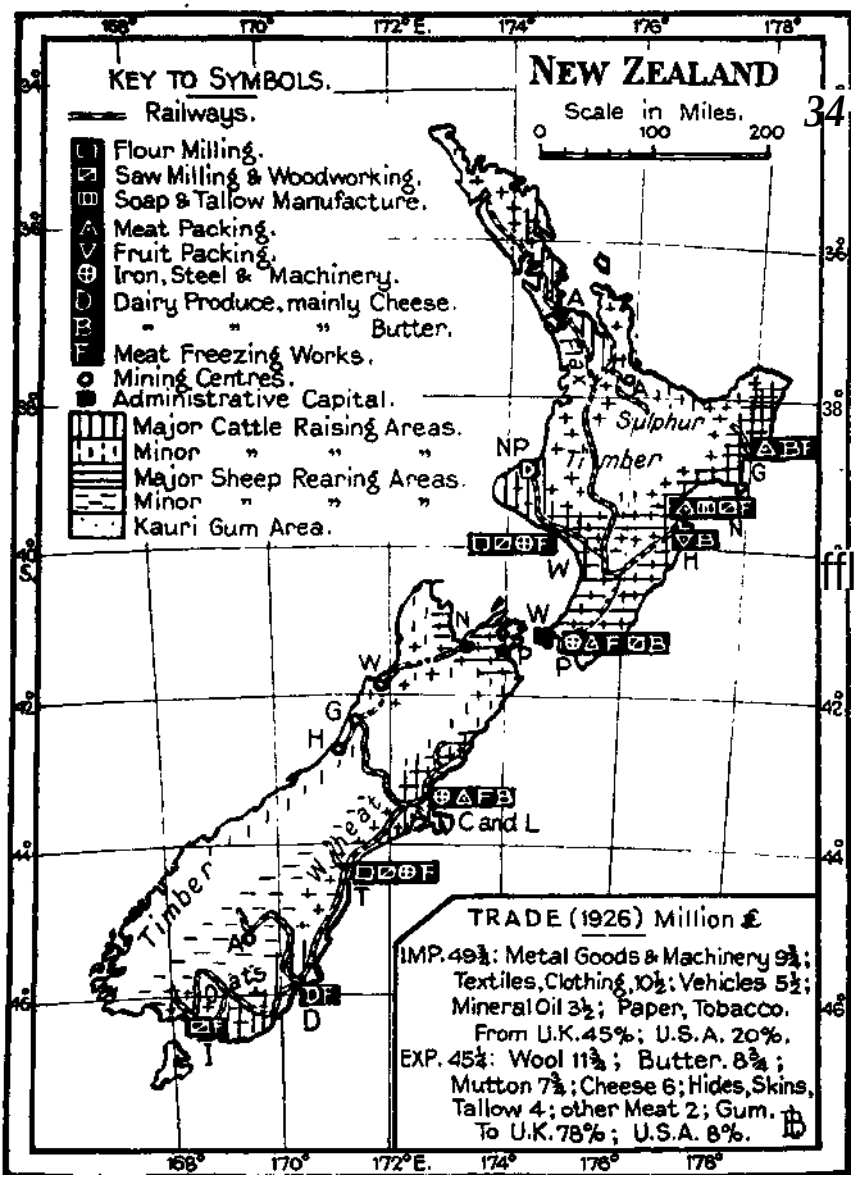



**FIG. 99. NEW ZEALAND; PRODUCTION, INDUSTRY, AND TRADE**

**The towns should** be identified by referring to an atlas

1935: Imports 36-3. Cars 4-2, iron and steel 3-7, textiles 4-8, machinery 3-6, petroleum 1-8. From U.K. 50 per cent; U.S.A., 12.
Exports 46-5. Butter 13-6, mutton 12*8, wool 7 1, cheese 4-4, gold 1-4. skins 1-3. To U.K., 87 percent; U.S.A. 5.

Insert these facts on a map of Europe, using a scale 12-14, 15-17, etc. Shade heaviest the countries having the highest rates. Compare your map with those showing temperatures, rainfall, vegetation, and crops, mineral wealth, density of population, industrial areas, and transport facilities. Explain any relationships

FIG. 100. REMOVING FLAX AFTER RETTING IN A LINT IIOLE, NORTHERN IRELAND

you discover and point out the probable bearing of the factors of geographical environment, including man himself, upon health.

12. From the above table say how the natural regions of Europe compare with each other.

13. Are there any marked differences between agricultural and industrial zones in the same natural region? See table above and maps.

14. Find out how the countries of N.W. Europe compare as regards illiteracy.

15. Summarize the conditions which favour the location and growth of manufacturing towns. How far have these factors influenced the location and growth of any local industry with which you are familiar ?

16. Including articles used for food, clothing, shelter, tools, and utensils, make a list of six manufactured commodities you know, and find out the following points concerning each: where made, material used in manufacture, source of the raw material, whether

*From a photo kindly lent by* *Messrs. Thos. Firth & Sons, Ltd., Sheffield*

FIG. 101. TEEMING FIRTH'S SPECIAL ALLOY STEEL, SHEFFIELD

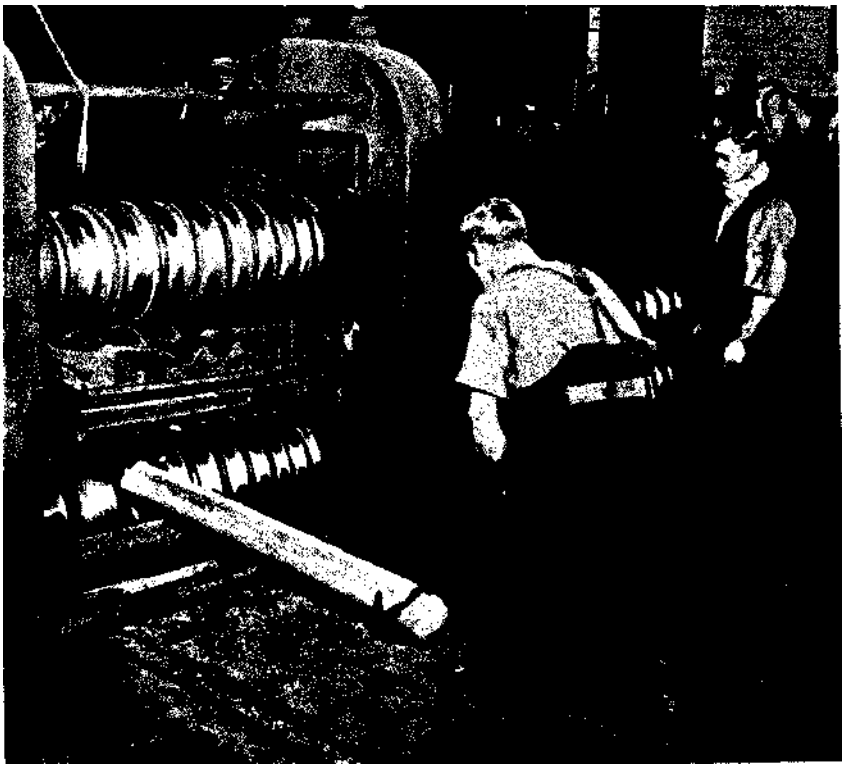
**The man on the left Is stirring and removing scum from the stream of molten metal as it flows into the mould to make a casting**

great skill is needed in production, whether value depends upon usefulness, artistic value, or other factors such as users' taste, value of by-products of raw material from which it is made, processes of its manufacture, working conditions of the producers.

17. "A good soil and climate and the absence of mineral

resources make the Danes an agricultural people." Expand, criticize, and explain this quotation.

18. " Holland's chief asset is its position." Explain why and how this is so.



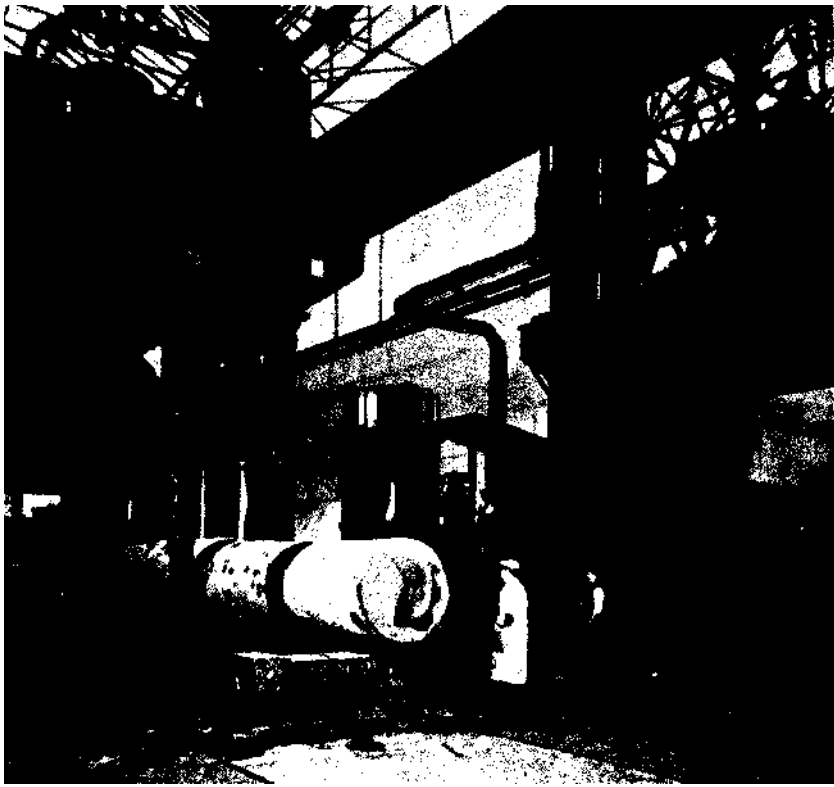
*From a photo kindly lent by* *Messrs. Thos. Firth & Sons, Ltd., Sheffield*

FIG. 102. ROLLING STAINLESS STEEL BARS FROM BILLETS, SHEFFIELD
This process is the first of a series of rollings by which strip and sheet metal is made the right thickness preparatory to being used on stamping-out machines

19. What are the chief occupations of the people of the Netherlands and Belgium ? Account for any differences.

20. Draw a map of the West Marginal sub-regions of North America and Europe and insert the principal areas growing wheat, rye, potatoes, flax, and apples. Tabulate the geographical conditions necessary for the successful growth of each, and give the various uses to which these crops are put.

21. Compare the South Island, New Zealand, with England, using the headings of position, relief, climate, racial characteristics of the inhabitants, occupations of people. How do New Zealand



*From a photo kindly lent hy* *Messrs. Thos. Firth & Son.s, Ltd., Sheffield*

FIG. 103. A 4,000 TON PRESS OPERATING ON A HEAVY FORGING, SHEFFIELD

**The upper die shown in the background rises and falls on the white-hot forging which rests upon a complementary die fixed in the flooring. The metal is shaped by being pressed between the two dies. The electrically-operated travelling sling moves the metal forgiog into position**

industries differ from ours, why, and are they likely to remain so different ?

22. Compare world maps showing density of population, climate, diseases, manufacturing areas, shipping, and railways. Which

natural regions are the most prominent? Explain and account for any resemblances or differences you may find.

23. Do climatic conditions or past human interference account for the lack of forests in North Manchuria ?

24. " Wheat is a cultivated grass and belongs to the natural grasslands of the world." Compare maps showing the natural grasslands areas and wheat production, and point out how far this statement is true.

25. What conditions make it possible for wheat to be cultivated so extensively throughout the world ?

26. Define the expression " mixed farming," and suggest the circumstances in which this type of farming can be profitably carried out.

27. Draw up a list of the actual and possible secondary industries to be found in an agricultural area where mixed farming is practised.

28. Give an account of the preparation of textile fibre used in the linen industry of Belgium.

29. Give a short description of the four chief processes of the iron and steel industries; smelting, casting, forging, and rolling. Consult Figs. 101, 102, 103.

30. Figs. 104 and 105 show the interior of a weaving shed in a " wool " town of the West Riding and the essential features of a woollen loom. Study the pictures carefully, identify the various working parts of the loom, and give their functions. Point out how a young woman worker is naturally fitted for the specialized work to be performed.

## EASTERN MARGINS

1. Examine climatic statistics relating to the regions of the cool temperate types situated on the east and west margins of continents, and point out and account for any climatic differences or resemblances you find.

2. What conditions favour the production of oats, rye, potatoes, and fruit in these regions ?

3. Under the headings given in Fig. 1, give a concise geographical account of the East Marginal region of Asia, i.e. the lands fringing the Sea of Japan.

4. Account for the position and importance of Vladivostock.

5. Draw a sketch map of the St. Lawrence and Great Lakes waterway system of N. America. Insert and name the canals, the chief towns, and their industries and railway connections.

6. Explain why the Hudson-Mohawk route is the most important

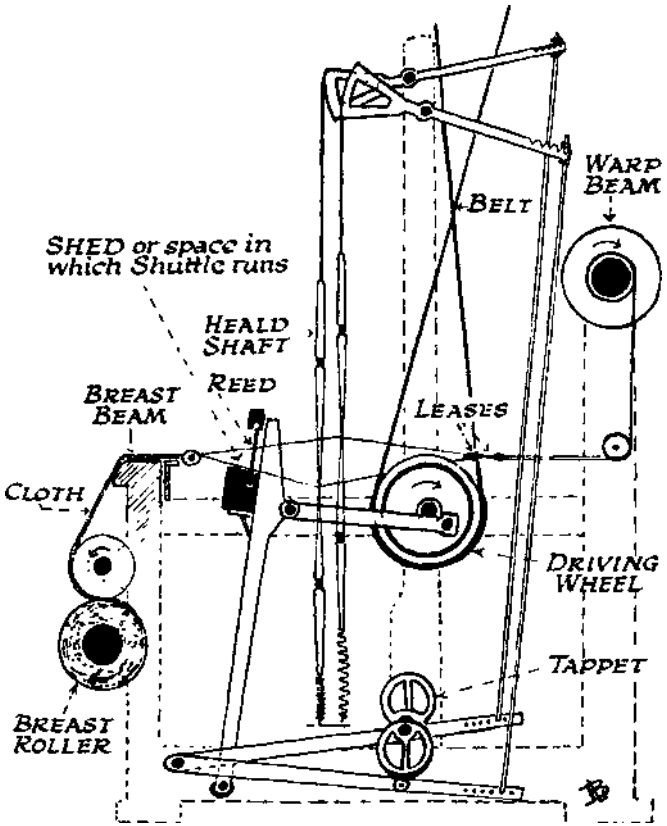



FIG. 104. DIAGRAM OF A POWER LOOM SHOWING ESSENTIAL PARTS

route between the Atlantic Coast and the Middle and Far West of the United States.

7. Compare and contrast the provinces of New Brunswick and Nova Scotia with Quebec as regards climate, agriculture, density of population, and racial stock of their inhabitants.

8. Why, as in Ontario, is butter manufactured in summer and cheese in winter in New Brunswick and Nova Scotia ?

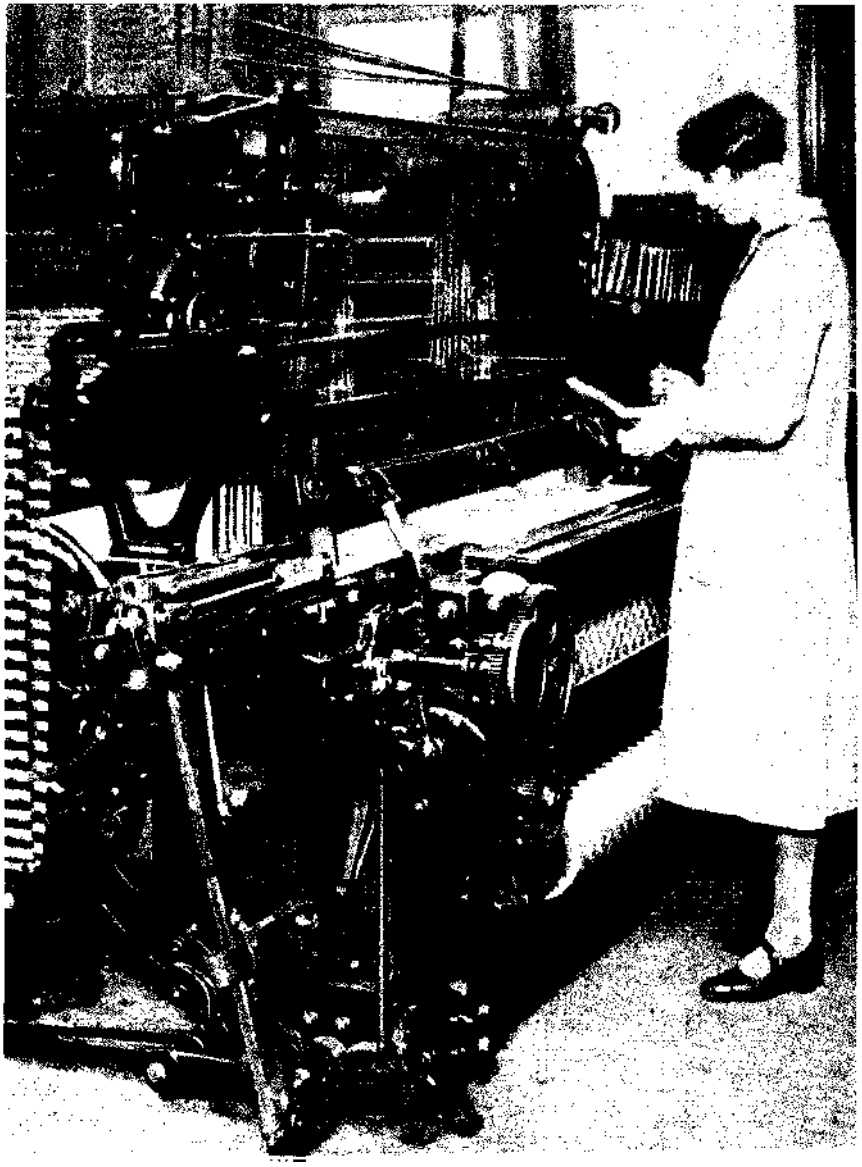


*Photo kindly lent by* *Messrs. Geo. HIattersley & Sons, Keighley*

FIG. 105. WEAVING ON A MODERN AUTOMATIC LOOM

9. Possessing virtually neither coal nor raw materials, account for the facts revealed in the following table—

| United States (State) | % of urban population | % of population engaged in manufacturing | Density of population, p.sm. |
|---|---|---|---|
| Maine | 40.3 | 7.5 | 26-7 |
| New Hampshire | 58.7 | 10.3 | 51.5 |
| Vermont | 330 | 4.2 | 39.4 |
| Massachusetts | 90.2 | 9.4 | 528.6 |
| Rhode Island | 92.4 | 7.5 | 644.3 |
| Connecticut | 70.4 | 8.3 | 333-4 |
| New York | 83.6 | 5.8 | 264-2 |
| New Jersey | 82.6 | 9.3 | 537-8 |
| Delaware | 51.7 | 6.7 | 214-8 |
| Maryland | 59.8 | 6.1 | 121-3 |

10. Draw up a list of the principal industrial centres in these states and their leading industries.

11. Define the term " New England States." In what ways has the rise of manufacturing industries changed the character of agriculture in this area ?

12. What is the " Fall-line " ? Explain its economic importance.

13.

| New York | Philadelphia | Baltimore | Boston | Gulf Ports | Pacific Ports |
|---|---|---|---|---|---|
| *Imports* 580, *212* Rubber, coffee, bides and Bkins, sugar, tin, bullion and specie. *Exports 675,164* Copper, machinery, meat products, grain and flour, cotton, fruit, tobacco, cattle. | *Imports* 44, 18.1 Sugar, skins, wool, jute goods, iron ore. *Exports* 90,95 Petroleum, grain and flour, cotton, coal. | *Imports.* 18, *8-2* Iron and iron ore, fertilizers, cork, bananas. *ExpoHs* 67, *12-6* Copper, cereals, flour, and tobacco. | *Imports* 60, *22-1* Jute, hemp, wool, hides, and skins. *Exports §7,4-9* Meat and dairy produce, cottons. | NEW ORLEANS *Imports* . 51,*16* Coffee, sugar, jute manuf., fruit. *Exports* 118,29 *1* Cotton, timber, tobacco, wheat, flour, rice. GALVESTON *ImpoHs* 3, *4-8* *Exports* 93, *67.9* As above. | SAN FRANCISCO *Imports* 48,*14 3* Silk, jute, coal, tea, sugar. *Exports* . 48,*21 6* Lumber, packed and canned fruit, and fish. SBATTLB *Imports* 20, *7* Silk, copper, hemp. *Exports* 54, *74* Flour, timber, cotton, iron, ana steel goods. |

**Figures in millions of pounds sterling, 1919-20, *and 1935.***

Express as a percentage of the value of the total trade of all the ports, the value of that handled by the ports situated in the eastern marginal region. Account for the changes between 1920 and 1935.

14. To what extent do the above tables indicate the industrial

and commercial importance of the eastern marginal region of the United States ?

15. Explain fully the character of the trade of New York and account for its commercial supremacy.

*By kind permission of* *High Commissioner for New Zealand*

FIG. 106. SLAUGHTER-HOUSE AT FREEZING FACTORY, CARSCITY, NEW ZEALAND

After the sheep carcasses have been skinned (left) they **are** dressed as they travel **along** the overhead rail (right)

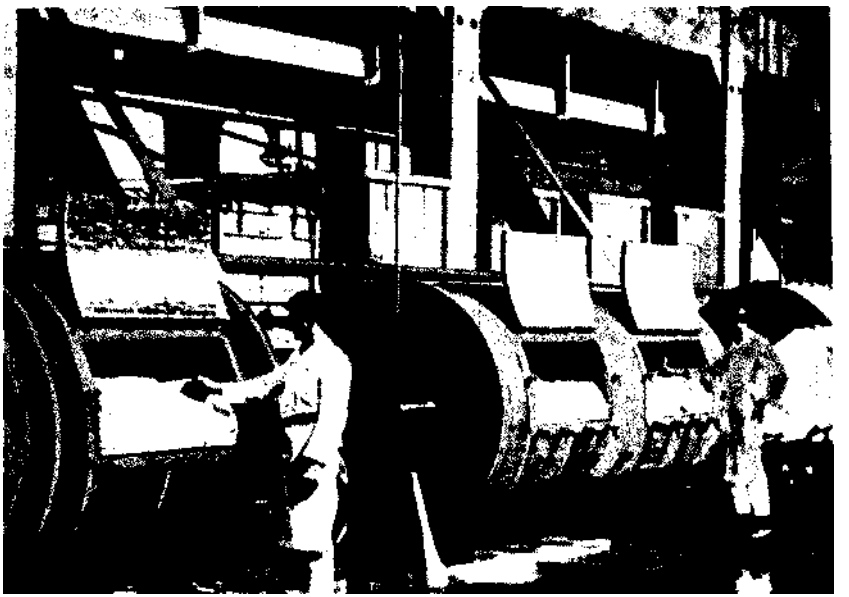
16. What differences do you notice between the character of the trade of the North Atlantic compared with that of the Gulf and Pacific ports of the United States ?

## INTERIOR LONG AND SHORT SUMMER TYPE OF REGIONS

1. Why are regions of this type mainly to be found in the N. Hemisphere ?

2. Give the essential climatic characteristics of the interior long summer type of region, and show how and why they differ from those of the interior short summer type.

3. Compare and contrast the climate of Winnipeg and Minneapolis, and point out how far location, aspect, nearness to water masses, and the direction of prevailing winds account for any resemblances and differences you find.



*By kind permission of* *High Commissioner for New Zealand*

FIG. 107. INTERIOR OF A CHURN ROOM, WAHATSA DAIRY FACTORY, NEW ZEALAND
The output of butter per day from this battery of churns is 20 tons

4. Explain the terms : *extreme, equable, continental, and maritime,* as used in referring to climatic conditions. Which terms could be suitably applied to regions of the interior long and short summer type ?

5. " Blizzards and thunderstorms are characteristic features of these regions." Why is this so ?

6. Point out any economic consequences of the seasonal variations in the length of daylight in Manitoba and Saskatchewan, and Kansas and Missouri.

7. " Although in natural regions of this type temperatures are more extreme than in the marginal cool temperate regions, weather conditions are less unpleasant to bear." Explain this statement.

**8.** What is meant by the terms *climate* and *weather* ? In what ways would the commonly occurring rapid and often violent changes of weather affect agricultural pursuits in these regions of the interior long and short summer type ?

9. " The Chinook is an important feature of the climate of Alberta and Montana, N. America." What is this feature which has been known to cause a rise in temperature of 80° F. in seven hours and to cause heavy falls of snow to disappear in a few hours ?

10. In which other parts of the world would you expect a similar feature of their climate ? Give reasons for your answer.

11. Describe the general distribution of beef cattle, milch cows, and pigs in N. America, and show how far climatic conditions, transport facilities, crop production, and the nearness of markets are factors in the distribution of these animals.

12. What is meant by " meat-packing " ? Why is this industry important in the sub-regions of the long and short summer type in N. America and not in Eurasia ?

13. " Throughout all the sub-regions of the long and short summer type, particularly in N. America, what is naturally grassland or mixed meadow land and woodland is being gradually brought under the plough." Account for this process of encroachment by arable farming.

14. Why, since physical conditions are very similar, have the Siberian steppelands not reached the same stage of economic development as the Canadian prairies ?

15. Explain the terms *hard, soft, spring,* and *winter,* as applied to wheat. In what localities in N. America are these types of wheat principally grown ? Give reasons why different areas favour particular types of wheat.

16. " Wheat is a product of moderately dry temperate and subtropical climates where the amount of rainfall (or equivalent irrigation) is from 9 in. to 30 in. per annum and the frost free period is not less than ninety days in the year." Discuss this statement.

17. In 1935 the wheat production, in millions of bushels of 60 lb. of the leading states of N. America was as shown on page 188.

Using the information given in this table, construct a map, showing the principal wheat-producing areas of N. America. Differentiate between winter and spring wheat areas.

| WINTER WHEAT | | | | SPRING WHEAT | | | |
|---|---|---|---|---|---|---|---|
| Kansas | 1201 | Washington | 31-3 | Saskatchewan | 135*0 | Minnesota | 15-5 |
| Ontario | j 54%Q | Pennsylvania | 19-3 | N. Dakota | 19-2 | S. Dakota | 41 |
| Alberta. | 5 54 u | Ohio | 40-1 | Alberta | 510 | Montana | 9-8 |
| Nebraska | 47-3 | Missouri | 31-2 | Ontario | 8-2 | Washington | 14-8 |
| Dlinois | 36-4 | Michigan | 16-7 | Manitoba | 22-5 | | |
| Indiana | 310 | Montana | 3-8 | | | | |
| Oklahama | 27-5 | Oregon | 13-2 | | | | |
| Total Winter Wheat, 617 | | | | Total Spring Wheat, 367 | | | |

18. Compare your sketch map with isotherm maps of N. America, and find out which summer and winter isotherms most nearly mark the limits of the winter and spring wheat belts of N. America.

19. WORLD PRODUCTION OF WHEAT, 1934-5

Millions of bushels (m.b.) of 60 lb.

| *Winter Wheat* | | *Spring Wheat* | |
|---|---|---|---|
| United States | 444 | United States | 157 |
| Canada | 12 | Canada | 269 |
| Russia, S.E. | 438 | Russia (European), including Ukraine | 692 |
| France | 285 | | |
| Italy | 282 | | |
| Spain | 158 | | |
| Rumania | 96 | Estimated World Total for all Wheat | 4,620 |
| Germany | 72 | | |
| Hungary | 84 | | |
| Yugo-Slavia | 73 | | |
| United Kingdom | 65 | | |
| Poland | 74 | | |
| Turkey | 92 | | |
| Bulgaria | 48 | | |
| Czechoslovakia | 62 | | |
| India | 363 | | |
| Japan | 48 | | |
| Australia | 143 | | |
| Egypt | 43 | | |
| Algeria | 32 | | |
| Morocco | 20 | | |
| Argentina | 245 | | |
| Chile | 34 | | |

*Notes*

*(a)* The figures relating to some countries are estimates only.

(6) Winter wheat production in the case of Greece, Belgium, Portugal, Syria, Uruguay, and Sweden, was about 10 m.b. each; Tunis, Austria, Denmark, and Korea, 8 m.b. each; Holland, South Africa, Switzerland, New Zealand, and Brazil, over 4 m.b. each.

(c) In cases where the production of spring wheat is relatively very small, the amount produced is included in the figures relating to winter wheat.

Express the above statistics in map form on an outline map (equal area) of the world. Use one dot to represent 10 m.b., and in the case of the larger countries, e.g. U.S.A., India, keep your stippling in the areas producing wheat.

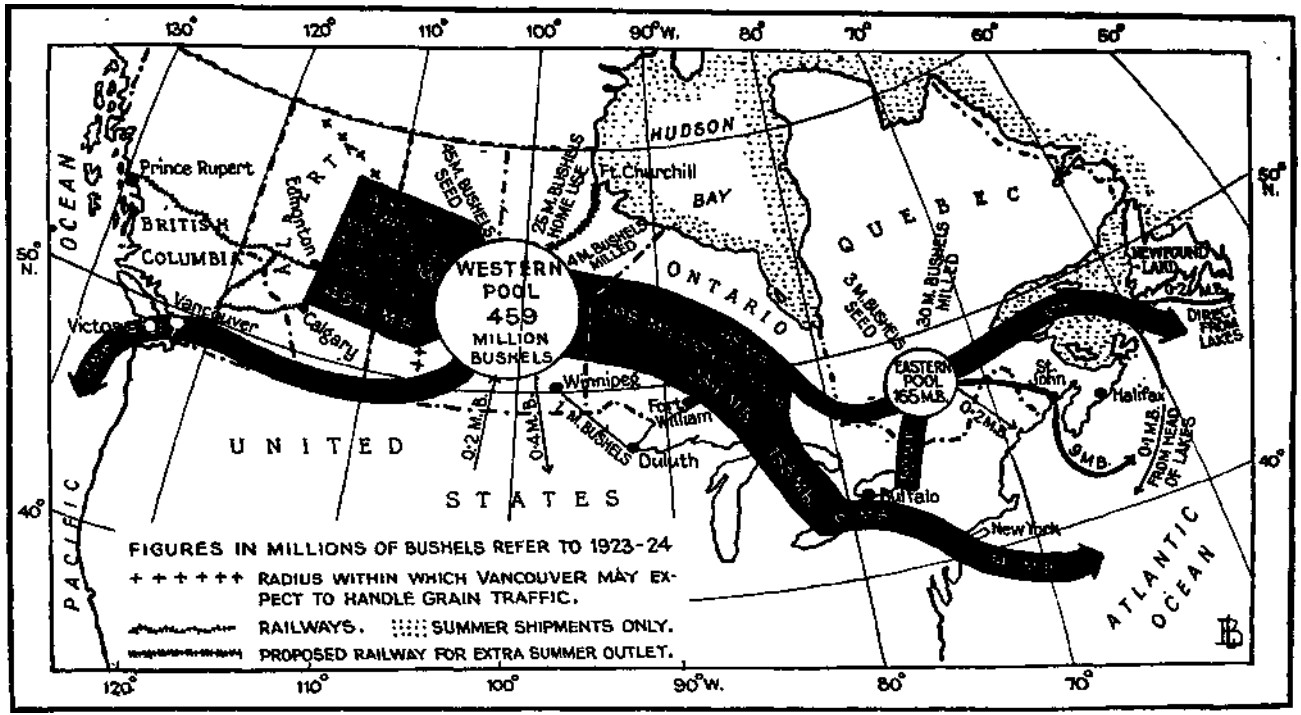



FIG. 108. MOVEMENT OF CANADA'S WHEAT CROP, 1925

1935. Western Pool 424 m.bush.; Exports via Prince Rupert 2-3, Vancouver route 45-2, Ft. Churchill 4 m.bush. Eastern Pool 126 5 m.bush.; Exports via St. Lawrence ports 32-6; Halifax 3-2, St. John 5 1, New York 22 m.bush. Production: Alberta 102, Saskatchewan 135, Manitoba 22, Ontario 14 m.bush.

20. Compare your map with maps showing actual temperatures for winter and summer, and those showing the amount and seasonal distribution of rainfall. Point out any connections which you discover between climate and wheat production.

21. Of the world's production of maize, averaging about 3,998 million bushels of 56 lb. (1933-6), the percentages contributed by countries was: United States 52; Argentine, 9; Brazil, 5; Roumania, 5; Yugo-Slavia, Italy, Dutch E. Indies and India, 3 each; Mexico, Egypt and Hungary, 1-5 each; South Africa and Bulgaria, 1 each; Spain, 0-5; and the rest of the world, including Canada and Australia, 11. On a world map mark in as nearly as possible (see maps showing production and industries) the area of each of these countries devoted to maize growing and indicate their relative production.

22. Examine rainfall and isotherm maps of the United States, and find out the climatic conditions best suited to maize production.

23. " The maize belt of the United States inside a 200 miles radius of Chicago is devoted to live stock farming. One-half of the total pigs and one-third of the total beef cattle of the United States are to be found in this area. It is estimated that 10 to 12 lb. of maize feeding stuffs produce 1 lb. of beef or 2 lb. of pork. Chicago has starch, glucose, and cornflour industries as well as meat packing." Account for the varying economic uses of maize in the Iowa-Missouri, Nebraska-Indiana area of the United States. Is maize, or any part of the maize plant, used for other purposes in other parts of the United States ? Give examples.

24. Why is hay a specially important crop in those areas of the cool temperate regions having severe winters ? Consult your maps and draw up a list of such areas, giving the causes of the exceptionally severe winters in the case of each area.

25. Of the world's production of barley, averaging about 1,850 million bushels of 48 lb. (1933-6), the percentages contributed by countries was: Russia, 19; U.S.A., 15; Germany, 8; Spain, 5; Canada, Morocco and Japan, 4 each; Poland, 3-5; France, Denmark, Czechoslovakia, 2-5 each; U.K. and Roumania, 2 each; Algeria, Hungary and Yugo-Slavia, 1.5 each; Argentine, Tunis and Bulgaria, 1 each; Italy, Sweden and Egypt, 0-5 each; rest of the world, 17. Insert this information in the same manner and on the same map as drawn in answer to Question 21.

26. Compare the world distribution of barley and maize

production and give reasons for any differences you notice. The use of barley for malting and human food as well as stock feeding, and the different climatic requirements of the two cereals should be borne in mind.

27. It was estimated that the average annual production of oats for the period 1933-6 was 4,400 million bushels of 32 lb. contributed by percentage as follows: Russia, 27; U.S.A. 26; Canada, 9; Germany, 8; France, 6.6; Poland, 3-8; U.K., 3; Sweden, 2; Czechoslovakia, Denmark and China, 1-5 each; Argentina, Belgium and Spain 1 each; the rest of the world, comprising many of the remaining countries of Europe, 8. Express this information in diagram form.

28. Consult your maps and note the areas where oats are chiefly grown in the above countries and the climatic requirements favourable to production in these areas.

29. The estimated average annual production of rye, 1,809 million bushels of 56 lb. (1933-6) was grown mainly in two areas, the Lake States of North America and North and South-Eastern Europe; Russia, 45 per cent; Germany, 17 per cent; Poland, 16 per cent; and the adjacent countries contributed 20 per cent of the world's harvest; the United States, 1 per cent; and Canada, 0*5 per cent. To what extent do these statistics support the statement: "That although rye can be grown where wheat can, rye is primarily the grain of lands of colder climates, poor soils, and poor peoples ?"

30. Compare Winnipeg and Chicago of sixty years ago and to-day, and point out the chief causes underlying the successive stages in their development.

31. Compare and contrast farmers and farming in Ukrania and Hungary with those of the corresponding natural regions of N. America.

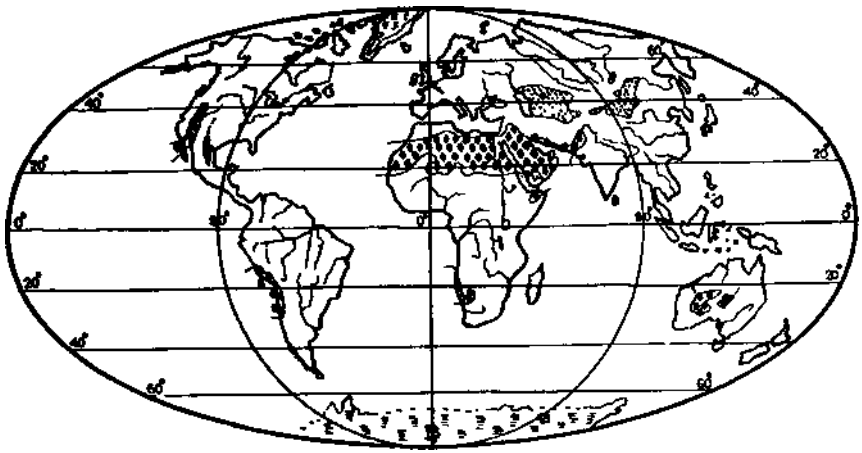
32. Under the headings of location, site, industries, and communications, write notes on Budapesth, Ruschuk, Kiev, and Odessa.

33. Analyse carefully the sites of St. Louis, Kansas City, Minneapolis (U.S.A.), Edmonton, and Calgary (Canada), so as to bring out the geographical factors which have led to their settlement and development.

34. Draw a sketch map showing the position, lines of communication, and productive hinterland which have helped to make Harbin the commercial and industrial capital of Manchuria.

CHAPTER VI

# HOT AND WARM DESERTS




## HOT DESERTS

**Location.**

The hot deserts of the world are situated near the tropics and occur only on the western sides of the land masses. They are found in those areas which partly lie permanently in the Horse Latitudes or Tropical Belt of Calms due to descending drying air streams, and which partly lie inside the Trade Wind Belts where the Trade Winds are dry offshore winds, e.g. the combined Sahara, Arabian and Thar Deserts on the west of Eurasia and Africa, the Colorado Desert (North America), the Atacama and Peruvian Deserts (South America), Kalahari Desert (South Africa), and the great Australian Desert. The deserts vary in size according to the size and shape of the land masses, and to the position of mountain ranges across the path of the rain-bearing winds. With the warm deserts, they occupy about one-fifth of the land surface of the world.

By courtesy of P.L.M. Railway Co., France

FIG. 109. CAMP OF NOMADIC DESERT ARABS AT AN ALGERIAN OASIS

The hide tent with its furnishings and the domestic utensils should be studied. Clusters of dates can be seen on the date palms

## Climate.

**MEAN MONTHLY TEMPERATURES (t° F.) AND RAINFALL *(r")***

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Yuma . *141* | 32° 40' N. 114° 36'W. | *t* *r* | 54.2 0.4 | 59-2 0-5 | 64-5 0-3 | 70-1 0-1 | 76-8 0 0 | 84-7 0-0 | 90-9 0-2 | 90-1 0-6 | 84-0 0-3 | 72-4 0-2 | 61-0 0-3 | 55-7 0-4 |
| Iquique *30'* | 20° 12' S. 70°11'W. | *t* *r* | 69.4 On | 69-4 ly lig | 67-6 ht sh | 64-8 owers | 62-6 very | 61-2 occas | 60-4 ionall | 60-3 y. | 61-2 | 63 0 | 65-3 | 67-5 |
| Wadi Haifa *421'* | 21° 52' N. 31° 22' E. | *t* *r* | 57-9 As | 61-0 Iqui | 68-5 que. | 78-1 Some | 84-6 years | 88 5 nora | 87-4 in. | 84-6 | 79 3 | 70-1 | 60-0 | 75-7 |
| Multan *420'* | 30° 56' N. 7i° 50' E. | *t* *r* | 55-6 0-4 | 59-8 0-3 | 71-6 0-4 | 82-0 0-3 | 914 0-3 | 94-9 0-5 | 92-7 1-9 | 90-4 1-7 | 88-0 0-6 | 78-6 0-1 | 67 1 01 | 57-7 0-2 |
| PortNolloth . *16'* | 29° 14' S. 16° 51' E. | *t* *r* | 59-5 0 0 | 59-9 0 1 | 59-3 0-2 | 57-7 0-2 | 57-0 0-4 | 55. 4 0.3 | 55-2 0-2 | 53-8 0 4 | 55-0 0-2 | 58 1 0-0 | 59-0 0-2 | 60 3 0-1 |
| Coolgardie *1,389'* | 30° 57' S. 121° 10' E. | *t* *r* | 77-3 0-4 | 75-5 0-7 | 713 0-6 | 65-4 0-6 | 57-5 1-3 | 52-3 1-2 | 50 8 0-9 | 53-3 0-9 | 58 2 0-6 | 63 5 0-7 | 710 0-5 | 76 0 0-6 |

Rainfall is scanty throughout the year because clouds are few. Sunshine is abundant. The daily and seasonal ranges of temperature are much greater than anywhere else in the world. Insolation by day and radiation by night are so rapid that it is not uncommon for the temperature at mid-day to be over 100° F. after a hoar frost the preceding night. Rainfall usually comes in torrential showers. Sometimes it rains overhead, but the drops evaporate before they reach the ground. Heavy night dews are frequent because of rapid radiation.

## Vegetation.

Desert vegetation in Asia, Africa, Australia, and North America is scanty, and in the Peruvian desert almost entirely absent. It consists of widely spaced plants which can grow and ripen quickly. Except in hollows, where the water table comes near the surface, plants have little foliage. Root systems are well developed, and small, tough leaves protect the plants from too rapid loss of moisture. Most of this vegetation appears like a magic carpet after a shower, and then, quickly withering, leaves the lonesome burning waste of stones and sand again. No plants of the desert are of commercial importance, but where underground supplies of water, springs, or rivers make oases, the cultivation of introduced crops is possible.

**Animal Life.**

Animal life shows adaptation to its environment. Lizards require little water, burrowing animals avoid the heat of day by remaining underground. The camel is really a native of the poor steppe lands adjoining these deserts. It can endure desert conditions

*Photo, Chatterton* *Kindly lent by Egyptian Tourist Bureau*

FIG. 110. SHEEP AND GOAT MARKET, CAIRO, EGYPT

for a week or two at a time. It can store food and water in its hump (i.e. puts on weight when fodder is plentiful); it can close its nostrils against the irritating wind-blown sand ; its cloven hoof enables it to walk across soft sand without sinking in deeply. So far life in the desert is almost impossible without the " ship of the desert." It still remains to be seen whether mechanical transport fitted with caterpillar wheels will replace the camel.

**Man. (1) Native.**

*Occupations.* In the deserts proper rainfall is everywhere too scanty and uncertain for agriculture, and barely sufficient to provide

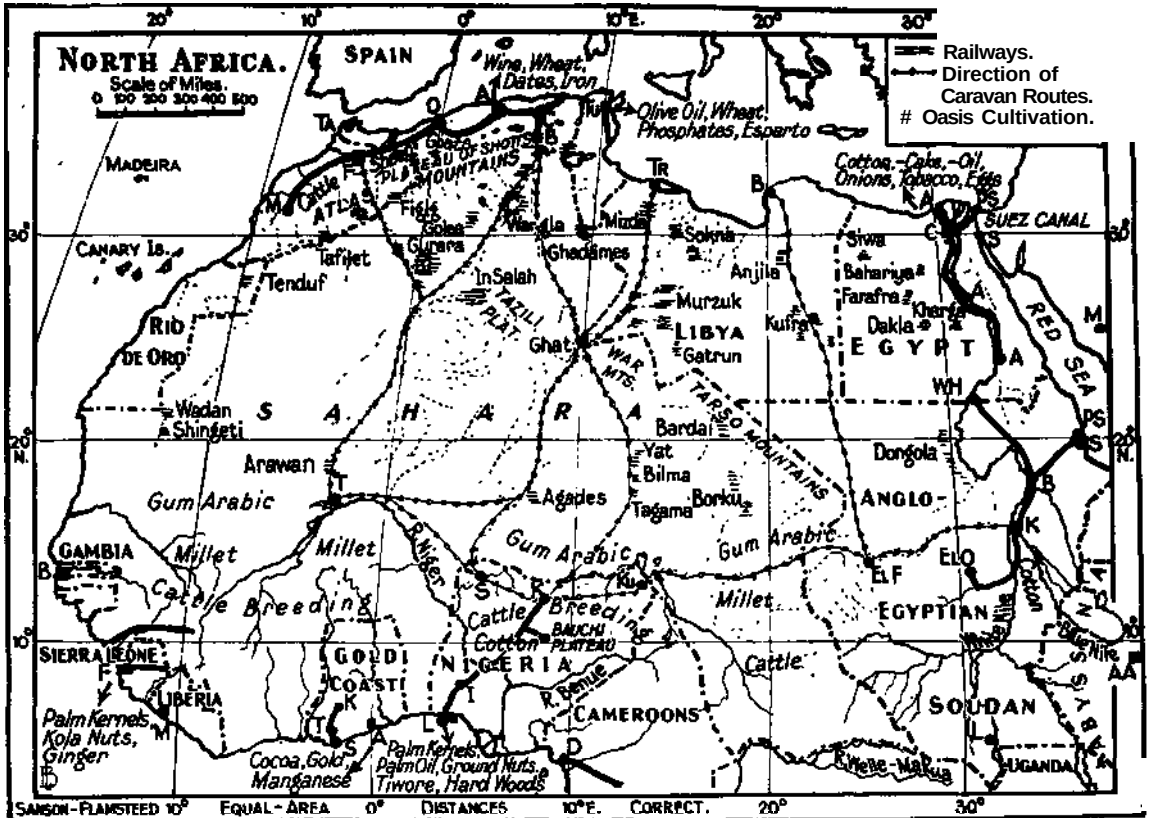



FIG. 111. COMMUNICATIONS AND ECONOMIC DEVELOPMENT; N. AFRICA

poor pasture even around the desert edges and water holes. In these areas nomadic pastoralists move from pasture to pasture, e.g. Arab' tribes of the Sahara, and the deserts of Arabia and Persia, and the more primitive Hereros, cattle herders of the Kalahari Desert. The mode of life is, like that of the inhabitants of the sub-tropical grasslands, of the simplest kind. Man is completely dependent upon his animals, sheep, goats, camels, for their milk,

*From a photo kindly lent by* *C. L. Evans, Esq., M.C., M.A.*

**FIG. 112. AN ARAB BAZAAR, KUT EL AMARA, IRAQ**

**Note the trays of dates and the basket of pulse with the three eggs. The shelters consist of wooden frames covered with matting. Has the Arab type of dress any special advantages?**

flesh, wool, hair, and skins. The camel is the principal beast of burden, and the horse is used for quick travel, e.g. in making raids. The raiding propensities of these people are not unconnected with their almost universal poverty. Caravan driving across the deserts from oasis to oasis also provides a means of overcoming this same poverty by legitimate effort. The desert dwellers' passionate fondness for freedom also seems to be related to the difficulty of making a living and consequently the need to fend for oneself. Their hospitable nature may also be the outcome of similar circumstances. These deserts are of considerably less extent and much more irregularly distributed.

The only permanent centres of population in these regions are found round the larger oases, which are in the deserts, but not of them. Agriculture in irrigated regions in both hot and warm deserts is distinctly advantageous. The soil is very fertile, because owing to the dry climate only a small portion of the soluble plant

*By courtesy of* *I'.L.M. Railway Co., Frame*

FIG. 113. RAISING WATER FROM WELLS, UHARDAIA, NORTH AFRICA
Note the use of mule power for water lifting and the characteristics of a typical Mediterranean landscape of a more arid district

foods in the soil have been washed out. Where stream water is used for irrigation mud deposits fertilize the soil. The weather is almost always sunny and the crops can be given just as much water as they require at the times when they need it. The weeding of crops is easy because weeds are fewer than in wet countries. Fruits can be easily and cheaply dried and the harvesting of cereal and grass crops is unhampered by wet weather. Irrigated lands are really Regions of Increment because good returns are obtained by moderate effort. Wheat, rice, millet, Mediterranean fruits, cotton, and sugar cane are grown. The characteristic date palm and the fig tree are alone capable of providing man's material

From a photo *kindly lent* *by* *C. L. Evans, Esq., M.C., M.A.*

FIG. 114. PART OP THE WATERFRONT, BAGHDAD, IRAQ

The peculiarities of the architecture of both lay and ecclesiastical buildings should be noted and accounted for

*By courtesy of* *The Air Survey Co., Ltd.*

FIG. 115. PART OF KAFR EL GAMUS, NILE DELTA, EGYPT

Note the rectangular, flat-roofed, dried-brick native houses, mostly with rooms forming a hollow square; the small size of the irrigated plots with their crops economically planted in rows; the black circles of the beaten paths round the open-air tlireshing floors; the cemetery, the higher village site, the lack of trees, and the clear-cut boundary between occupied land and the desert

*

needs, c.f. the coconut. Crops can be grown all the year round, and two and sometimes three successive crops are grown on the same plot of land in **a** year. Small holdings and gardens are the rule, and in such densely settled areas land values are inevitably high.

Cattle rearing and trade in dates, salt, leather goods, pottery, and articles of foreign production, such as rifles and " Manchester Goods/' are also carried on by the inhabitants of these oasis settlements. These town dwellers have reached a stage of stagnant civilization much the same as the people of Hot Monsoon lands.

The principal oases are the densely peopled strips of the Nile, and the Tigris-Euphrates valleys, the man-made irrigation colonies of the Punjab, and the oasis of Timbucto. The latter is about as large as the county of Kent. The high degree of civilization reached by the Moors in the still more favourable environment of South Spain illustrates how geographical conditions can limit a people's development and progress. History tells us how these oasis areas, like other irrigated lands, such as South China, India, and the Mediterranean Regions of Increment, early became the seats of ancient civilization, e.g. Babylon, Egypt, Palestine. Civilization is promoted in irrigated areas. The population must be settled, hence every improvement is of permanent value and further progress is stimulated. Forethought and industry in the construction of irrigation works and the tending of the crops are necessary if starvation is to be avoided. The mutual dependence upon water fosters the growth of political organizations to safeguard public interests, and social co-operation is more possible in a compact community.

**Food, Clothing, and Shelter.**

These reflect the geographical environment of the oasis dweller. Figs, dates and cereals figure largely in a varied diet which, though mainly vegetal, is highly nourishing. Clothing of a loose, flowing kind affords protection from the burning heat. Since life out of doors is possible all the year round, buildings are mainly used as shelters at night and storehouses at all times. The buildings are usually built of local stone and bricks, plastered with mud, which hardens quickly in the dry air. Roofs, solidly made of one or two beams with mud-plastered palm branches and bundles of straw, are usually flat and are used as storehouses. Cupolas of brick are found

on the more permanent buildings, such as mosques. Nearly **all** structures are cubical in form and have small light and air apertures high up the walls in order to obtain the greatest possible amount of shade and ventilation indoors and safety with privacy.

### (2) White Men.

White men only live in these regions when there is some lure to entice them to do so, e.g. the gold fields of the Coolgardie, Kalgoolie and Murchison districts in the West Australian Desert and the nitrate areas of the Peruvian and Atacama Deserts of South America. At these centres the population is entirely dependent upon supplies from the outside world. Even water is brought by pipelines, barrels on pack animals, water tanks on railway wagons, e.g. the 300 miles long pipeline from Perth to Coolgardie, numerous pipelines from snow-fed Andean streams to the nitrate camps of North Chile. In this latter region irrigated crops like cotton, sugar cane, and fruits are grown where the mountain streams debouch upon or cross the desert plains.

## WARM AND MIDDLE LATITUDE DESERTS

### Location.

These deserts are of considerably less extent and much more irregularly distributed than the hot deserts of the low latitudes. Warm deserts occur on the leeward side of highland masses, e.g. South Alberta and Utah in the rain shadows of the North American Rocky Mountain System; Tarim basin and the Desert of Gobi in those of mountain areas of Central Asia. Smaller areas of warm deserts occur in similar situations in South America.

### Climate.

**MEAN MONTHLY TEMPERATURES (t° F.) AND RAINFALL (r")**

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reno *4,500'* | 39° 30' N. 119° 50' W. | *t* | 32 | 36 | 40 | 47 | 54 | 62 | 70 | 69 | 60 | 51 | 42 | 33 |
| | | *r* | 1-7 | 1-4 | 1-0 | 0-5 | 0-9 | 0-3 | 0-2 | 0-3 | 0-3 | 0-4 | 0-8 | 1-1 |
| Urga *4,000'* | 47° 55' N. 106° 45' E. | *t* | -18 | -13 | 8 | 33 | 48 | 55 | 64 | 59 | 50 | 27 | 1 | -14 |
| | | *r* | 0-0 | 0 0 | 0-2 | 0-0 | 0-2 | 1-8 | 1 1 | 1-1 | 0-2 | 0-1 | 0 1 | 0 0 |

A comparison of the climatic tables for hot and warm desert regions shows that on the whole the latter have slightly more rainfall and much lower temperatures.

**Vegetation and Animal Life.**

These exhibit similar characteristics in warm deserts as in hot. In point of value to man the main difference between these two kinds of desert areas lies in the fact that in the warm deserts the growing season is not continuous.

**Man.**

In the Asiatic section stagnant communities of native peoples lead lives similar in character to those of the herdsmen and oasis settlers in the Sahara. Greater isolation from civilizing influences makes life if anything more primitive.

It would seem that the physical characteristics of the inhabitants of the Desert of Gobi on the plateau of Mongolia and adjacent regions are related to climatic conditions in this region. Dry yellow-brown skins are very common, partly because the blood vessels are deeply sunk and partly because of strong exposure to the glare. In a dry atmosphere rapid continuous evaporation of perspiration takes place, and the skin would become excessively dry and cracked. To prevent this the amount and rate of perspiration is apparently diminished by the limiting of the sweat glands and the strengthening of the pores of the skin so that they may be firmly closed. Firm round hair pores give a regular and almost cylindrical section to the hair which is usually coarse and grows very nearly straight. Among other common but by no means universal characteristics are broad prominent cheek bones, sunken nasal chambers, and the external downfolds of the upper eyelids, producing oblique eyeslits. It is thought that these specializations are related to winter high pressure conditions, resulting from very low temperatures on the high plateau, the bitter cold in winter, and the glare from the strong summer sunshine respectively. Fig. 116 illustrates the characteristic facial features of a member of the Northern Mongolian or East Asiatic division of the human family.

The European communities of the North American sections may more appropriately be called compact rather than stagnant, although they cannot be regarded as being so progressive as their neighbours,

the commercial ranching and wheat farming peoples of the adjoining regions. Irrigated farming is intensively practised by Mormons of Utah, Galicians east of Edmonton, and a British settlement at Lloydminster. The cultivation of sugar beet and high-priced fruit crops, the manufacture of sugar and the preparation of dried

FIG. 110. HEAD OF A CHINESE COOLIE

FIG. 117. HEAD OF A NEGRO

fruits are carried on. Dairy cattle are raised on irrigated fodder crops, e.g. alfalfa.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. Make a list of the hot and warm deserts of the world, classifying them as inland or coastal. Account for their distribution.

2. What is meant by radiation ? Give simple examples from your own experience to illustrate how cloudiness and the character of the ground affect radiation by day and by night.

3. Explain the term " oasis " and give a short account of an actual example of one type of oasis.

4. Write a brief account of the characteristic plant and animal life in a hot desert and explain their adaptation to geographical conditions.

5. Compare the density of population in Tropical Forest and Hot Desert regions, and show how the presence of water influences the density and the distribution of population in such regions.

**6. Why is camel transport largely used in the interior of Australia ? What other means of transport might be used ?**

**7. Interpret the following tables and show how far the figures reflect the use made of their physical environment by these two Arab tribes living in the Shot el Jerid region in North Africa.**

| | | Numbers of | | | | |
|---|---|---|---|---|---|---|
| Tribe | Description | Persons | Camels | Sheep | Goats | Palm Trees |
| Metlita | Villagers | 1,425 | 268 | 830 | 1,450 | 7,851 |
| Ulad Alush | Nomads | 2,210 | 1,815 | 15,615 | 9,417 | 8,183 |

**8. In investigating the possibility of extending irrigation in Iraq the following points were raised : the total flow, volume, and quality of water of the Tigris and Euphrates, seasonal variations in the amount of water in the rivers, the possibility of reservoir construction, the position of the land to be irrigated, the facilities for drainage, the probable cost of various suggested schemes in relation to the amount of revenue capable of being recovered, directly by means of a water tax, and indirectly by taxes upon the value of the crops which could be grown by irrigation. Explain why each of these points had to be considered.**

**9. Compare and contrast irrigation methods employed by European farmers at Mildura (Australia) and those of a cultivator on an Algerian oasis.**

**10. "Agriculture in irrigated regions enjoys several distinct advantages." Give six, at least, and as many more as you can.**

**11. "Irrigation is one of the strongest agencies promoting civilization." How does history support this statement ? Why should this be so ?**

**12. Of the area of Egypt 96 per cent is arid and inhospitable waste. The remainder (about one quarter the area of England and Wales) supports nearly 14,000,000 inhabitants, and the following numbers of animals in thousands : cattle 944, buffaloes 932, donkeys 794, horses 34, mules 17, pigs 13. One-fifth of the useful land is devoted to cotton growing. Since Egypt is neither a mining, manufacturing, nor great trading country, how is so remarkable a state of affairs possible ?**

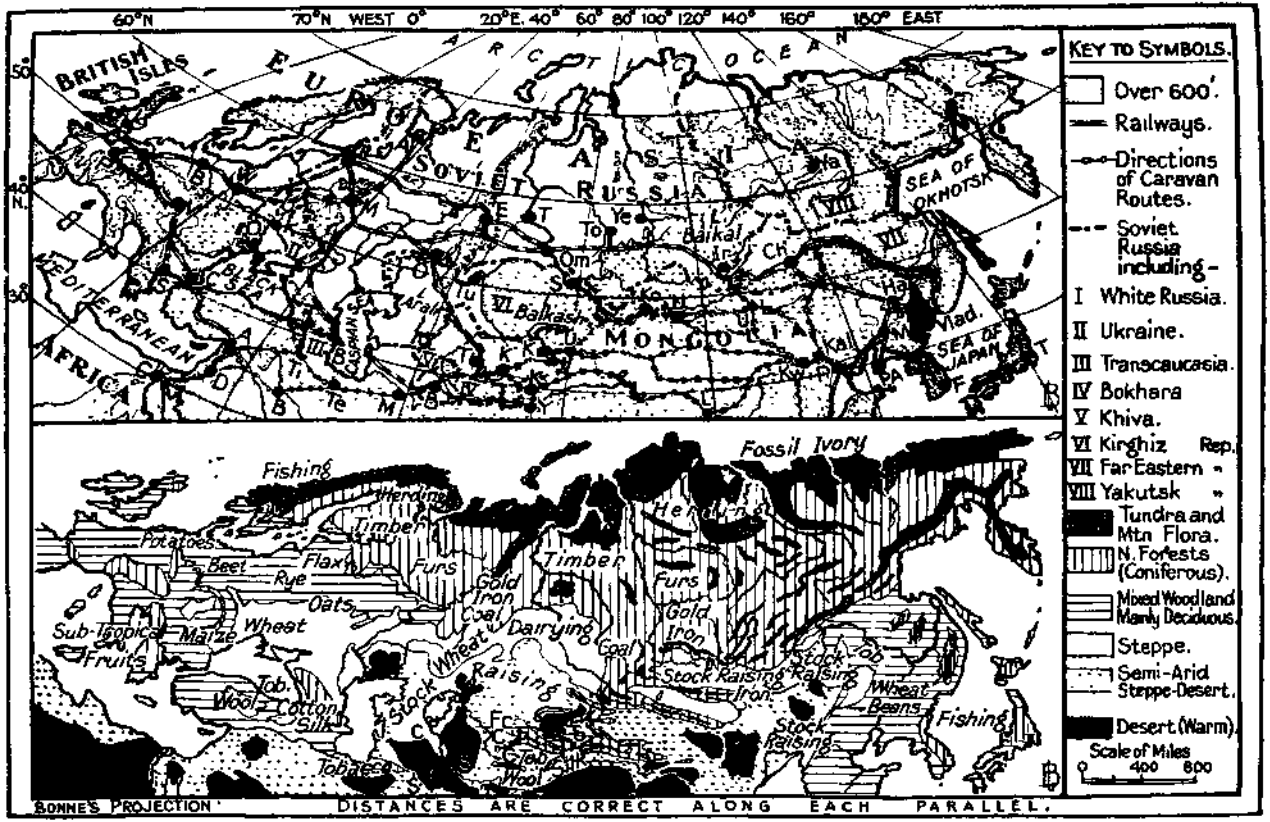



FIG. 118. RELIEF, ROUTES, AND PRODUCTION; NORTHERN EURASIA

**13. In what ways do town Arabs differ from desert Arabs in character and general outlook ? To what extent is this the result of their environment ?**

**14. History relates how from time to time the dwellers of the deserts and adjacent semi-arid regions have overflowed into and taken possession of neighbouring regions, e.g. Huns attacked the Roman Empire about A.D. 450 ; Arabs spread through Syria, North Africa and Spain, A.D. 630 to 730 ; Jengis Khan captured Pekin A.D. 1214 ; Moguls founded an empire in India A.D. 1525. What geographical influences underlay these successful migrations ?**

**15. Look up what are sometimes called the " Ten Commandments " of the Mohammedan religion, and find out how many deal with habits and customs arising out of the conditions of a nomadic desert life. Explain their significance.**

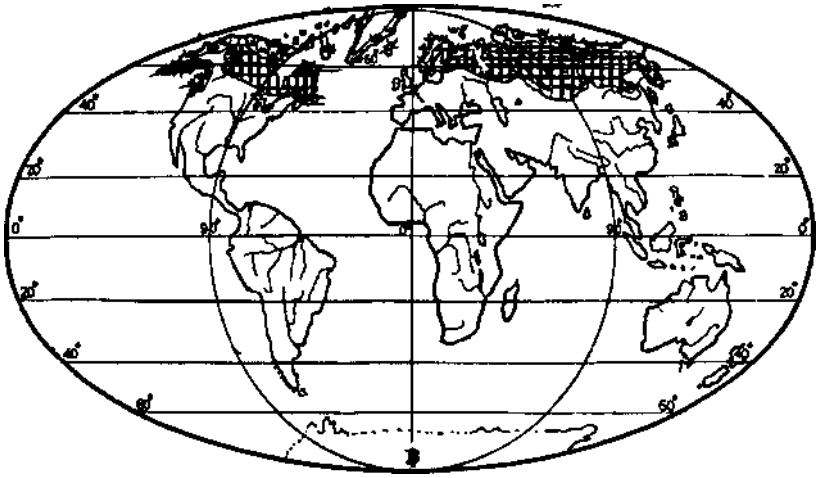
**16. Which part of the United States is famous for its canyons ? How are canyons formed and why are they only found in desert regions ?**

**17. Write an account of one of the Mormon, Galioian or British settlements in the warm desert region of North America.**

**18. After thoroughly examining Figs. 109 to 115, show how, for both town and desert Arabs, their ways of living, and of getting a livelihood, reflect marked adaptation to life under desert and oasis conditions.**

## CHAPTER VII

# TAIGA, TUNDRA, AND POLAR ICE CAP REGIONS



r++f Northern Forest  Tundra EF1

## NORTHERN FOREST REGIONS OR TAIGA

### Location.

**These regions stretch in vast irregular belts across the land masses of the Northern Hemisphere, south of the Tundras.**

## Climate.

MEAN MONTHLY TEMPERATURES (*t° F.*) AND RAINFALL (r")

| Place. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vermilion 950' | 58° 23' N. 115° 59' W. | t | -14·3 | -5·6 | 7·8 | 30·2 | 47·8 | 54·9 | 60·0 | 56·8 | 45·6 | 32·0 | 10·3 | -4·1 |
| | | r | 0·6 | 0·3 | 0·5 | 0·7 | 1·0 | 1·9 | 2·1 | 2·1 | 1·4 | 0·7 | 0·5 | 0·4 |
| Archangel 50' | 64° 39' N. 40° 50' E. | t | 8·1 | 9·7 | 17·4 | 30·0 | 41·4 | 52·7 | 59·5 | 55·2 | 45·7 | 33·8 | 21·4 | 12·2 |
| | | r | 0·9 | 0·7 | 0·8 | 0·8 | 1·0 | 1·8 | 2·4 | 2·4 | 2·2 | 1·5 | 1·2 | 0·9 |
| Tomsk 400' | 56° 30' N. 84° 25' E. | t | -3·0 | 2·1 | 12·9 | 30·2 | 46·6 | 59·0 | 64·0 | 59·2 | 48·4 | 31·6 | 12·7 | 1·6 |
| | | r | 1·0 | 0·8 | 0·8 | 0·8 | 1·4 | 2·6 | 2·9 | 2·4 | 1·5 | 2·3 | 1·4 | 2·0 |
| Verkhoyansk 330' | 67° 33' N. 133° 24' E. | t | -58·2 | 47·7 | -22·4 | 8·4 | 34·7 | 53·6 | 59·2 | 51·4 | 36·0 | 5·7 | -34·2 | -51·7 |
| | | r | 0·2 | 0·1 | 0·0 | 0·1 | 0·2 | 0·4 | 1·4 | 0·2 | 0·2 | 0·2 | 0·2 | 0·2 |



15—(E.1139)

In these regions winters are long and severe with short days and long nights; summers are short and warm, with very long days and very short nights. Great extremes of temperature are experienced in the interior districts, where the annual range of temperature, over 100° F., is greater than anywhere else in the world. By day temperatures are warm and in summer are often as high as in sub-tropical regions. Although precipitation, mostly in summer, is as scanty as in semi-arid regions, it suffices for plant growth because the loss by evaporation is smaller. High winds are frequent.

**Vegetation.**

Vegetation consists mainly of forests of coniferous trees, e.g. pines, firs, larch, hemlock, and deciduous trees, e.g. birch, alder, cotton-wood. Berry-bearing plants, such as cranberries, crowberries and whortleberries, are especially abundant in clearings and areas devastated by forest fires. The northern limit of these forests appears to be determined by adequate summer warmth, and the southern limits depend upon more complicated factors, especially rainfall and the absence of drying winds when the ground is frozen. The coniferous trees are protected against rapid transpiration by their glossy needle shaped leaves, which also permit snow to slide off easily. A pyramidal form gives strength to withstand gales.

The forest belts of North America and Eurasia differ in their species of trees and bushes, but are very similar in their general aspect.

**Animal Life.**

These forests provide shelter and an .abundant food supply throughout the year. Forest haunting animal life is similar to, but more plentiful than, that in the forest of the cool temperate regions.

**Man's Activities.**

Population, both of native, mixed, and European stock, is scanty and is mainly engaged in hunting and trapping. Fur bearing animals are numerous, and these regions provide the bulk of the world's valuable pelts. The North American fur trade is the best organized by the Hudson's Bay and other fur-trading companies, which handle about £4,000,000 (one-third from fur farms) of pelts

a year. The yearly take of furs is said to vary in a seven-year cycle according to the abundance of the Arctic hare, which provides food for the more valuable and carnivorous fur-bearing animals, such as the sable, black and silver fox, and lynx. The animal yield of furs from other animals like the members of the beaver family and

*By courtesy of* *The Canadian Pacific Railway Co.*

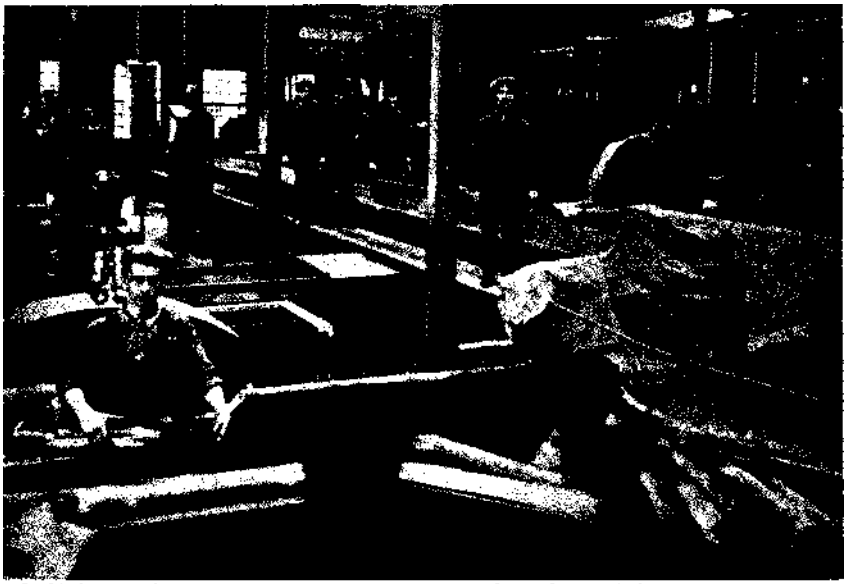
FIG. 119. A TRAPPER WITH HIS SUMMER CAMP, N.W. TERRITORIES, CANADA

A trap is shown hanging on the tree behind the trapper who relies upon his rifle and rod to supplement food supplies brought from the trading posts

squirrels fluctuates less. In Siberia trapping is done mainly by hunting clubs under Government control. Trapping is not so profitable as it used to be, because of the competition of cheaper imitation furs made up from hare, rabbit, and cat skins, and the growth of commercial fox-fur farming.

So far the vast timber resources of these forests have only been exploited in the more accessible parts. The growing demand for wood pulp has given them an increasing value. As the timber supplies from the temperate forests decrease, more and more use is likely to be made of these cold northern forests.

A little agriculture, chiefly by Europeans, is done in the clearings. The growing season, varying from two or three months during which frosts are likely to occur at any time, permits the cultivation of hardy varieties of rye and oats in more sheltered districts and those having a south aspect. Quick growing vegetables and hardy



*By kind permission of* *The High Commissioner for Newfoundland*

FIG. 120. WOOD-PREPARING ROOM SHOWING " BARKERS," PULP FACTORY, NEWFOUNDLAND

Note the spruce logs floating in the tank ready to have their bark removed after which process they are passed through grinding machines. Cheap perishable paper, e.g. newspaper Is simply ground wood fibre which has been rolled, dried, and sized with kaolin, resin, alum, and talc. For better quality paper-pulp or rayon wood-cellulose used in the manufacture of artificial silk, wood chips are digested by the action of chemicals in steam-heated boilers to produce sulphite or soda pulp

fruits, such as cabbage, turnips, radishes, and strawberries, often grow better here than in Scotland. Many plants of this kind grow three or four times larger than they do in the cool temperate lands. This is due to the fact that, owing to the longer days and consequently greater sum total amount of sun heat received, three months in these regions is about equivalent to five months in our own part of the world.

The raising of domestic cattle is possible, but the great expense involved in providing shelter and fodder during the long winter makes cattle raising uneconomical and unprofitable. Reindeer

grazing offers an interesting commercial possibility in the transitional areas between the forests and the Tundra. The herd of 1,200 introduced into Alaska by the U.S.A. Government 1892-1902 now exceeds 600,000. In 1921 the Hudson's Bay Company started a reindeer ranch with 300 head on Baffin Island and the Lomen Reindeer and Trading Company's Alaskan Ranch carried 50,000 head. The ranches of Finland exported 1,000 tons of reindeer meat to Sweden in 1935 but it is a moot point whether this meat will become popular among peoples having the choice of other meat.

From the European point of view, the development of the vast mineral wealth of this region is the chief economic interest. The principal mining districts are Alaska and the Ural Mountains. In 1934 Alaska produced 457,345 oz. gold, 14-6 million lb. copper, 154,700 oz. silver, 2,555 oz. platinum, and other minerals, such as tin, lead, coal, marble, and gypsum, valued at £4 million. Over 90 per cent of the world's platinum, besides quantities of iron, gold, and copper, come from the Urals, Russia.

## TUNDRA

### Location.

The Tundras occupy the Arctic lowlands north of the Northern Forests Belts in North America and Eurasia.

### Climate.

MEAN MONTHLY TEMPERATURES *(t°F.)* AND RAINFALL (r")

| PLACE. | Position. | | Jan. | Feb. \| Mar | | Apr. 1 May. | | June | July.\| Aug. 1 Sep. | | | Oct. | Nov. 1 Dec. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point Barrow | 71°23'N. | *t* | -18 | -19 | -12 | -1 | 21 | 33 | 38 | 38 | 29 | 5 | -C | -14 |
| *20'* | 156° 17' W. | *r* | 0-1 | 04 | 03 | 0-3 | 03 | 0-5 | 1-3 | 1-1 | 06 | 08 | 0-4 | 0-3 |
| Spitsbergen . | 78° 2' N. | *t* | -8 | -7 | -8 | 4 | 21 | 35 | 42 | 38 | 30 | 19 | 3 | 0 |
| *40'* | 14° 14' B. | *r* | 10 | 1-5 | 11 | 0-9 | 0-3 | 0-4 | 0-8 | 10 | 07 | 1-7 | 1-2 | 1-3 |
| Qothaab | 64° 11' N. | *t* | 15 | 4 | 21 | 22 | 32 | 36 | 44 | 41 | 37 | 37 | 22 | 18 |
| *80'* | 51° 44' W. | *v* | 0-1 | 1-6 | 2-7 | 0-4 | 1-3 | 8-0 | 7-5 | 0-8 | 92 | 0-7 | 0-6 | 0-3 |
| Ssagastyr | 72° 23' N. | *t* | -34 | -43 | -28 | -6 | 16 | 31 | 40 | 38 | 32 | 5 | -18 | -28 |
| *15'* | 124° 5' E. | *r* | 0-1 | 0-0 | 0-0 | 0-0 | 0-3 | 0-7 | 0-3 | 1-4 | 0-5 | 0-1 | 0«1 | 0-2 |

Winters are so long and summers so short that, except in those regions where the modifying influence of the Arctic Ocean is felt, the snow has hardly time to melt away between one winter and the next. In between the continuous night of the winter months and the continuous day of the summer months there are long twilight periods. Temperatures, though low, are less extreme than

in the Northern Forest regions. Sharp changes in the weather occur; foggy and cloudy cold spells are numerous and the spells of bright weather are exhilarating. Precipitation, mostly as snow or sleet, is small, usually 8 in. to 10 in. for the year.

**Vegetation.**

In winter, since the ground is frozen, there is no plant growth. When the thaw sets in these swampy Arctic meadows blossom like the prairies. Mosses, lichens, grasses, such as timothy grass, hundreds of flowering perennials like primroses, buttercups, dandelions, aquatic plants, and squat cranberry and crowberry plants rapidly spring to life. The ground becomes so carpeted with **a** spongy mass of vegetation, sometimes over a foot deep, that land travel is difficult. Owing to the short growing season, low temperatures, and permanently frozen subsoil, agriculture is impossible.

**Animal Life.**

In summer these regions offer secure breeding grounds for numerous migratory birds, such as snow buntings and the eider duck The snow owl and ptarmigan, which stay here all the year round, are well feathered, even to their toes.

Reindeer, caribou, and the musk ox can graze all the year round; in winter by scraping away the snow.

During the summer months these regions are a paradise for beetles, butterflies, bees, the mosquito, and other insects that sting. These latter insect pests are not disease carriers like their relations of the Tropics.

Aquatic life, especially in the sea, is abundant, and forms the chief source of food for man and to some extent for his half tame animals. Even the reindeer eats seaweed in times of scarcity and the Eskimo dog eats fish, shell fish, marine animals, and seaweed, as well as animal flesh. Fish, seals, walruses, polar bears whales, and other marine life are plentiful. The only domesticated animal is the Eskimo dog, which is not native.

**Man.**

The people are nomadic and few in number, because the means of livelihood are small. In these " Regions of Privation," civilization has made little progress, because life is one long struggle for a bare

existence. Scattered tribes of Eskimos (North America), Lapps and Finns (Europe), and Ostyaks and Samoyads (Asia), manage to exist, mainly by hunting and fishing, and in a few cases by primitive herding. Whatever their occupation, a nomadic life is necessary, because pasture, and fishing and hunting grounds, are soon

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FIG. 121. ESKIMOS IN KAYAKS, DORSET, N.W. TERRITORIES, CANADA

exhausted and it is necessary to follow food supplies. In no other natural region are a people's ways of living more closely adjusted to their natural environment and in none is more complete use made of natural possibilities.

**(a) Hunting and Fishing Tribes,** e.g. Eskimos.

**In** summer these people fish in the sea and streams, hunt animals and catch birds. The women also prepare food and clothing for the winter from the products of the chase. In winter outdoor activities largely cease.

**Food, Clothing, and Shelter.**

Food consists almost entirely of the flesh of animals, fish, and birds, either fresh, dried or powdered (pemmican), with birds' eggs and a few edible leaves, berries, mosses, and lichens. When possible, this diet is supplemented by foodstuffs, such as flour, obtained by barter, and sometimes the caribou and musk ox can be found, but the sea and the coastal margins provide the most dependable source of food, e.g. seals, walrus, polar bear, fish, sea-birds. The seal is the mainstay of existence, giving flesh for food, blubber for

oil, skin for clothing, shelter and boat building, and bones for making harpoon and arrow heads. Needles are made from fish bones.

Clothing is strong and practical, and made to give adequate protection against winds and cold. Neatly fashioned and well-sewn under-garments are often made from the dressed skins of small fur-bearing land animals or the downy breast skins of

*By kind permission of* *The Hiuh Commissioner for Canada*

**FIG. 122. ICE " IGLOO," NETSELIK, N.W. TERRITORIES, CANADA**
These ice huts are only used when travelling or hunting and are not for permanent use as dwellings

*By kind permission of* *The High Commissioner jor ( anada*

**FIG. 123. NATIVE CHILDREN, OKITO MAONA, N.W. TERRITORIES, CANADA**
Part of a " tupik " or tent of skins is shown on the right

birds—the soft fur or down being worn next to the skin. The outer garments usually consist of a sealskin jacket with hood, fox or bear skin trousers and water-proof seal-skin boots. Nomadic life precludes a large wardrobe. Skins are dressed by being scraped and

*w?*

*Reproduced by kind permission of* *The Swedish Tourist Association*

FIG. 124. LAPLANDERS' TEMPORARY ENCAMPMENT, SWEDEN

The tent of skins is used by Laplanders of the more remote districts when travelling in winter, and when moving with their herds from one pasture to another in summer. In less remote districts Laplanders have adopted a more settled mode of life, living in houses and dressing much the same as their countrymen farther south

treated with some astringent. Leather is made supple by being chewed bit by bit by the womenfolk.

Because a nomadic life is a necessity, fixed dwellings are impossible. In summer a light, portable tupik made of skins stretched upon willow poles is used ; in winter a more substantial and wind-proof shelter, heated by oil lamps, is made of earth, wood, stones, and skins. In the snow houses, found only among the North American tribes, the indoor temperature can be more easily regulated. The greater the cold outside, the higher can the indoor heat be made. This is often so great, that the almost naked occupants stream with perspiration as they squat on their skin rugs.

**Tools and Weapons.**

Kayaks or canoes, consisting of a light wooden or bone framework, on to which seal skins are sewn with sinews, are used for fishing and hunting. They are light, almost indestructible, and made to fit their owners like part of their dress. The sledge, made of pieces of wood or bone, lashed together with leather, often shod with bone runners; and hauled by a team of semi-domesticated dogs, is the principal means of transport. The Eskimo's weapons and tools consist of bone-tipped harpoons and borers, nets made from animal sinews, lassoes of strips of leather, all home-made, and steel axes, knives and firearms, obtained by barter. Pottery and iron cooking utensils have been introduced by outside peoples.

**(b) Herding Tribes, e.g. Lapps**

In Eurasia most of the inhabitants of the Tundra keep small herds of semi-wild reindeer, which they follow from one inland pasture to another. They depend upon these animals for the satisfaction of most of their needs. Alive, the. reindeer provides nourishing milk, and is useful as a beast of burden or draught animal; when dead it provides meat for food, a hide for leather, hair and sinews for thread, bones and horns for making tools and weapons. Existence is less precarious with the Lapp than with the Eskimo. The former can preserve and increase, the latter is constantly destroying, his sources of food. Whether the mode of life is entirely hunting and fishing, or these occupations combined with primitive herding, work is divided between the sexes. The men are primarily engaged in getting food and in providing weapons and other means by which they obtain it. Women's work consists in making the most use of the supplies which men obtain.

Man's Needs.

Food is obtained mainly from the herds, and supplies are thus regularly forthcoming. The hunting of wild animals and birds, fishing, collecting birds' eggs, leaves, berries, and birch bark (for making flour), as well as bartering furs for groceries (flour, tea, sugar, make the diet of the Lapp more varied than that of the Eskimo). Because of this regular and more varied food, the Lapp is less prone to diseases induced through the stomach becoming disordered.

The clothing and dwellings of the primitive herders resemble

those of the Arctic hunter. As the search for food takes up less of their time, the herders can give more attention to the making and ornamenting of their garments. The women of some tribes, e.g. Ostyak, make cloth from the fibre of plants, such as nettles. Men and women dress very much alike in garments loosely shaped to the figure. Protection against the severity of winter is afforded by the hood, fur gloves or mittens, and fur boots. The summer yurta, or tent dwelling, is made of hides and bark spread over a framework of poles and in size and shape is more like the Red Indian wigwam than the Eskimo tupik. In winter these tents are made warmer by adding extra layers of skins, or more permanent dwellings are made of earth or of turf supported by poles. Furniture consists of a few skins for seats and beds, a cooking pot hung from cross poles over a fire made on a large flat stone in the centre of the tent, a few simple utensils, such as bottles of hide, scrapers and knives.

Where firearms have not been obtained, animals are hunted with bows and arrows. Blunt arrows are used when the undamaged fur of an animal is wanted. Sledges drawn by reindeer are universally used, and for winter travelling on foot some tribes use skis.

The only attraction of this region for white men is its mineral wealth. The contents of the Spitsbergen coal-fields of differing geological formations have been estimated at 9,000 million tons. British, Norwegian and Swedish companies work these deposits and 614,257 tons of coal were exported in 1935.

## POLAR ICE CAPS

Location.

Antarctica and the plateau of Greenland.

### Climate.

**MEAN MONTHLY TEMPERATURES (t°F.) AND RAINFALL (r")**

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Victoria Land 50' | 165° 35'E. 77° 42' S. | *t* | 24 | 17 | 5 | -9 | -11 | - 13 | -17 | -17 | -12 | -4 | 14 | 25 |
| | | *r* | Not | avaii | able. | | | | | | | | | |

Temperatures are mostly below freezing point all the year, and the ground is covered by perpetual snow and ice hundreds of feet thick. Storms and high winds are frequent. Antarctica has more severe temperatures, less precipitation, and more violent winds, than Greenland. Although human existence is possible as far as climate goes, the means on land are entirely lacking.

**Plant and Animal Life.**

Plant and animal life, except for a few mosses and insects, is wholly marine, e.g. sea birds, including the penguin (Antarctica only), species of seals, walrus, sea elephants and whales (humpback, fin, and blue varieties).

**Man.**

A few permanent fishing and whaling settlements have been established on the Western coast of Greenland and temporary bases on the coasts of the Falkland and Ross Dependencies of the Antarctic continent. Scandinavian, British, and Canadian whalers visit these whaling fields in the summer months. Modern whaling operations are now carried out from the decks of fast steamers instead of open boats. The whales are shot with a harpoon bomb instead of being harpooned by hand. The carcasses are towed to a factory, floating or on shore, where practically the whole of them is reduced to oil, meat, and fertilizer. The Norwegian whalers in the South Atlantic produce over one million barrels of whale oil annually and the value of the whale products of the Falkland Dependencies during the last twenty years has exceeded £30,000,000.

The great ice cap of Greenland is the parent of most of the gigantic icebergs which menace transatlantic shipping. The pressure exerted by fresh falls of snow continually converts the lower layers into ice and causes these to move slowly outwards towards the sea along the lines of least resistance. The ice continues its progress into the sea until, owing to its buoyancy on the deeper water, large masses break off and float away. During the year many icebergs are formed in this manner, and there is one Greenland glacier which alone furnishes, on an average, an iceberg a day. After the Titanic disaster in 1912, a permanent International Ice Patrol Service was established by the chief maritime powers of the world. To ensure greater safety at sea a continuous patrol carefully

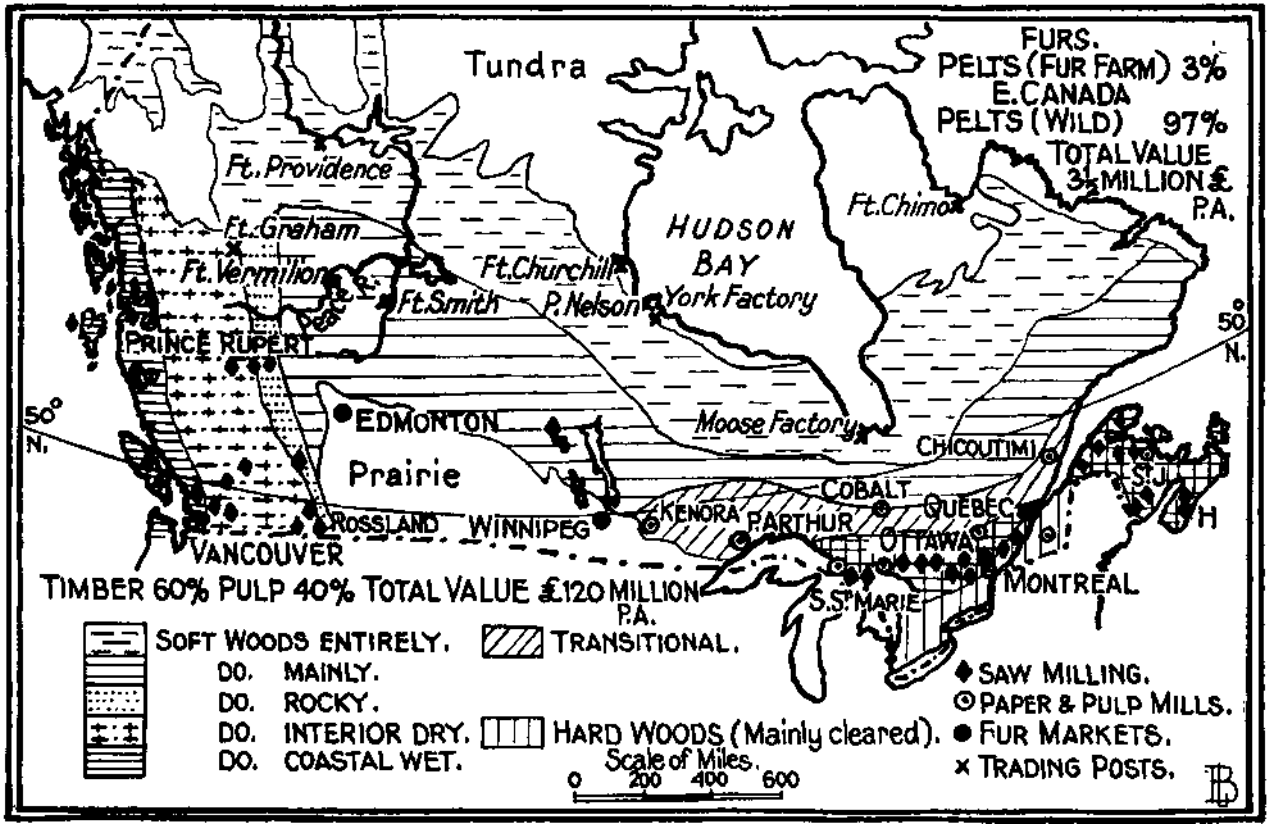



FIG. 125. EXPLOITATION OF CANADIAN FORESTS

watches ice movements in the North-West Atlantic, South of Latitude 43°, and passes on the information to shipping. In conjunction with the scouting duty, scientific observations relating to the area are taken, so that the causes underlying the variations in the limiting lines of menacing ice may be discovered.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. Give an account of the exploitation of the Taiga forests by (a) natives, (6) foreign peoples.

2. In what parts of the Northern Forest region is reindeer farming carried on ? Do you think the prospects favourable or unfavourable ? Give your reasons.

3. " I n the more inaccessible areas of the Northern Forest regions fur trapping is an important occupation." Give reasons why other occupations are not followed. Write a short account of the methods of fur-trapping and of the industry itself, used in either North America or Siberia.

4. Classify the various forms of wood used in your own home locality and give examples of each of these kinds : natural, squared, sawn and dressed, burnt, pulped, extracted, and built up.

5. During the Great War some of our foreign supplies of timber were cut off or reduced. How did we meet the deficiency ? What steps have been taken to increase and protect home supplies ? What work does our Forestry Department do ?

6. The yearly average consumption of timber in cubic feet per capita is: Finland 300, U.S.A. 260, Canada 192, Germany 36, France 24, U.K. 14, Egypt 2; the estimated average consumption of chemical and mechanised wood pulp in lb. per capita is : Canada 297, U.S.A. 67, U.K. 55, Germany 36, France 18, Finland and Egypt a little. Under the headings of supply, uses, substitutes, and the stage of economic development account for so disproportionate a consumption between the different countries.

7. " The single-crop farming that has characterized the grain-growing areas of Canada, and the fact that winter is the most suitable season for logging have combined to further the lumbering enterprise in E. Canada." Explain this and give reasons.

8. "In mountainous, glaciated and sparsely peopled areas of the temperate regions, forest industries are of outstanding importance."' Show why this is so and support your answer by giving examples of forest industries in the Northern Forest regions of North America and Europe.

9. Explain why the United States and Canada export timber to practically every tropical country in South America and Africa, and why Swedish timber even finds a market in Australia.

10. Give reasons why wood working and furniture manufactures, etc., tend to be located near to the market for their products, especially in timber-importing countries.

11. Explain why the growth of paper-making and artificial silk industries have led to the increased exploitation of coniferous forests, especially in higher latitudes where the trees are less suitable for timber.

12. TRADE IN WOOD PRODUCTS, 1935*
(By value in millions of pounds sterling)

| Total Exports (converted at par) value) | | Imports by United Kingdom (c.i.f. actual value) |
|---|---|---|
| | | s = SAWN dr = DRESSED |
| Canada . | 33 | 6.8 Soft 2.7 (s.), 0.7 (dr.); hard 0.7; pulp 0.5; manfd. 1.1. |
| Sweden . | 32 | 11.2 Pulp 2.9; soft 1.9 (s.), 2.0 (dr.); paper 2.6; pitps. 0.2; manfd. 0.5. |
| Finland . | 23 | 13.6 Soft 4.7 (s.), 1.1 (dr.); pulp 3.8; pitps. 1.3; telegraph p. 1.1; manfd. 1.3; matches. |
| U.S.A. . | 20 | 4.8 Soft 0.8 (s.), 0.5 (dr.); hard 2.1; turps 0.6; manfd. 0.5. |
| Russia | 14 | 7.6 Soft 4.6 (s.), 0.2 (dr.); hewn 0.3; pitps. 1.4; manfd. 1.0; pitch. |
| France . | 9 | 0.7 Pitps. 0.4; veneer 0.3. |
| Norway . | 8.5 | 6.4 Soft 0.2 (s.), 0.2 (dr.); pulp 1.3; paper 1.3; telegraph p.; matches. |
| Newfoundland | 2.6 | 1.7 Pitps. 0.1; paper 1.6 |

* European timber trade and wool pulp output subject to trade restrictions.

Find the total value of the exports of the above-named countries and express their shares as percentages.

13. What percentage of our imports comes from countries of the Northern Forest regions in Europe, and in North America? Account for the differences.

14. Name the classes of timber products given in the table; find the amount of our imports of each kind, and give their uses.

15. Write a short comparison of the plant and animal life of the Tundra and the Taiga.

16. Why, and to what extent, does the Tundra deserve to be called a region of privation ?

17. Compare the mode of life of a Canadian fur trapper and a Lapp herdsman, and show how their ways of living are influenced by their geographical environment.

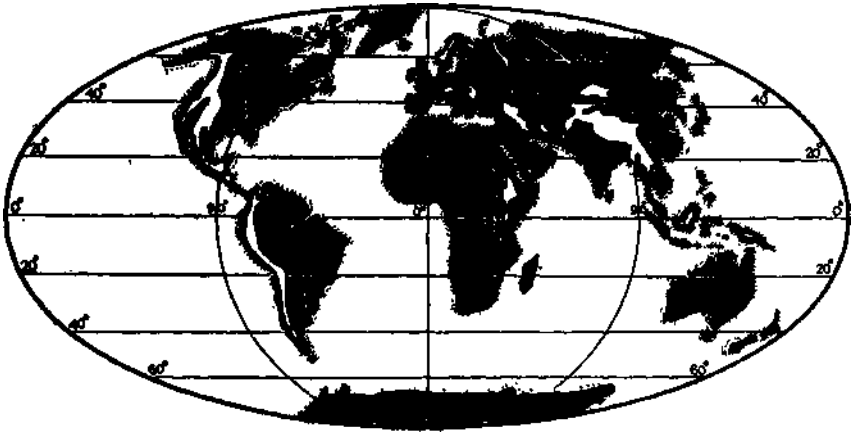
18. " In no other natural region of the world are a people's ways of living more closely adjusted to their natural environment and in none is more complete use made of its natural possibilities." Explain and discuss this reference to the Eskimo inhabitants of the Canadian Tundra. Refer to Figs. 121-3.

19. " Whaling is the only true industry of the Polar Ice Cap region." Account for this fact and give a short description of work done on a whaling station. See Fig. 155.

20. To what extent are the dangers to shipping in the North Atlantic due to the influence of Arctic lands ? What steps are taken to minimize these dangers ?

# CHAPTER VIII

# HIGHLAND REGIONS



*I* Highland Regions having Mountain Climates.

## GENERAL CONSIDERATIONS

HIGHLAND Regions of many varieties are distributed throughout the world. Unlike the lowland regions described in the previous chapters, differences are now due more to altitude than latitude. While climatic conditions are of as great importance as in other natural regions, relief is also of great consequence.

### Climatic Characteristics.

As altitude increases, atmospheric pressure decreases and essentially affects temperatures, precipitation, and light. On the average temperatures fall 1° P. for every 300 ft. increase of altitude. Actually this cooling varies considerably, according to local variations of relief and aspect. Owing to colder and heavier air at higher levels sinking to lower levels, inversions of temperature sometimes occur, higher ground thus having the higher temperature. In the middle latitudes the degree of cooling is greater in summer and less in winter. In Highland Regions there are very marked differences between temperatures in the sun and in the shade. In Tibet a

difference of 45° F. between the sunny and shady side of a tent has been recorded ; in the Alps the difference between shade and sun temperatures is about double that of the lowlands at the same latitude. This is brought about by the intensity of radiation due to the rarefaction of the air.

Precipitation tends to increase with altitude up to a certain level and then to decrease. The average height of the level in the Himalayas is about 3,000 ft. above sea level and it gets lower towards the poles. Everywhere it varies considerably with local climatic conditions and relief. In the middle latitudes it also varies with the seasons, being lower in winter than in summer.

Owing to the rarity of the atmosphere, mountain light is richer in blue, violet, and ultra-violet rays, the atmosphere carries less moisture, and the amount of water vapour that can be carried rapidly gets smaller as height increases.

### Relief.

In highland regions soil is rapidly eroded by rain and wind. Farmers have to be careful to plough across slopes (i.e. along contours) in order to preserve the thin layer of soil. Large level spaces are lacking, and consequently terracing is practised. The construction and upkeep of terraces involve expense and much labour and, consequently, adding to the cost of cultivation, tend to keep the cultivator poor. The lack of level ground and the stony nature of the soil prohibit the use of farm machinery and thus make man's work more arduous than it might otherwise be. Steep gradients make road and railway building and maintenance difficult and expensive, and the limited choice of direction makes networks of them impossible. For these reasons, and because there are less people to bear the cost, railways and roads for vehicular traffic are few. Goods are often carried on pack animals, which follow rough trails. Land travel and transport is slower than in fairly level country because it is impossible to go much as the crow flies between places, and more costly because of the greater wear and tear on machines and animals.

### Vegetation and Animal Life.

Theoretically, changes in elevation are accompanied by a somewhat similar sequence of climatic types, with their corresponding

plant and animal life, as does latitude. Actually, the sequence is hardly ever complete and many variations occur.

**Man.**

As in the lowlands, man's occupations vary according to the opportunities provided by Nature. Where climate and relief make it possible to get a living, altitude alone is relatively unimportant so far as man is concerned. The human body soon adapts itself to new conditions ; e.g. the city of Denver is a mile, Mexico City a mile and a half, and Quito two miles high above sea level. The farther from the Equator, the lower the upper limit of habitation becomes, and the more sparse the population, in Highland Regions.

The life and character of the inhabitants of Highland Regions is influenced by their environment. Mountain folk are apt to be sturdier and more manly than the people of the adjoining lowlands, but even in highly civilized countries they are also likely to be less well educated, clannish, and a little behind the times. Local dialects, dresses, and customs die slowly in the Scottish Highlands, Wales, Scandinavia, Tyrol. Isolation prevents the rapid penetration of new ideas, and owing to lack of scope, the proportion of professional and artisan classes of society is small. In less civilized parts of the world the highland areas are the homes of secluded peoples, such as the Tibetans and the warlike and intensely patriotic hillmen of Afghanistan, and of the Balkans.

In the tropics, civilization is more progressive in highlands than on the lowlands. Unless the drawbacks of isolation have been overcome, the reverse is the case in extra-tropical regions. The people of many Swiss Valleys no longer depend wholly on their farms. Catering for tourists and the development of hydro-electrical power have respectively broadened their ideas and widened their opportunities for gaining a living all the year round. Their prosperity has increased and a higher standard of life has been made possible. In the Balkans, where communications are poor, the people are backward.

**Mountain Climates and Zones.**

Six typical mountain zones are distinguishable in the mountain **areas** of the world.

| *Mountain Zone Type* | *Corresponding but not Exactly Similar Natural Region* | |
|---|---|---|
| 1. Tierra Templada | Savannah | In ascending order: |
| 2. Tierra Fria | Sub-tropical grasslands | In ascending order: |
| 3. Puna | Cool temperate continental interior, short summer | In ascending order: |
| 4. Paramos | Tundra | In ascending order: |
| 5. Alpine | Cool temperate west margins and northern forests | In ascending order: |
| 6. Colorado | As 3. | In ascending order in middle latitudes. |
| 7. Fjeldt | As 4. | In ascending order in middle latitudes. |

## MOUNTAIN ZONES. LOW LATITUDES

MEAN MONTHLY TEMPERATURES (t°F.) AND RAINFALL (r")

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tosan *5,830'* | 7° 54' S. 112°55'E. | *t* | 62 | 61 | 61 | 61 | 60 | 60 | 59 | 59 | 60 | 60 | 61 | 61 |
| | | *r* | 11-2 | 12 6 | 8-7 | 5-3 | 3 5 | 3 0 | 1-7 | 2-0 | 0 4 | 2 8 | 5 8 | 10 0 |
| Darjeeling *7,376'* | 27° 3' N. 88° 18' E. | *t* | 40 | 42 | 50 | 56 | 58 | 60 | 62 | 62 | 60 | 55 | 48 | 42 |
| | | *r* | 0-7 | 0 9 | 1 7 | 4 0 | 8 6 | 23 6 | 31 9 | 25 4 | 18 2 | 5 3 | 0 2 | 0 2 |
| Mexico City *7,475'* | 19° 26' N. 99° 8' W. | *t* | 54 | 57 | 60 | 64 | 65 | 64 | 62 | 62 | 61 | 59 | 56 | 53 |
| | | *r* | 0-2 | 0 2 | 0 6 | 0 6 | 1-9 | 3 9 | 4 1 | 4 7 | 4-1 | 1-8 | 0 5 | 0 1 |
| Quito *9,335'* | 0° 14' S. 78° 32' W. | *t* | 56 | 56 | 56 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 56 |
| | | *r* | 4 3 | 4 0 | 5 3 | 7-3 | 5 1 | 1-5 | 0 9 | 1 5 | 3 0 | 3 7 | 3 7 | 3 9 |
| La Paz *11,900'* | 16° 30' S. 68° 9' W. | *t* | 52 | 51 | 51 | 49 | 47 | 44 | 45 | 46 | 48 | 49 | 53 | 52 |
| | | *r* | 3 9 | 4 5 | 2-6 | 1 5 | 0 5 | 0 1 | 0 2 | 1 1 | 0 9 | 1-3 | 1-5 | 4-2 |

### Tierra Templada.

Mexico has three distinct climatic zones which illustrate the important differences resulting from elevation in countries in the low latitudes. On the lowlands and penetrating up the valleys into the highland areas is the *tierra caliente* or hot land of the tropical forest type. On the lower middle slopes of the Mexican Plateau and mountain shoulders of medium elevation, the *tierra templada*, or temperate land, occurs. This zone really has a temperate climate. Temperatures are on the average moderate and vary only 4° to 5° all the year round. Days are not too hot or nights too cold for Europeans, and the difference between sunshine and shade is not greatly marked. This evenness of heat is due to clouds which act as a screen and mists which reduce evaporation to a minimum.

Vegetation is abundant and mixed in character, e.g. evergreen forests in which broad-leaved trees, tree ferns, lianes, and mosses all grow together. The cultivation,of many crops is possible in

the clearings. Sugar cane, maize, and wheat, can be seen growing side by side. In this type of climatic zone many tropical and sub-tropical crops, such as coffee, tea, tobacco, which require shade, are grown successfully. Coffee is usually grown under bananas, tea plantations are protected from too sudden changes of temperature

*By kind permission of H.M. Eastern African Trade and Information Office*

FIG. 126. CULTIVATING A YOUNG COFFEE PLANTATION, KENYA
More mature coffee bushes interspersed with shade trees are shown in the background. Because of its mild character and valuable liquoring quality, Nairobi coffee commands a high price

and winds by wind breaks, and the fields of tobacco plants are often covered with muslin. Most of the hill stations and sanatoria for Europeans in the East Indies, Ceylon, Philippines, West Indies and Brazil, and Addis Abbaba, the capital of Abyssinia, are located in **this zone.**

**The Tierra Fria Zone.**

This zone replaces the temperate zone at a height varying from about 9,000 ft. near the Equator to 6,000 ft. near the tropics. This

zone is both cooler and drier. The annual range of temperature is still small, but days are much hotter and nights much colder. Overcoats or other warm clothing like the native serapes are needed in the evenings and mornings. Houses have no heating facilities, but are designed to make the most of the sunshine. The rainfall,

*By kind permission of* *The Trade Commissioner for India*

FIG. 127. BAGGING COFFEE BEANS ON A DRYING GROUND, BANGALORE, INDIA

The plantation of coffee bushes whose " cherries " are **shown being dried occupies the** tree-shaded hillsides

which comes mostly as " relief " showers in the afternoons and evenings of the warmer months, is only about one quarter as much as in **the** *tierra templada.* Snow sometimes falls in the cool season, **but** soon melts.

Grass and scrub is the natural vegetation, and the herding of cattle, sheep and goats is the principal occupation of the inhabitants of this zone. Where irrigation is possible, wheat, maize, barley, vegetables, and fruits, such as apples, are grown.

Some of the best developed plateaux and intermontane valleys in **the** world are found in this zone in Ecuador, Colombia, Peru,

Kashmir (India), Mexico, and Abyssinia. The *tierra fria* was the seat of the Aztec civilization in Central America. Europeans find the climate of this zone very agreeable, hence its selection for the establishment of " hill stations " in India, e.g. Simla.

**Puna.**

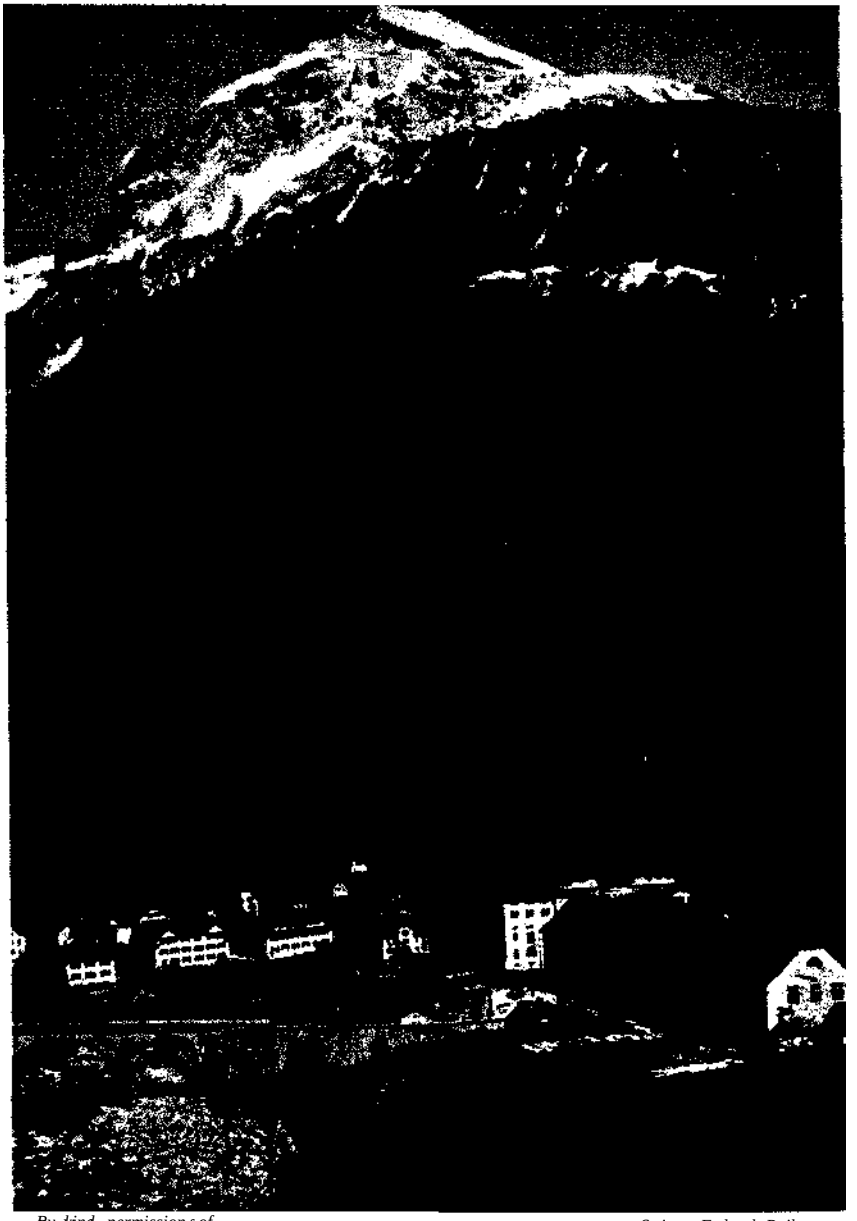
This is another Spanish-American name which is given to the climatic zone found above that of the *tierra fria* type on the lofty plateau of Bolivia, South America. The mean annual temperature is lower and the seasonal range of temperature is about 10° F. Diurnal variations of 30° to 40° F. are unpleasant, and the rareness of the atmosphere makes the difference between sun and shade temperatures very marked. Even the passage of a cloud across the sun causes a sharp drop in temperature. The natives even do their cooking out of doors in order to be in the sunshine. These sudden changes result in violent winds, which raise clouds of dust. Most of the scanty rainfall comes as thunderstorm rain during the warm months.

Natural vegetation consists of quick-growing plants, such as grasses, low leafy bushes, whose masses of leaves protect buds and flowers from damage by storms, and at the same time hold rain much as sponges hold water. Wood is so scarce that even telegraph posts are built of stone.

Most of the people dwell in the lower valleys, where irrigation or deeper soil make possible the cultivation of potatoes, beans, alfalfa, and similar crops. Most of the land elsewhere is used as pasture for sheep, yaks (Thibet), llamas and alpacas (South America). The greater part of the wool and hair from these animals is made up locally into woollen cloth or felt for articles of clothing. European newcomers to this zone suffer from mountain sickness, but can become acclimatized.

**Paramos (Bleak Moors).**

These chilly, misty zones of the high mountain tops lie between the " puna " and the snow line, which is reached at an elevation of about 15,000 feet near the Equator and progressively lower towards the poles. These zones are narrow and of no human value.



*By kind permission of* *Swiss Federal Railways*

FIG. 128. AMSTEG, SWITZERLAND

The zones of cultivation, forest, alp, with summer chalets and permanent snow, are shown. The large building on the right is the hydro-electric power station, and the building beyond on the stream's bank is a sawmill. The shape of the valley and the boulder strewn bed of the stream are worth noting

**MOUNTAIN ZONES. MIDDLE LATITUDES**

**MEAN MONTHLY TEMPERATURES (*f* F.) AND RAINFALL (r")**

| PLACE. | Position. | | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sep. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Davos . *5,120'* | 46° 46' N. 9° 48' E. | *t* *r* | 18-7 1-9 | 22-8 2-2 | 27-3 2-2 | 361 23 | 44-1 2-3 | 50-4 40 | 53-8 4-9 | 52-2 5-0 | 47-1 3-7 | 38-0 27 | 29-7 2-2 | 21.0 2.4 |
| Kashgar *4,040'* | 39° 25' N. 76° 7'E. | *t* *r* | 218 0-2 | 33-6 0-2 | 46-5 06 | 60-9 0-8 | 69 6 1-0 | 770 0-2 | 79-7 0-2 | 76-0 00 | 68 9 06 | 55-5 0-0 | 39 9 0-0 | 25.6 0.2 |
| Long's Peak . *8,700'* | 40° 20' N. 105° 50' W | *t* *r* | 23-0 0-5 | 23-0 0-8 | 27-0 1-9 | 34-0 2-5 | 43-0 2-3 | 50-0 15 | 540 2-7 | 550 2-0 | 49-0 1-8 | 38-0 1-6 | 32.0 0.6 | 25.0 0 6 |

### Comparison of Mountain Zones in Low and Middle Latitudes.

The mountain zones of the middle latitudes carry a smaller population, which is partly migratory. In the middle latitudes conditions of life are harsher in the mountains than on the plains; in low latitudes the reverse is usually the case.

### Alpine Types.

This type of zone is found in highland areas of medium elevation situated in humid regions. Its summer rainfall and winter snowfall is heavier than in the adjoining lowlands areas. The amount of precipitation varies according to the situation of the mountain area as regards its nearness to the ocean. It is greatest in areas near the sea, like the Cascades (U.S.A.), or the mountains of Japan, and less in interior district like the Swiss Alps and the Caucasus Region. Mean annual temperatures are lower than those of lowlands of similar world location. Day temperatures are higher and night frosts occur during three parts of the year. A shorter growing season is the result. The contrast between sunshine and shade is sufficiently well marked to make fires for heat desirable indoors in the summer. Violent, but short-lived, summer storms and heavy falls of snow in winter take place. In these districts winter climatic conditions are pleasant and invigorating, partly because of abundant and intensified sunshine and partly because of the comparative dryness of the air. At a height of about 2,000 ft. many places which are cloudy in summer are above the clouds in winter, and although the hours of daylight in winter are shorter, the actual hours of bright sunshine are nearly the same in summer and winter. The intensity

of the sun's rays is often nearly doubled by reflection from snow and ice. It is weather conditions such as these which make possible the holding of winter sports seasons at places in the High Alps, Switzerland, and the Adirondacks, U.S.A. Considerable local variations in precipitation due to relief in relation to the direction of prevailing winds occur.

**Plant Life.**

The lower mountain slopes are usually well timbered with forests of broad leaved deciduous trees, which are replaced by coniferous trees and finally luxuriant grass—" alp " (Switzerland), " saeter " (Scandinavia)—as elevation increases. About 22 per cent of the land is forested in Switzerland and 24 per cent in Norway. Quick growing and moisture loving root-crops, garden produce, oats, barley, and temperate orchard fruits, are raised on the valley floors and in the lower forest clearings, where the soil is deeper, ground more level, and situation more sheltered. Sixteen per cent of the area of Switzerland is under cultivation, and of this area more than one third is devoted to grass and other fodder crops. So rugged is the relief of Norway that only 4 per cent of the land is cultivated, none under grass. Fortunately, Norway abuts on the North Sea fishing grounds, and the impossibility of agriculture is compensated by the possibility of fishing. Owing to the irregular occurrence of fairly level patches of ground cultivated plots are found in more scattered positions and have more varied shapes than the contiguous and almost regular shaped fields of the plains.

**Occupations.**

In Switzerland the principal occupations are herding, with a little agriculture, and lumbering. Cattle raising, more for milk than beef, is nomadic in character. During the winter months the cattle are kept in shelters and stall-fed. As the weather improves in spring they are allowed to graze on the cultivated meadows below the forests. For the summer months they are driven up to the natural "alp" pasturage. The return during the autumn is similarly made. To a much less extent, similar movements take place between the lower levels and higher " saeter," or summer grass pasture, in Norway. In some parts relief makes it necessary to bring the grass down to the cattle.

In progressive areas, industries connected with pastoral pursuits have arisen, e.g. in Switzerland, cheese making (Gruyere and Emmental varieties), condensed milk (Nestle) and chocolate (Suchard) manufacturing.

In Switzerland lumbering is mainly done in the autumn and

*Photo Max Kettel* *Kindly lent by Swiss Federal Railways*

**FIG. 129. A TYPICAL SWISS VILLAGE, VAL D'HERENS, SWITZERLAND**
**Note the drying racks for hay on the larger buildings**

winter, partly because other outdoor occupations are impossible and partly because the frozen snow makes haulage easy. The timber is mainly used locally for buildings, wood-working and fuel. In Norway, where agriculture and herding are much more difficult, lumbering is a most important industry. Timber resources are much more scientifically exploited and a large proportion of the timber is made up into wood pulp, paper, and matches for export.

In both Switzerland and Norway ample water power suitable for developing electrical energy has had an important bearing

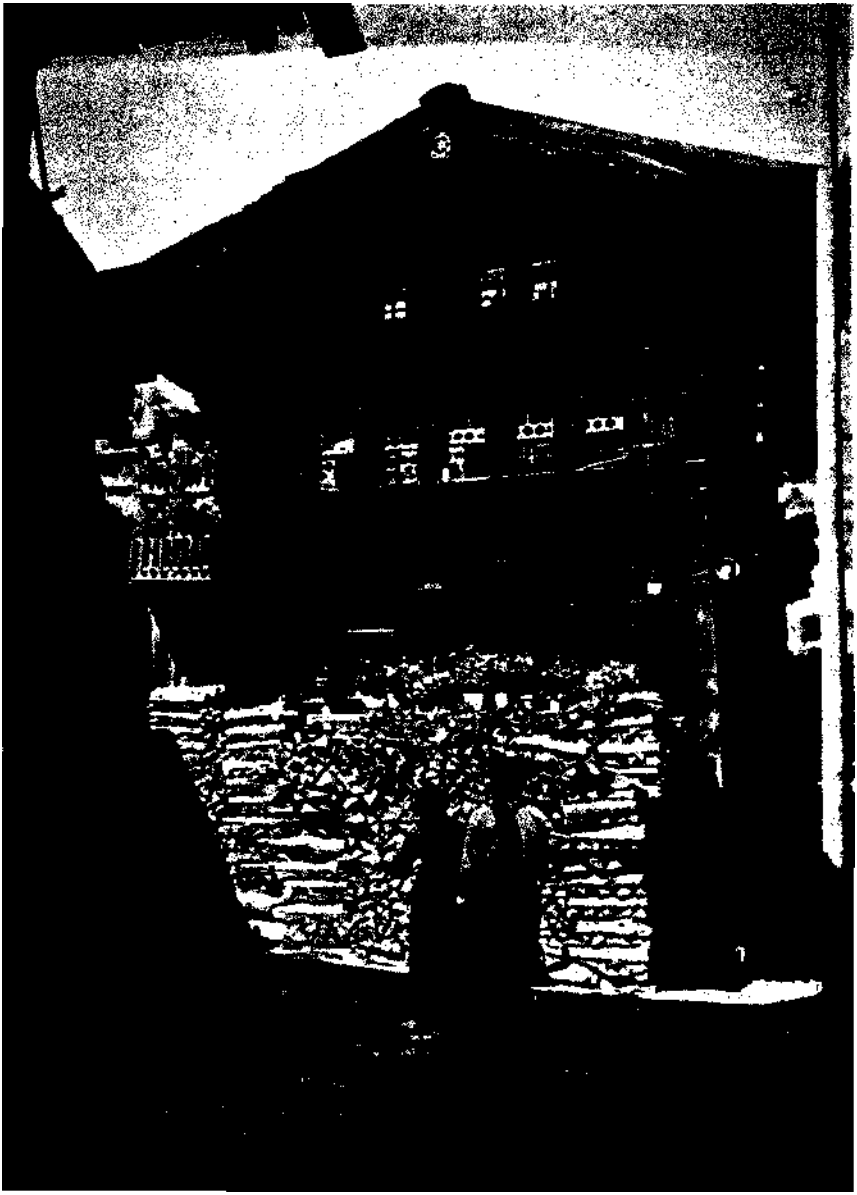


*Photo R. Vuarnoz* *Kindly lent by Swi*s Federal Railways*

FIG. 130. NURSMANN HAUS IN KIPPEL, SWITZERLAND

A fine example of a timber house. Note the size of the shuttered windows and the extent to which the eaves overhang, compared with these features of our houses. The winter supply of split logs for fuel, the telephone, and the electric light should also be **noted**

upon industrial development, transport, and communications. Telephones and electric lighting and heating have done much to mitigate isolation and the harsh living conditions in these countries.

Situated within easy reach of progressive and densely peopled lowlands, the beautiful scenery of Switzerland and Norway attracts large numbers of tourists all the year round. In Switzerland, with its more favourable position, the tourist and hotel-keeping industry flourishes on a large scale.

Much of what has been said in reference to mountain zones of the Alpine type in interior regions, such as Switzerland and maritime regions like Norway, applies to similar areas in East Asia, Japan, and North America, especially British Columbia and the " Adirondacks " (U.S.A.).

**Food, Clothing, and Shelter.**

Apart from differences which have already been mentioned, folk live on similar kinds of food, wear similar but warmer clothing, go about their work in much the same ways, and live in houses very like those of people of the corresponding lowlands. Houses reflect the differences due to mountain conditions more than man's other material needs. The choice of materials for buildings is more restricted to local products. The Swiss chalet and Norwegian house are made of wood, because it is cheap and easily available. The structural design of houses is also more determined by weather conditions, such as heaviness of precipitation, violence of winds, and frequency of storms. This is shown by the preference for rather low built one-storey buildings having heavy or weighted roofs with a moderate pent and overhanging eaves, and windows fitted with shutters.

**Colorado Type.**

Mountain zones of this type are found on interior plateaux at about the same elevation as that of zones of the Alpine type. Compared with the latter, temperatures are more extreme and precipitation is smaller.

The natural vegetation consists almost entirely of grass and scrub, consequently man is chiefly engaged in raising cattle for beef and sheep for wool. A little cultivation is done where irrigation is possible.

**Fjeldt.**

Situated just below the snow line and above the tree line, zones of this type are found near the high tops of highland areas in humid regions, e.g. 8,000 ft. (Alps), 3,000 ft. (Norway), and 13,000 ft. (Rockies, which are drier). Despite the regular alternation of night and day, the natural vegetation, consisting of a grassy brush of low underscrub, with small and leathery-leaved junipers, crowberry, etc., and a carpet of moss and lichens, resembles that of the Tundra. These zones, snow-bound during the winter months, are of little human importance.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. Study the drainage and location of farms, villages, towns, roads, and railways, and the proportions of woods, grassland and arable land of your own local area, and compare your observations with similar ones relating to another area whose relief is in contrast to that of your own locality. Use Ordnance Survey 1 in. maps.

2. Compare maps showing distribution and density of population. Pick out one area that is mostly mountainous and one that is plain, preferably in the same natural region. What differences can you see ?

3. Do you think relief is of greater or less importance than climate in its effect upon the economic development of regions of the Alpine, Colorado, and Fjeldt types ? What bearing do other factors, such as soils, mineral wealth, sources of power and the location of such a region in proximity to a densely populated lowland, have upon their development ?

4. How do the following figures help to show the influence

Density of Population

| | |
|---|---|
| **Bolivia** | **6.2 per sq. mile** |
| **Peru .** | **12.7** |
| **Ecuador** | **20.8** |

Grissons—Switzerland

| | |
|---|---|
| **Below 1,000' above sea level** | **22*3% of population** |
| **1.000'-l,100' .** | **19.8%** |
| **1,100'-1,200' .** | **18.4%** |
| **1,200'-1,300' .** | **21.6%** |
| **1,300'-1,400' .** | **14.0%** |
| **Above 1,400' .** | **3.9%** |

of altitude upon the distribution of population in mountainous parts of the world? What other factors exert an influence?

5. In Abyssinia the population is almost entirely confined between elevations of 6,000 ft. and 8,000 ft. above sea level. In Switzerland only 5 per cent of the people live above 3,300 ft. Give as many reasons as you can why this is so.

6. Using the following headings, general elevation above sea level, area of fairly level surface, relation to surrounding land forms, shape and size of valleys, drainage, point out how the physical characteristics of plateaux differ from those of mountain regions, hilly country, and plains. Would you expect these differences to be reflected in the economic life of plateaux peoples? Illustrate your answer by giving actual examples.

7. Compare and contrast the location and climate of Quito and Guayaquil (S. America) and say in which city you would prefer to live, and why.

8. "In regions where communication is difficult sheep are profitable animals to keep." Give as many reasons as you can why this is so and illustrate your answer by quoting examples of sheep-rearing regions where the difficulty of communication is mainly due to relief.

9. In Switzerland, the cows are driven to the "Alps" or pastures above the tree belt for the summer months. Why is such grazing limited to the summer season and how are the cattle fed during the rest of the year?

10. In mountain zones of the Alpine type where is cultivation concentrated? Where the ground is tilled, roads are narrow, hedges practically absent, fields as small as allotments, and fodder and root crops are grown rather than cereals. How do these facts reflect the pressure of geographical conditions?

11. "Scenery is a real economic resource in Switzerland, Norway, and Northern Ontario, Canada." Explain this statement and point out how the possession of such a resource affects the use of land, the density, and prosperity of the population, and transport facilities in these areas.

*

12, SWITZERLAND

| Use of Land | | Percentage Total Exports (value) 1935 | |
|---|---|---|---|
| Waste | 20% | Silk ribbons and embroidery | 8.5% |
| Grass | 42% | Cotton goods . | 10.0% |
| Forests | 22% | Watches and clocks | 17.0% |
| Orchards | 3% | Small machinery | 12.5% |
| Crops and gardens | 13% | Cheese and condensed milk | 5.0% |
| | | Hides and skins | 3.0% |
| | | Others . . . . | 44.0% |

Compare and contrast these tables and show how far they reflect geographical conditions. How do the Swiss obtain the raw materials and power for their manufactures. Do you think that in a table of exports by weight the percentages for the articles named would be the same ? Give your reasons.

13. " Mountaineers are hardy men and jacks of all trades." Discuss this statement, giving reasons for your opinions.

14. In what ways did geographical conditions foster the development of the Inca civilization centred round Cuzco ?

15. Give a geographical account of three climatic and vegetative belts passed through on a journey from Vera Cruz to Mexico City, Central America.

16. What are the chief contrasts in the mode of life and economic activities of the inhabitants of the highland and lowland areas of either Ecuador or Java ?

17. Using the headings given in Fig. 1, write a geographical account of the Tarim Basin, Thibet.

18. " Mountain zones act as barriers to transport and trade. Even tunnels do not represent a complete conquest of Nature." Discuss this statement in relation to the Alps, separating France, Switzerland, Austria, and Germany from Italy.

19. Terrace cultivation is a characteristic feature of mountain agriculture. In view of the cost of construction and maintenance of terraces, under what conditions of population and economic organization would you expect to find it ? Quote actual examples to illustrate your answer.

20. World Hydro·Electric Development, 1924 and 1935.

MILLIONS OF HORSE·POWER

| Country | Potential output | | Actual output | | Percentage of actual to potential | |
|---|---|---|---|---|---|---|
| | 1924 | 1935 | 1924 | 1935 | 1924 | 1935 |
| United States | 30 | 58 | 11 | 160 | 37 | 28 |
| Canada | 23 | 25·5 | 3·6 | 7·5 | 16 | 30 |
| France | 5·6 | 9·7 | 1·6 | 4·3 | 29 | 45 |
| Japan | 8 | 12·8 | 1·5 | 4·2 | 19 | 33 |
| Switzerland | 4 | 4·8 | 1·4 | 2·3 | 37 | 48 |
| Italy | 4 | 9·6 | 1·4 | 5 8 | 35 | 60 |
| Norway | 9 | 14·4 | 1·3 | 2·4 | 15 | 17 |
| Sweden | 6·2 | 6·8 | 1·3 | 1·8 | 21 | 26 |
| Russia | 20 | 25·3 | 1·2 | 1·9 | 6 | 8 |
| Germany | 4·5 | 4·8 | 1·2 | 2·8 | 27 | 58 |
| Spain | 5 | 5·4 | 0·9 | 1·4 | 18 | 26 |
| British India, Guiana, Africa, N.Z., etc. | 40 | 56 | a little | | — | — |
| Austria | 1·4 | 2·5 | 0·4 | 0·9 | 0·3 | 0·4 |
| Brazil | 25 | 25·7 | 0·3 | 0·7 | 1·3 | 2·7 |
| Britain | 0·9 | 1·3 | 0·2 | 0·4 | 22 | 32 |
| Finland | 2 | 2 1 | 0·1 | 0·3 | 5 | 17 |
| Czechoslovakia | 1·3 | 1·3 | 0·1 | 0·3 | 8 | 26 |
| Yugo·Slavia | 2 | 3·3 | 0 1 | 0·2 | 7 | 7·7 |

*Note.* In most cases actual output represents the rated capacity of water wheels or turbines installed and potential output represents the total power that could be obtained at ordinary low water and an efficiency of 70 per cent in the plants.

Comment upon the above three columns of statistics. Suggest the factors underlying the points of difference you discover.

21. Write a concise account of the development of hydro-electric power in Norway and Spain and show in what ways the social and economic life of these countries has been modified by this factor.

22. Compare and contrast the advantages of cheap electricity to the people of Switzerland and of the Plain of Lombardy, Italy.

23. In what ways do Figs. 128·130 show that the intelligent and progressive Swiss make the most of their difficult geographical **environment**?

24. TIMBER AND WOOD PRODUCTS, 1935

(Millions of tons)

| Exports | | | | Special Imports | | | |
|---|---|---|---|---|---|---|---|
| | S.T. | W.T. | W.P. | | S.T. | W.T. | W.P. |
| **World** . | 16·5 | 0·9 | 6·8 | **World** | 10·1 | 0·9 | 7·7 |
| U.S.S.R. | 3·8 | 01 | 001 | **U.K. .** | 3·4 | 0·75 | 3·4 |
| Finland | 3·4 | 001 | 1·6 | Germany | 0·9 | | 01 |
| Canada | 2·4 | 0·2 | 0·6 | Netherlands | 0·8 | 001 | 01 |
| Sweden | 2·0 | 0·5 | 2·1 | U.S.A. | 0·7 | * | 21 |
| U.S.A. | 1·8 | 01 | 0·2 | Italy . | 0·6 | | 0·2 |
| Esthonia | 1·0 | | * | Belgo·Lux. | 0·0 | * | 01 |
| Poland | 0·6 | 003 | * | France | 0·4 | | 0·6 |
| Koumania | 0·6 | * | * | Denmark | 0·4 | 004 | 006 |
| Austria | 0·6 | * | 001 | Hungary | 0·3 | | 003 |
| Latvia | 0·3 | * | * | S. Africa | 0·2 | 005 | |
| Norway | 0·01 | 005 | 0·5 | China. | 0·2 | 003 | * |
| Grermany | 0·004 | * | 0·3 | Egypt | 0·2 | * | 004 |
| | | | | Australia | 0·1 | 001 | 0·2 |
| * A little. | | | | Japan | | | |

S.T. Sawn or squared timber excluding railway sleepers.

W.T. Grooved, tongued, or planed timber excluding parts of boxes, wood blocks, panels, mouldings.

W.P. Mechanical and chemical wood pulp with some pulp of straw, fibres, and **rags.**

Describe and explain the world trade in the raw materials shown in the above table and say to what extent the above table gives a true picture of the part played by wood and wood products in international trade.

CHAPTER IX

# EXPLOITATION OF THE WORLD'S MINERAL WEALTH

## Origin and Distribution of Mineral Wealth.

MOST mineral substances are inorganic in origin ; coal and possibly nitrates and petroleum are derived from former organic plant and animal substances. Mineral substances of use to men are found in all parts of the world and different mineral deposits predominate in different regions. Some areas may have larger, better, or more accessible supplies than others.

Compared with lowlands, mountainous regions usually offer the greater variety of mineral wealth, especially metallic ores. As the earth cooled and solidified, heavier substances, like metallic compounds, appear to have sunk into the interior of the earth. The same earth movements of folding, uplift, and faulting, which have produced many of the highland areas of the world have also in many instances exposed the deeper parts of the earth's crust. By wearing away overlying rocks, running water, weathering, moving ice, and other agents of denudation have also helped to bring mineral deposits within the reach of man. While the Rocky Mountains and Andes of the Americas, the Highlands of Eastern Australia, South Africa, and North and Central Europe produce valuable minerals, the Swiss Alps and the Himalaya Mountains of India contribute little or nothing to the world's output of metals. Even where the geological structure of an area is known, without detailed prospecting it is impossible to say whether particular minerals are available in any area.

Unlike that of plant and animal life, the distribution of minerals , bears but little relationship to the other factors of our physical environment.

## Production and Supplies.

The production of minerals is much more localized than that of primary products of vegetable and animal origin, e.g. compare maps

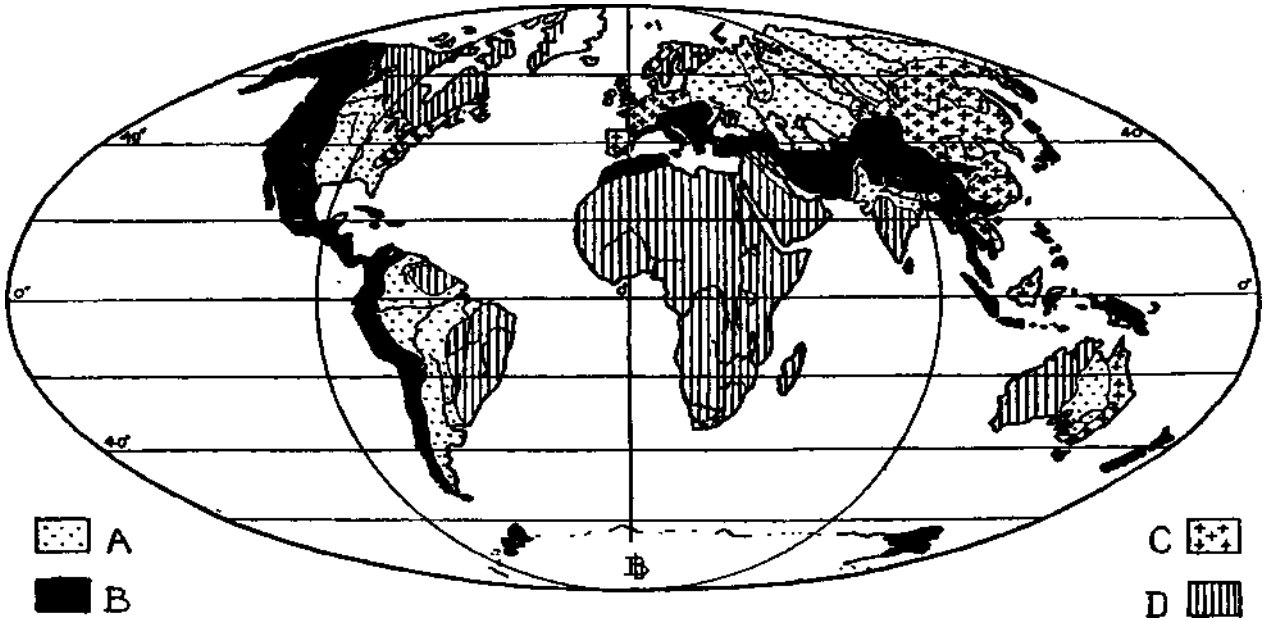



FIG. 131. MAJOR STRUCTURAL DIVISIONS OF THE LAND

*A.* Unfolded Lowlands and Depressions of Quaternary and Tertiary rocks. *B.* Folded Mountains mainly of Secondary rocks with cores of older formations. C. Residual and Block Mountains with Basins. D. Unfolded Mountains and Peneplains composed mainly of Archean and Primary rocks.

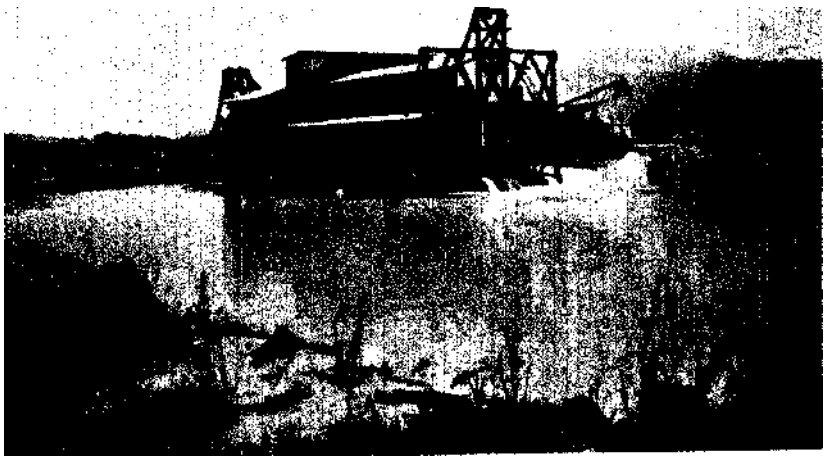
of the world showing coal producing and wheat growing areas. This is more so in the case of metals and fuels than with clays, sands, and stony minerals, whose occurrence is more widespread ; e.g. of the world's supply of primary tin 68 per cent comes from Malaya and the Dutch East Indies; Canada has a similar monopoly of asbestos and cobalt nickel; U.S.A. produces 60 per cent of the world's petroleum.

The chief difference between the supplies of vegetable, animal, and mineral products, is that the mineral wealth of the world is irreplaceable and cannot be increased. Each ton of coal used now means a ton less for use in the future. The total amount of the world's supply of some minerals is decreased less rapidly than others. For instance, unlike coal, iron can be used over again. These two considerations influence the supply of the world's minerals. The following table shows the situation as regards the available world supplies at the present rate of consumption—

| *Future Shortage Unlikely.* | *No Shortage for Some Generations.* | *Shortage in the Near Future Likely.* |
|---|---|---|
| Clay, sand, lime. | Coal. | Petroleum. |
| Slates, building stones. | Potash. | Nitrates. |
| Salt. | Copper. | Phosphates. |
| Iron. | Zinc. | Tin. |
| Aluminium. | Lead. | |
| Gold, silver. | | |
| Precious stones and metals. | | |

It should be remembered that the discovery of new uses or artificial substitutes may cause the supplies of a mineral to be consumed more rapidly or more slowly. Following the introduction of steam power for driving machinery (first used in the British Isles for cotton manufactures in 1785) the output and consumption of coal greatly increased. Inventions of machinery for making machinery, leading to the rapid expansion of metallurgical industries, and the growth of textile and chemical industries, and transport facilities, further increased coal consumption. Copper was little used from the Bronze Age until the discovery and widespread application of electricity. Electrical energy made possible the

extraction of aluminium on a larger scale, and consequently many utensils formerly made of copper, iron, and pot, are now made of this metal. Steps are being taken to conserve coal supplies by finding better ways of using the energy contained in coal, e.g.



*Reproduced by kind permission of* *The Malayan Information Agency*

**FIG. 132. TIN DREDGER AT WORK ON THE TAILINGS, MALAYA**

low temperature carbonization. Alcohol is being more and more used as a substitute for petroleum. Artificial nitrates are rapidly taking the place of the natural product. A feature of the last century has been the steady increase in the output of baser minerals such as limestone, clay, and shale, igneous rock, chalk, sandstone, gravel, and sand for constructional and industrial purposes.

**Value and Uses.**

The market value of a mineral varies mainly according to the quantity forthcoming in relation to demand, the lack of substitutes, **and** the cost of production. This last factor depends upon the kind of mining methods which have to be used, the richness of the

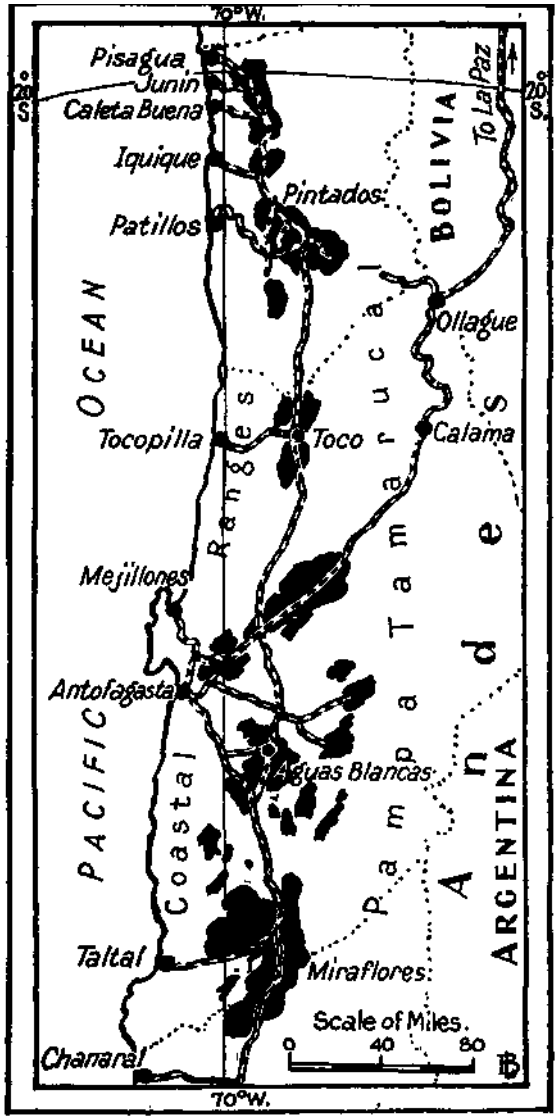



FIG. 133. NITRATE FIELDS, CHILE

deposits, the chemical state of the mineral, climatic conditions, and the efficiency and cost of labour.

Where mineral deposits occur at or near the surface in alluvial

deposits or as outcrops, placer mining (e.g. gold in Alaska), open cast working (e.g. tin in Malaya), or quarrying (slate, stone, clay), are favoured. Where the removal of the overburden of useless rock would be too costly, deeper deposits are reached by sinking shafts or pits from which tunnels and galleries are driven along the

*By courtesy of* *The Chilean Nitrate Committee*

FIG. 134. A CALICHERA, OFICINA " ACONCAGUA," CHILE
**Preparations for blasting are being made. Note the arid nature of the ground**

seams, veins, or lodes (coal, copper, diamond bearing blue clay). Working minerals by the aid of pits and shafts is costly because of the initial expense of proving the existence and depth of deposits by boring, of constructing the shafts, and the working expenses in connection with the draining, ventilation, and safety of the underground passages and the haulage of the mineral to the surface. Only in the case of valuable minerals, e.g. coal and metals, does it pay to use shafts and pits and expensive machinery, power, explosives, and chemical processes. The rise of huge mining corporations, commanding large capital resources, is one result of these conditions. On the average it costs five times more to raise a ton

of coal than to dig out a ton of brick earth in England. Underground supplies of mineral oil are exploited by boring oil wells from which the oil usually flows of its own accord. Pumping is sometimes necessary. Rock salt deposits are worked by pumping water into borings and then pumping the brine out again. In both of these two cases, the expenses of underground workings are not incurred.

The extensive natural nitrate fields of the rainless provinces of Chile are exploited by open cast workings.

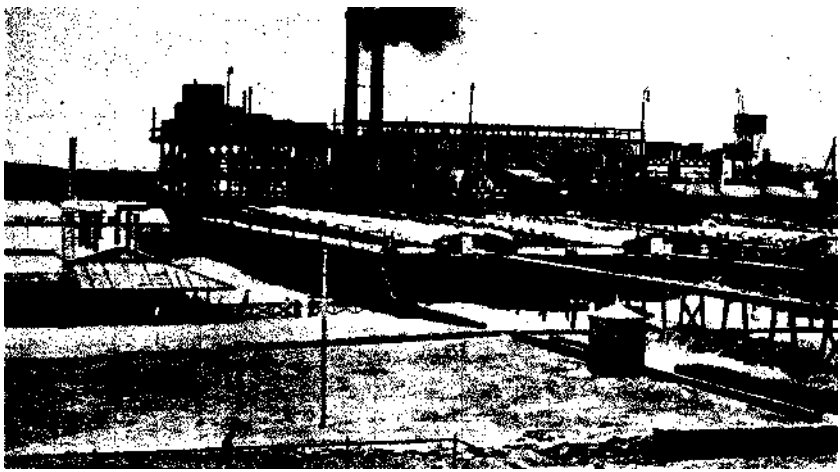
The operations of extracting commercial nitrates from the crude material, involving crushing, boiling, and crystallization, are performed at plants known as oficinas. Necessaries for man and beast, building material, and machinery have all to be imported.

Gold mining in South Africa furnishes an example of the mining of metals by the use of expensive machinery and chemical processes. In the gold ore reef of Witwatersrand, the gold is found in veins or as very small particles more or less evenly distributed throughout the rock. Except for the less risk of fire, and consequently greater freedom in the methods used for lighting, drilling, and haulage, the quartz containing the ore is mined in much the same way as coal. After being brought to the surface the quartz is ground into a powder by powerful stamping machines before being placed in huge steel pitch-lined leaching vats, layer upon layer, separated by matting or sacking. Here the rock powder is subject to a continuous spraying of potassium cyanide, which, in soaking through the layers of mineral matter, combines with the particles of gold to form gold cyanide, which is drawn off from the bottom of the vats. The gold is recovered from this solution by galvanic action.

TYPICAL SECTION of A NITRATE WORKING

| Strata | Thickness of deposit | Remarks |
|---|---|---|
| Chuco | 10·16 in. | Surface layer; sand, earth, and loose salts |
| Costra | 1·10 ft. | Mixture of disintegrated felspar and common salt cemented into a hard mass by calcareous and other salts |
| Congelo | Various | Solid congested mass, several feet thick. Nitrate content too poor to be worked at present |
| Caliche | 1·18 ft. | Yields 30 per cent to 40 per cent nitrate, 30 per cent common salt, 18 per cent other salts; sodium sulphate, calcium sulphate, potash, iodine, magnesia. |

Most minerals occur in an impure state : e.g. while high grade haematite may contain as much as 80 per cent, low grade iron stone often has as little as 10 per cent of iron. While it does not usually pay to work iron ore with a lower content than 30 to 40 per cent, copper ore containing about 1 per cent of copper, and quartz,



*By courtesy of* *The Chilean Nitrate Committee*

Fro. 135. " MAQUINA," DRAINING PANS AND DRYING FLOORS, OFICINA " RICA AVENTURA," CHILE

**The nitrate industry of Chile is largely financed with British capital**

having as little as 0*0015 per cent of gold, can be worked. Further, iron ores of low phosphorus content are better for smelting than those containing iron chemically combined with phosphorus.

Our table salt, corrugated iron buildings, coal fires, machinery, money, and jewellery show that mineral substances are used to meet man's varying needs of food, shelter, fuel, tools, coinage, **and** ornament.

### Exploitation of Mineral Wealth and Population Movements.

History tells us of the irresistible attraction of minerals. Salt, lime, and flints were valuable articles of barter to the inhabitants

of pre·Roman Britain, Cornish tin attracted Phoenician traders to our shores, the lure of gold and precious stones has helped in the colonization of Canada, Australia, and South Africa. The development of the coalfields of the United Kingdom, in addition to being one of the factors underlying the rapid and general increase of population, has also caused the Midlands and the North, instead of London and the South·East, to become the chief centres of population. The modification of old·established industries and the rise of new ones based on coal power, helped to bring about the depopulation of the rural and some coalless areas, and the rapid expansion of towns associated with the coalfields. At the end of the seventeenth century the port of Glasgow did not exist, Manchester had a population of about 6,000. To·day, Glasgow the second largest seaport, and Manchester, the second largest city in the British Isles, have each a population of over a million. London, firmly established as the seat of government, finance and commerce, continued its development, despite its distance from coalfields, and attracted coal supplies.

Similar movements of population have taken place in other parts of the world where industries based on coal have arisen, e.g. U.S.A., Germany.

Mining gives rise to a form of nomadism. The presence of mineral deposits fixes man's settlement in a place for a period. When the deposits are exhausted the mining population needs to move elsewhere, unless some alternative means of livelihood, such as established industries, make such a migration partially or wholly unnecessary. Dawson City on the Yukon River, Canada, which had a population of 20,000 forty years ago, now has only 3,000 inhabitants. Coolgardie, West Australia, has reached decrepitude in thirty·six years. To·day its once famous streets are already empty sites with here and there heaps of house·breakers' debris. The rest has been dismantled and sent 200 miles farther west as building material to Merredin and other towns springing up as the wheat belt is being extended eastwards.

In newer countries like North America and Australia, where alternative means of livelihood are more easily available, the inevitable displacement of population brought about by the exhaustion of local mineral deposits is soon remedied, and the distribution of population is, in a short time, readjusted to changed economic

conditions. In older countries with long established industries the re-absorption of surplus labour arising from the closing down of worked-out mines, pits, and quarries, is often a prolonged and difficult business, attended by serious unemployment, with its consequent loss of revenue, and often expense to the State, and hardship to the workers thrown out of work. Prolonged unemployment may, also lead to the demoralization and deterioration of the unemployed. The closing down of uneconomic coal mines in England during recent years has brought about such a state of affairs. Sometimes the law of inertia operates in the mining industry as in other industries. The English " Pottery " towns, formerly dependent upon the now exhausted supplies of local material for pottery manufactures, now use raw material imported from South-West England and elsewhere.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. "Minerals, especially metallic ores, are usually found in mountainous regions." Discuss this statement and point out to what extent it is true, and why.

2. In what ways does the world distribution of minerals differ from that of plant and animal life ?

3. " Mining is a ' robber ' industry." Is this so ? Is it the only industry which can be so termed ?

4. Point out some of the factors influencing the rate of production and use of the supplies of the world's minerals. Give examples.

5. Describe briefly, with examples, the principal ways in which minerals are won.

6. " Mining gives rise to a form of nomadism." Explain this statement and give examples of movements of population arising out of the exploitation of mineral wealth.

7. Compare maps showing the distribution of population and of coalfields in the British Isles, and explain any marked resemblances and differences.

8. " Although lacking coal, 27·6 per cent of the population of Norway are engaged in manufacturing industries, and nearly two-thirds by value of the commodities exported from Norway are manufactured goods." Account for these facts.

**FIG. 136. LOCATION, OUTPUT, AND MOVEMENT OF BRITAIN'S COAL AND IRON, 1923·1928**

COAL EXPORTS, 1934·5. Cumberland ports 0·2, Newcastle 70, Blyth 2·6, Hartlepool 1·3, Middlesbrough 0·06, Lanes·Cheshire ports 0·4, Humber ports 3·1, Cardiff 8·6, Swansea 2 8, Newport 20, Port Talbot 1·7, Llanelly 0·5, Dover 0 1, Ayr ports 0·7, Glasgow 0·5, Leith 1·2, Fife ports 2·6, Grangemouth 0·6 million tons.

IRON ORE and SCRAP IMPORTS, 1934·5. Middlesbrough 1·3, Newcastle 0·3. Grimsby 0·3, Cardiff 0·2, Swansea 0·02, Manchester 0*1, Barrow in Furness 0·1, Ardrossan 0·2, Glasgow 0·3, Grangemouth 0·2.

Compared with 1928, output of coal decreased 10 pe cent and that of iron ore remained unchanged in 1935.

**9.** The provinces of Ontario and Quebec have no coal deposits and yet are the two foremost manufacturing areas of Canada. Explain how this can be so.

10. The mineral resources of Africa and Siberian Russia **are** considerable. Why are only the precious metals successfully worked at present ?

11. It is estimated that in the Alberta and Saskatchewan coal-fields, Canada has one·ninth of the world's coal resources. Annually some two to three million tons of coal from New Brunswick and Nova Scotia are exported to Newfoundland and U.S.A., and between eighteen and nineteen million tons are imported from U.S.A. What reasons can you find for this state of affairs ?

12. Draw a map of the coalfields of Britain and enter the names of the principal towns situated on or near them. Indicate by symbols, the principal manufactures carried on at each town you insert.

13. On an outline map of Central Europe repeat the previous exercise.

14. Draw a sketch map to show the principal mineral deposits and mining centres of either Africa or Australia.

15. " The United States is one of the largest mineral producing countries in the world." Examine the tables and diagrams giving mineral production and discuss this statement.

16. What minerals does the United States lack ? From what sources does she obtain foreign supplies to meet her needs ?

17. Give as many reasons as you can, political, economic, and physical, why the output of minerals in S. America is so small.

**18. ESTIMATED PERCENTAGE OF THE WORLD'S MINERAL RESOURCES CONTROLLED BY THE BRITISH EMPIRE, 1919**

| | Territorial control | Financial control | | Territorial control | Financial control |
|---|---|---|---|---|---|
| Coal . | 26 | 24 | Silver | 23 | 33 |
| Petroleum . | 2 | 9 | Graphite | 22 | 25 |
| Copper | 9 | 13 | Nickel . | 85 | 39 |
| Tin . | 60 | 57 | Manganese | 35 | 31 |
| Lead . | 13 | 17 | Asbestos . | 87 | 64 |

**The British Empire controls, territorially and financially, iron ore, 12 per cent; zinc, 6 per cent; gold, 63 per cent, of the world's resources.**

Examine the above table and discuss any differences of control.

# COAL AND LIGNITE PRODUCTION OF THE WORLD.

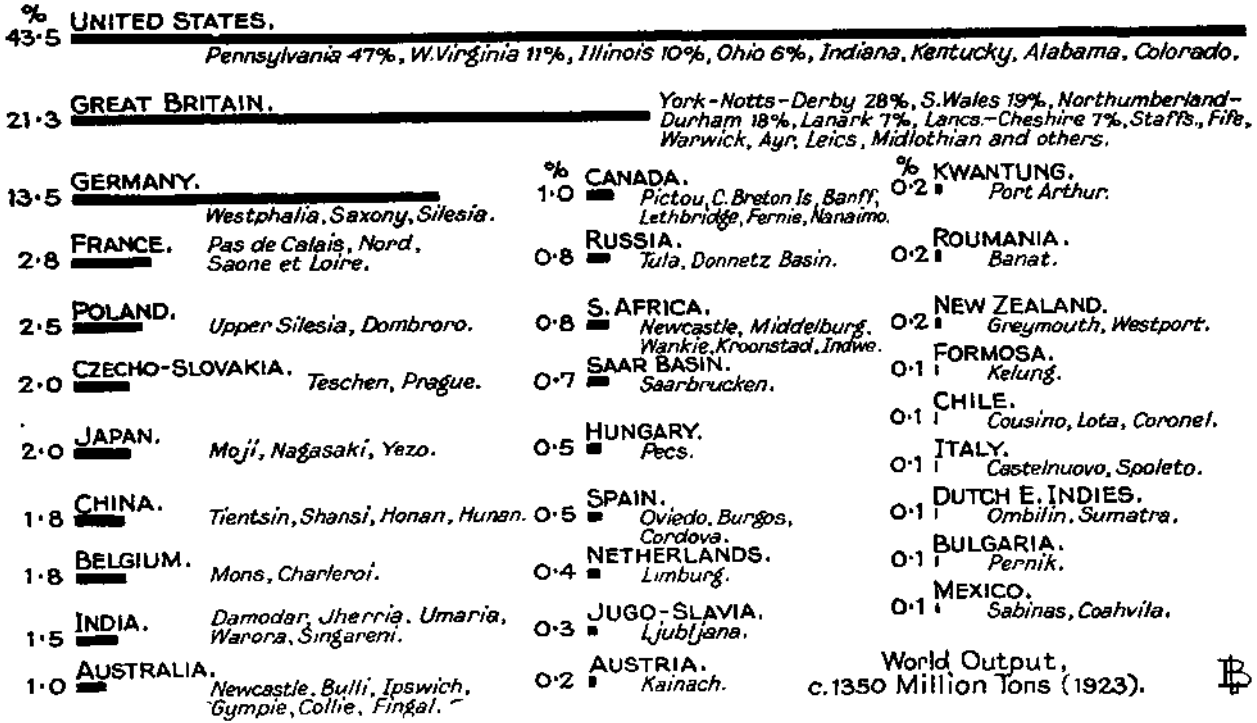
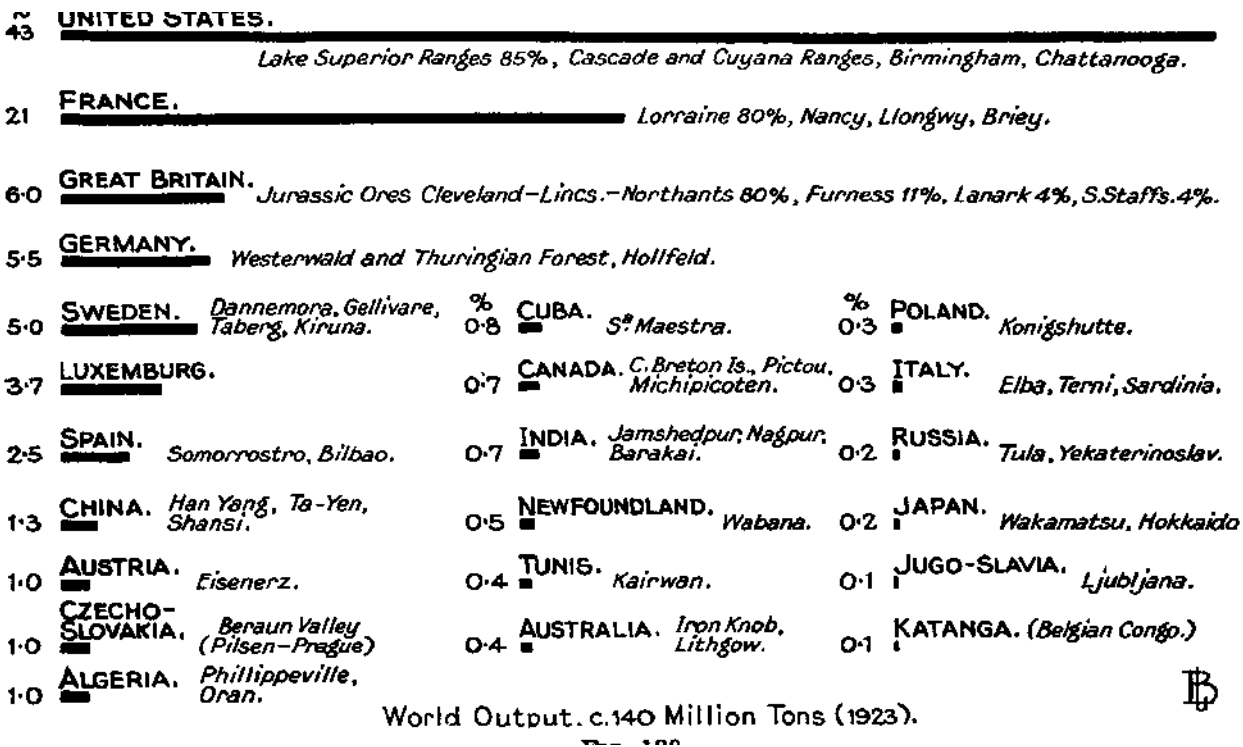



**FIG. 137**

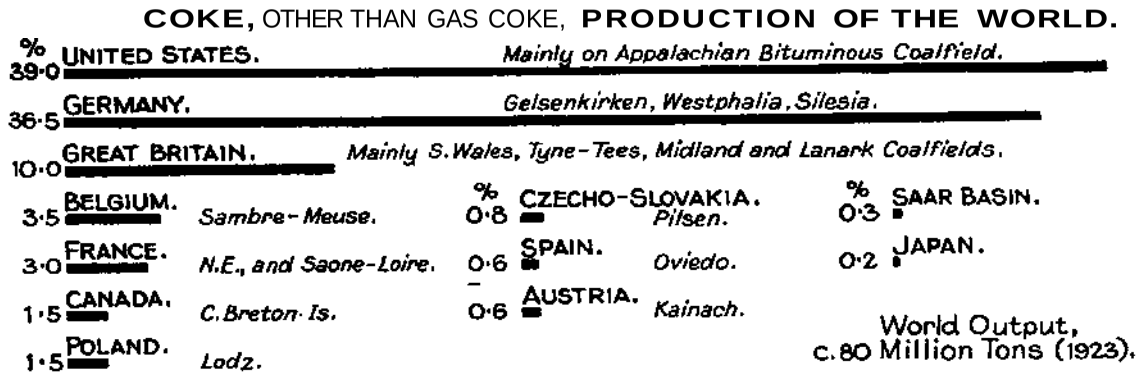
WORLD OUTPUT, 1936, c. 1,440 million tons, U.S.A. 32-5, U.K. 19, Germany 13*2, France 3-8, Japan 3 2, Poland 2-4, Belgium'2-3, India 2, China 1-7, S. Africa 1*1, Netherlands 1,

LIGNITE. Austria ,Hungary, Yugo-Slavia, Bulgaria and B-oumama 90 per cent, New Zealand 65 per cent, Germany and Czechoslovakia, 55 per cent. Canada 23 per cent. Australia 8 per cent of total output.

# IRON ORE PRODUCTION OF THE WORLD.

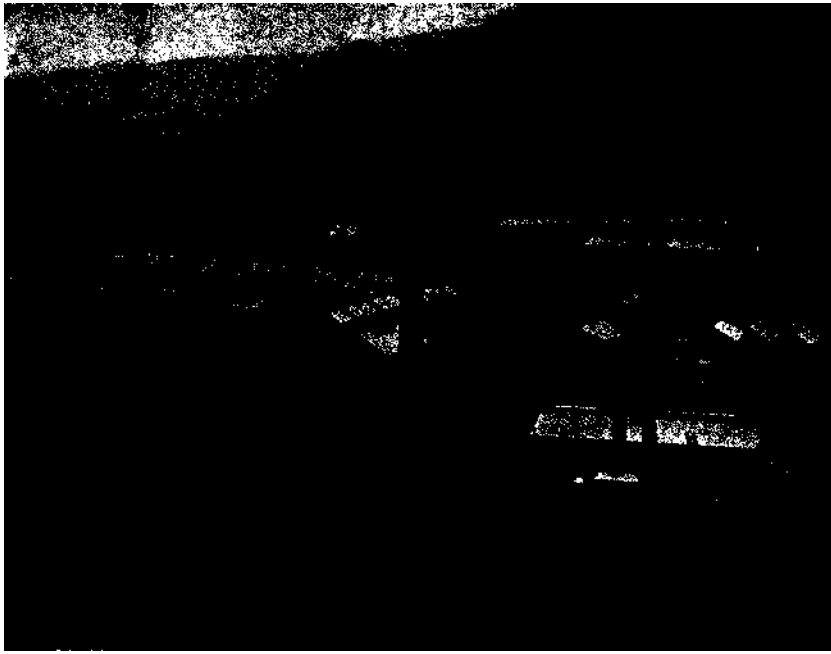



WORLD OUTPUT, 1936. c. 157 million tons. France 21 *(35)*, U.S.A., 19-5 *(50)*, U.S.S.R. 16 *(40)*, U.K. 6-8 *(30)*, Sweden 4-9 *(60)*, Germany 3-7 *(30)*, Luxemburg 2-5 *(30)*, Spain 1-6 *(47)*, China 1-5 *(45)*, India 1-5 *(64)*. Australia 1-2 *(66)*, Algeria 11 *(50)*, Malaya 1 *(65)*, per cent *(iron content percentage)*.




WORLD OUTPUT, 1936, IRON, *C.* 91 million tons (STEEL, 124 million tons). U.S.A. 30 (35), Germany 18 *(17)*, Russia 17 (13), U.K. 9 *(11)*, France 8 (tf), Japan 3 (5), Belgium 4 *(3)*, Luxemburg 2-6 (2), Czechoslovakia 1 (1), Italy 1 *(2)*, India 2 (2), Canada 1 (J), Australia 1 *(0-7)* Sweden 0-9 *(0 9) pet* cent world output pig-iron and ferro-alloys *(and crude steel including that from pig-iron and scrap).*

19. Of the U.K. output, 221 million tons, 1934, 57 million tons were exported (coal 40, coke 2, patent fuel 0·7, foreign bunkers 13·5) and 162 million tons retained (industry and domestic use 92, gas



*By courtesy of* *The Powell Duffryn Steam Coal Co., Ltd.*

**FIG. 140. ANTHRACITE COLLIERY, SOUTH WALES**

**The site of the colliery, the lay-out of its plant, the housing accommodation for the miners, the general appearance of the countryside, and transport facilities should be noted**

works 17, electricity generating stations, railways and collieries 12 each, coastwise shipping 1·2). What do these figures tell you about the exploitation of our coal resources ?

20. " Our exports of coal account for about 60 per cent of the total weight of our exports." Has this fact any bearing upon the volume and direction of our overseas trade and the movement of British shipping ?

21. Discuss the statement that "coal and iron, petroleum and copper, form the direct or indirect basis of modern industrialized civilization."

22. In 1935 the estimated world production of the following minerals in metric tons was: silver, 6,795; gold, 933; platinum, 2·4; lead 1,382,000; zinc, 1,332,000; nickel, 75,000; aluminium,

*Photo kindly lent by The Climax Rock Drill and Engineering Works, Ltd.*

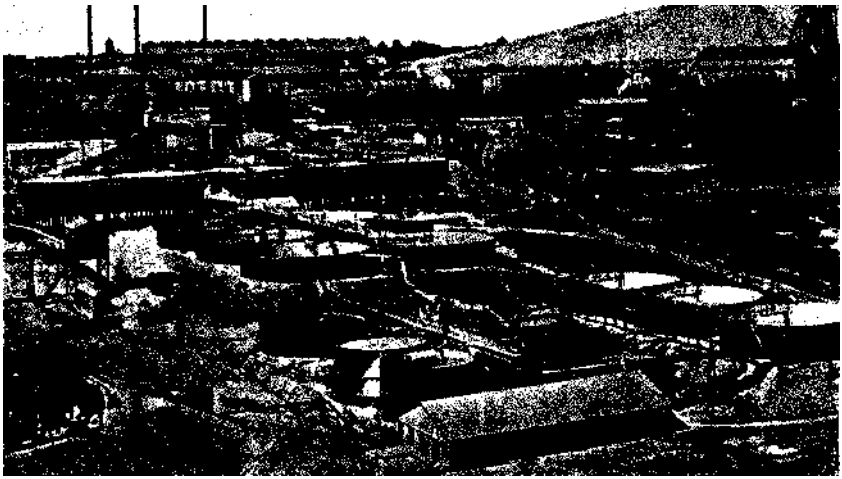
FIG. 141. MINER USING A RIPPING PICK IN A COLLIERY, SOUTH WALES

This light and compact tool worked by compressed air helps a miner to increase his output per shift, and makes his working conditions better and safer by doing away with the need for shot·firing and its consequent loss of working time and risk of explosions. **Used with** a vacuum dust **trap** attached, the risk of miners contracting miners' phthisis is minimized

259,000; copper, 1,527,000; tin, 140,000; iron ore, 170,000,000; graphite, 65,000; coal, 1,189,700,000; lignite, 188,000,000; salt, 31,000,000; mineral oil, 226,374,000; mercury, 3,405; potash, 2,540,000; sulphur, 2,200,000; radium, 0·00009; China clay,

3,800,000; manganese, 2,800,000; chromate, 619,000. Express as bar graphs, scale 1 in. to a million tons. How far do your graphs indicate the relative usefulness of these minerals to man ?

23. Would statistics by value give the same picture of the output



*By courtesy of* ***The South African*** *Railways and Harbour Hoard*

FIG. 142. GENERAL VIEW, CROWN (GOLD) MINES, JOHANNESBURG, SOUTH AFRICA

**Ninety per cent of South Africa's gold is produced on the Rand**

of these minerals ? (The current prices of most of the minerals in the list can be got from market reports given in newspapers.)

24. In what ways in your own locality do the geological formation and their structure affect *(a)* your water supply and the construction of buildings (e.g. foundations, building material used, provision of cellars), *(b)* roads, railways, and canals? Have any of your local industries arisen from the presence of local deposits of minerals ? Give particulars.

25. Discuss the distribution of mineral oil outside N. America, point out any possible changes in output in the future, and indicate any political consequences which may ensue.

26. What do you know about the mineral production of Trinidad

and the competition its products have to face from synthetic or derived products ?

27. Give an account of the nitrate industry of Chile under the following headings: origin and location of deposits, method of extracting the nitrates and their by·products, output, political significance, uses of products, competition of synthetic nitrates.

28. The yearly output of sulphur by the principal countries in millions of tons is: United States, 1·8; Spain, 1·1; Japan, 0·8; Italy, 0·7; Chile, 0·02. To what extent do these statistics reflect *(a)* the natural opportunity for sulphur mining, and (6) the use made of the opportunity in view of the special requirements for industrial, including agricultural, purposes in these countries ?

29. Under the headings of principal sources and their output, and commercial uses, write notes on manganese, tungsten, asbestos, mica, flourspar.

29A. WORLD'S GOLD PRODUCTION
(24,482 oz. troy, 1933·6)

| Country | Per cent of world output | Mining centres and areas |
|---|---|---|
| South Africa | 50·0 | Witwaters-rand, Johannesburg, Pietersburg |
| United States, Philippines | 14·8 | Nevada City and Tuolumne, Idaho and Montana; Nome, Alaska; Baguio, Philippines |
| Canada | 13·0 | Dawson City (Yukon), Porcupine Creek (Ont.), Caribou (B.C.) |
| Australia, N.Z. | 4·2 | Kalgoorlie, Murchison (W.A.); Bendigo, Ballarat (V.); Charters Towers, Mount Morgan, Gympio (Q ); Otago (N.Z.) |
| Japan, Korea | 4·1 | Ashio, Hitachi, Saganoseki |
| Rhodesia | 3·0 | Gwanda district, Bulawayo, and Salisbury areas |
| Mexico | 2·7 | Cuidad Garcia |
| British W. Africa . | 1·5 | Tarkwa |
| Belgian Congo | 1·5 | |
| Colombia | 1·3 | Medellin, Bogata |
| India . | 1·3 | Kolar (Mysore); Silchar area, Assam |
| Rest of the world . | 4·1 | Brazil, Russia, Central America, China and Peru |

On a map of the world mark in the principal gold·producing centres and areas, and indicate their relative importance as producers.

WORLD'S SILVER PRODUCTION
(6,350 tons, 1933·6)

| Country | Per cent of world output | Mining centres and areas |
|---|---|---|
| Mexico | 34·6 | Pachuca district |
| United States | 22·2 | Tonapah (Nev.); Denver, Pueblo (Col.), S.W. California |
| Peru . | 7·9 | Salpo, Cerro de Pasco |
| Canada | 7·6 | Cobalt (Ont.), Rossland (B.C.) |
| Australia and N.Z. | 5·5 | Broken Hill (N.S.W.), Zeehan (Tas.) |
| Bolivia and Chile . | 3·8 | Oruro, Rancagua, Chanaral |
| Japan | 3·8 | Nikko (Shimotsuke), Ikuri (Yezo), Sado I., Satsuma (Kiu Shu) |
| Germany | 2·7 | Harz Mountains |
| India . | 2·7 | Mogok·Mome area (Burma) |
| Spain . | 0·6 | Linares and Castuera (Sierra Morena) |
| Rest of the world . | 8·5 | South Africa, Dutch E. Indies, Yugoslavia |

**Insert information given above on the map, and in the way suggested in Question 29A.**

WORLD'S PLATINUM AND ALLIED METALS PRODUCTION
(414,000 oz. troy, 1934)*

| Country | Per cent of world output | Mining centres and areas |
|---|---|---|
| Canada | 49 | Sudbury, Pt. Colbome, Acton |
| Russia | 25 | Goroblagodil, Nyni·Tagilish (Ural Mountains) |
| Colombia | 14 | Choco, Guapi, Barbacoas, Cauca River |
| S. Africa | 6 | Rand, Lydenburg, Rustenburg |
| Rest of the World | 6 | United States, Congo, Ethiopia 1% each, Tasmania, Nigeria |

Subject to international trading agreements and price restriction

**Repeat Question 30, and give a short account of the world production of precious metals.**

32 WORLD'S PRIMARY LEAD PRODUCTION
(1,333 thousand tons, 1933·6)

| Country | Per cent of world output | Mining centres and areas |
|---|---|---|
| United States | 21·3 | Missouri, Oklahoma, Wisconsin, Idaho |
| Australia | 16·0 | Broken Hill (N.S.W.), Goulbourn (N.S.W.), Ash·burton (W.A.) |
| Mexico | 13·0 | Sierra Madre Cordillera, between Sonora and Oaxaco |
| Canada | 10·7 | Rossland (B.C.) |
| Germany | 8·7 | Gottingen area (Harz Mountains) |
| India . | 5·3 | Bawdin (Burma) |
| Belgium | 5·0 | Verviers |
| Spain . | 4·5 | Almaden, Lorca district |
| Italy . | 3·1 | Iglesias |
| Tunis | 1·8 | Constantino·Bona area; Oran area (Atlas Mountains) |
| Great Britain | 1·6 | Roughtengili (Pennines, Durham), Bala, Llanidloes |
| Poland | 1·3 | Tarnowski Gory |
| France | 1·1 | Clermont Ferrand, Rennes (Central Plateau) |
| Czechoslovakia | 0·3 | Asch area; Olmutz district |
| Rhodesia | 0·02 | Broken Hill |
| Rest of the World | 7·0 | Japan, Peru, Yugoslavia, Argentina, Greece |

Secondary Lead (scrap) output, 1935, U.S.A. 245,300 tons.

**On an outline map of the world, insert the lead·producing centres and areas.**

WORLD'S PRIMARY ZINC PRODUCTION
(1,232 thousand tons, 1933·6)

| Country | Per cent of world output | Mining centres and areas |
|---|---|---|
| United States | 28·7 | Franklin Furnace (N.J.), Ozark Plateau, Iowa, Wisconsin |
| Belgium | 13·7 | Aachen, Moresnet |
| Canada | 10·2 | Rossland (B.C.); Portneuf (Q.) |
| Germany | 9·3 | Rhineland (Duren to Arsberg), Konigshutte, Harz Mts. |
| Poland | 6·4 | Upper Silesia |
| Australia | 5·2 | Broken Hill (N.S.W.) |
| Great Britain | 4·75 | Nenthead, Nentsberry (Pennines, Cumberland) |
| France | 3·6 | Western Ardennes |
| Norway | 3·4 | Kongsberg |
| U.S.S.R. | 3·3 | Berozov, Kuznetsk |
| Japan | 2·4 | Shimotsuke |
| Mexico | 2·4 | Sierra Madre Ranges |
| Italy . | 2·1 | Sardinia |
| Rest of the World | 4·5 | Rhodesia, Spain, Netherlands, Czechoslovakia, Sweden |

Secondary Zinc (scrap) output, 1934, U.S.A. 86,200 tons.

**Insert this information on the map prepared in Question 32.**

**34.** WORLD'S PRIMARY TIN (SMELTER) PRODUCTION
(134 thousand tons, 1933·6)*

| Country | Per cent of world output | Mining centres and areas |
|---|---|---|
| Malaya | 44·0 | Perlis, Kedah, Larut, Kinta, Tapah, Kuala Lumpur, Pahang, and Mersing areas |
| Great Britain | 21·0 | Camborne, Redruth (Cornwall) |
| Netherlands | 11·4 | Arnhem (smelter centre only) |
| Dutch E. Indies | 8·1 | Banka, Billiton |
| China | 7·1 | Mongtse (Yunnan) |
| Belgium | 3·0 | Hoboken (smelter centre only) |
| Australia | 2·0 | Kangaroo Hills, Cooktown (Q.), Hoomskirk (Tas.) |
| Germany | 1·5 | Hof area (Fichtel Geb.) |
| Japan | 1·5 | Akenobe |
| Rest of the World | 0·5 | Bolivia, Nigeria (Bauchi Plateau), Chile, U.S.A., Norway |

Secondary Tin output. 1933, U.S.A., 25,311; Italy, 1,540 tons.
* International Cartel controls output by quotas.

Repeat Question 33, and discuss the world distribution of lead and zinc compared with that of tin, with special reference to the British Empire.

35 WORLD PRODUCTION OF COPPER (SMELTER)
(1,293 thousand tons, 1933·6)

| Country | Per cent of world output | Mining centres and areas |
|---|---|---|
| United States | 24·8 | Anaconda, Butte (Mont.), Bisbee, Globe, Jerome (Ariz.), Ely (Nev.), Bingham (Utah), Keweeun Peninsula (Mich.) |
| Chile | 17·0 | Chuquicamata, Rancagua, Chanaral, Potrerillos |
| Canada | 11*5 | Howe Sound (B.C.), Sudbury (Ont.) |
| N. Rhodesia | 9·5 | Roan Antelope, Rhokana, Mufuhra |
| Belgian Congo | 7·0 | Kambove |
| Belgium | 5·4 | (Smelting only) |
| Japan | 4·8 | Nikko (Shimotsuko) |
| U.S.S.R. | 4·1 | Ural, Caucasus, Kazakstan |
| Germany | 3·1 | Mansfeld (Saxony) |
| Mexico | 2·7 | Sierra Madre Cordillera, between Sonora and Oaxaca |
| Yugoslavia | 2·6 | Mines de Bor |
| Peru | 2·0 | Cerro de Pasco, Trujillo |
| Great Britain | 1·0 | Dolcoath (C'nwall), Ecton (N'hants), Pnrys (Anglesey) |
| Australia | 1·0 | Cobar, Cloncurry, Mt. Morgan, Wallaroo, Mt. Lyell |
| Spain | 1·0 | Huelva, Aznolcollar |
| Rest of the World | 2·1 | Norway, Sweden, S. Africa (Ookiep, Grootfontoin) |

Secondary Copper output, 1935, U.S.A. 407,200 tons.

Draw up a map of the world, showing the distribution and output of centres producing copper and aluminium.

WORLD PRODUCTION OF ALUMINIUM (SMELTER)
(232 thousand tons, 1933·6)*

| Country | Per cent of world output | Mining centres and areas |
|---|---|---|
| Germany | 27·2 | Bitterfeld, Lauterwerk, Innwerk, Erftwerk |
| United States | 20·8 | Massena, Niagara, Badin, Alcoa |
| U.S.S.R. | 9·4 | Dnieper, Urals |
| France | 8·5 | Corbieres, Les Baux, Var, Saintonge, Berry |
| Canada | 8·2 | Arvida, Shawinigan |
| Great Britain | 4·6 | Larne, Kinlochlevon, Foyers, Dolgarrog |
| Italy | 4·6 | Borgofranco, Mori, P. Marghera |
| Switzerland | 4·5 | Rheinfelden, Neuhausen, Chippis |
| Norway | 4·4 | Sulitjelma area |
| Rest of the World | 7·8 | Japan, Austria, Spain, Sweden, Hungary |

Secondary Aluminium output, 1935, U.S.A., 46,600 tons.
* Cartel (U.S.A. excluded) fixes quotas and prices.

State the respective properties of copper and aluminium, and how they are likely to compete commercially.

*By courtesy of* *The Anglo·American Oil Co., Ltd.*

FIG. **143.** VIEW OF PORTION OF AN OILFIELD, CALIFORNIA, U.S.A.
The location and disposition of the oil wells and the pipe line in the foreground should be noted

FIG. 144. INSIDE AN OIL DERRICK
Using a rotary table for boring operations

37 WORLD'S PRODUCTION OF CRUDE PETROLUEM

**Mineral oil from oil shale, natural gas, coal, and lignite excluded.**
**(80,150 million gallons, 1933·6)**

| Country | Per cent of world output | Producing centres and areas |
|---|---|---|
| United States | 59·5 | Texas 39%, California 20%, Oklahoma 19%, Kansas 5·2%, Pennsylvania and Colorado 1·6% each, Wyoming, Illinois, Ohio, W. Virginia, and Kentucky 0·4% each |
| Russia | 18·6 | Baku, Grosny, Chusovaya, Chimkent |
| Venezuela . | 14·7 | Guanoco |
| Roumania . | 3·7 | Prahova |
| Persia | 3·4 | Maidan·i·Napthan, Mosul |
| Dutch E. Indies . | 2·7 | Lanykat, Ombilin, Palembang, Soerabaya |
| Mexico | 2·6 | Tampico, Tuxpan, Tehuantepec |
| Iraq . | 1·6 | Khanaqin |
| Argentina . | 0·9 | Gulf of St. George |
| Peru . | 0·9 | Lolutos |
| Trinidad | 0·7 | |
| British India | 0·5 | Singu, Yennanyat, Yenangyuang (Burma), Badgapur (Assam), Attock (Punjab) |
| Rest of the World | 12·7 | Sarawak, Bahrein Is., Germany, Poland, Japan, Ecuador, Canada, Egypt |

FIG. 145. OILFIELDS OF THE NEAR AND MIDDLE EAST

PIG. 146. PRINCIPAL OILFIELDS WITH OUTPUT; AMERICAS

**On a map of the world insert the chief petroleum-producing centres, and indicate their relative importance.**

**38. In 1935 the world output of sulphur, including manufactured and by-product varieties, was approximately 5,570,000 tons. United States, 34 per cent; Spain 19 per cent; Japan 14 per cent; Italy 13 per cent. Express this information in diagram form and find out for what purposes sulphur is chiefly used.**

**39. With the help of the questionnaire describe the scene shown in Fig. 140.**

**40. Bearing in mind the stages involved in the extraction of gold from quartz by the cyanide process, identify the buildings and equipment shown in Fig. 142.**

**41. What information does Fig. 143 give concerning the exploitation of an oilfield?**

**42. Describe a Chilean " oficina " and the work carried out there.**

*By Factory of The Czechoslovak Legation, London*

FIG. 147. INTERIOR OF A MODERN GLASS WORKS, CZECHOSLOVAKIA

The bulk of the raw materials used in the glass industry, producing all kinds of glass, hollow, plate, bottle, chemical, and laboratory, are obtained within the country itself.

43. WORLD'S PRODUCTION OF GRAPHITE, 1934*

| Country | Output 1,000 tons | Mining centres and areas |
|---|---|---|
| Korea | 32·0 | |
| Austria | 18·0 | Upper Austria, adjoining Passau |
| Germany | 17·.5 | Passau district |
| Ceylon | 11·7 | Area lying between Kurenegala and Galle |
| Madagascar | 9·4 | Over wide area |
| Italy . | 3·9 | Torino, Genoa, Savona, and Cuneo provinces |
| Mexico | 3·75 | Hermosillo |
| Czechoslovakia | 3·5 | Budweis—continuation of Passau·belt |
| Norway | 2·2 | Skaland |
| Canada | 1·4 | Renfrew |
| U.S.S.R. | No data | Irkutsk, Turukhansk |
| U.S.A. | „ | Associated with coal and intrusive granite rocks. |

* Artificial graphite, the product of electric furnaces, e.g. at Niagara, U.S.A., is not included.

For what industrial purposes is graphite used ?

**44.**

**FERTILIZERS AND CHEMICAL PRODUCTS USEFUL IN AGRICULTURE, 1935**

| | Superphosphate of Lime | Basic Slag | Nitrate of Soda | Natural Guano | Synthetic Nitrogenous Products |
|---|---|---|---|---|---|
| World output | 13,236,000 tons | 4,205,000 tons | 1,306,000 tons | 210,000 tons | 582,000 tons |
| % World Exports | Netherlands 44·0<br>Belgo-Lux. 15·5<br>U.S.A. 9·0<br>Japan 7·5<br>Germany 4·2 | Belgo-Lux. 58·0<br>France 36·5<br>Germany 1·5<br>Russia 2·4<br>U.K. 1·7 | Chile 88·0<br>Prance 8·3<br>Norway 2·0<br>Switzerland 1·2<br>Germany 0·8 | U.K. 35·5<br>Japan 20·5<br>Netherlands 10·6<br>Argentina **8·7**<br>Germany 4·7<br>Seychelles 3·7<br>Falklands 3·7 | Norway 60·3<br>France 20·0<br>Italy 10·0<br>Poland 0·0 |
| % World Imports | Egypt 9·8<br>U.S.A. 9·2<br>India 7·5<br>Canada 7·3<br>Germany 7·5<br>France 0·9 | Germany 39·0<br>Netherlands 26·5<br>Belgo-Lux. 9·1<br>Switzerland 8·0 | Egypt 14·5<br>U.S.A. 30·0<br>Spain 11·0<br>France 6·8<br>Germany 6·4<br>Japan 4·5 | U.K. 40·6<br>U.S.A. 14·2<br>Belgo-Lux. 9·4 | Egypt 42·5<br>Denmark 17·0<br>Spain 16·0<br>Sweden 9·5<br>U.S.A. 3·8<br>Finland 4·0 |

Give the special character and agricultural uses of these fertilizers and say what the above table suggests regarding agricultural conditions in the countries concerned.

# CHAPTER X

# OCEANS, SEAS, AND INLAND WATERS

## NATURAL REGIONS OF THE OCEANS AND SEAS

### General Notes.

IN the oceans different combinations of differing physical conditions, such as the presence or absence both of sunlight and a sea floor, and variations of temperature, salinity, density, composition, and movements of the sea water, give rise to differences of marine plant and animal life. As over large areas of the dry land, so throughout large parts of the oceans, geographical conditions are sufficiently uniform to permit the division of oceans and seas into three major natural regions: littoral (coastal or shallow water), pelagic (open sea, or oceanic), and abyssal (deep water). The last sunless zone is completely overlain by the pelagic zone, which, with the littoral zone, occupies those superficial layers of the oceans which are illuminated by sunlight. The chief difference between the littoral and pelagic zones is that the latter have no sea floor or substratum of land. They have, however, a false bottom where they make contact with the colder, heavier, and more saline waters of the underlying abyssal zones. The transition from one zone to another is more sudden than the gradual change over from one natural region to another on land. On dry land living things do not go very high above or deep below the surface, but in the seas life is present everywhere throughout the whole mass of water of any zone.

In the sea, as on land, carnivorous animals prey upon herbivorous animals, who *in* turn feed upon plant life, which gets its food partly from the sea water and partly from the waste material of the land brought into the oceans by rivers and man. Man is mainly concerned with the exploitation of marine plant and animal life of the upper layers of the pelagic and littoral zones from the surface down to about a depth of 100 fathoms.

**Littoral Zones,**

These extend outwards from all sea coasts either to the edges of continental shelves or until the depth of the sea exceeds about

100 fathoms (600 ft.). Except in enclosed seas, tides and currents keep the water sweet, distribute food supplies derived from the waste of the adjoining land areas, and give rise to local variations of temperature and salinity. The character of the sea floor, whether sandy, muddy, gravelly, or bare rock, also gives rise to local differences of plant and animal life, especially in those portions of littoral zones lying between high water mark and 20 fathoms.

Plant life in the littoral zone consists mainly of two groups of algae, benthos (attached to the sea bottom), and phytoplankton (floating), which are distributed throughout greater depth in warmer than in cooler water. Except in coastal waters of polar seas, where the rocks have been scoured bare by ice, benthonic algae are present in profusion, e.g. the ribbon-like eel grass, and the gulf weed with its small berry-like bladders, found around our own coast. In tropical waters red algae or corallines are more often met with. Countless myriads of microscopically small floating algae flourish in the sub-surface layers of water. Brown algae or diatoms preponderate where the sea water is muddy and less salty.

Bacteria, organisms often deemed the lowest form of life, are also most abundant in shallow off-shore waters, particularly at what has been called the " mudline." They change into plant food much of the dead organic matter, the waste of domestic and industrial life which finds its way into the sea. Plants feed herbivorous marine animals, which provide food in turn for predaceous sea creatures. On land, so in the sea, animal life shows marked adaptation to its physical environment and food supplies, especially in littoral zones where often tides and currents are strong, variations of temperature and salinity large, and the nature of the sea bottom very varied. The inhabitants of these zones need to be strong swimmers, like the herring, or able to attach themselves to rocks, as in the case of mussels. Many forms of marine life, particularly seafaring mammals, e.g. whales, porpoises, seals, and walruses, are able to withstand moderate changes of temperature. There are seventeen species of cod in the North Sea, and each spawns in a part of the sea having favourable conditions of depth, temperature, and salinity; mussels, periwinkles, and, in warmer seas, sponges, prefer a bottom of bare rock ; oysters prefer mud ; shrimps, prawns, and plaice are found on sandy floors ; crabs and lobsters favour a sea floor strewn with boulders. Numerous kinds of sea animals and birds, such

as seals and walruses of the cold seas, turtles of warm waters, and the flightless penguins of the Antarctic, live partly in coastal waters and partly on shore. Possibly for safety, they come ashore for breeding purposes.

Whales, dolphins, and sea cows, although really pelagic, haunt the shallow waters of the littoral zones because of the abundance there of fish and other small marine organisms.

### Pelagic Zones.

In these zones of open waters over the great depths, fish life is relatively less abundant compared with littoral zones, because food supplies are more scanty. The absence of a bottom and the lack of seaweeds explain the paucity of small plants on which fish feed. Myriads of floating algae, together with shore plants and small marine animals, are swept out to sea by offshore currents, and the change of temperature often leads to great mortality. When dead they sink until the density of the deeper and colder waters becomes too great for them to sink farther. Thus suspended they form a false bottom and provide food for migratory herring, mackerel, and pilchards.

Compared with littoral waters the pelagic zones have much less to offer man, and that in a way less easy in the obtaining because of the distance from land and the greater seafaring risks which must be taken.

## LOCATION OF FISHING COMMUNITIES

It is no mere chance that the chief fishing grounds in the world are found in the littoral zones of the middle latitudes, and that those of the Northern Hemisphere, Japan, North America, and Europe are more important to man than those of the Falkland Isles, South Africa, Australia, and New Zealand, in the Southern Hemisphere. The warmth of tropical waters appears to favour a multiplicity of marine life, including many poisonous and inedible species of fish. Physical conditions of the cooler waters of the temperate seas favour the individual abundance of fewer species of fishes, many of which are valuable as food for man. This fact, together with climatic conditions, the resources of the adjoining land areas, and the type of coastline, favour the growth and development of sea fisheries in the middle latitudes rather than in lower

or higher latitudes. A cool climate makes it fairly easy to preserve the catch by using salt or ice. Also, fish can therefore be caught farther from the land. In some countries adjoining temperate seas life on land is difficult. To the people of Newfoundland, Norway, Holland, Japan, and the Falkland Islands, the sea offers a supplementary if not quite an alternative means of livelihood, as is the case with the Eskimos. In other parts, as in the case of Eastern U.S.A. and the British Isles, a large industrial population demands large and cheap supplies of food, and fish is both cheap and nutritive. The occurrence of submerged coasts giving rise to indented shore lines possessing many harbours has encouraged men to go and secure the harvest of the sea.

The comparative smallness of the fishing grounds in the temperate seas of the Southern Hemisphere is due to the tapering off of the land masses, resulting in much smaller areas of shallow water. These southern seas are also less well stocked with food fishes. Cod and herring belong only to the Northern Hemisphere.

## PRINCIPAL KINDS OF SEA FISHERY IN LITTORAL WATERS

Throughout the world the methods of fishing vary according to geographical circumstances, such as tides and the nature of the sea floor, the habits of the fish or other marine animals, and the traditions of the fishermen. A detailed study of the methods used by British fishermen will illustrate these points.

### British Fisheries.

Trawling holds first place of fishing methods, and by this means about one-fifth by quantity and one-third by value of the general average post-war catch of sea fish was landed in the British Isles by British fishermen. Predaceous fish, such as flat fish, halibut, turbot, plaice, or skate, which feed on bottom animals, are the chief fish caught by means of a trawl or bag-shaped net which is towed mouth foremost by a trawler. Nets with a boom to spread the mouth of the net are still in use, but are being replaced by more efficient trawls fitted with otter boards, which keep open the huge 70-sq. ft. mouth of the net. For a small steam trawler the fishing gear costs about £300, and the yearly upkeep of such a boat works out at about £5,000. Trawling is usually done in 30

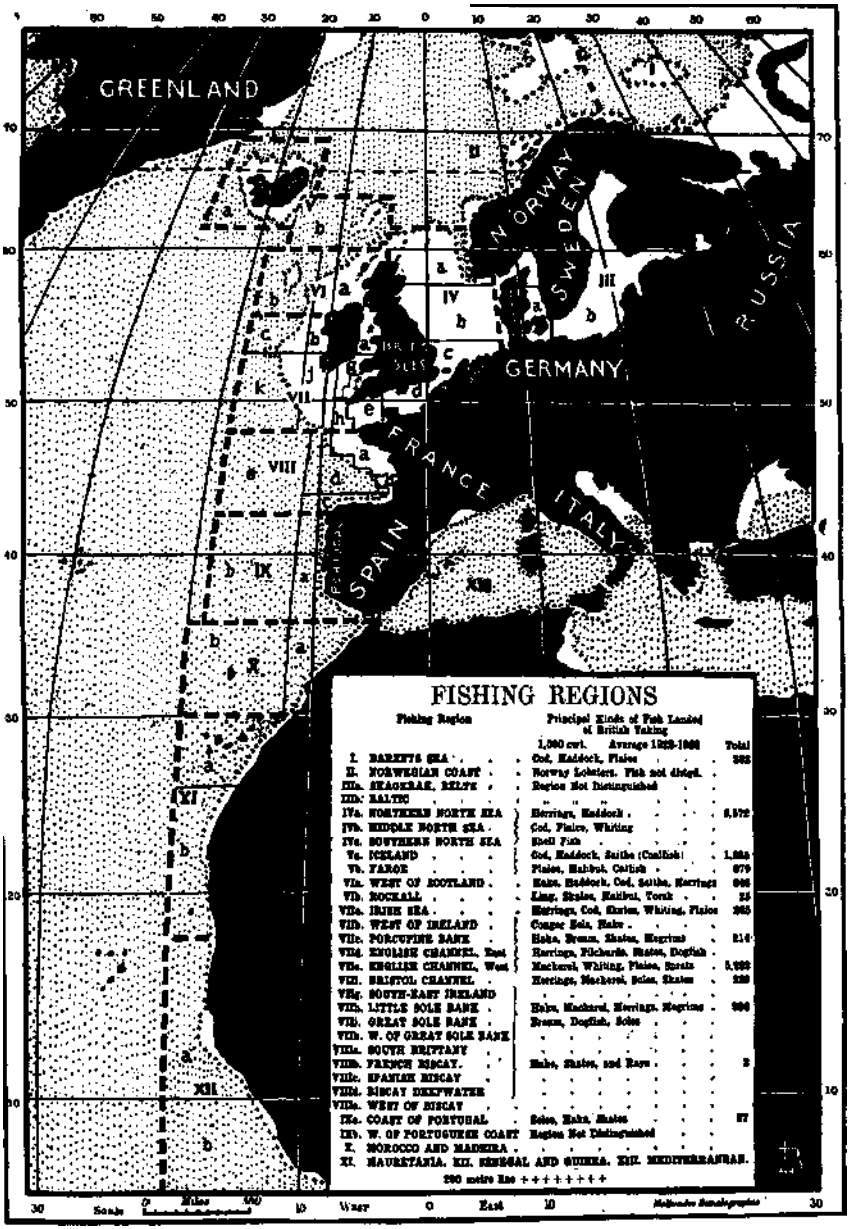



FIG. 148. BOUNDARIES OF INTERNATIONAL FISHING REGIONS NOS. I-XIII; EASTERN N. ATLANTIC

fathoms of water and only on fairly level bottoms. The boats work throughout the year under all conditions of sea and weather, either as members of a fleet or as single boaters. The former remain at the fishing stations for several weeks at a time and land

*Photo kindly lent by* *Messrs. Mac Fisheries, Ltd.*

FIG. 149. LANDING HERRINGS FROM STEAM DRIFTERS. YARMOUTH

their catches by "carrier" boats; the latter bring in their own catch. The trawling grounds frequented by British trawlers extend from the White Sea and Iceland to the coast of Morocco. Two fleets, the Great Northern and the Red Cross, fish the North Sea banks. Since 1885, when steam trawlers began to replace sailing smacks, the tendency has been to use larger boats and to

*Photo kindly lent by* Messrs. *MacFisheries, Ltd.*

FIG. 150. SCOTTISH FISHWIVES CLEANING HERRINGS, YARMOUTH
Salted herrings are mostly exported; the home market favours smoke-cured herrings or kippers

fish farther from land. In consequence, traffic in fish has gravitated to those ports having large harbours and easy access to centres of population, e.g. Grimsby, Hull, and Aberdeen. At Grimsby the steam trawler fleet has grown from four or five vessels in 1858 to about 600 at the present time. Seven thousand men are employed on the boats, besides 21,000 *men* employed ashore as buyers, salesmen, dockers, curers, ice workers, engineers, shipwrights, etc. Varying from year to year, in 1920 the catch was 3-6 million cwt., of which one-fortieth were herrings. After being sold on the docks and prepared for market, the fish is loaded into specially constructed railway fish wagons and dispatched direct to London, Leeds, Sheffield, Manchester, Birmingham, and Nottingham. Hull and Aberdeen are each about half as important as Grimsby as regards the number of vessels and their crews and quantity of fish landed.

Where the nature of the sea floor is unsuitable for trawling, fishing is done with hand lines or long lines. Predaceous fish, especially cod, halibut, skate, and haddock, are so caught off the East Coast of Scotland and Cromer Knoll. The baited lines, which, having been " shot," hang down in the water, vary in size from the small " bilters " with small hooks used in the English Channel to those eight miles long and having 5,000 hooks, used in the North Sea. Nearly as much fish is caught by line fishing as by trawling.

Migratory shoal fish, such as herring, mackerel, and pilchard, which live in the upper layers of the sea and feed upon marine plant life, are caught by means of drift nets. These cotton nets, measuring about 34 yd. by 13 yd. and supported by a row of corks on top, hang like curtains in the water when they are shot from the steam drifters at right angles to the current of the tide. Swimming into the nets, the fish push their heads through the diamond-shaped meshes and their gills, acting as barbs, prevent the withdrawal of the head. After the nets have been hauled on board the fish are picked out by hand. Pilchards are chiefly taken off S.W. England, mackerel in the English Channel, and herrings off the East Coast of Britain. About one-half by quantity and one-ninth by value of the general average catch by British fishermen is so caught. All drift net fishermen are partners. Nine-sixteenths of the catch go to the crews and the remainder to the owners of the vessel **and** gear. Although, unlike trawler nets, drift nets are machine-made, the outfit of a drifter costs about six times as much as that

of a trawler of similar size. Starting at the Shetland Isles in June the fleets of drifters follow the southward migration of the shoals of herrings in the North Sea. The catches are landed at convenient ports near to the fishing stations, and by November, Yarmouth and Lowestoft are reached. On shore people associated with the herring fishing industry follow the fleets southwards from port to port. Supplies for the drifters have to be ready to hand and provision has to be made for dealing with the preparation and marketing of the fish landed. Scottish lassies can " gip " herrings at the rate of 45 a minute, and grade them at the same time. Gutted fresh herrings are packed in barrels between layers of salt and dispatched inland daily by the special fish trains. For bloaters and kippers the herrings are smoked over burning oak dust. Grimsby, Hull, Aberdeen, and Fleetwood possess plant for manufacturing by-products, oil (including cod liver oil), meal, and manure from fish unfit for food. About 100,000 barrels of oil and 40,000 tons of manure, valued at £600,000 and £400,000 respectively, are produced annually.

While trawls, lines, and drift nets are principally used for offshore fishing, a bewildering variety of methods and appliances are used inshore ; shrimps are netted, mussels often hand-gathered, oysters dredged, and crabs and lobsters caught in baited wickerwork traps sunk to the sea floor. Oysters, the most valuable of our shellfish, are obtained partly from natural beds and partly from privately owned fisheries planted with young oysters imported from Holland, France, and Portugal. The mud flats round the Thames estuary furnish some 50,000,000 to 100,000,000 oysters annually. Mussels are gathered in nearly all our estuaries. Private beds fitted with purification tanks exist in the Medway and at Boston in Lincolnshire. Despite the fact that an acre of ground devoted to mussel cultivation produces a greater amount of food than a similar area under wheat, the development of this industry is difficult because of the disproportionate cost of railway carriage compared with the market value of the mussels. Neither lobsters nor crabs, which are mostly caught off the rocky parts of the West Coast of Scotland, Ireland, and N.E. England, are cultivated. In 1923 £86,000 worth of crabs and lobsters were caught. Finally, in considering British fisheries, two further points are worth noting. The value of fish caught in Irish waters is relatively small because

food fishes are less abundant there and because the great markets for fresh fish in Britain are not easily accessible. The meeting of food-carrying currents, the comparatively sheltered waters and the great local variations in the character of the seafloor around the coasts of England, help to account for the more miscellaneous nature of fisheries of England compared with those of Scotland.

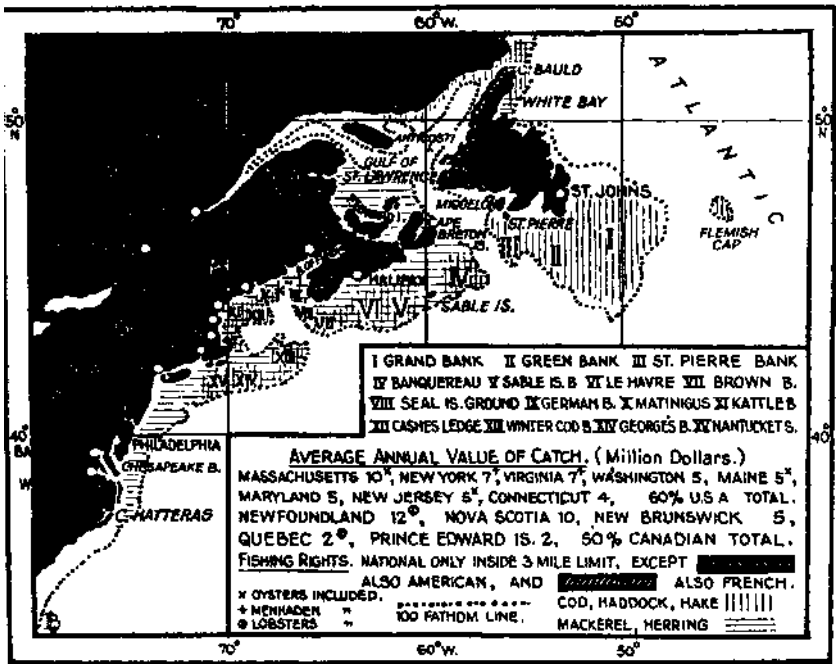



FIG. 151. INTERNATIONAL FISHING REGION XIV, 1925
1935: U.S.A states 23 m. or 40 per cent; Canadian provinces 14-6 m. or 41 per cent total catch.

### Other Countries Engaged in the North European Fisheries.

The coasts of Norway are not good for trawling. Cod is caught by line fishing on the shallow banks round the Lofoten Isles, while herring and mackerel are taken by drifters in the neighbourhood of Bergen. The Atlantic fisheries of France, Portugal, and Spain are well known for their sardines (immature pilchards) and anchovies (sprats pickled in salt, sugar, and spices). Natural oysters are found on the coasts of Brittany, while oyster cultivation is carried on in the basin of Arcachon (south of the Gironde, France) and

round the mouth of the Scheldt, Holland. Norwegian cod liver oil and tinned herrings, French and Portuguese tinned sardines and bottled anchovies are familiar productions of these continental fisheries. About one-half of the population of the Netherlands is engaged in fishing and allied industries.

**North Atlantic Coast Fisheries.**

Although producing a less quantity of fish and other food of marine origin, the average annual value of the catches of these fisheries, £9,500,000, is about the same as that of the North European fisheries. The comparatively higher value is due to a much larger proportion of oysters and other valuable shellfish. Five-sixths of the world's oysters come from the New England fisheries of the United States, and the most extensive lobster fishery in the world is situated in the Gulf of the St. Lawrence.

The fishing banks or shallows, consisting of a chain of submerged ocean plateaux raised considerably above the floor of the Atlantic Ocean, extend from near the Massachusetts coast north-east to the Grand Banks of Newfoundland. As in North European waters, fishing in the open sea is free to all, and the rights of inshore fishing are limited by treaty mainly to the nations owning the coast line. Ships of all nations, U.S.A., Norway, England, France, and Portugal, share the harvest of the open sea ; Canadian and Newfoundland fishermen confine their activities nearer the coasts. The principal fish caught by lines are cod, haddock, and hake, and by seine nets herring, mackerel, American shad, and menhaden. The last is mainly used for obtaining oil and fertilizers. Until recently the prosperity of Newfoundland was based on cod fishing and its subsidiary industries, which together employ the bulk of the people. About 1,160,000 cwt., or three-fourths of the total catch of cod, is obtained by the use of lines, trawls, and cod traps near the shore. As in the North Sea fisheries, the cod is mostly cleaned, filleted, and salted down on board the ships and afterwards dried or smoked on shore. Large quantities of cod liver oil are made under Government inspection. Gloucester, Boston, U.S.A., and St. Johns, N.F., are the chief centres for the fishing fleets.

**Other Sea Fisheries, Littoral Zones.**

Of these the only ones that need to be noted are the fisheries of

Japan, the Mediterranean, Pacific Coast of North America, and those for trepang in tropical seas.

Sardines, herrings, and bonitos are the principal products of the Japanese fisheries, although on the banks near the island of Yezo, salmon, cod, and other food fishes are taken. The Japanese,

*Photo Wilse* *Kindly* *nyian State Railways*

**FIG. 152. DRYING SPLIT HADDOCKS, KRISTIANSUND, NORWAY**
Note the circular and roofed stacks of dried fish, the timber buildings, and the bare rocky shore—a feature of a glaciated region

even more than the Norwegian, are compelled to rely upon the sea for animal food. The products of these fisheries are slightly more valuable than those of the United Kingdom. Besides sardines and anchovy the only important food fish of the Mediterranean waters is the tunny, which appears during the summer in immense shoals off the coasts of France and Italy. Most of the fishing is in the hands of native fishermen. Of recent years cod and halibut fisheries have been established off the coasts of Washington, British Columbia, and Alaska, and with the increasing use of the new process of brine freezing, one of the difficulties of sending the catch to distant markets in North America, Australia, and even Europe, should gradually be overcome. Ordinary cold storage methods are

*By kind permission of* *The High Commissioner for Canada*

FIG. 153. REMOVING THE CATCH FROM A LARGE WEIR INTO SCOWS BRITISH COLUMBIA, CANADA

*By kind permission of* *The High Commissioner for Canada*

FIG. 154. UNLOADING SALMON FROM SCOWS AT A CANNERY ON THE SKEENA RIVER, BRITISH COLUMBIA, CANADA

not very successful in the case of fish. The freezing is too slow, the temperature not low enough, and the flesh of the fish is often spoilt by the shattering of the tissues by ice crystals. By freezing the fish in ice blocks, impregnated with hypochlorite of soda (the photographic "hypo"), most of these drawbacks are obviated. The value of Canadian frozen salmon, whitefish, smelts, etc., is about £1,000,000 per annum, and 6,000,000 lb. of salmon and 1,500,000 lb. of halibut valued at £200,000 are exported to Britain. Trepang, or beche de mer, is extensively fished for the Chinese market on all the coasts and submerged banks off the East Indies, New Guinea, and Queensland, Australia.

Shallow water fishing is of fair importance in many other parts of the world—South Chile, South Africa, New Zealand, and tropical islands, where the fish is sold in local markets almost as soon as it is caught.

## FRESH WATER FISHERIES

This type of fishing is carried on in rivers, lakes, or fish-ponds in most parts of the world, but except for salmon, eel, and sturgeon, it is often only of local importance. Salmon fishing is pursued along the Pacific Coast of North America from the Columbia River to Sitka. The salmon ascend the rivers during spring or summer in order to spawn in fresh water. At such times, by traps, weirs, and other means, the fish are captured and taken to the canning or freezing factories. Each year over a thousand factories and canneries prepare for export alone over 70,000,000 lb. of tinned salmon, or over twenty times the total yearly average amount of salmon caught in Scottish waters. Ireland, Holland and Denmark supply us with some 7,000 tons of eels yearly, although the British Isles are well favoured for eel cultivation. In Russia the river fisheries and those of the Caspian Sea are noted for their sturgeon fishing, and caviare, the roe of this fish, is an important fishery product.

The fisheries of the rivers and the Great Lakes of North America supply the local demand with considerable and valuable quantities of whitefish, trout, and fresh water herring. Some of the fish is sent in refrigerating trucks to distant American markets. Fish-growing in ponds and rivers is one of the easiest ways of getting meat in densely peopled countries such as China and Japan. The Germans are also systematic fish growers, devoting themselves to

carp, a fish which can be fed in a pond, like poultry in a farmyard. About 10,000 tons of fresh water fish is produced annually in this way.

## WHALE, SEAL, PEARL, AND OTHER MARINE INDUSTRIES

Whale and seal fisheries provide the most important animal oils

*Photo Wilse* *Kindly lent by Norwegian State Railways*

**FIG. 155. FLENSERS CUTTING UP WHALES, VINGVAGEN HVALSTATION, NORWAY**

**Having been stripped off, the blubber is cut up, placed in vats and reduced by superheated steam. Three tons of whale oil is obtained from a good sperm whale, besides fertilizers made from the bones and flesh of the carcass. Whale oil is now hardened into a creditable margarine**

of commerce. Train oil, used for soap boiling, is chiefly obtained from the Greenland and bottle-nosed whales, which are hunted in the Arctic Sea off Greenland and Iceland, and under licence in the Antarctic Ocean off the Falkland and Ross Dependencies. Modern whaling is done from the deck of fast steamers which, the whale having been slain by a harpoon bomb fired from a small cannon, tow the carcass to a shore or floating factory. The blubber is stripped

off, steamed, and the oil drawn off and put into casks. In addition to oil, the whale fisheries provide ambergris, used in perfumery, spermaceti for cold cream and salves, whale bone, and guano. Since the introduction of petroleum and artificial whalebone, the whaling industry has steadily declined. Framnes (Iceland), San

*By kind permission of* *Agent-General for W. Australia*

**FIG. 156. LANDING MOTHER-OF-PEARL, BROOME, WESTERN AUSTRALIA**

Francisco, U.S.A., South Georgia (Falkland Isles), and Dundee (Scotland) are the principal home ports of the whaling fleets.

The world's most famous herd of fur seals raises its young on the Pribilof Islands in the Behring Sea. Under international agreement only a certain proportion of the young males are captured each year. London is the market for most of the valuable skins. In spring a fleet of steam-sealers sail from St. John's, N.F., for Labrador on an annual fishing voyage of one month. The hair seal is sought for its oil and leathery skin.

Pearls, the uncertain products of accidents, are found inside the shells of certain inedible oysters that inhabit the shallow waters off

Ceylon and Venezuela and in the Gulfs of Persia and California. The large pearl oysters of the waters of New Guinea and Australia provide mother-of-pearl. Sponges, which flourish under the same geographical conditions as the pearl oysters, come mainly from the Western Mediterranean, the Bahamas, and Florida. The growing scarcity and high prices of sponges has stimulated their cultivation. Among the multitude of minor products of the sea are coral and seaweed from which iodine is obtained.

## COMMERCE IN FISH

Fish does not figure largely in the foreign trade of the countries having the largest fisheries. The United Kingdom, U.S.A., and Japan consume about as much fish as they catch. Our export of herrings to Central Europe and the Baltic is about balanced by our import of tinned salmon and sardines. The United States import Canadian fish to replace their exports of salmon and cured cod to Europe, Australasia, and South America. Newfoundland and Norway, lands of small population, export the greater part of the fish they catch, chiefly cod and herring. The chief fish-importing countries are Spain, Portugal, and Italy, where the people are mainly Catholics, and where poverty limits the masses to a food cheaper than animal meat. Brazil and the other Latin-American countries import much fish for reasons similar to those found in Latin Europe, and the added one that dried fish keeps almost indefinitely in hot climates.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. Explain the terms: *littoral, pelagic, abyssal, mud-line.* Account for the location of the principal fishing grounds being situated in the littoral zones of the middle latitudes.

2. " Herring fishing is a key industry upon which our Empire rests." Discuss this statement historically and geographically.

3. For the period 1933-5, the approximate average annual catch of fish of all sorts in pounds head of population was: Faroe Islands, 1,590; Scotland, 113; Canada, 80; Newfoundland, 52; Denmark, 53; England and Wales, 43; United States, 23; Germany, 16; Ireland, 4. Discuss these figures, bearing in mind the situation,

**coastline, climate, population, and alternative means of food supplies available in these countries.**

**4. " The sea is Japan's grazing ground." Expand and discuss this statement**

**5. What is a fish hatchery ? Name any fresh-water or salt-water fish or shellfish raised in British hatcheries.**

**6. Explain how the methods of taking fish used by British fishermen are adapted to suit geographical conditions and the habits of the fish sought after.**

**7. Give a concise account of the whaling industry of to-day.**

**8. In 1935 United Kingdom imported 143,360 tons whale oil: British Whale Fisheries (with Falkland Islands), 75,100; Netherlands, 31,500; Norway, 19,830 (20 per cent refined); Denmark, 8,120 (80 per cent refined); South Africa, 2,590 tons. How far do these figures give a true indication of the location of whale fisheries ?**

**9. Under the headings of location, fishing methods, and products, describe the more important pearl fisheries of the world.**

**10. Name and write notes on six commercial products other than foodstuffs obtained from the sea.**

**11. Make a note of the varieties of fish on sale in your locality. Observe whether the particular varieties are fresh, frozen, chilled, dried, salted, smoked, canned, or otherwise prepared for market, and try to discover the reasons for the differences of preparation and the places of origin.**

**12. Discuss the statement that fishing fleets have been, and still are, the training ground for the personnel of navies and mercantile marines. Give historical examples to support your views.**

**13. On a map of European seas mark, by symbol or otherwise, and name the areas where the principal fish given on Fig. 148 are taken.**

**14. Arrange the International Fishing Regions shown on Fig. 148, in order of importance to England. Is the order what you would expect ? Give your reasons and explain why more fish is taken in Region I than in II, III, or VIII.**

**15. In which region are the methods of taking and landing the catches likely to be the most varied % Why ?**

**16. Give examples of the three principal ways in which the exploitation of sea fisheries are regulated and the rights of interested countries safeguarded.**

*By kind permission of* *High Commissioner for Newfoundland*

**FIG. 157. NEWFOUNDLAND SEALERS BRINGING PELTS TO SHIP, LABRADOR**

17. Analyse carefully the sites of the salmon weir and canning factory in Pigs. 153-4, and point out the various factors which influenced the choice of their position, individually and in relation to each other.

18. Describe a steam drifter used for herring fishing, and point out its special advantages for such work.

19. How does a native diver work when pearl fishing? Why is he able to work in this manner?

**20. ENGLISH FISHING FLEETS** *{1st Class Boats)*

| Vessels | Trawlers | | | Liners | | | Drifters | | |
|---|---|---|---|---|---|---|---|---|---|
| | Number | Total Tonnage | Average Tonnage | Number | Total Tonnage | Average Tonnage | Number | Total Tonnage | Average Tonnage |
| **Average 1912-1913** | | | | | | | | | |
| **Steam** | 1,362 | 278,450 | 204 | 60 | 10,213 | 179 | 575 | 45,835 | 80 |
| **Motor** | 8 | 151 | 19 | 5 | 104 | 21 | 71 | 1,832 | 26 |
| **Sailing** | 808 | 27,889 | 35 | 31 | 1,230 | 41 | 172 | 4,722 | 28 |
| **Average 1925-1926** | | | | | | | | | |
| **Steam** | 1,218 | 280,226 | 230 | 55 | 10,857 | 199 | 313 | 22,065 | 87 |
| **Motor** | 64 | 1,777 | 28 | 33 | 722 | 22 | 26 | 867 | 33 |
| **Sailing** | 326 | 10,328 | 32 | — | — | — | 2 | 34 | 17 |
| **Average 1934-1936** | | | | | | | | | |
| **Steam** | 1,220 | 314,225 | 257 | 27 | 5,751 | 214 | 275 | 25,184 | 92 |
| **Motor** | 78 | 2,717 | 35 | 32 | 746 | 23 | 14 | 309 | 22 |
| **Sailing** | 97 | 3,228 | 33 | | | | | | |

Discuss the figures given above, pointing out what changes have taken place in the character and composition of England's fishing fleets during the past twenty years. Suggest reasons for these changes.

21. Of the world's estimated annual total catch of sea fish, 13,000,000 tons, the landings in millions of tons are Japan, 3-3; Korea, 1-5; U.S.S.R., 14; U.S.A., 1-3; U.K., 1-0; Norway, 1-0; Germany, 0-5; Canada, 04; Spain, 04; Alaska, 0-35. Express this data in diagram form and point out to what extent opportunity and necessity influence the size of the landings by the countries concerned.

## CHAPTER XI

# WORLD TRADE AND COMMERCE (I)

### Man's Economic Environments, Local and Universal.

IN the preceding chapters the broad outlines of men's relationships to their own native geographical environments have been emphasized. This is only one aspect of geographic control. In addition to having their existence influenced by local conditions, all men are in some measure influenced by geographical conditions and the use made of them by men in natural regions other than their own. More directly and fully individuals or peoples are affected by their local environment, and at the same time indirectly and to a lesser extent by what is going on outside their own locality. For example, the life of the uncivilized pigmies of Central Africa is almost wholly influenced by their geographical surroundings. Their struggle for existence has, however, been made less severe because sometimes it is possible for them to obtain a steel knife, a box of matches, a trinket, or some other product from places outside the Equatorial Rain Forest Region. Again, in the case of ourselves, the food we eat, the materials of which our clothing is made, the raw materials used in our many industries, even books we read, and films and plays we see are often of foreign origin. Droughts on Australian sheep farms or the agricultural tracts of India, political disturbances in the Far East or South America., the ravages of the boll-weevil in American cotton fields, or the wheat rust on Canadian prairies would each affect our daily life. Nor is the repercussion of overseas conditions confined to those having an unfavourable influence upon our existence. The effect of a bumper wheat harvest in the Ukraine or sugar beet crop on the Continent would also affect our lives, possibly by cheapening the price of bread and sugar respectively.

Besides a material or economic environment, men, particularly Britons, have the wide and varied intellectual environment. They get ideas from other lands and are able to tackle their own problems the better for being able to draw upon the experiences of other peoples. It is easy to see that geographical knowledge of this kind must be of great service to merchants who require to make an

earnest study of the needs and desires of our customers overseas. To be cognizant of the ways other people look at things and to be able to appreciate their points of view is one of the first conditions of intelligent citizenship. As citizens of a world-wide empire we especially need to cultivate the broad view and the habit of looking for causes of things in order to do the right thing for others as well as for ourselves.

The more highly civilized a people become, the more their lives come under the control of geographical factors operating in regions of the world other than their own. Trade has been the principal means whereby man has extended his geographical environment. The extension is not necessarily one of continuous growth nor confined to certain directions. Another feature of this widening of men's environment is the tendency of men to become more and more bound by conditions arising in other places where they have less personal control. This growing dependence of civilized man upon the world outside his own region underlies the efforts made by more civilized communities to obtain the control of foreign sources of supply by political, economic, or financial means, by conquest, colonization, or peaceful penetration.

**Britain**—An Example of **the** Ways **in which a** People **During the Growth of their** Civilization, **Widen** their Environment.

We read how the primitive inhabitants of Britain, creatures of local circumstance, came to draw upon the resources of areas outside their tribal lands for flints, lime, and salt, in much the same way as the savages of the interior of New Guinea to-day either barter with or take by force from the savages of the coastal areas. With the beginning of the Christian era, the inhabitants of Southern Britain were bartering on a small scale with the Phoenician traders who came to our shores in search of tin and furs in exchange for dyed cloth and other articles of the more civilized communities of the Eastern Mediterranean. This very small " frontier trade " shows that the geographical environment of some at least of the British had become wider than the limits of Britain.

The Romans appear to have been fully alive to Britain's geographical advantages of fertile soil, equable climate, large areas of lowlands fit for agricultural production, and the admirable facilities for cheap water transport. They showed the British how to make

better use of their opportunities, and themselves made good use of Britain's possibilities as a source of raw materials, such as corn, cattle, hides, metals, furs. The British, now copying Roman civilization, began to need luxuries and necessities unobtainable in Britain, and a small trade with Mediterranean lands grew up. In the confusion which followed the break up of the Roman Empire the people of Britain appear to have been thrown back upon the resources of their own land.

Their economic environment remained contracted until the Saxon agriculturalists began to draw on Spain for iron with which to make agricultural implements, and upon France for millstones. During the Danish period trade expanded still further, and we find the people of England supplementing their own native products by importing articles such as wines, vinegar, fish, cloth, pepper, and cloves from Scandinavia, Flanders, and the Mediterranean. Contact with the Continent, and especially with Mediterranean lands, increased, and trade benefited as a firm, centralized government gradually came into being during the twelfth, thirteenth, and fourteenth centuries. German merchants of the Hanseatic League established their steelyard on the Thames and smaller factories at Lynn and Boston. Assured of fair treatment, foreign merchants from Italy and the Iberian Peninsula came to sell their wares in England. The English Merchant Staplers and Merchant Adventurers now became serious rivals of the alien traders in the exploiting of England's wool, wrought lead, tin, jet, cattle, fish, and salt meat, and in supplying England's very small but growing demands for French and Rhenish wines, Italian and Flemish cloths, Norwegian and Icelandic salted fish, Baltic tar, and Eastern luxuries (via the Levant), such as currants, pepper, spices, and silks. Down to the end of the fifteenth century, trade was both fitful and scanty, the machinery of exchange was clumsy, and even the amount of metallic money was too small for trading operations. It has been estimated that at the time of Henry V I I the population of England was 99 per cent self-supporting.

During the sixteenth and seventeenth centuries two far-reaching modifications in the expansion of the economic environment are noticeable. Although its character varies little, the direction of trade becomes radically changed and the machinery of commerce is greatly improved. Until the ocean became important and

shipping became pelagic (oceanic) in type in place of thalassic (of the narrow seas), Britain had been very much on the outer edge of the world that mattered. As trade developed the ocean way, Britain, most favourably situated for such trade, began to exploit her natural advantages, and so we find British seamen making voyages to the Atlantic Islands, the Newfoundland fishing banks, Morocco, Guinea, the White Sea, North, South and Central America, and, perhaps the most important of all, to India and the Far East. The Mediterranean was no longer the focusing point of the world's commerce. Although trade was done by the private efforts of individuals or trading companies, it was actively regulated by the Government with the idea of making still more powerful the first centralized European State of modern times. To this end English shipping was encouraged by Navigation Acts and the character of trade regulated so as to make Britain as self-supporting as possible, and at the same time to amass wealth for the nation so that it could hold its own successively with Portugal, Spain, Holland, and France. The people of England continued to depend on foreign lands only for luxuries and indispensable raw materials, the equivalent of about one-fortieth (compared with one-fourth to one-third to-day) of the articles consumed in the country. Trade was still of the " frontier type " as between peoples differing in degree of civilization, with the difference that in former times traders mostly came to us and now British merchants mainly sought out other lands.

By the middle of the seventeenth century neither sentiment nor law any longer placed obstacles in the way of financing trade along much the same lines as banks do to-day. The lending of money at a reasonable interest was no longer regarded as illegal and immoral. Money economy, involving the exchange of goods for money, had finally ousted natural economy under which system goods were exchanged for goods. The circulation of goods was greatly facilitated. Trading ventures financed by the private wealth of the venturers were superseded by trade carried on by joint-stock companies, such as the East India Company, using the money of investors. Our coinage had been reorganized and more money was put into circulation. A further advance was made when the Goldsmiths Company began to act as bankers and the Bank of England, the keystone of our present financial supremacy, was founded.

During the eighteenth century Britain was compelled to extend her overseas possessions in order to obtain the control of sources of supplies of foreign commodities, which were now coming to be regarded as necessaries rather than luxuries of life. This colonial and commercial expansion by the State, more than by private enterprise as hitherto, was necessary because at that period no country permitted foreigners to engage in trade with its colonies. Trade was actively pursued with the lands surrounding the Atlantic and Indian Oceans, Canada, Newfoundland, West Indies, British Guiana, Gold Coast, Cape Colony, India, Ceylon, Mauritius. Better use came to be made of Britain's own resources, too.

Industry, ways and means of transportation, and communication developed rapidly during the nineteenth century. Mercantilist ideas in the nature of things became discredited and rejected in favour of the application of the theory of Free Trade. The emergence of Britain as " Mistress of the Seas " meant that goods could be more securely carried in British ships. Our island position gave security not only to our rising industries and trade, but also made it possible to manage trade with greater economy than elsewhere. Our position in relation to sources of supplies and markets was unique. In addition to trading upon our own account with practically all the countries of the world, we became the largest transporters of goods for other countries. In particular we developed a large re-export trade with Europe and North America. By degrees, as the units of our colonial empire, European countries, and the United States developed, our trade changed both in character and direction. The bulk of it, which had previously been of the " frontier " type, became what has been called " complementary " in character. Most of our commerce came to be with other progressive peoples who differed from us in the stage of their industrial development and specialization rather than in their degree of civilization. This is largely the case to-day. For instance, we exchange our manufactured goods for Australia's wool, meat, and other primary products ; our cotton and woollen goods for German dyestuffs and chemicals. Specialization enables a region to utilize to a greater degree than otherwise possible its own particular natural and social advantages, temporary or permanent, and by the exchange of its products to obtain the commodities of other lands more cheaply. As the material civilization of Britain advanced this is

what happened, and to-day, preferring to specialize in other goods yielding greater profit, we even import articles which we could produce more cheaply ourselves. It is the comparative cost of production and selling price of goods which determine our specialization. For example, it is worth our while to buy Irish butter and eggs instead of producing our own, so that we can concentrate our energies upon those industries and occupations for which we have relatively great world-wide advantages, such as textile and iron and steel production, and performing the function of middlemen, shippers, and financiers for world trade.

Even in the case of the less advanced peoples of India and China the character of our trade similarly altered. As articles of trade, commodities such as tea, wheat, jute, cotton, leather, rubber, and tea far surpass in importance goods such as spices, indigo, saltpetre, raw silk, and cotton goods, formerly the principal imports by Britain from India and the Far East. This example also illustrates yet another tendency which is developing in modern trade, namely, the relatively greater growth of trade between temperate and non-temperate lands than between temperate regions. Despite interference by national ideas of well-being and class interests, the world is becoming a single economic unit wherein tropical and temperate lands form complementary economic components.

As the inhabitants of Britain have become increasingly civilized, not only have they made greater use of Nature's opportunities in their own land, but also, by means of trade, more and more use of those of other lands. The geographical environment of the people of the British Isles has thus been widened from one of local to one of world-wide extent. Formerly the expansion was extensive in character, now it is becoming more and more intensive. Trade, the instrument by which this expansion has been largely accomplished, has grown from simple bartering to supply the few wants of savages into the complex, highly organized, world commerce of to-day, by which means the great variety of the world's resources is made to contribute to the many and ever-growing needs of the highly progressive and civilized inhabitants of Britain to-day.

**Why Men Trade.**

All men, individually or collectively, primitive or civilized, having different goods, exchange them because it is to their mutual

benefit to do so. It is mainly through trade that man can overcome in a measure varying according to his own ability and desire, the natural limitations of his geographical environment. So long **as** man remains primarily a creature of circumstances, he may propose, but Nature disposes, as in the case of the lower forms of life. Within wide limits, the more man uses his intelligence the more independence he achieves, becoming less the controlled and more the controller of his environment. Trade makes men's struggle for existence easier and enables them to raise their standard of living and comfort. By taking part in trade men make the most of the fruits of their labours because they can exchange their surplus products to advantage, and this indirectly enlarges the scope of their efforts in the most economical way. Trade is the last link in men's productive activities and assists them in their efforts to secure the maximum of satisfaction of their needs for the necessaries, comforts, and luxuries of life with the minimum output of energy.

### Why the Commodities of Trade in Various Parts of the World Differ in Kind and Character.

Fundamentally all trade is the outcome of specialization, either natural or man made. Products more easily produced in certain regions are exchanged for commodities more easily produced in others. The special advantages possessed by a region for the production of particular commodities entering into trade are partly the outcome of differences of natural resources and partly due to some special aptitude or social circumstances of the inhabitants of the region.

The high quality of British cotton goods or Japanese lacquer ware, Indian brass ware or German dyestuffs, American labour-saving machines or Parisian models of ladies' attire shows how articles of trade result from the specialized skill, knowledge, or taste of the people concerned in their production. As civilization spreads, peoples tend to become more alike in these qualities. British typewriters and vacuum cleaners, for instance, now compete with similar American products ; British dress designers produce creations equal to those of Paris ; and imitation brass ware made in Birmingham is scarcely distinguishable from the genuine Indian article. What is true of our own country is equally true in other progressive countries. Nor is this tendency towards equalization in the quality of products

confined to manufactured goods only. The United States export " Wiltshire " bacon, and Canada " Cheddar " cheese. The ease with which ideas and goods are circulated to-day has led to peoples of one area imitating and improving upon the products of other regions. Within limits and mainly in the case of the more progressive peoples, the copying of ideas and goods is regulated by laws relating to copyright and patents.

Differences of trade articles arising out of the different social circumstances of peoples are more important than those resulting from the special aptitude of peoples. Although partly dependent upon racial differences, it is largely a matter of differences in the density of population. Every living being is ultimately dependent upon the products of the land and sea. As the population of a given area of land increases, the pressure on the soil increases. For the inhabitants of such an area to maintain or improve their standard of living, it becomes necessary first to increase primary production and eventually to make up raw materials in order to add to their value. The first stage is possible only up to a certain extent, and if the second stage, that of industry based upon mechanical power and machinery, is not entered, the progress of the people is impeded and their civilization becomes stagnant. This is shown in the case of the peoples of India, China, and Java. Japan was similarly situated until the introduction of Western industrial methods made further progress possible. Differences in density of population account for the different stages in the use made of the land by whites in their homelands and in their colonies. The white colonists are as civilized as their kindred in the older countries, but the articles the younger and more sparsely populated countries offer for export are principally raw materials, e.g. Australian wool, Canadian wheat. In return they import mostly manufactured goods from their parent or other more densely peopled progressive countries. A similar state of trade still exists between the older and established countries of Europe and the United States, and even between ourselves and other Continental nations over whom we have the advantage of an earlier start in the modern industrial system. The United States send steel bars to England, dressed leather to France, coal tar to Germany, and import high-class cutlery, fancy shoes, and dyes from these countries respectively. Then we export cotton yarn to Germany, where it is made into

## COMPARATIVE TRADE OF THE CHIEF BRITISH POSSESSIONS

POST-WAR AVERAGE (1921-6)

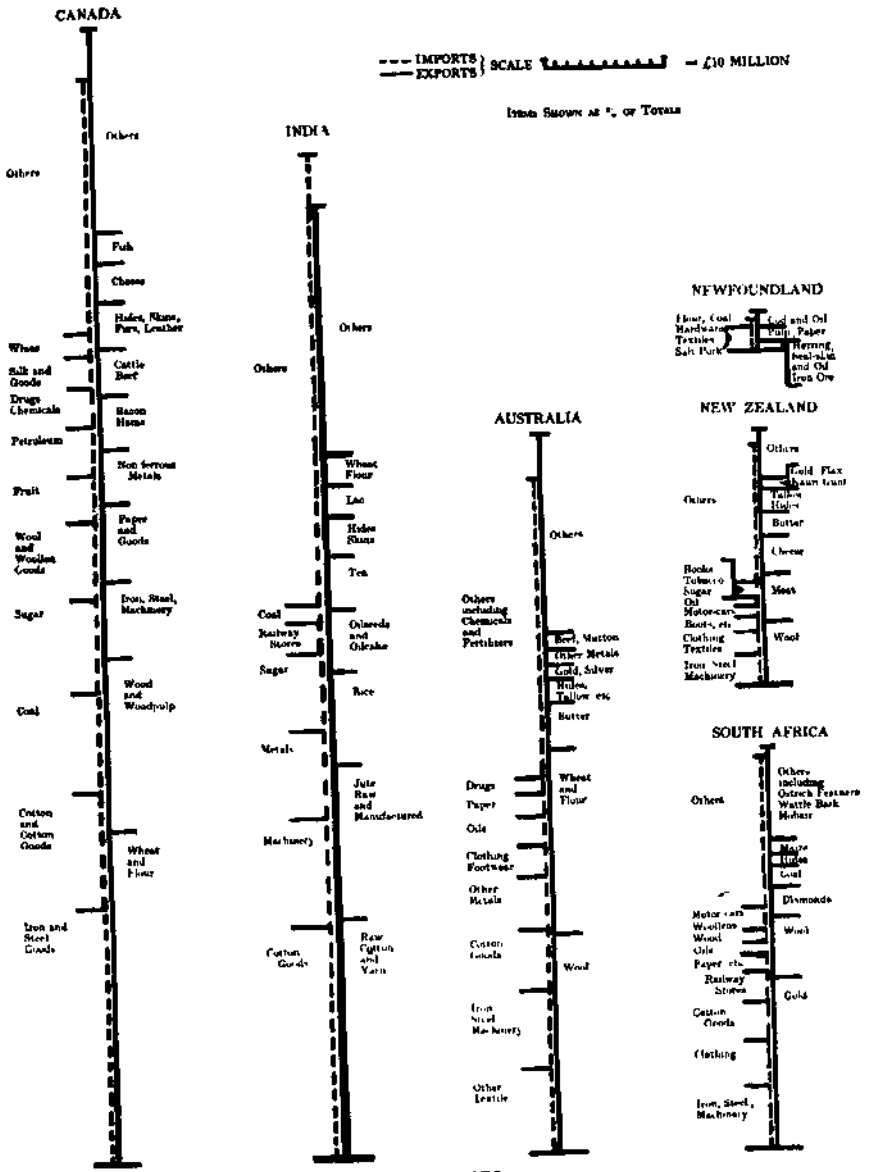



FIG. 158

lace netting and sent back to us to be made into curtains. As the population of progressive countries increases, trade arising from differences in the density of population tends to disappear. Already a few woollen mills and iron and steel works are established in Australia, and engineering works and cotton mills are arising in the more densely peopled Eastern provinces of Canada. Two contributory factors in the trend towards the elimination of trade resulting from differences of density of population are the desire among younger countries to be as self-sufficient as possible and the growth of the home market as population increases. This latter circumstance makes the establishment of home industries worth while and less risky, and consequently both the export of the raw materials used in those industries and the imports of foreign-made goods tend to diminish. This diminution is often fostered by protectionist tariffs, bounties, or subsidies.

A third important factor accounting for different regions furnishing different articles for trade is the diversity of natural resources due principally to regions having differences of climate, geological formations, topography, and world position.

The effect of differences of temperature is fundamental and lies at the root of " latitudinal " trade, whether it be the movement of goods north and south between tropical and temperate regions, or even between the warmer and cooler parts of one natural region, e.g. the importation respectively of tea from India, bananas from Central America, early new potatoes from the Channel Islands, and flowers from the Scilly Islands to England. Of the other factors of climate, " dryness " or " dampness " of the air, the combined result of many elements, such as the amount and frequency of precipitation and of fog, vapour, pressure, evaporation, and soil conditions, is also of prime importance, since it is the chief factor underlying the distribution of " sheep " lands, " cattle " lands, " dried fruit " and " fresh fruit " areas of the world.

Geological differences give rise to richness or poverty of mineral resources, underground water supplies, and soils. The possession and economic utilization of coal by the United Kingdom and petroleum by the United States exercise a considerable influence upon the trade and commerce of these two countries. Coal is our only raw material of much value for export, and many of our industries and means of transport are based upon coal power.

The presence or absence of water supplies indirectly affects trade by affecting the possibility of human settlement and, consequently, production. The bulk of the oilseed cash crops of the Central Provinces, India, depend upon irrigation from wells. Were the soil and subsoil of these provinces not porous, such irrigation would be impossible. Sheep farming in Australia is becoming more and more dependent upon artesian water. It is a well-established fact, too, that different soils suit different crops, e.g. wheat grows best on heavy land and potatoes on light soils.

How topography indirectly influences the kind of commodities entering into trade is well shown by the different articles exported from mountainous Norway and lowland Denmark. Even when the resources of a region are being fully exploited, articles of trade produced in mountain and plain areas will remain different and complementary in character. Minerals, especially metals, timber, " top " fruit, nuts, and other tree products, will continue to bulk largely in the exports of highland areas. Manufactures, with the help of water power or hydro-electric power, will be restricted to the production of light-weight goods of comparatively high value because of difficult transport conditions, lack of sites for large industrial concerns, and for the accommodation of the workers. The world position of a region has an effect upon the commodities it offers for exchange. Distance from the world's principal markets may so add to the cost of transport that the exchange of goods becomes unprofitable. Until transport becomes cheaper, or world prices increase, little of Siberia's wheat and meat products will enter into international trade. Britain's island and somewhat central position among the more progressive, densely populated, and commercial nations of to-day is a valuable asset as regards the security and extent of our trade.

**Man's Influence as an Agent in the Production of Commodities Entering into Trade.**

In so far as the trade of a region depends upon its surplus of plant and animal products, man can to a limited extent interfere with the natural order of things. The trade in rubber from Malaya, coffee from Brazil, wheat and the products of sheep and cattle from temperate and sub-tropical countries outside Europe, are striking examples of man's control of production resulting in trade.

In each of these cases, and many of a similar character, man has been able to make regions having similar physical conditions similarly productive of the commodities he needs. He can do little to alter the physical conditions of climate, soil, and relief, although by the selection of plants and animals, and the improvement of farming methods, he can do something to modify their control of production. In Canada, the " Marquis " wheat, which superseded the " Fife " variety, which it beat by ten days as regards the length of time needed for growth and ripening, will soon be supplanted by the new " Garnet " wheat, which gives good yields and ripens in ten days still less time. On official authority it is stated that the new variety will make possible the tripling of Canada's area under wheat by opening up lands at present excluded owing to autumn frosts. This is just one of many examples of what man can do. As regards mineral production, man is virtually helpless. He must take minerals where he finds them and continue to seek out new deposits.

The principal and most permanent of the factors giving rise to different kinds of goods offered for exchange in different parts of the world is the diversity and distribution of natural resources. Because this factor is largely outside man's control it is becoming more and more important in politics no less than in trade. This is especially apparent as regards mineral resources, which are diminish - able assets. Unlike plant and animal products, they do not grow. No single region is wholly self-sufficient in those minerals upon which the whole structure of life in modern industrial countries is based. As supplies begin to run short, the need for international co-operation in the use of such minerals will become acute. As regards oil, platinum, and nitrates, the question of their further exploitation and trade distribution has already been raised by the United States. In some measure this need to control the supplies of basic raw materials has already been recognized, and huge international combines controlling supplies and their distribution have been formed, e.g. as regards petroleum, iron ore, and artificial silk.

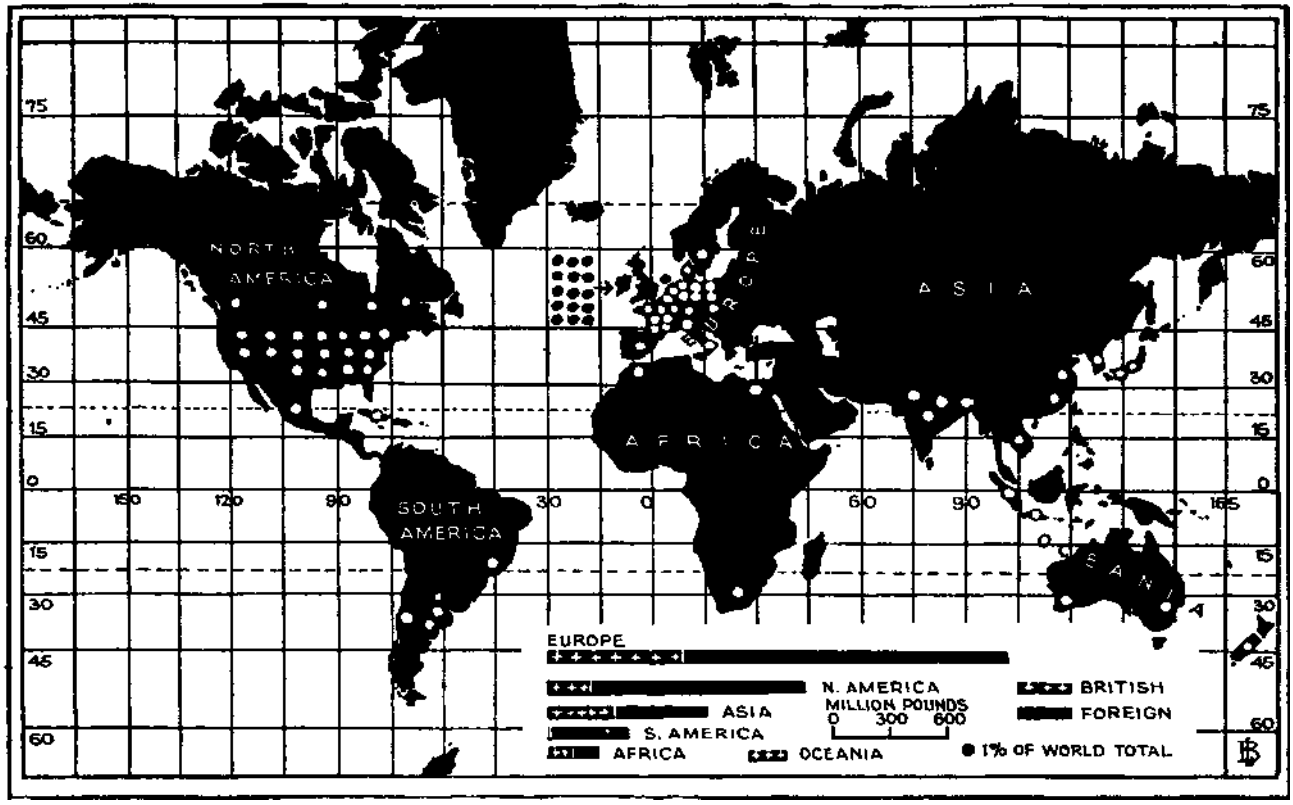
### Why the Peoples of some Regions Engage in Trade more than Others.

The fact that individuals and groups of people engage in trade signifies that they have varieties of needs demanding satisfaction

and that they employ different means to supply their needs. Broadly speaking, the more civilized people become, the greater in variety and amount become their needs and the more specialized their efforts to satisfy their wants. It is not easy to define what we mean by civilization. Usually we mean the measure of success men have achieved in the struggle for existence. Peoples who have the most successfully adapted themselves and their mode of life to their geographical environment by the perfecting not only of mechanical arts, tools, and weapons, but also of systems of government and other institutions to ensure their intellectual and social well-being, are said to be the most highly civilized. Such people have been able so to arrange their ways of life as to minimize hardships and even to gain profits from the geographical conditions under which they live. Material civilization, then, is measured chiefly by man's capacity to produce and consume goods and by his efficiency in conducting commercial transactions. Differences in the extent to which people engage in trade are mainly due to their differing degrees of civilization, in which racial characteristics play an important part. Differing degrees of civilization in turn are largely the outcome of differences of geographical environment.

**Commercial Peoples.**

In the chapters dealing with the various natural regions of the world, it has been suggested that the great civilizations of the past and present have been the products of regions of the subtropical and warm temperate types. In these areas geographical conditions have favoured the growth of population, and material civilization is mainly the product of numbers, because an increase in population aids the growth and spread of ideas, stimulates improvements, and promotes social and political stability without which progress would be difficult. Excluding the high and therefore temperate plateaux of the Andes and Central America, the regions situated in low and high latitudes have never produced civilizations comparable with those that have grown up from time to time in the middle latitudes. This is because the native inhabitants of tropical lands, finding life easy, seem to lack the intellectual ability and desire to make an independent advance in culture, while the peoples of cold regions in high latitudes are severely handicapped by a benumbing climate and the paucity of material resources. Extensive participation in trade has thus come




**Fia. 169** WORLD TRADE BY VALUE, IMPORTS, **1922-3**

1935 (1922-3 =100): Europe 133 (British 150), N. America 60 (75), Asia 90 (57), S. America 56 (60), Africa 125 (70), Oceania 62 (60)

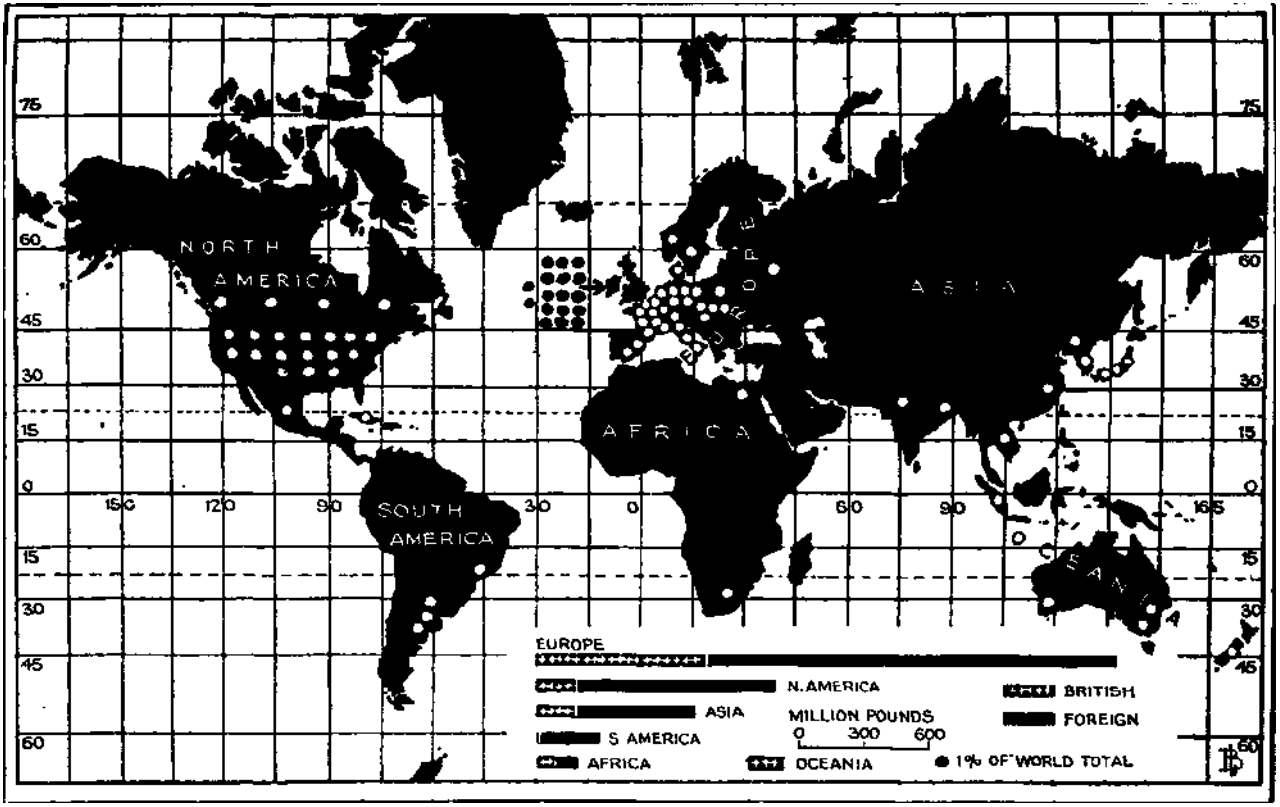



**FIG. 160. WORLD TRADE BY VALUE, EXPORTS, 1922-3**

1935 (1922-3 = 100) • Europe 94 (British 135), N. America 87 (133), Asia 106 (137), S. America 130 (60), Africa 145 (150), Oceania 150 (150)

to belong to the races of the yellow and especially the white types inhabiting the middle latitudes. The history of our own nation outlined above illustrates how the instinct for trade is closely bound up in the development of civilization, which in turn developed out of a favourable environment. To-day the bulk of the world's trade is in the hands of the white races, and by far the largest share of this trade is carried on between the more settled and established countries of N.W. Europe and their more youthful kindred countries overseas, particularly those of North America.

Until the recent emergence of Japan as a progressive nation, now fifth in position among nations carrying on world trade, the civilization and trade of the yellow races appeared to have been arrested at a phase passed through by European nations in the Middle Ages. This backwardness is traceable to isolation, both natural and man-made. Both China and Japan suffered from an isolation imposed by the mountain barriers of Central Asia, by the inhospitable nature of the country lying to the north, and by that desert of water, the Pacific Ocean. So long as the land was capable of supporting its population the Chinese and Japanese were content to keep to themselves and even to refuse to have anything to do with the rest of the world. The Chinese were better placed to maintain a policy of isolation by reason of the vastness of their river basins and the variety of subtropical and temperate products available by internal trade. Pressure of population, insufficiency in quantity and variety of land products, together with the advantages and enticements of an island position, caused the Japanese to be the first to enter into the modern trade of the world. China is awakening to the advantages of intercourse and trade with other nations.

British example and encouragement are helping India to overcome the stagnation of her civilization, and her share in the world's commerce is increasing both absolutely and relatively. To-day India stands eighth among the commercial nations of the world.

Another factor which has helped to bring about the commercial supremacy of the white and yellow races living in the temperate regions is the fact that progressive races migrate to a larger extent and are able to adapt themselves more successfully to new surroundings. Such migrations have helped to widen the field for trade and added to its volume and value. After the settlement of new countries is well under way, the native population ceases to be

of much account as an agent of trade, and hence the trade of new lands comes into the hands of the races to which the settlers belong. In a similar way the trade of land occupied but not colonized by progressive peoples comes under their control.

**Non-Commercial Peoples.**

Under this heading are included those native races who inhabit lands outside the temperate and subtropical regions and who take little part in world trade. For the most part, geographical conditions have hampered the material progress of these peoples, and, consequently, their participation in trade on a large scale as an expedient in the struggle for existence and for a higher standard of living.

From the earliest times the more progressive peoples of the temperate lands found tropical lands of use as sources of supplies and as markets for their own goods. Step by step, under the control and direction of the more active and civilized races, particularly Europeans, these lands have been drawn into contributing to the world's trade. Financially and economically, if not in all cases politically, nearly all tropical lands and their peoples are to-day under the domination of the people of the temperate regions. This is particularly well illustrated in Africa, where the whole continent, with the exception of Liberia and Egypt, is under the political control of Europeans. Liberia owes its existence to the efforts of Europeans and Americans; Egypt gained its independence by the termination of Britain's Protectorate in 1922; and the political integrity of Abyssinia, safeguarded by an agreement between Britain, France, and Italy, ceased in 1936 when Italy annexed this country. In exploiting tropical regions, peoples of European stock are handicapped because they cannot do the actual work of production and transportation. To overcome climatic and other conditions unfavourable to white men, and the natural disinclination of natives to work for themselves, or other people, many ways have been tried. Even with the aids of science Europeans are unable to make themselves at home in the tropics. The former use of slave labour in tropical America, the system of forced labour in Java, were two ways in which attempts were made to make imported or indigenous natives work. When these methods of compulsory labour were abolished, production in the tropics became dependent upon the

goodwill of the natives. In view of the unwillingness of the natives to work, the whites in the tropics were faced with three alternatives : either failure, or the introduction and use of expensive machinery whose working needs fewer but more highly skilled workers, or the employment of foreign substitute labour forces under what is known as the "coolie system." The last alternative is widely practised in Malaya, Java, British Guiana, tropical Africa, and the West Indies. The use of these tropically acclimatized and more industrious labourers from India and China raises political and social difficulties such as are met with in Kenya, Africa, and Malaya at the present time. Moreover the transport of such labour forces to the scene of their work and back to their homeland when the period of their contract expires, and the catering for their special needs in foreign lands, entails heavier expenses than would the employment of indigenous native labour.

In the cold regions of high latitudes, the struggle for existence presses so constantly upon the inhabitants that they have little surplus to offer for exchange. The scanty resources of these regions have also never tempted the cupidity of more progressive peoples.

Thus the native races occupying extra-temperate regions, lacking the opportunities which make possible an advance in material civilization, do not seem likely to play anything like an important part in world trade on their own behalf or on behalf of other races. In a general way the human race can be classified on the basis of its civilization, according to its participation in trade, into two broad divisions, each of which has two subdivisions. The commercial peoples fall into two classes : (1) Those of the temperate and subtropical regions, which, by reason of a favourable geographical environment, have been able to develop a high degree of civilization and are the leading traders of the world. Their external and internal commerce are both very large. These are the inhabitants of N.W. and S.W. Europe, of Southern Canada and Northern U.S.A.; of Japan, Southern Australia, Tasmania, and New Zealand. (2) The civilized peoples of the, as yet, undeveloped areas and the backward inhabitants of the isolated parts of the same regions. With the latter folk the internal trade generally exceeds the external trade in value and volume ; with the former people the reverse is usually' the case. Under this subdivision come the inhabitants of Northern Canada, South Africa, S.E. Brazil, Argentina, Chile, the "back

country " of Australia, Southern Siberia, Northern India, Northern and Central China. Two general types are distinguishable among the non-commercial races : (1) Those residing in the fairly productive tropical regions exploited by commercial races—India, Ceylon, Burma, Malaya, the East and West Indies, S.E. Asia, Polynesia, other tropical parts of S. America and Africa, excluding the Amazon and Congo Basins respectively, and N. Australia. Except where the native population is dense, the external trade exceeds internal trade. (2) Those inhabiting the isolated regions of extreme heat and cold—regions of the Equatorial and Tundra types. Little trade of any kind is done by these peoples.

**Size of a Country as a Factor in Trade.**

Small countries tend to have a higher volume of external and internal trade per head than large countries. This tendency is ultimately traceable to differences in natural resources rather than to other factors affecting trade. Generally speaking, the smaller a country the more limited in quantity and variety are its natural resources, and hence, if a similar standard of life is to be maintained, the more extensive its trading operations compared with those of a larger unit. The external trade per head for India is about 9s., while China, a country two and a half times as large, only trades to the value of approximately 2s. 6d. per head per annum. In both cases the native population are the principal producers and consumers of the commodities of trade, and more progressive peoples act as the principal agents of trade. Among progressive countries, very similar as regards the character of their production, density of population and proportional numbers engaged in similar occupations, the influence of the size of the trade unit is also to be seen. In 1935 Belgium had a trade per head of £17 per annum, while that of the United Kingdom, ten times larger in area, was only £15. In extreme cases, where the very small size of the trade unit restricts its resources to a few but valuable products, the trade per head is very large. That of the Falkland Islands works out at about £300 per annum.

**The Balance of Trade.**

An examination of trade returns reveals the fact that with most countries their total imports and exports differ in volume

and value. A country having larger exports than imports has been said to have a favourable balance of trade, and vice versa. An excess of imports does undoubtedly signify that such a country has credit abroad, and in that sense the balance of trade may properly be regarded as favourable. It does not follow that because a country imports more than it exports that it has a really unfavourable balance of trade. Imports are eventually paid for by exports and paid for in goods. Money, as money, is only the very convenient medium of exchange. It has its intrinsic value, if metallic and not paper money, as an article of trade when exported as bullion from countries where the metal used for currency is mined. Except for the funds of emigrants, bad debts, unsound investments, the trade between nations tends to balance over a period of years. The apparent difference between the values of imports and exports approximately shows the extent of what are called invisible exports or imports, as the case may be. The chief forms of invisible exports are the incomes of nationals from foreign investments, from shipping, insurance, and from other services such as commission on business transactions performed for foreign peoples.

In 1935 the net value of Britain's invisible exports was officially estimated at £312,000,000 and thus what appeared at first sight as an adverse trade balance of £275,000,000 was really a credit balance of £37,000,000 on the year's trading. The value of our invisible exports varies from year to year. In 1913 it stood at £339,000,000 and in 1920 at £595,000,000. The figure for 1920 is a net figure after the deduction of £50,000,000 paid to the U.S.A. debt—a form of invisible import. The money spent by tourists in a country, and the property of emigrants, and inherited foreign stocks and shares which represent immediate ownership are other forms of invisible imports. It is estimated that Switzerland's annual profits from tourists amount to about £2 and Belgium's 10s. per head of their populations. It is estimated that £75,000,000 was spent by tourists visiting Canada; £32,000,000 by those coming from the United States by motor-car; £26,000,000 by those entering by rail and steamer, and £15,000,000 by those arriving by ocean ports. Our modern trade only differs from crude barter in the visibility of the devices by which it is effected. Behind our machinery of international financial settlements, with its bills of exchange

**and** cheques on banks, lies the settlement by goods complicated by invisible exports and imports. There is a final balancing of trade by the exchange of goods or the promise of balance as shown by stocks or shares and bonds.

**Relation of Balance of Trade to Industrial Development.**

Whether imported goods are paid for by other goods at the time or at a later date depends upon the stage of economic development of the country concerned. Young states like Kenya Colony, Nigeria, Mesopotamia, need to borrow money by means of foreign loans on behalf of their governments, corporate bodies, or individuals, in order to develop the country and equip its industries. Vast quantities of materials for the construction of irrigation works, for railway construction and operation, and for the development of its oilfields have had to be imported by Mesopotamia. Most undeveloped regions just beginning to take part in the trade of the world are at this stage of economic development, and as a rule their imports exceed their exports. On the surface, the so-called unfavourable balance of trade of Iraq appears to signify that the nations supplying her imports receive no return. Actually they have received an immediate return in the form of concessions and stocks and bonds of the enterprises. These are really promises to pay, and payment will take place when the new enterprises get into working order and pay dividends.

From the equipment stage, a country passes gradually into the second or interest-paying stage. Australia, New Zealand, British India, the Dutch East Indies, and all the countries of South America have reached this stage. They have what is so often called a favourable balance of trade. Exports exceed imports in value because the ordinary exports have not only to pay for the ordinary imports but also the interest on loans and redemption of loans.

As countries develop it very often happens that before they have finished paying off loans to themselves they become in a position to invest money in other countries. The United States have reached this investment or third stage. While paying vast amounts in interest to Britain, who has provided much capital for American railway construction and manufacturing enterprises, the United States are themselves investing money, in the form of materials supplied, in Brazil, Canada, and other countries, including continental nations which were once creditors of the United States.

**At** this third stage exports are likely to exceed imports, because exports perform three functions : they pay for imports, pay debts, and are supplied to countries making only deferred payments.

As debts are largely extinguished, and safely made investments begin to pay interest, a country arrives at a fourth stage, that of income-receiving and of returning investments. Britain has reached this stage. We led, and lead, the way in loaning money to other countries. From some we receive interest payments in the form of goods, from others our loans are being repaid in goods, and in many cases we receive goods in settlement of both kinds of financial obligations. The inevitable result of our heavy foreign investments has been to make our visible imports appear by far to exceed our exports. This was particularly so during the world economic slump 1930-6. It has been estimated that during the worst year of the slump although by value our general import trade decreased by about 60 per cent and our general export trade by about 33 per cent compared with the period 1926-30, our income from short and long term investments only decreased by about 20 per cent in spite of currency restrictions, moratoriums, instability of prices and purchasing power and other adverse factors. Although the apparent excess of our visible imports over visible exports rose from 24 per cent to 47 per cent we were still just about able to show a satisfactory balance of our total trade. The Netherlands are in a similarly favourable position and, like ourselves, continue to re-invest old and invest new capital in countries having prospects of favourable development and an expansion of industries.

NOTE. Questions, Exercise and Topics for discussion will be found at the end of Chapter XII.

## CHAPTER XII

# WORLD TRADE AND COMMERCE (II)

### The Extent of Man's Control over the Character and Channels of Trade.

IN so far as the character and course of trade is determined by-natural conditions, man's influence is restricted to the modification of the natural distribution of plant and animal, but not mineral, products in the major climatic regions of the world and to finding better ways of using such resources. Whatever agriculturists may do, they cannot produce quinine, rubber, tea, or cane sugar for trade in extra-tropical regions. They can, however, transplant cinchona, rubber trees, tea bushes, and sugar canes to other parts of the tropical regions, often widely remote from those of their origin. The temperate and subtropical regions of the Americas, Australasia, and Africa, South of the Equator, have been stocked with wheat, barley, oats, flax, beans, rice, cotton, hemp, figs, alfalfa, citrous fruits, and the vine from corresponding regions of Eurasia. The trade in Australian dried fruits, American cotton, and Canadian wheat is thus man-made in the sense that man, in understanding natural conditions, has shown his enterprise in exploiting them to his own account. If we turn to animal life, the case is not so different from that of plants. The meat, wool, hides and skins trades of Australasia and the Americas are the outcome of the successful transference of animal life from one part of the world to another, where natural conditions were identical or nearly identical with those of its natural environments. The scope of man's interference does not end with the mere appropriation and transplantation of plant and animal life, and consequently the re-ordering of the kinds of goods regions offer to trade with, and the channels of the exchange. By the discovery of the laws of heredity, and the art of breeding and improving organic life, man has been enabled to modify, in the direction of his own particular needs and desires, the forms given him by Nature. The character of plant and animal products has been, and still is being, changed. Most of the vegetable products of modern commerce are in a very large part

the direct results of modifications produced by artificial selection and the alteration of environmental conditions, e.g. hard and soft wheats, cotton of long staple, seedless raisins, sugar beet, and many others. The effects of man's intervention are perhaps better known in the case of animals. Sheep are fed for mutton or for wool, and cattle for meat, for milk-giving qualities, or for leather.

Man can influence the character and volume of the trade of a region by making more and more use of its natural resources. Whether the resources of a country can be said to be fully utilized depends upon the standard of living of the inhabitants, upon the degree to which the country is peopled, and is complicated by the fact that nowadays most countries consume products from other regions. Of some areas in Europe and Asia where the system of household industry is in vogue, it might be said that their resources are being fully realized and that the lands are peopled up to their food and " needs " limit. Japan has over 2,000 persons per square mile of cultivated land, and S. Italy has reached the ultimate stage of agriculture, that of garden cultivation by hand labour or work animals. The agricultural resources of many parts of the temperate lands are capable of better utilization by intensive agriculture and double cropping. The temperate regions of the Americas and Australasia could support millions of people if the land was cultivated as scientifically and carefully as that part of the Northern Plain of Europe lying between the Seine and the Vistula. China, with its vast stores of mineral wealth and huge labour supply, has great manufacturing possibilities. In the cooler temperate regions where rainfall is sufficient, land that is now regarded as waste or incapable of being ploughed could be made to yield tree crops, e.g. walnuts, filberts, chestnuts, mulberry, hickory, which would provide food for animals if not for man. To the Italians chestnuts are as valuable for food as some cereals are to us. In more arid and warmer lands, trees such as the Mediterranean carob (" locust " bean) tree might be used with profit. Tropical lands occupying more than half the land surface of the earth, and more than half the world's area having abundant rainfall, with the possibility of continuous growth, offer a wide field for the creation of new resources through the help of science. Java supports 600, the Barbados 1,170 persons per square mile, and Cuba about 1,500 persons per square mile of cultivated land. These examples indicate that,

given good government, protection and guidance, native or acclimatized labour forces can people the tropics and produce bananas, rice, rubber, cane sugar, oil nuts, and vegetable fibres for their own use and for exchange in return for the manufactured and other goods of the temperate lands. The future development of tropical lands appears to be essentially agricultural, with at best a low stage of manufacturing. While in temperate lands the increased utilization of their natural resources would at first affect their internal rather than their external trade, in tropical regions the reverse would be the case.

As regards inorganic substances which likewise enter into trade, man's control is severely limited. He can neither add to nor redistribute the world's supply of useful rocks, ores, and water. These can only be located and worked. The discovery and exploitation of hitherto unknown supplies leads to the development of new trade routes if the inorganic resources are not located on or near a channel of trade already in existence, e.g. in the case of the nitrate trade of Chile and the new oilfields of Iraq. As indirect consequences of the exploitation of minerals, the peopling of new countries which have later entered into world trade, and the extension and expansion of man's activities in older countries resulting in greater trade have been helped, e.g. Australia and Great Britain respectively. The art of mining, extraction, and purification of metals is constantly being improved. Mineral deposits once regarded as unworkable are being worked, and their products are entering into trade. Many examples of this progress are to be found in our own land, e.g. the wartime and post-war development of the iron sandstones of Northants and the new coalfield in N. Notts, respectively.

Though large changes in the character of trade and in the directions in which commerce flows have been brought about, the fundamental limitations of man's activities must be kept constantly in mind. Where Nature has made a decision or a disposition, man is, generally speaking, powerless to change it.

So far, man's manipulation of trade by means of his scientific enterprise and partial control of the production of the commodities of commerce has been briefly examined. The character and course of trade, however, is also influenced by the ways in which men both feel and seek to satisfy their needs. Human needs are neither felt in the same way by all men at the same time, nor even by the same

people at different times. Trade, moreover, must be carried on by human agency, and men can control other men by persuasion or by force more easily than they can manage the great forces of Nature. Usually the will of a majority is imposed upon a minority unless the latter is better organized, or more favourably placed politically, economically, or socially. It is, then, in dealing with men as agents, handling rather than producing articles of trade, that the opportunity for man's intervention in commerce more frequently arises, although even in this field of operations man's sphere of actions is limited by geographical factors such as the geological distribution of mineral wealth, the comparative distances between different areas of production and consumption, and the different seasons at which plant and animal products come forward. While the broad streams of trade tend to be more and more governed by the great elemental forces of geographical conditions, their minor surface currents can be meddled with, temporarily or permanently, by men, as they wisely or foolishly think such interference will be to their advantage. Such interference is accomplished on behalf of nations or other political units chiefly by means of treaties, trade and shipping regulations, taxation, bounties, subsidies, and warfare, and in the interest of single or groups of private individuals by means of trade agreements and the creation of trusts and combines. The following sections give short accounts of the typical ways in which states and private concerns endeavour to regulate their own trade by legitimate means. To go into all the activities of merchants, financiers, politicians, and other trade manipulators, including dishonest as well as honest producers and traders, would require a volume. That there is a not very large amount of dishonest commerce is evidenced by the existence of smuggling, " bootlegging," the evasion of full customs duties by the use of fraudulent invoices giving under-valuations, and the more or less regular shipments of " distress " goods at prices which are often below replacement costs. Whether state control and trustification are good or bad is a complicated question, concerning which opinions differ widely. History shows that if such interference is too drastic, trade either languishes or finds a means of circumventing it. The trade between India and the Par East and the Mediterranean by land was almost taxed out of existence by the Turks, but the trade persisted and expanded by way of the sea. Under the monopolist policy of Spain and

Portugal, after a short-lived success in the sixteenth century, the trade of S. America languished until most of that continent became politically independent. Following the establishment of the Soviet Union Russia had no foreign trade, 1917-20, and even to-day her internal and external trade, organized as a state monopoly, is small and fitful. To-day " tariff walls " are surmounted by the establishment of branch or subsidiary industrial concerns inside the frontiers of protectionist countries by firms domiciled outside them. Within recent years American and French motor-car manufacturers have set up motor works in England, in order that in the British market their products shall not be handicapped by Britain's heavy import duties on foreign made automobiles. The protectionist policies of India and Australia have been countered in a similar way by British textile and iron and steel manufacturers respectively. Men, by their manipulations, have thus been able to change the type and course of commerce to a certain extent, and at different periods of time. Such tamperings seem to have been part of the process through which world trade of to-day has evolved. The process is still continuing. Trade is one of those great factors in the life of men which is ultimately conditioned by geographical circumstances, both physical and human, and it is only by studying its nature and its relationship to these conditions, and wisely applying the knowledge so gained, that men and countries can hope to direct the course and character of commerce.

The simplest form of state interference, though not designed with that intention, is by the levying of import duties upon goods for revenue purposes only. Commerce, as it were, insures against insecurity, and, like other industries and persons, contributes towards the upkeep of good government. Without political stability, and consequently security for production and exchange, trade becomes very difficult, if not impossible. Free trade countries follow this policy, which was, on the whole, that pursued by Britain during the half century preceding the Great War. Whether a country carries out the commercial policy of free trade is not just a matter of the choice of its people. It may be due rather to force of circumstances, as in the case of Holland and Belgium. Both these countries were too weak to be strong naval or military powers; too small to have a sufficiency and variety of native resources necessary for the satisfaction of the needs of their inhabitants. To maintain their

political independence and well -being they pursued a free trade policy because, by so doing, trade was attracted and their many home requirements were satisfied in the easiest and cheapest way from foreign lands.

Other countries try to make secure their economic, social, and political independence by relying on a plentiful variety of materials produced within their own boundaries, rather than upon an unbreakable chain of commercial intercourse with other nations. One means of attaining this end is to extend the normal taxation of trade goods for purely fiscal purposes, with the intention of controlling the flow of trade. Customs duties then become protectionist in character. But the United States and India have such a range of natural resources as to be almost capable of being self-supporting countries. The British Empire, with its variety of products, is thought by some people to be capable of supplying the bulk of the needs of its population from its own internal resources. Such conditions make it possible, and in so far as the peoples inhabiting such economic units think it is to their interest to do so, for such countries to impose protective tariffs. Duties are levied upon imported goods on such a scale as to encourage the home production of goods so taxed by the total or partial exclusion of similar goods of foreign origin. Where such a policy is followed, as, for example, in the United States, Australia and Canada, certain branches of internal commerce are fostered, but external trade is hampered. If this deliberate interference with trade is done with the idea of establishing an industry which is fitted by natural conditions to flourish independently of such fostering, the levying of protectionist duties tends in the direction in which commerce as a whole is moving. Australia, Canada, and India protect their rising industries in this way. Key industries, which are regarded as being essential for the safety and well-being of a nation, are usually safeguarded by fiscal means. We have endeavoured in this manner to make Britain independent of foreign dyestuffs and chemicals. Under the Safeguarding of Industries Act, 1921, British manufacturers could apply to have their goods protected from what they felt to be unfair competition in the home market by the levying of import duties upon similar foreign-made goods. The power of deflecting trade along certain channels by advertisement, scientific research, and economic investigation was used by our state-aided Empire

Marketing Board until 1934. Marketing boards for bacon, herrings, hops, milk, pigs, and potatoes similarly help trade to-day.

In certain cases where an import duty is not considered to be in the interests of a country, native production is subsidized by the state. Since 1925, partly to make Britain more independent of foreign beet sugar, and partly because we need large supplies of cheap sugar, the beet sugar industry of Britain has been subsidized, and by 1936 the output of beet sugar had increased twenty-four times.

Export duties are less frequently levied than import duties, and generally only when a country has what is virtually a world monopoly of the commodity so taxed. Chile, Brazil, and the Federated Malay States obtain most of their revenue from export taxes upon nitrates, coffee, and tin respectively. India, Ceylon, and Burma, too, have presumably sufficient control of the world's exportable supply of jute, hides, tea, and rice that these articles can be subjected to export duties. Many countries levy few or no duties upon their exports, which are in this way unhampered, if not helped, in meeting foreign competition in the world's markets. More refined and less obvious ways of interfering with the free flow of exports are by means of bounties and subsidies. The former consist of payments made directly or indirectly upon the exportation of goods with the idea of encouraging native industries which it is thought and hoped will become capable after a time of self-maintenance. Down to 1903 France, Belgium, Germany, and to 1908 Russia, helped their beet sugar industry in this way. In an effort to assist the coal mining industry of the United Kingdom to tide over the serious trade depression arising from, among other causes, a decrease of 22 per cent in British coal exports compared with those for 1909-14, this industry was subsidized in 1925-26 by the Government to the extent of £24,000,000. During the operation of the Overseas Trade Acts, 1920-27 (continuing), the normal export trade by reliable exporters handling British goods has been helped by what are known as "Export Credit Guarantees." To traders with all countries except Russia (to 1929) and China (textiles only excluded), for a reasonable premium approved by an Advisory Committee of bankers and business men, the British Government is willing to guarantee that bills of exchange in payment for British goods exported will be paid in full or up to 75 per cent of their value on their due dates. British exporters are thus able to give their

overseas customers longer credit, and at the same time insure themselves against bad debts, whatever may be the cause which prevents the debtor from meeting his obligations. When a bill is dishonoured, the exporter receives the full amount of the Government's guarantee, and will also receive a proportion of the net recoveries, if any, when the defaulter has been brought to book. Although these facilities are offered by the Government, the scheme is self-supporting and is not a burden on the taxpayer.

The trade of a country may also be largely influenced by legislation or equivalent measures relating to production, consumption, and transport, particularly in wartime, and during the subsequent period of readjustment to peace-time conditions. State control was much more prevalent in the seventeenth and eighteenth centuries under the Mercantilist System than it is to-day. At the present time the organization of industry and trade in Russia is based upon complete state ownership and control. Production and exchange are carried on by Russian associations, combines, and a few foreign holders of concessions. In Italy, since 1926, under the Fascist *regime* of Mussolini, and since 1934, in Germany (and Austria 1938) under the National-Socialist Government under Hitler, production, finance, and trade are subject to considerable direct and indirect political interference designed to stimulate home production and make each country as far as possible self sufficient. Under the Nazi *regime* in Germany the Reich Nutrition Corporation by the imposition of duties, restrictions, prohibitions and price regulations controls the importation and, indirectly, home production of foodstuffs. The foreign and home trade in and prices of imported raw materials and other goods are rigorously regulated by twenty-six Supervision Boards. These boards sanction each transaction and issue " exchange certificates" guaranteeing foreign currency for the payment of the importer without which the importation of most goods is impossible. Such control has led to a radical displacement in the relative value of import groups and this change has been further intensified by state regulation compelling the use of synthetic materials (e.g. light oils, fibre and annualized cellulose textiles) or home produced substitutes (aluminium) and the stimulation of home productions (e.g. wheat, flax) by protective duties, state credits, bounties, monopolies and price regidation. Export trade is subsidized to create an inward flow of foreign exchange wherewith to pay for imports. In the

U.S.A. both the external and internal trade in alcoholic drinks was prohibited by law 1919 and in subsequent years the Agricultural Adjustment Administration, recast in 1936, regulated the production of and trade in certain crops, e.g. cotton exports are restricted by large quantities of cotton being impounded in Government loan holdings to maintain prices. The Canadian Government through its Wheat Board similarly regulates the trade in wheat by buying in whenever the price at the head of the Lakes falls below about 90 cents per bushel and releasing its stock whenever prices are favourable. Under the sponsorship of the Governments of the interested countries the production of and trade in tea is regulated by the International Tea Committee (1933), in tin by the International Tin Cartel (1931) and in rubber by the International Rubber Regulation Committee (1934).

In some countries the State engages in trade by exercising Government monopolies on certain articles of trade, e.g. Italy in salt and tobacco, France in matches and tobacco, India in salt and opium. Normally the United Kingdom does not engage in State trading ventures, although the Government has investments of about £40,000,000 of public money in private concerns engaged in the production of petroleum, nickel, chemicals, dyestuffs, cellulose, and beet sugar, and in steamship, canal, shipbuilding, and flour milling companies. Indirectly, of course, governments assist production and, consequently, trade by guaranteeing loans and advancing money to their colonies and even foreign countries which need capital for the development of their resources. The United States furnishes an example of the continued enforcement of Navigation Laws. Only American vessels may engage in coastwise traffic or be employed on inland waters, including the Great Lakes, even though her trade may be considerably hampered by lack of tonnage. To secure the safety of the Panama Canal the shipment through it of petroleum above a certain flash point is prohibited.

The preceding paragraphs have dealt with some of the major ways in which commerce is helped or hampered by the home legislation and activities of governments. A nation can extend its influence upon the character and channels of its trade beyond its political boundaries by the conclusion of commercial treaties with other nations. In 1932 by the Ottawa Agreements Britain and the other Empire countries guaranteed each other an expanding share in one

another's markets to be brought about by quota agreements and preferential tariffs. The increase in inter-empire trade which followed helped to offset our loss of trade with other countries which was partly due to the world depression and partly to our implementing of the Agreement by imposing a minimum 10 per cent import duty. Many countries have graded tariff systems. Under the Ottawa Agreements Australia's average import duty for British Goods was 11 per cent compared with one of 49 per cent for foreign goods. In 1934 Britain received a 5 per cent preferential primage and other concessions. For foreign countries negotiating treaties with her, Australia created an intermediate tariff. By 1937 Britain's foreign trade position had been stabilized by a series of bilateral trade agreements with most European and South American countries and negotiations with U.S.A. were started. The effect of these agreements was to maintain the flow of our trade at agreed levels and to alter its direction rather than to stimulate it. Our departure from the gold standard in 1931 resulting in a depreciation of the pound sterling in terms of gold and the maintenance of a balanced domestic economy—examples followed by many other countries—were contributory factors in checking the decline in world trade before and helping its revival after 1933.

Many progressive countries help their commerce through the activities of trade commissioners, consular agents, and similar State representatives in foreign countries, in collecting information relating to crops, production, and market conditions. To facilitate the rapid transmission and dissemination of such knowledge, our own Government has assisted in spreading a network of marine cables, telegraphic and telephonic lines, wireless beam stations, and in instituting mail and parcel post facilities throughout the world ; and has created a special Government office, the Overseas Trade Department, to assist British traders. State assistance or encouragement are frequently given towards the formation of Chambers of Commerce, the holding of regular fairs such as the British Industries Pair, and occasional exhibitions, like Wembley, 1924, and Glasgow, 1938, which help the internal and external trade of countries.

The most arbitrary and harmful way in which a state can dislocate its trade is by taking part in warfare. Trade and prosperity flourish in times of peace rather than of war. War causes an immense destruction and depreciation of human life, as well as of materials.

**The normal course of production, exchange, consumption, and trans* port is often abruptly diverted, changed, or stopped. Between nations, belligerents and neutrals, distrust, hatred, and annoyance largely replace that confidence and helpfulness upon which national credits depend and commerce is based. Arbitrary state regulation becomes imperative and the rule rather than the exception, since the interests of a nation as a whole are paramount. To meet the cost of war taxation increases, and consequently the costs of production rise and trade is hampered. Rates of exchange go against the combatant powers, and even a nation's currency may depreciate considerably, and as a result its external trade becomes very difficult. These facts and many others relating to the wasteful and uneconomic effects of warfare are familiar to us at the present time. Large and prolonged strikes and lockouts also seriously hamper the production and exchange of goods. There can be little doubt that Britain's predominance as an industrial and commercial world power is partly the result of our comparative immunity in the past from invasion and internal strife. The advance of civilization should bring increased toleration and understanding among nations. To this end, in 1920, the League of Nations was established to promote international co-operation and to achieve international peace and security.**

**Having briefly reviewed some of the ways in which nations may officially influence trade, let us examine a few of the ways in which the actions of private individuals exert a control over commerce. Much could be written about the business enterprise, personality, integrity, and other vitally important but not easily defined qualities possessed by successful merchants. Suffice it to say that all the world over the high reputation of our merchants and goods has been of the greatest value in building up Britain's position as the largest trading nation in the world on behalf of other nations as well as of ourselves. Here is but one illustration of this fact. The United Kingdom herself consumes only about one-sixtieth of the world's rice available for international exchange, but it is a striking testimony to the good name of British shippers and brokers that the rice trade of the world is regulated and controlled from London. The contracts and arbitrations of the London Rice Brokers' Association are not only recognized but welcomed by buyers of all races in all countries.**

From the earliest times, men, as private individuals, have combined in various forms of association for the purpose, as they saw it, of improving the production and marketing of goods, e.g. merchant venturers, gilds, and great chartered companies, to mention a few. Nowadays we have larger combines and trusts operating more extensively and more intensively than ever before. Some people hold that the formation of cartels and the conclusion of national and international industrial and trading agreements are the means whereby pre-war and post-war economic problems could be solved. They have their uses. Properly conducted, they should help to make the production, transport, and marketing of goods more efficient, and so their existence would be justified because the needs of producers and consumers would be satisfied more cheaply and easily, and a higher standard of living would be made possible. Such results are claimed to be the avowed object of most of the cartels, pools, trusts, combines, fusions, amalgamations, and co-operative bodies formed during recent years. Until 1925 the British, North and South American, and Dutch companies engaged in supplying the British market with chilled beef from South America belonged to two huge combines, which, by agreement, supplied 70 per cent and 30 per cent of our needs. An attempt was made to equate supply to demand by a committee representing the different companies meeting in London each week and fixing the total weekly quantity of beef that should leave South America. The companies, however, became dissatisfied with the fixed quotas allotted to individual companies and to the combines, and a " meat war" followed. The International Crude Steel Cartel was formed by the producers in Germany, France, Belgium, Luxembourg, and the Sarre District, and joined by Britain, 1935. The output of steel by each country is restricted to a definite agreed quota to avoid uneconomic competition and to strengthen the position of European steel producers in the world's markets. For similar reasons a vast trustification of the artificial silk industry, embracing seventeen firms, operating in England, U.S.A., Germany, Belgium, France, Austria, Czechoslovakia, and Switzerland, took place in 1926. State co-operative marketing associations in all the main cotton growing states of U.S.A. have worked out satisfactorily their systems of accounting, financing, grading, stapling, insurance, warehousing, transport, sales, and field services. Denmark, Eire (Irish Free State),

and New Zealand have co-operative marketing schemes for dairy produce. Less than 6 per cent and 2 per cent respectively of New Zealand's exports of butter and cheese are processed in proprietary factories. In 1927 an agreement was reached between' the leading match manufacturing and selling companies of Britain and Sweden for the identification of their interests within the British Empire (excluding Asiatic possessions) and the allocation of markets in the rest of the world. Unfortunately, the interests of producers and consumers are not always fairly balanced, and sometimes groups of traders and producers try to create "corners" or to form "rings" by buying up or otherwise securing control over all or most of the available supplies of commodities offered in the world's markets, in order to exploit the unorganized and almost defenceless consumers. Owing to the international ramifications of trade becoming more widespread, it is becoming more and more impossible for unscrupulous traders to act in this way. These few examples show some of the typical ways in which the actions of associations of producers and traders influence the volume and flow of national and international trade.

Large associations of consumers formed to strengthen the bargaining and buying power of their members are met with much less frequently. One of the most important developments in co-operative trading during the last fifty years has been the expansion of the Co-operative Wholesale Society, which has manufacturing as well as trading activities. This huge organization supplies co-operative stores having a combined membership of over six million consumers, with commodities manufactured in its own works, produced on its own estates, or bought directly from producers in various parts of the world. In this way it secures for its members the benefits which come from trading on a large scale, and in 1937 its trade exceeded £100,000,000. The International C.W.S., a federation covering fifteen countries to foster international co-operative trading handled trade valued at £47,000,000, and the International Co-operative Alliance embracing thirty-eight countries had 70,000,000 members in 1937.

It is not ordinarily realized what an important part private individuals play in a nation's financial system, thereby influencing the direction and scope of trade in their own and other countries. Some individuals put their savings in banks, which loan and advance

about half of their deposits to traders and producers requiring accommodation; other people, usually through the agency of stockbrokers, invest their savings in stocks, shares, and bonds; a large number of people take out various kinds of policies with insurance and assurance companies, who in turn invest a large proportion of the premium money, and also make loans in much the same way as banks. In these and similar ways, private individuals give credit or increase facilities for the granting of credit. Without some system of credit the production and transportation of many articles of commerce would be impossible or hampered. It takes five or six years to establish a rubber plantation and bring it into bearing. The cost, of obtaining, planting, and cultivating the plantation during this period is usually met by money raised by the issue of shares in a rubber company. Similarly, vast sums of money raised by loans have to be spent upon the establishment of railways, steamship lines, and manufacturing concerns before it becomes at all possible for them even to begin to pay their way. Before a single ton of coal could be raised from one of the new coal mines in Notts, over a million pounds had to be spent in sinking and equipping the pit. Private or corporate investors supplying such credit have as security for their money something which they consider a sufficient guarantee that it will be repaid at a profit. The guarantee may take the form of one or more of the following : the good reputation of the people in charge of the concern, the favourable opinion of trustworthy experts regarding business possibilities, guarantees by third parties and underwriters, and the possession either of stocks, shares, or bonds legally entitling the holders to a share in the assets and profits of an undertaking, deeds of property, or documents of titles to goods.

Without credit the exchange of goods would be carried out upon a much smaller scale and much less easily than is at present possible. Customers have weekly accounts with tradesmen, and retailers have quarterly accounts with wholesale merchants. Our newspapers display advertisements of goods offered for sale under hire-purchase and deferred payment systems. The period of credit may range from a week in the case of the daily paper to thirty years, over which time the repayment of a building society loan may be extended.

Partly because the elements of time and place enter still more largely into international trade, and partly because buyers and

sellers are not fellow-countrymen, payment for goods in ready cash is rare. Owing to differences of currencies, cash payments would be difficult, and the movement of large consignments of gold and silver from country to country would be expensive, because of the costs of buying, transporting, and insuring bullion. Payments for the huge quantities of goods and services constantly being exchanged between countries are therefore made by means of instruments of credit known as *bills of exchange.* Whether a produce bill drawn against actual produce, e.g. coal, cotton, or an anticipatory bill credited in anticipation of the movements of commodities and " backed " by banks or accepting houses of world-wide integrity, " a bill of exchange is an unconditional order in writing addressed by one person to another, signed by the person giving it and requiring the person to whom it is addressed to pay on demand or at a fixed or determinate time a certain sum of money to, or to the order of, a specified person or bearer." Such a bill gives its holder the right to receive a certain sum of money at a given place and time, and this right can be bought or sold. Except that a bill gives particulars of the transaction, is usually made payable one, two, or three months after the date upon which it is endorsed or accepted by the buyer, and can be drawn or cashed by firms as well as banks, it is very like a cheque. Buyers thus may receive credit for a time. Banks and bill brokers are ready to discount bills and to pay a seller in cash in the currency of his own country the face value of a bill less interest for the time still to elapse before a bill becomes due. Bills drawn in London have truly been called the real cash of international exchange. This is because British currency is the soundest legal tender in the world and because London is the "chief financial centre of the world ready to exchange bills for pounds sterling, a currency acceptable to the chief trading countries at a time when, U.S.A. excepted, they are off the gold standard.

The enormous amount of credit involved in the production, transport, and exchange of goods at home and abroad cannot be definitely ascertained. The estimated total of loans (1937) by British banks exceeded £950,000,000, and by accepting houses £185,000,000. Income tax returns for 1935 showed that taxable profits on investments alone amounted to the stupendous sum of £2,000,000,000. The amount of British investments abroad may be judged from the fact that the estimated interest received from them

was £196,000,000 in 1936. Before the restriction on foreign loans, 1931, the average yearly amount of loan raised in the London capital market for foreign countries was £50,000,000 and for Empire countries £150,000,000. The following table gives the estimated amounts of British money loaned to various countries of the world in 1910. Since 1910 both the total value and the geographical distribution of our foreign investments have altered. Despite the wartime embargo upon foreign loans, the losses, withdrawals, or changes in value of our overseas investments resulting from the war, the total amount of British capital invested overseas has increased. Oar

ESTIMATED AMOUNTS OP BRITAIN'S OVERSEAS INVESTMENTS IN 1910
(Millions of Pounds Sterling)

| *British Empire* | | *Foreign Countries* | | | |
|---|---|---|---|---|---|
| British N. America | 373 | United States . | 688 | Cuba & Philippines | 31 |
| India & Ceylon | 365 | Argentina | 270 | China. | 27 |
| S. Africa | 351 | Brazil | 94 | Spain | 19 |
| Australia | 302 | Mexico | 87 | Turkey | 18 |
| New Zealand . | 79 | Japan | 54 | Italy . | 12 |
| W. Africa | 29 | Chile | 46 | Portugal | 8 |
| Straits Settlements | 22 | Egypt | 44 | France | 7 |
| Hong-Kong . | 3 | Russia | 38 | Germany . | 6 |
| Other Possessions . | 20 | Uruguay | 35 | Other American . | 23 |
| | | Peru | 32 | Other European . | 36 |
| Total | 1554 | | | Total Foreign | 1637 |
| Grand Total . | | . 3191 (]Private capital excluded) | | | |

OVERSEAS INVESTMENTS BY CONTINENTS, 1910
(Per Cent of Total)

(a) *(b)* (c) (d) *(e)*

**(a) N. and S. America. (6) Asia, (c) Africa, *(d)* Australasia, (e) Europe.**

investments in Australia, Canada, Malaya, Argentina, and Brazil have increased in some cases twofold, while those in the United States, China, and Peru have diminished, and, in the case of Russia, become non-existent. Trade on our own account and also on behalf of other countries is affected in volume and direction by such overseas investments. Rarely is the interest due on foreign loans paid directly to this country in bullion. Instead we receive goods, hence, other conditions being equal, the greater the amount of

British capital invested in a foreign country the larger our imports from that country tend to become. International financial manipulation makes it possible for British investors to receive their interest in cash and in our own currency. Broadly speaking, the dividends, for example, of holders of shares in Argentine railways are indirectly obtained from part of the money forthcoming from the sale of Argentine exports to us of wheat, meat, and other products. Then, again, many of our loans to foreign countries are used to purchase British manufactures needed to further the development of these countries, e.g. railway material. Thus our export trade tends to be increased when a loan is floated. Subsequent orders for goods required for the maintenance, extension, or renewal of previous works are frequently placed with the original British contractors, and so the original increase in our export trade tends to be maintained and even augmented. This is especially the case as regards plant for foreign railways and industrial concerns, e.g. in India and South America. Until the United States and Canada became sufficiently industrialized to meet most of their home requirements, a similar state of affairs existed as regards our export trade to these countries

**International Payment by Bills of Exchange**

Mention has already been made to the negotiable instruments of exchange known as *bills of exchange,* by the use of which the

Cardiff,
No. 2345. 10th September, 1937.

*Exchange* for £4000 sterling.

REVENUE STAMP £2

Three months after sight of this first of Exchange (2nd and 3rd of same tenor and date not paid) pay to ourselves or order *Pounds* four thousand, *shillings* . . . . . *pence* . . . . . for value received.

3500 tons of coal per S.S. Swansea,
*Signed* S.W. & Co.

To Messrs. B.A. & Co., Buenos Aires.

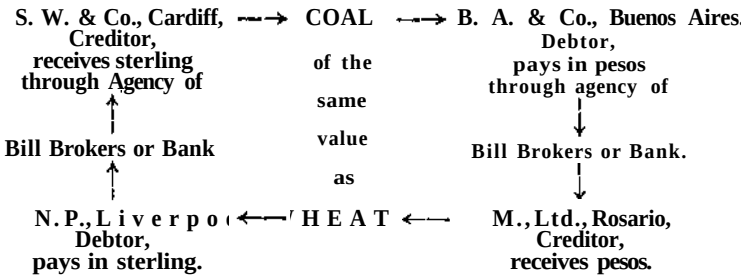
costly transfer of bullion from one country to another is largely avoided, buyers obtain credit, and sellers receive payment in their own currency. The following ideal example illustrates how the system of international payments works and how the above-mentioned results are achieved. A South Wales exporter, having sold 3,500 tons of coal valued at £4,000 to a firm in Buenos Aires, draws a bill as shown on page 327.

Messrs. S. W. & Co. would probably hand this bill to their bankers, who would endorse it and send it to Messrs. B. A. & Co. or their agents. Documents showing that the coal had been actually shipped and insured against risk would accompany the bill. Messrs. B. A. & Co., or their agent, would " accept " the bill by writing across it—

If the credit of Messrs. B. A. & Co. was not good, Messrs. S. W. & Co. would require an accepting house or bank to " back " the bill. The accepted bill may now be returned to Messrs. S. W. & Co. or their agents, who could either hold it until 8th December, 1937 (i.e. three months plus three days grace after the date of acceptance), and receive £4,000, or turn it into ready cash by getting it discounted by a bank or a firm of bill brokers. Supposing the discount rate was 4 per cent, they would receive £4,000 less interest at 4 per cent for the period still to elapse before the bill became due, i.e. on 8th November the bill would be worth £3,986 13s. 4d.

The simplified diagram of an ideal case shown on page 329, shows how the South Wales exporter was able to be paid in pounds sterling and not in Argentine pesos.

The arrows indicate the movements of goods and of money, and it will be seen that it is only the goods and not money which pass from the United Kingdom to Argentina. Actually, the method




of payment for goods in international trade is much more complicated. Bills change hands many times and may represent transactions between many countries. Thus, a bill drawn in London against goods exported to India may be used to pay for goods imported from America, and finally pay for some American imports from another country. In reality, too, it is the sum total values and not the individual values of goods exchanged which balance.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. " The *raison d'etre* of trade is the satisfaction of men's needs. Its function is the redistribution of the different products of the earth, whether the differences arise from physical conditions or the differing personal aptitudes of peoples." Expand and discuss this statement.

2. "Trade is the means whereby men have extended their environment." How does the history of Britain's trade illustrate this quotation ?

3. Explain the terms : frontier, complementary, latitudinal, and longitudinal trade.

4. Tabulate as many reasons as you can why different countries export different kinds of goods. Give an example to support each of your reasons.

5. Discuss the extent to which man, as an agent of production, can influence *(a)* the world distribution, (6) the quantity, and (c) the character, of commodities entering into world trade.

6. Point out the principal ways in which men. collectively or individually, as agents of trade can manipulate the character and course of international commerce.

**7. Account for the supremacy of the white and yellow races as commercial peoples.**

**8. Show what relationship exists between the balance of trade and the degree of industrial development of a country.**

**9. What effect upon trade has war ?**

**10. Give a concise account of the way in which payment for goods exchanged between countries is made.**

INTERNATIONAL TRADE
**(Exclusive of bullion and in millions of £)**

| Country | 1913 | | 1923 | | 1935-6 | | Approximate value per head £ sterling | |
|---|---|---|---|---|---|---|---|---|
| | Imports | Exports | Imports | Exports | Imports | Exports | 1923 | 1936 |
| United Kingdom . | 708 | 624 | 986 | 784 | 464 | 260 | 39 | 16 |
| United States* . | 358 | 496 | 912 | 917 | 286 | 285 | 18 | 4-5 |
| France | 325 | 265 | 429† | 400† | 180 | 110 | 21 | 7 |
| Germany | 560 | 509 | 317† | 317† | 201 | 227 | 11 | 6-5 |
| Japan (proper) | 73 | 63 | 239 | 178 | 93 | 90 | 5 | 2-5 |
| Canada* | 132 | 92 | 194 | 218 | 75 | 122 | 46 | 18 |
| British India | 117 | 160 | 161 | 224 | 54 | 80 | 1-5 | 0-5 |
| Australasia | 97 | 93 | 182 | 160 | 73 | 89 | 49 | 20 |
| Argentina . | 72 | 113 | 170 | 171 | 40 | 59 | 40 | 8-3 |
| Italy . | 141 | 97 | 174† | 113† | 26 | 44 | 7 | 1-7 |
| Netherlands | 314 | 246 | 173 | 113 | 77 | 56 | 42 | 16-5 |
| China and Manchuria | 86 | 61 | 136 | 138 | 33<br>22 | 25<br>15 | 0-9 | 0-2 |
| Belgium | 179 | 140 | 140† | 90† | 85 | 79 | 30 | 20-5 |
| Grand Total—all countries | | | 4100 | 3729 | 2610 | 2498 | | |

* F.O.B. values, † Redistribution of territory as a result of the Great War.

NOTES, **(a) Imports are General Imports usually C.I.F., and exports show Trade Exports, both domestic and foreign. He-exports are therefore included.**

***(b)*** **Bullion and precious stones are excluded.**

**(c) The figures, as far as can be ascertained, are for the calendar and not fiscal year.**

***(d)*** **Native currencies have been converted into sterling at the rates of exchange obtaining monthly, quarterly, or annually, as available, for the years stated.**

**11. Find out the meaning of F.O.B. and C.I.F. Show how far the figures for the United States and United Eangdom are not strictly comparable.**

**12. Point out any other factors indicated in the table which**

**would also modify the relative values of the trade of the countries quoted.**

**13. Make two lists of the five leading commercial countries: *(a)* in order of the total value of their trade, and (6) in order of their trade per head. Suggest as many reasons as you can for any differences you may find between the two lists.**

**14. Arrange in two groups : *(a)* those countries which import more than they export, and *(b) vice versa.* How far are the stages of economic development of the countries in these groups responsible for the state of their trade ?**

**15. Which country has made the most rapid advance as a commercial nation ?**

**16. By 1923 " while most older and established countries show an absolute increase in their trading accounts, their relative share in world commerce is declining." Discuss this statement and account for the world wide decrease in trade 1923-36.**

**17. Which country in the table shows a marked decrease in 1923 and 1935 compared with 1913 ? Has its proximity to Germany any bearing upon this state of affairs ?**

**18. Prices in U.S.A. and United Kingdom were respectively about 50 per cent and 21 per cent, and 50 per cent and 13 per cent higher than in 1923 and 1936 than in 1913. Applying this correction, how does their trade of 1923 and 1936 compare with that of 1913?**

**19. In 1935 the estimated tonnage of goods imported and exported respectively in millions of tons was for United Kingdom, 57 and 34 ; for France, 48 and 28 ; and for Germany, 51 and 52. Calculate the average value per ton of merchandise imported and exported by each country. What do these figures suggest concerning *(a)* the relative values of exports and imports of each country, and (6) the value of the merchandise exchange by one country compared with that of another ?**

**20. " In 1935 United Kingdom, U.S.A., France, Germany, and Japan handled about 37 per cent, by value, of the world's commerce.'' Check this result from the table arid draw diagrams to show the share of each of these countries as a percentage of the world's total trade.**

**21. The British Empire, exclusive of the United Kingdom, handles 12 per cent of the world's trade. What percentage does the British Empire handle ?**

**22. The supreme position of Britain in international trade suggests that we possess peculiar advantages. Under the headings (a) climate, (6) ease of access to, and control of, sources of supplies and markets, at home and abroad, (c) character, efficiency, and organization of the inhabitants of Britain, and *(d)* indebtedness to the past, point out as many advantages and disadvantages as possible possessed by Britain.**

PRE-WAR AND POST-WAR PRODUCTION AND TRADE

**Statistics for 1925 are shown as approximate percentages of 1913**

| | Population | Quantities of Raw Materials Produced | Volume of Exports | Volume of Total Trade |
|---|---|---|---|---|
| East and Central Europe (Russia excluded) | 103 | 102 | 62 | 82 |
| Rest of Europe | 105 | 107 | 86 | 99 |
| North America | 119 | 126 | 140 | 137 |
| Central America and West Indies | 107 | 170 | 152 | 128 |
| South America | 122 | 135 | 105 | 97 |
| | 107 | 139 | 116 | 99 |
| **Asia** (excluding former Russia territories) | 105 | 120 | 153 | 136 |
| Australasia and Pacific Islands | 115 | 123 | 146 | 132 |
| World as a whole (approx.) | 105 | 117 | 102 | 105 |

**23. Compare and contrast the trend of world production, exports, and trade during the period 1913 to 1925.**

**24. In which regions has post-war production not kept pace with the increase in population ? Suggest any historical, political, social, or economic causes which may underlie this state of affairs.**

**25. Name the three principal areas in which production has increased more rapidly than population. In view of the location of the chief theatres of the war and the general state of economic development of these regions, is your list what you would or would not have expected ?**

**26. In which area has trade as a whole increased more rapidly than production ? Do you think these two sets of data strictly comparable ? Give your reasons and say whether a comparison of production and exports would be a more reliable criterion.**

**27. " The after-effects of war are more long-felt in highly industrialized countries than in those engaged in primary production." How far do the above statistics support or disprove this statement ?**

28. Assuming 1 per cent of the world's trade, at 1925 gold values, to be worth about £600,000,000, estimate the loss of international trade due to the war and its after-effects. Express your answer in terms of Britain's annual trade and the National Debt.

BALANCE OF TRADE or GREAT Britain AND NORTHERN IRELAND, 1935*

| Exports F.O.B. £1,000,000 | Chief Items | Group Totals | Imports C.I.F. £1,000,000 | Chief Items | Group Totals |
|---|---|---|---|---|---|
| Food, drink, and tobacco | | 31 | Food, drink, and tobacco | | "355 |
| Raw materials | | 53 | Grain and flour . | 57 | |
| Coal . . . . | 32 | | Meat and animals | 83 | |
| Manufactured goods | | 328 | Tea . . . . | | |
| Iron and steel | 37 | | Raw materials | | 212 |
| Machinery . | 38 | | Raw cotton and waste | 37 | |
| Cotton yarns and manufactures . | 60 | | Wool and wool rags . | 37 | |
| Wool and woollens | 30 | | Oilseeds, oils, etc. | 26 | |
| Other textiles | 17 | | Wood and timber | 36 | |
| Vehicles, including ships and aircraft | 28 | | Metal ores | 12 | |
| | | | Hides and skins . | 15 | |
| | | | Paper materials . | 11 | |
| Other miscellaneous items | | 12 | Rubber | 10 | |
| Total, special exports | | 426 | Manufactured goods | | 185 |
| Re-exports, foreign and Colonial | | 55 | Iron and steel | 9 | |
| | | | Non-ferrous metals | 28 | |
| Wool | 12 | | Oils and fats | 33 | |
| Rubber . | 3 | | Silk and silk goods | 3 | |
| Tea | 5 | | Other miscellaneous items | | 4 |
| Total, visible general exports . . . . | | 481 | Total visible general imports | | 756 |
| Silver, bullion, specie | | 55 | Silver, bullion, specie | | 40 |
| Estimated invisible exports | | 295 | Total visible special imports . | 700 | |
| Net shipping services . | 70 | | Total invisible imports, e.g. money spent by Tourists, foreign shipping, royalties on books and films, missionary contributions, etc. | Accounted for in net invisible exports | |
| Net commissions, insurance and merchants' profits, etc. | 30 | | | | |
| Net income from overseas investments | 185 | | | | |
| Net other sources | 10 | | | | |
| Total exports (approx.) . | | 831 | Total imports (approx.) . | | 796 |

* External trade decreased by 40 per cent compared with 1925.

29. Point out the advantages and disadvantages of the use of average statistics in studying the trade of a country.

30. Define carefully the meaning of each of the four kinds of

**exports shown in the above table. How do " Special Imports " differ from General Imports? Give examples of "Invisible Imports."**

**31. Express as percentages of the whole the various groups of special exports and general imports, and show in diagrammatic form the relative importance of the different groups.**

**32. Some items appear both in the exports and in the imports. Explain why this should be so in the case of a highly progressive country like our own.**

**33. What is meant by the term " balance of trade " ? Do you consider our trade balance adverse or favourable ? Give your reasons.**

**34. " Coal is Britain's only exportable raw material of importance." Is this so ? If 4 tons of shipping are needed to transport 9 tons of coal, how much shipping tonnage is employed yearly in our coal export trade ? In what other ways, other than as a commodity of exchange, does British coal find its way overseas ?**

**35. " Bulky articles occupy a large place in our trade." Criticize this statement and give examples to support your answer.**

**36. How do the total value and the values of individual items of the trade we handle on behalf of other countries compare with those on our own account ?**

DISTRIBUTION OF BRITAIN'S TRADE BY VALUE, 1935

**Percentages of Total Imports and Exports**

| | Europe | | Asia | | Africa | | N. America | | S. America | | Oceania | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Brit | For. | Brit. | For. | Brit | For. | Brit. | For | Brit. | For. | Brit. | For. |
| **Imports from .** | 3·2 | 32·5 | 8·8 | 3·3 | 3·3 | 1·7 | 1·9 | 13·1 | 0·1 | 9·0 | 12·0 | 0 0 |
| **Exports to** | 5·8 | 31·5 | 11·3 | 3 7 | 10·6 | 2·6 | 5·5 | 6·0 | 0·2 | 5·5 | 9 0 | 0 0 |

**37. Give as many reasons as possible why we do so much trade with Europe.**

**38. Why do we do more trade with foreign than with British North America ?**

**39. How does our trade with countries mainly inhabited by progressive peoples compare with the rest ?**

**40. What percentage of our imports is supplied by, and what percentage of our exports is taken by, the rest of the British Empire ?**

BRITAIN'S BEST CUSTOMERS

Average, 1935-6, by value of General Exports

| Country | U.K. Exports % | Chief Commodities in order of Value |
|---|---|---|
| India, Ceylon | 8·6 | Cotton goods, iron and steel, machinery, dyes, paper |
| South Africa | 8·2 | Vehicles, machinery, clothing, chemicals, paint, paper |
| Australia | 7·1 | Textiles, iron and steel, machinery, chemicals, paper |
| Canada | 5·1 | Iron and steel, woollens, clothing, coal, pottery |
| Irish Free State | 4·75 | Coal, iron and steel, wood |
| Other Br. Africa | 4·1 | Cottons, machinery, groceries, oil, sacks |
| New Zealand | 3·5 | Clothing, iron and steel, paper |
| Malaya | 1·8 | Cottons, tobacco, iron and steel, machinery |
| W. Indies | 1·6 | Textiles, foodstuffs, iron and steel, machinery |
| Other British | 3·3 | |
| United States | 5·8 | Iron and steel goods, cotton and woollen goods, chemicals, pottery, jute, tin, rubber, tea |
| Germany | 4·4 | Cotton yarn, coal and coke, iron and steel, fish, wool |
| France | 4·0 | Coal and coke, machinery, ships, and chemicals |
| Argentina | 3·5 | Cottons, iron and steel, woollens, pottery, dyes |
| Denmark | 3·3 | Coal, textiles |
| Netherlands | 2·8 | Coal, iron and steel, cotton yarn, clothing |
| Sweden | 2·3 | Coal, cottons, wool, cotton, iron and steel |
| Belgium | 2·1 | Machinery, coal, woollens, iron and steel, cottons, chemicals |
| Egypt | 1·7 | Coal, cottons, woollens, iron and steel |
| Norway | 1·5 | Coal, cottons, iron and steel, sugar |
| China | 1·2 | Cottons, iron and steel, machinery, woollens |
| Other foreign | 8·0 | |

**41. For what percentage of Britain's exports do the twenty countries mentioned account ?**

**42. In what ways do the articles we export reflect Britain's supremacy in certain branches of manufactures and the high quality of our goods ?**

**43. To which countries do we export goods not produced in Britain ? Name the goods re-exported.**

**44. Would it be true to say that the list of commodities indicated in a general way the stage of economic development reached by the importing countries ? Give reasons for your answer and classify the countries under the headings (a) primary producers, (6) semi-manufacturing, (c) manufacturing.**

**45. Using a scale of shading graduated from under 2 per cent to over 9 per cent, map the distribution of Britain's export trade.**

**46. What does your map suggest to you about the relative**

**importance of *(a)* temperate, (b) sub-tropical, and (c) tropical regions as markets for our goods ?**

BRITAIN'S PRINCIPAL SOURCES OF SUPPLIES

Average General Imports, 1923-5 and 1933-4, by value

| Country | U.K. Imports % | | Chief Commodities in order of Value |
|---|---|---|---|
| | 1923-5 | 1933-4 | 1933-4 |
| United States | 190 | 12·0 | Cotton, tobacco, machinery, lard, wood, canned fruit, hides, lubricating oils, hams, petroleum, motors, leather, copper, bacon, sugar, fish |
| India . | 6·25 | 6·8 | Tea, leather, cotton, jute, gums and resins, oilseeds, wool, goatskins, rice, petroleum, manganese ore, teak, rubber, coir goods |
| Australia | 5·75 | 7·0 | Wool, butter, wheat, frozen mutton, frozen beef, lead, apples, flour, sheep skins |
| Canada | 5·5 | 7·5 | Wheat, wood, bacon, copper, skins and furs, apples, cheese, flour, zinc, lead, motor-cars, canned salmon, rubber manufactures, oats, barley |
| Argentina | 5·25 | 7·0 | Frozen mutton and beef, maize, wheat, wool, linseed, butter |
| France. | 50 | 2·0 | Wine, silk goods and ribbons, woollen goods, chemicals, wheat, motor-cars, apparel, pit-props |
| New Zealand | 40 | 6·0 | Frozen mutton, wool, butter, cheese, frozen beef, sheep skins, tallow |
| Denmark | 3·75 | 4·5 | Bacon, butter, eggs |
| Germany | 3·75 | 4·5 | Machinery, chemicals, glass, hosiery, dyes, electrical goods, toys, artificial silk, woollen goods |
| Netherlands . | 3·5 | 3·0 | Bacon, condensed milk, sugar, bulbs, cardboard, electrical goods, butter, tomatoes, cheese |
| Irish F.S. . | 3·25 | 2·5 | Cattle, beer and ale, butter, bacon, eggs, wool, horses |
| Belgium | 2·75 | 2·0 | Iron and steel, glass, cotton goods, worsted, zinc |
| Egypt. | 2·5 | 1·7 | Cotton, cotton seed, oilcake, onions |
| S. Africa | 20 | 2·0 | Gold, wool, diamonds, maize, hides and skins, bark, angora hair |
| Russia | 1·75 | 2·5 | Timber, fish, hides and skins, pit-props, flax, butter, petroleum, wheat, manganese ore |
| Sweden | 1·75 | 2·5 | Wood pulp, timber, millboard, bacon, butter, iron ore |
| Switzerland | 1·5 | 1·0 | Watches, silk goods, machinery, dyes, footwear |
| Spain . | 1·5 | 1·5 | Wine, oranges, iron, onions, grapes, copper, mercury |
| Italy . | 1·5 | 1·5 | Lemons, canned vegetables, silk and rayon goods, cheese, raw silk, rubber, motor vehicles |
| Straits Settlements | 1·5 | 1·5 | Rubber, tin, canned pine-apples, copra, pepper, tapioca, sago, rattans |
| China . | 1·0 | 1·0 | Egg-yolk, bristles, raw silk, tung oil, tea |
| Chile . | 1·0 | 1·0 | Copper, wool, frozen mutton, tin ore, barley, nitrates |
| W.Africa | 10 | 1·0 | Palm kernels, palm oil, groundnuts, cocoa, hides, cotton lint, tin ore |

47. Calculate the percentage of our exports purchased per million population in the countries given in the table. Arrange the countries in order of their relative purchases by percentage when allowance has been made for differences in population. Discuss the two tables of countries, giving purchases *(a)* by percentage of our total exports, and (6) by percentage of our exports per million inhabitants, e.g. "From us India buys 50 per cent more goods than the United States, yet on the average an American buys seven times as much by value as an Indian. This fact suggests a higher standard of living in U.S.A. . . ."

48. What percentage of Britain's imports is represented by this table ? Compare the order in which the countries appear on the tables showing those from whom we buy and those to whom we sell. Account for any differences as far as you can.

49. From which countries do we import by value more than we export, and *vice versa* ?

50. Are the countries from which our imports are obtained as widely spread as those to which our exports are consigned ? Which are the more evenly distributed throughout the world, our sales or our purchases ?

51. Upon which countries do we draw mostly for *(a)* foodstuffs, (6) raw materials, (c) partly or wholly manufactured goods ? Make a map to illustrate the extent to which various countries of the world contribute to our needs.

52. " For most of her needs Britain is in the favourable position of not being solely dependent upon any one source of supply." Discuss this statement and illustrate your remarks by references to the table of imports.

53. " The bulk of our import trade is concerned with the necessaries rather than the luxuries of life." What support does the table give to this statement ?

54. To what extent do a country's exports reflect (a) its sources, (6) the main occupations of its inhabitants, and (c) the state of its economic organization ?

55. " The trade of a port reflects local conditions of production, consumption, and transport facilities." Study the trade of British ports, Fig. 98, and find out how far this statement is true.

56. Compare and contrast the relative values of the different groups of imports and exports of the U.S.A. during the periods

**FOREIGN TRADE OF THE UNITED STATES**

**(In millions of dollars)**

| Merchandise Groups | Averages 1910-14 | | Averages 1924-26 | | 1936 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Exp. | Imp. | Exp. | Imp. | Exports | | | Imports | | |
| I **Raw** materials for use in manufacturing | 705 | 580 | 1333 | 1550 | Raw cotton | 361 | 675 | Rubber | 159 | 667 |
| | | | | | Tobacco . | 137 | | Raw silk . | 102 | |
| | | | | | Coal | 50 | | Wood pulp | 83 | |
| | | | | | | | | Hides & skins . | 55 | |
| | | | | | | | | Wool | 53 | |
| | | | | | | | | Oilseeds | 37 | |
| | | | | | | | | Tobacco . | 30 | |
| | | | | | | | | Cotton | 10 | |
| II. Foodstuffs in crude condition, and food animals | 126 | 2031 | 315 | 489 | Fruits, Nuts | 81 | 58 | Coffee | 133 | 335 |
| | | | | | Fish | 12 | | Wines, spirits | 75 | |
| | | | | | Veg. products . | 12 | | Fruits & nuts | 58 | |
| | | | | | | | | Fish | 30 | |
| III. Foodstuffs partly or wholly manufactured | 295 | 194 | 553 | 457 | *Meat products | 87 | 150 | •Cane sugar | 155 | 336 |
| | | | | | *Grain, etc. | 49 | | •Grain, etc. | 84 | |
| IV. Manufactures for further use | 342 | 307 | 641 | 738 | † Mineral oils | 260 | 372 | †Wood & paper . | 249 | 450 |
| | | | | | † Chemicals | 116 | | Newsprint | 97 | |
| | | | | | † Iron & steel | 112 | | †Furs | 81 | |
| | | | | | † Timber . | 100 | | Tin, refined | 75 | |
| | | | | | * Animal fats | 58 | | Vegetable oils | 63 | |
| | | | | | Copper, refined . | 50 | | †Jute and mmu- | | |
| | | | | | † Cotton goods | 33 | | factures | 46 | |
| | | | | | | | | †Mineral oils | 40 | |
| | | | | | | | | †Copper, etc. | 30 | |
| | | | | | | | | Chemicals | 30 | |
| | | | | | | | | †Iron & steel | 21 | |
| V. Manufactures ready for consumption | 656 | 389 | 1795 | 807 | Machinery | 652 | 1073 | Fertilizers | 33 | 436 |
| | | | | | Motor-cars, etc. | 240 | | Cotton goods | 10 | |
| Totals | 2130 | 1639 | 4718 | 4111 | | | 2421 | | | 2416 |

• These items partly belong to Group II and Group III.
† These items **partly** belong to Group IV and Group V.

**given in the table and suggest possible explanations. Refer to Question 18.**

**57. Compare the post-war trade of Britain and the United States as regards (a) the comparative importance of the chief groups of trade, and (6) the individual items of merchandise.**

**68. Estimate the share of America's imports obtained from tropical countries.**

**69. Since the re-export trade of the United States, 1936, only averages 1½ per cent of her total trade, how do you account for the appearance of so many similar commodities appearing in both the export and import lists ?**

60. What light do the trade returns of the U.S.A. throw upon *(a)* the average American's standard of living, *(b)* the chief occupations of the people of the United States, (c) the size of the country, and *(d)* the variety and quantity of her resources compared with our own?

61. How far does your answer to the previous question help to explain why the internal or domestic trade of the U.S.A. is sixteen times more valuable than her external or foreign trade?

DIRECTION OF TRADE OF THE UNITED STATES
(Average values, 1935-36, expressed as per cent of total)

| | Imports | | Exports | |
|---|---|---|---|---|
| Region | Chief Countries | Total ! | Chief Countries | Total |
| Europe | Britain 8, Germany 3, Franco 2¾, Belgium 2½, Netherlands 2, Sweden 2, Italy 1½ | 29 | Britain 18, France 5¼, Germany 4, Italy, Netherlands, Belgium, each 2¼, Sweden 2 | 40 |
| Rest of N. America; | Canada 15½, Cuba 5 . | 26 | Canada 16, Mexico 2¾ . | 26 |
| Asia . | Japan 7, Malaya 7, Philippines 4, China 3½, India 3 | 29 | Japan 5¼, Philippines 2½, China 2¼, India 1, Malaya ¼ | 17 |
| S- America . | Brazil 4½, Argentina 2¾, Colombia 1¾ Chile 1 | 12 | Argentina 2¼, Brazil 2, Colombia 1¼, Chile ¾ | 8 |
| Rest of the World | Australia 1, S. Africa \ | 4 | S. Africa 3, Australia, 2 ½ | 8 |

62. Draw a bar graph or rectangle to illustrate the distribution of the trade of the United States by regions.

63. Compare and contrast the directions of the exports and imports of the U.S.A.

64. Find out the six countries with whom the United States do most trade, and arrange them in order of the value of their total trade.

65. How does the world distribution of the trade of the United States compare with that of Britain?

66. What does the table suggest concerning the importance as

(a) sources of supplies, and *(b)* markets for goods of (1) older established countries of temperate regions, (2) newer countries of **temperate** regions, and (3) tropical lands ?

67. " The United States pays for many of her imports from Asia **and** South America by her exports to Europe." Is this possible ? If so, how is it done ?

FRANCE, SPECIAL TRADE

**Average, 1933-36 in millions of £. (Converted at actual values p.a.)**

| Imports | | | Exports | | |
|---|---|---|---|---|---|
| **Food Products .** | | **94** | **Food Products** | | **30** |
| **Wine .** | **19** | | **Wine** | **6** | |
| **Cereals** | **16** | | **Fruits** | **2** | |
| **Coffee** | **8** | | **Salt fish .** | **0·6** | |
| **Sugar .** | **4** | | | | |
| **Raw materials** | | **165** | **Raw Materials** | | **53** |
| **Coal .** | **26** | | **Raw wool** | **8·4** | |
| **Cotton** | **20** | | **Pearls** | **0·5** | |
| **Oil-seeds** | **18** | | | | |
| **Wool .** | **17** | | | | |
| **Petroleum .** | **15** | | | | |
| **Silk .** | **2** | | | | |
| **Manufactured goods** | | **46** | **Manufactured goods** | | **103** |
| **Machinery .** | **8** | | **Chemicals** | **19** | |
| **Metal goods.** | **3** | | **Cotton goods .** | **9** | |
| | | | **Iron and steel .** | **8** | |
| | | | **Silk goods** | **6** | |
| | | | **Automobiles** | **4** | |
| | | | **Clothing** | **1** | |
| **Total .** | | **305** | | | **185** |
| **Note. Total 1922-26** | | 612 | | | **654** |

68. Express the data given in the above table in diagrammatic form. State and comment upon the chief facts indicated by your diagram.

69. The corresponding tonnage for the import groups was, in million of tons, 6·2, 40·0, and 1·7; for the export groups, 1·3, 25·2, 4·0. Compare and contrast the relative ton-values of the different groups.

70. About what percentage of shipping tonnage arriving in French ports must leave again in ballast ? Why does this happen ?

71. By percentage of the total trade of France the share of Britain is 9·3, Belgium, 8·5; U.S.A., 8·3; Germany, 5·8; Switzerland, 3·9;

Argentina, 2·0; Spain, 1·9; Brazil, 1·0; Italy, 0·7. Draw a diagram to illustrate the direction of French commerce and suggest reasons for the relative shares taken by the countries mentioned.

TRADE OF GERMANY

**Approximate average values, 1933-36, in millions of £**

| | Imports | Exports |
|---|---|---|
| Raw materials and partly manufactured goods | 7·7<br>112<br>186<br>32<br>8·9 | 0·2<br>6·8<br>70<br>304<br>8·2 |
| Note. Compared with 1924-26 Imports fell 40 per cent and exports by 3 per cent. | 346·6 | 389·2 |

72. Comment upon the above table and point out the relative importance of the various commodity groups in the commerce of Germany and France.

73. Of Japan's average total imports, 1933-35, by value £104 million, the percentage of the chief items were raw cotton, 47 wool, 11; iron and steel, 7; machinery, 5; oilcake, 2; rice, 0·4 the chief items of her exports were cotton tissues, 16; raw silk, 13 silk tissue, 5; earthenware, 1·5; cotton yarn, 1; sugar, 0·6; and coal, 0·3 per cent of the total exports valued at £105 million. Write a short account of the trade of Japan, which has fallen 45 per cent since 1925.

74. Examine the comparative trade tables of the chief British possessions and find out how far their trade reflects *(a)* the comparative extent to which the resources of each country is being utilized, (6) the degree of industrial development, and (c) the extent to which each country can meet its own needs. Fig. 158.

75. Almost every type of natural region is represented in S. America. To what extent are the differences in the kind and character of the commodities exported and imported by the countries there due to diversities of natural resources and opportunities ?

76. What does the table on page 343 tell of the economic crisis of 1929 and 1936? Note. The broad movements indicated are the 3resultants of disparate trends in different parts of the world and in different branches of production and industry; agricultural production is

FIG. 161, S. AMERICA; COMMUNICATIONS, INDUSTRY, AND TRADE

1934-5. Imports (Exports) million £: Colombia 21 (25), Equador 2 (2·2), Peru 8·7 (15), Chile 7·5 (12), Argentina 77 (110), Uruguay 7·5 (13·5), Brazil 30 (39), Venezuela 11·2 (36·6).

WORLD ECONOMIC CRISIS, 1932

Average 1925·29 = 100.

| World· | 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 |
|---|---|---|---|---|---|---|---|---|
| Trade by Value (gold) . | 104·5 | 84·5 | 60·5 | 41 | 37 | 35·5 | 36 | 39 |
| Prices (gold) | 95 | 82·5 | 64·5 | 50 | 44·5 | 41 | 40·5 | 41·5 |
| Trade by Volume | 110 | 102·5 | 94 | 82 | 83 | 86 | 90 | 94·5 |
| Foodstuffs Production . | 104 | 103 | 105 | 103 | 103 | 105 | 105 | 106 |
| „ Stocks | 125 | 130 | 144 | 149 | 151 | 154 | 137 | 120 |
| Raw Materials Prodn. . | 112 | 102 | 91 | 80 | 88 | 95 | 104 | 111 |
| „ „ Stocks . | 102 | 118 | 150 | 161 | 155 | 145 | 135 | 118 |
| Manufactures and Mining Production . | 111·4 | 98·6 | 88·1 | 76·9 | 86·5 | 94·7 | 106·3 | 1231 |
| Employment | 100 | 88·4 | 791 | 69·0 | 77·7 | 85 | 95·4 | 110·5 |
| Man·hours Worked | 100 | 85·4 | 70·9 | 57·5 | 62·8 | 68·6 | 73·6 | 80·0 |
| Output (Man·hour) | 100 | 1011 | 105·5 | 109 | 113·5 | 112·2 | 1161 | 119·3 |
| Shipping Tonnage (act.) | 111·5 | 111 | 102 | 94·5 | 98 | 102 | 105 | 107 |
| (idle) | 100 | 114 | 137 | 170 | 143 | 121 | 111 | 100 |
| Shipping Freights | 100 | 78 | 77 | 73 | 73 | 76 | 78 | 85 |

· Note. 1925·1936 world population increased 12·8 per cent

relatively more important than mineral production and increased in areas having protection schemes and expanding markets, e.g. Europe, Africa and Oceania, and decreased where restriction schemes operated, e.g. U.S.A. Natural conditions, restriction schemes, availability of foreign currency, industrial demand, technical progress enabling equal service to be had from smaller quantities, wider use of regeneration of scrap and waste, the introduction of synthetic products, discovery of new uses for known products are among the factors which affected the production and consumption of raw materials. Disparate changes in industrial production,1929·36, resulted; e.g. U.S.S.R. and Japan over 50 per cent, U.K. 20·30 per cent, Germany 10·20 per cent, increase; U.S.A., Belgium, and Italy, little change; Czechoslovakia, Netherlands, Poland and France, 10·20 per cent decrease.

CHAPTER XIII

# WORLD TRANSPORT AND COMMUNICATIONS (I)

## GENERAL CONSIDERATIONS. LAND AND INLAND WATER TRANSPORT

### Introduction.

TRANSPORTATION and communication perform a common function, but while the former is mainly concerned with the movement of goods, the latter deals chiefly with the movement of ideas. Man's use and development of transport and communication facilities are necessary expedients, not only in his struggle for existence, but also for the satisfaction of his desires for the luxuries no less than the necessaries of life. Both facilities have enabled men to extend their entire environment, made up of their geographical, economic, political, social, and intellectual surroundings, beyond the borders of their own native localities. As regards trade as we know it, without adequate means of transport it would be strictly localized in extent and restricted in character. Lack of communications by messenger, post, telephone, telegraph or wireless would make the buying and selling of goods more slowly and less easily carried out. The state of the world's harvests is often known the world over before those harvests are reaped, and selling prices regulated accordingly. Crops are even regularly bought and sold while they are still standing, e.g. Canadian wheat, Indian oilseeds, and American cotton. Although not yet appreciated by all the peoples of the world or of even a single country, the growth of a world outlook among mankind and the growing realization of the oneness of the world are taking place. We have still to realize fully the great fact that what happens in Britain or any other land affects the rest of the world, and *vice versa.* These facts are the outcome of modern trade and the rapidity with which, nowadays, events become known the world over. Through the instrumentality of these agents, different parts of the world are being brought into closer contact and greater

economic interdependence. Almost everything progressive peoples need has to be brought or transported from the place of origin to the place of use. It is greatly to the advantage of both producers and consumers if this necessary service can be carried out securely, cheaply, rapidly, and regularly. In devising the best means of transport for various types of goods, many circumstances have had to be taken into account and many obstacles have had to be avoided rather than over-ridden.

### Factors in the Use and Development of Modes of Transport.

The factors which exert a control over the methods of transport may be classified as those arising from physical and natural conditions, such as climate, topography, vegetation and animal life, and those resulting from man's activities. All the world over there is evidence of man's very skilful adaptation of transport to suit geographical conditions. In speed and carrying capacity the systems of transport in use to-day far surpass those of previous ages.

### Climate as a Factor in Transport.

The direct and indirect effects of temperature, winds, and moisture conditions are among the fundamental factors influencing not only the type of vehicle and its motive power best suited for a particular region, but also the kind of work that a particular mode of transport is designed to do. Climatic control is perhaps more easily recognizable in the case of primitive transport such as the dog-drawn sledge, whose low carrying capacity of about 100 lb. is adequate to meet the needs of the Eskimo in the cold, comparatively unproductive, and non-commercial Tundra, than in the more specialized systems of transport used in highly productive and commercial temperate regions such as our own country. The construction of our railways, roads, canals, is normally influenced by prevalent climatic elements in a variety of ways which can only be appreciated by a detailed study of the practical application of meteorology to engineering as well as to the construction of the vehicles and the special contrivances we employ to combat climatic conditions. Such a technical study is outside the scope of this book

but some of the more commonplace facts as given below are familiar to us—

**SOME ILLUSTRATIONS OF THE INFLUENCE OF CLIMATE UPON MODERN MODES OF TRANSPORT**

| Roads | Railways | Waterways |
|---|---|---|
| **Durable** road bed and crowned firm surface to avoid roads becoming quagmires in wet weather. | Well ballasted track to minimize the danger of track subsidence in rainy weather. | Construction of embankments, levees and weirs to cope with flood water on inland waterways. |
| **Note that** farmers do most of their heavy carting along farm tracks during very dry or frosty weather. | Damp-proofing of wooden sleepers. | Harbours, giving protection from elements, provided for ocean vessels. |
| | Spaces left between ends of rails to allow for expansion partly due to solar heating in hot weather. | Vessels given stream lines to reduce wind resistance. |
| Ice shoes for horses, chains for wheels of vehicles, easy starting devices for motor vehicles during frosty days, screen wipers for wet weather. | Apparatus on locomotives for sanding the rails when slippery during wet and frosty weather. | Facilities for battening down hatches and for securing movable fittings during stormy weather. |
| Snowploughs to keep open roads. | Snowploughs to clear railroads. | Ice breakers to clear passage for barges and ocean shipping. |
| **Use** of fog flares. | Use of fog signals. | Use of fog-horns. |

**Protection of goods carried from damage by rain, frost or fog.**
**Provision on passenger vehicles for adequate ventilation, especially in summer, and for warmth, particularly in winter.**

In London the disorganization and delay of traffic due to a foggy day has been estimated to involve a loss of over a million pounds. Our railways are put to an equally big expense during foggy weather. In other areas of the cool temperate regions, where snowfalls are heavier, e.g. the Canadian Rockies or Switzerland, railways have to be protected by snow sheds or by barricades against avalanches. In the Tundra, Northern Forests, and the more backward parts of the temperate grassland regions, frost and snow help rather than hinder communications on land. Where the surface of the land is fairly uniform, hard snow offers special facilities for rapid locomotion without the necessity of having to build specially-prepared tracks to reduce friction. Winter is the only time when travel on foot by

snowshoes, skis, or by dog- or reindeer-drawn sledges is undertaken in Tundra regions. In summer, these lands become almost impassable swamps. On the steppes of Russia, the northern prairies of Canada, and the highland areas of temperate regions, where specialized land transport has not been extensively developed, the snow-covered ground and frozen rivers of winter provide excellent natural surfaces for horse sledge transport. The Swiss or Norwegian postman going his rounds on skis is a familiar sight to British tourists visiting winter sports centres.

Climatic conditions make winter a particularly busy time in the Northern Forest Regions. Prospects are good for the fur trapper because the scarcity of food makes the capture of animals by baited traps more successful, the winter coats of the animals are in good condition, and the snow-covered surface makes the visitation of his traps easier. Since pelts have a high value in comparison with their weight and bulk, the sledge provides an adequate means of transport. Timber is bulky compared with its value and adequate labour and cheap transport are essential if lumbering is to be carried on profitably. Both these conditions occur during winter in the Canadian backwoods. Winter on the prairie farms is a time of enforced inactivity and hence a labour supply is available for lumbering. Snowfalls and sometimes artificial watering turn the forest ways into ice-slides, along which the cut timber can be cheaply hauled to the nearest river or railway, where it awaits further transport until springtime. On the great lakes of North America and in the Baltic Sea water routes have to be kept open during the winter by the use of boats specially built for the purpose of ice-breaking. During the months of February to November, the lanes of Transatlantic shipping have to be moved southwards to avoid the danger arising from the presence of icebergs and fogs. St. John, New Brunswick, and Halifax, Nova Scotia, handle the winter traffic which would go to Quebec and Montreal if the Gulf of the St. Lawrence were not ice-blocked. In Northern Europe, Archangel and most of the Baltic ports are frozen up in winter. Barge transport gives way to sledge transport and skating replaces cycling when Holland's canals are icebound.

In tropical and sub-tropical lands, frost and snow cease to have any serious influence upon transport problems. In these regions the amount and seasonal distribution of rainfall becomes an

important factor. In many parts of India, during the summer period of heat and rains, transport by bullock, wagon, or pack animals along the earthen tracks which do service for roads is practically impossible. Special precautions have to be taken to protect roads and railways against heavy rainwash, and in valleys particularly, against the seasonal flooding by rivers, e.g. Beira and other railways in East Africa and Tanganyka Territory. Railways crossing semi-arid regions, as in Australia, Egypt, and South-West Africa, are subjected to destructive sand blast, and much money has to be expended in keeping the track in working order. Although by reason of their dry climate, firm and elastic soil, and fairly even surface, desert regions offer relatively easy conditions for transport, because they produce little, these advantages are of little importance. The caravan routes across the Sahara Desert in Africa and the cattle routes following the line of springs and artesian wells from Cloncurry, Queensland, to Port Augusta, South Australia, are typical instances of the hydrographic control of land routes in desert and semi-arid regions. Similarly, the usefulness of inland water routes is affected by the amount and seasonal distribution of rainfall. Rivers subject to seasonal floods are more difficult to navigate, and the construction of dams and weirs and other works has often to be undertaken so that the flow of water can be regulated. Besides large variations in the depth of water at different seasons, floods often cause rivers to have shifting channels and shoals. For instance, the Murray-Darling River, Australia, and the Orange River, South Africa, are of little use as waterways, because their volume of water varies considerably during the year. The navigation of the Indus, India, which always has a sufficient depth of water for barge traffic, is so hampered by shifting channels and shoals below Sukkur that from there it is more profitable to send Punjab wheat by rail to the coast. Partly in the interests of the Port of London, even the seasonal fluctuations in the volume of water of the Thames are regulated by an up-river system of weirs.

Water transport, especially upon the high seas, is much more at the mercy of the elements than land transport. The same high winds, torrential rains, and extremes of temperatures, which only mildly affect road and rail traffic, prove disastrous to even modern ocean shipping. To suit the capabilities of different classes of shipping crossing the North Atlantic, definite monthly sailing courses

have been worked out, so that the possible risks arising from gales and storms, fog and ice, may be avoided in so far as is humanly possible. (See Figs. 162 and 163.) In former times sailing ships were even more at the mercy of wind, waves, typhoons and hurricanes. Although man can do little towards controlling the natural forces of sea and air, he has achieved some measure of success by the modification of vessels, the introduction of new propulsive powers, the invention of special contrivances and improvement in the arts of navigation so as to minimize their adverse effects. It has been pointed out that the comparatively late discovery of the Americas was the result of two meteorological facts: first, the presence in the North Atlantic of ice streams and fogs, and, secondly, the fact that before the time of Columbus, the early ocean-going navigators of Southern Europe could not bring themselves to risk the recrossing of the Atlantic in face of the N.E. Trades. Columbus first saw and tested the possibility of crossing on a southerly route by the N.E. Trades, and of returning over a more northerly route by the aid of the Westerlies. The fact that the English Channel is a track for cyclonic storms was, until the advent of steamships, a factor in diminishing free intercourse between Britain and Continental Europe. In the days of sailing vessels the direction and seasonal variation of prevailing winds not only influenced the choice of tracks for shipping, but also the time of year at which such tracks could be used. This is well shown by the track followed by the East Indiaman from London to Calcutta, and the times of the year at which the fleets made their outward and homeward voyages in order to take advantage of the Indian monsoon. Unlike sailing ships, modern steamships or oil-burning vessels can travel independently of the direction of the prevailing winds. Wherever possible, however, as a means of reducing fuel consumption, routes are chosen so as to avoid head winds and to give even modern liners and tramp steamers the advantage of following winds. For all types of shipping harbours providing protection against weather conditions adverse to the safe and speedy loading and discharging of cargoes are essential and usually provided.

**Topography as a Factor in Transport.**

Topography, unlike climate, is a more important factor in determining the layout of routes and the means of transport employed upon land than upon water.

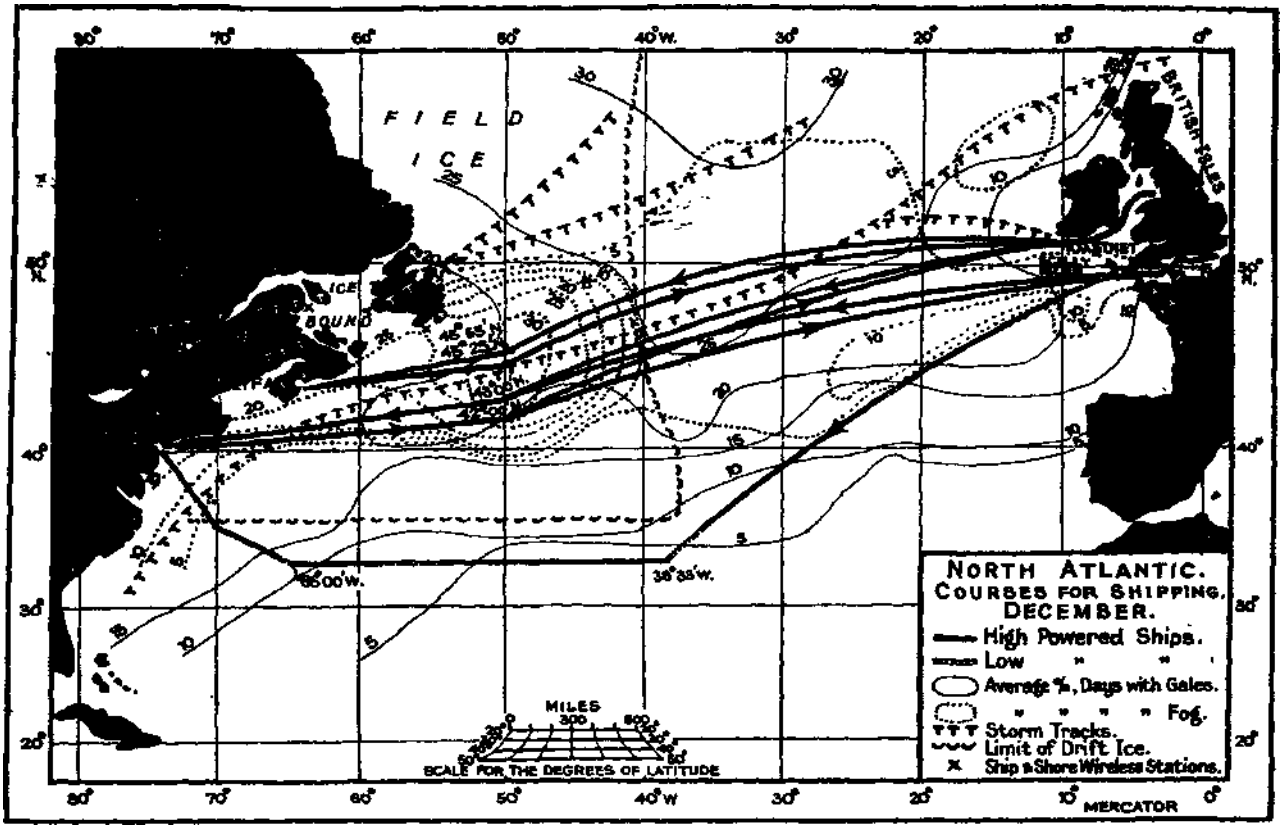



FIG. 162. NORTH ATLANTIC: SAILING CHART FOR DECEMBER—WEATHER CONDITIONS

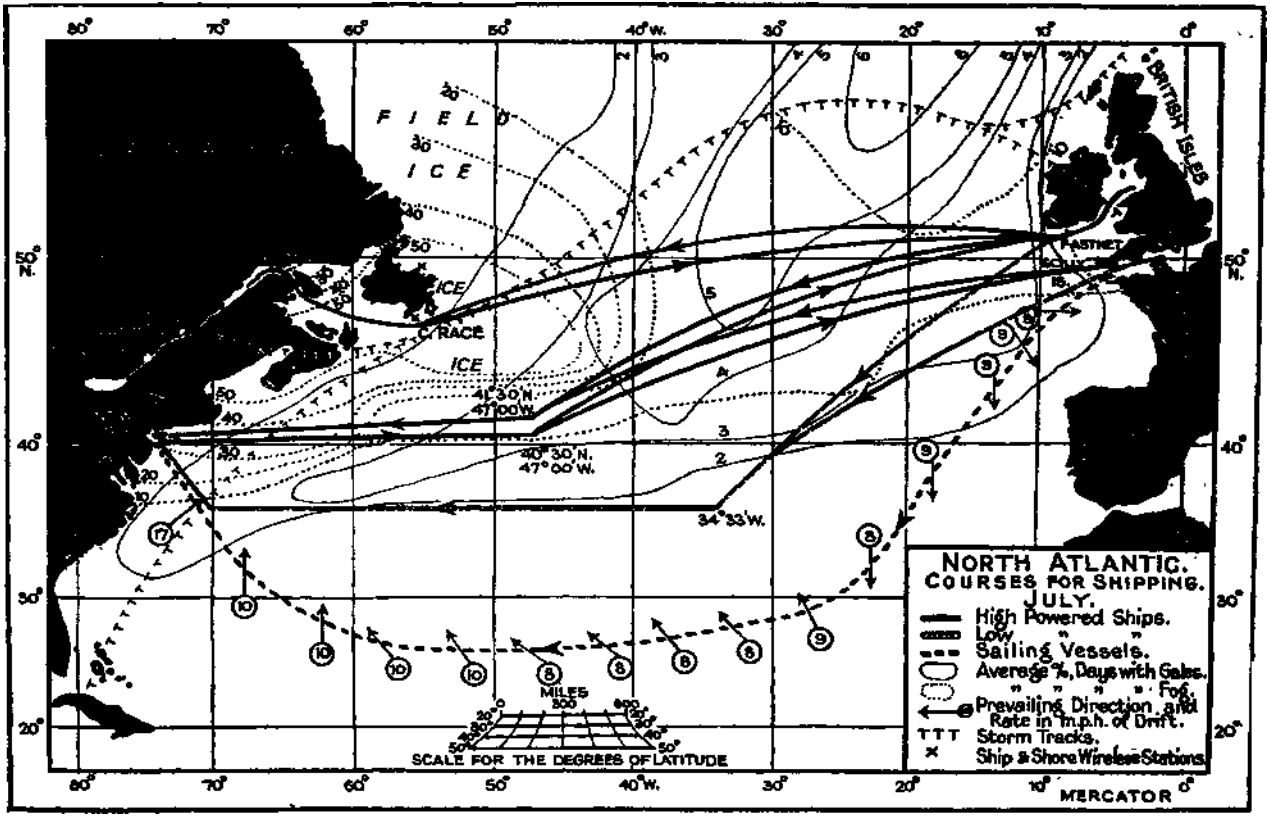



FIG. 163. NORTH ATLANTIC: SAILING CHART FOR JULY—WEATHER CONDITIONS

Except for sandbanks, submerged reefs, and the depth of water near coasts, the relief of the sea floor has little effect upon the movements of shipping and the type of vessel employed. On our inland waterways, rapids, waterfalls, shallow reaches and similar obstacles to navigation have to be surmounted by the cutting of

*By kind permission of* *" The Yorkshire Observer "*

FIG. 164. LOOKING UP THE AIRE VALLEY NEAR SHIPLEY, YORKS '
Road, river, railway, and canal use this valley route

canals, canalization, dredging, and the constructional adaptation of boats to suit local requirements, e.g. depth of draught of vessels.

On land the relief of a region has an important bearing upon transport facilities. Broadly speaking, plains permit freedom of movement, and mountains and uplands tend to impede movement and to limit the directions in which movements can take place : e.g. the Northern Plain of Europe or the Himalayan system of India. On the other hand, plains such as the forested Selvas of South America, the lake-dotted Plain of Finland, or the swampy everglades of Florida, U.S.A., are as great obstacles to movement by land as highland areas. By reason of their lower average height, less width and numerous passes, the Alpine system of Southern Europe

presents a much less serious obstacle to free communication between the adjoining lowland regions than does the Andean system of South America.

In lowland areas, but more important still, in mountainous areas, river valleys provide lines of penetration linking seaways and land-

*Photo supplied by* *The Central Aerophoto Co., Ltd.*

FIG. 165. THE CENTRE OF BRADFORD, YORKSHIRE

A typical example of a city which has developed at a point where natural routes converge near the present Town Hall (having the clock tower). Reading clockwise from the bottom left-hand corner the main roads go to Manchester (1), Halifax, Keighley (2), Aire and Wharfe valleys and East Coast Route (3), Leeds and Wakefield

ways, and their usefulness is increased if valleys, after traversing the length of a region and passing through areas of differing production, debouch upon seas giving easy communications with other lands. For instance, the Rhine and Danube valleys furnish excellent natural routes from the highland core of Europe to the North and South-East respectively, and pass through areas contributing differing kinds of traffic, but while the Rhine valley leads to the busy North Sea and Atlantic, the Danube valley leads away from the world's main line communications and enters the almost landlocked and out-of-the-way Black Sea.

It might be thought that air transport would not be greatly influenced by the relief of the countries where this form of transport is being developed. Aeroplanes, however, need level and open landing grounds and weather conditions not subject to sudden and violent changes. Mountainous areas do not offer these conditions. The development of air transport therefore has taken place in those lowland areas whose dense populations, requiring rapid and secure transport for passengers, mails, light expensive articles and bullion, have made worth while this form of transport.

The structure of Europe even more than that of North America is highly favourable to the development of routes in the places where they are most needed. Natural routes in Europe tend to bunch on the Atlantic seaboard. Marginal highlands, except in Scandinavia, are few, and the principal mountain systems of Europe extend in an east and west direction. Many natural route gaps and passes occur in the Alpine mountain system and its associated highland blocks at most convenient places, and man has been able to supplement them by tunnels at other points of vantage. Possessing a long, indented, and transverse coastline, providing many harbour sites, Europe is also fortunate in the fact that the North, Baltic and Mediterranean Seas permit ocean transport to be continued far into the land mass. Especially in the north-west lowlands, slow-moving and copiously-branched rivers are numerous, and their usefulness has been further increased by linking them together by an intricate system of more than 150,000 miles of canals in Germany, Holland, Belgium and France. Except in the lowland plain extending from Belgium to Russia, and the coastal plains of Mediterranean countries, the main railway routes of Europe coincide with the principal inland waterways.

Of the continents, North America has probably the finest system of natural and improved inland waterways in the world. The improved St. Lawrence and Great Lakes route, penetrating 2,200 miles inland, opens up the vast productive interior plains to the North Atlantic during nine frost-free months in the year. Access to the lakes is easy and their situation in a lowland area has facilitated the construction of lakeside harbours. The Mississippi system, navigable by large steamers and barges at all seasons for a distance of 1,250 miles, is of less commercial importance than might be thought, because it is of relatively little use in linking the interior

states to the Atlantic seaboard and Europe. Like the Danube in Europe, the Mississippi flows in a wrong direction, and as a consequence is of less importance than the Mohawk-Hudson and Ohio-Susquehanna routes across the Appalachians. The land routes across North America tend to converge on the west and east sides of the continents in order to take advantage of the natural gaps through the marginal Rocky Mountain system on the west and the highland areas running parallel with the east coast. The coastline of North America is less indented and shorter in proportion to the area of the continent than that of Europe. Good natural harbours are fewer, and, with the exception of Vancouver, Seattle, and San Francisco, are mostly found along the east coast, where many lowlands and valleys have been invaded by the sea—Baltimore, Philadelphia, New York, Halifax, Quebec and Montreal.

The structure and relief of South America impose a well-marked north and south direction to the land routes of this continent, especially on the west side, where the railways keep to the longitudinal valleys lying between the Andes and the coastal ranges. Only two railways cross the Andean system, from Buenos Aires to Valparaiso, and from Antofagasta via Uyuni to La Quiaca. On the lowlands of Argentina where the railways are most numerous, they extend northwards from the River Plate and supplement the inland waterways of the Rivers Parana, Uruguay and Paraguay, and southwards to augment the sea communications of the southern territories. From the Pongo de Manseriche rapids, only 250 miles from the Pacific coast, the Amazon provides a magnificent but little used inland waterway right across the continent. Compared with North America, the coastline of South America is smooth and either rockbound or lowlying. The otherwise fine harbours of Rio de Janeiro, Valparaiso and Callao are hemmed in by mountains, while the usefulness of those situated upon the estuaries of rivers, Buenos Aires, Montevideo, Guayaquil, Valdivia, Barranquilla, is impaired by sandbanks, and shifting or tortuous channels.

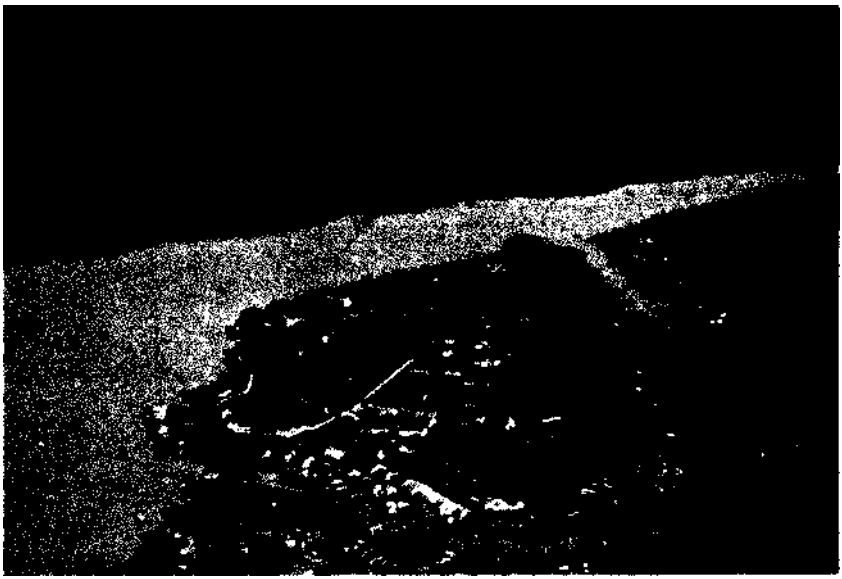
The relief of Asia forces routes to follow an east to west direction by land across the great plain and blocks and basins of Siberia and Manchuria, or by sea through the Indian and Pacific oceans. The northern plain slopes to an ice-blocked sea, and consequently the great rivers flowing northwards are, except locally, of little use as

inland waterways. The great system of folded mountains which crosses Central Asia cuts off the Siberian foreland in the north from the tablelands and plains of Arabia, India, and China in the south. Here the Mesopotamian and Indo-Gangetic depressions and the basins of the Si Kiang, Yangtse Kiang, and Hwang Ho rivers provide natural lines of penetration. Out of the ten leading ports of Asia, it is noticeable that with the exception of Calcutta on the Hoogli branch of the Ganges, none are found at the mouths of important rivers. Shanghai, Rangoon, and Karachi are located near estuaries and the remaining six, including the principal ports, are all situated on islands near the mainland. These ports, in order of importance, are Hong-Kong, Colombo, Kobe, Yokohama, Singapore, and Bombay.

The configuration and structure of Africa and Australia are partly responsible for the small and inadequate number of good harbours, defective inland waterway systems, and the paramount importance of sea transport to these continents. Africa is for the most part an almost level tableland, and it is only in the north-west, where a folded mountain system is found, and in the south-west, where a small block mountain system occurs, that an indented coastline provides natural harbour sites, e.g. Algiers, Tunis, Cape Town. The other ports of Africa are either on islands, e.g. Zanzibar; near but not on river estuaries subject to silting, e.g. Lagos and Alexandria, or man-made, as, for instance, Port Elizabeth, Durban, Mombasa, and Port Said. The navigation of almost all of Africa's rivers is impeded by falls and cataracts, especially where the rivers descend from the plateau to the coastal lowlands. On the Nile and the Congo railways have been built so that traffic may be carried round the falls by land. Taken as a whole, the layout of the main railway routes shows little relationship to river systems in Africa, In most cases the railways either cross rather than follow, or avoid altogether, valley routes.

Australia consists of a central lowland area shut off from the sea on the east by a marginal block mountain system and on the west by the Western Tableland. The mountains west of Sydney proved a formidable obstacle to communications inland for some fifty years. Roads were usually carried along the ridges between the valleys and through gaps. Later the railways followed these same routes. The slow growth of the railways at the outset was in

part due to the heavy cost of construction through the mountainous country close to the east and west coasts. The Murray-Darling River system, which alone embraces the greater part of the Central Lowlands, is not very useful as a navigable highway. Even the main stream in parts of its course dries up into a chain of small



*By courtesy of* *The Air Survey Co., Ltd.*

FIG. 166. SIBU, A TRADING CENTRE IN SARAWAK

The centre lias developed on an island site near the confluence of two rivers. The sandy spit would be easy to defend, and could be cleared without much difficulty. The native quarter is along the creek (right), the Chinese quarter with " go-downs " on the creek (left), and the European quarter on the river side. Rubber gardens can be seen on the far side of the river with newly cleared land beyond and then the high, dense and almost impenetrable jungle

lakes in summer, and a sand bar prevents river navigation being continued into the sea. In Australia, therefore, even more so than in the case of Africa, sea connections are of vital importance to the economic development of the continent. Inter-state steamship lines are maintained, and all the capitals of the states of the Australian Commonwealth, Central Australia excepted, are seaports or river ports. With the exception of Freemantle, Albany, Christchurch and Dunedin, all the principal ports of Australasia are located in regions where young folded mountain systems occur.

**Plant and Animal Life as Factors in Land Transportation.**

In his efforts to get about and transport his goods, man in most parts of the world has to contend with or make use of the quality of plant and animal life. These inter-related organic factors, closely bound up with the inorganic factors, climate and relief, vary broadly in importance and character from one natural region to another.

All the world over, forests act as barriers to man's movement. Tropical forests and jungle, with their luxuriant and sometimes superabundant vegetation, make land communications exceedingly difficult. Forest trails, roads, and even railway tracks, can only be kept open by constant and systematic clearing. Unused tracks become completely obliterated by new vegetation in a year or two. Except when they occur at the foot of mountain ranges, Temperate forests are less serious obstacles to free and speedy movement. The opening-up and maintenance of lines of communication is easier because vegetative growth is slower. The open formation of the Mediterranean woodlands and shrub vegetation is only a slight obstacle to movement on land, but, in common with all types of wooded country, offers unsatisfactory landing grounds for aeroplanes. Thorn forests and thickets of impenetrable scrub in semi-arid and desert regions respectively restrict freedom of movement quite as effectively as the prolific vegetation of tropical lands. In the Tundra, the thick carpet of mosses, lichens, and dwarf-bushes becomes an almost impassable, swampy and spongy mass during the summer thaw.

All over the world man has to reckon with animal life either hostile or friendly. This is broadly true, whether man regards animals as potential means for supplying his needs or as helpers in his everyday life. Men cannot live without some property which they need to carry about with them. Being comparatively ill-adapted for continuous rapid movement or for transporting heavy loads, men early learnt to make use of such animals as were available and seemed fitted for transport purposes. Thus we find different animals employed in different ways in many, but not all, parts of the world.

To this day man still has to be his own carrier in both backward and advanced regions. In some parts of the world, e.g. New Guinea and Australasia, natives had to be their own beasts of burden because suitable animals were non-existent until the whites introduced them from Europe. It is said that woman is the world's oldest

burden bearer. In other places, like tropical Africa, the prevalence over wide areas of *paard-ziekte* (horse-sickness), nagana, and red-water fever, the last two caused respectively by infection through bites of tsetse flies and grass ticks, made human porters the only available means of transport, until in fairly recent times progressive peoples have begun to make use of mechanized forms of transport,

*By kind permission of* *H.M. Eastern African Trade and Information Office*

FIG. 167. ON SAFARI, BRITISH EAST AFRICA

Mode of transport used in the more remote districts during shooting expeditions. An example of "savannah" country

e.g. railways, motors. Travelling in single file, negro porters, carrying loads varying from 50 to 120lb., can journey from ten to twenty miles a day. In the densely-peopled parts of China and Japan, food supplies are insufficient for both man and beast, and so in these areas we find porters carrying tea or silk packs weighing 200 to 400 lb. hundreds of miles, from China into Thibet, and the coolie-drawn Chinese wheelbarrow and Japanese jinrickshaw. Such modes of transport would be expensive if labour was not plentiful and cheap and animals scarce. Even in progressive countries

where animal and mechanical modes of transport are available, men must still transport goods for short distances, when these are first handled, transferred from one means of conveyance to another between the various stages in manufacturing processes and when finally delivered. The farmer carries his milk to his cart or lorry,

*Photo supplied by* *Will. F. Taylor*

**FIG. 168. A STREET SCENE, NEW CHWANG, MANCHUKIA**
**Note the three native modes of transport shown and the three visible signs of the penetration of Western ideog**

porters transfer the churns to the milk train, other railway workers help the milkman to load his conveyance, from which he delivers the milk by hand to the consumer. Instances can be multiplied.

The distribution of animals is bound up with the distribution of their food supply, that is, in the first instance, vegetation, which is closely related to climatic conditions. Thus, broadly speaking, the different major natural regions of the world have each come to have their own characteristic transport animals. The present-day distribution of man's beasts of burden is in some cases natural. The camel, reindeer, elephant, llama and yak each have very special geographical locations, respectively Semi-Arid Grasslands, Tundra, Tropical Forests, areas of high elevation with little and deep snow. In other cases, the distribution has been modified by man, either by introducing useful animals from some parts of the world to other places having somewhat similar climatic conditions and food supplies, or by creating food supplies on the one hand and by breeding animals to withstand climates different from those of their native homes on the other hand. For instance, all the transport animals used in Australasia, the Americas, and South Africa, with the exception of the Eskimo dog of North America and the llama of South America, have been introduced by Europeans within the last five hundred years. The original range of the horse, ass, donkey, dromedary, and ox, with perhaps its horned relative, the carabao has been extended from their probable home on the temperate and sub-tropical grasslands of Western and South-Western Asia into adjacent natural regions. The horse and pony, which are intolerant of tropical humid heat and insect pests, are distributed throughout the cool and cold temperate grasslands and forested regions of the world. Only about 20 per cent of the world's horses are to be found in the less humid parts of tropical lands. The hardier and more stolid ass and donkey, which can subsist on more meagre forage, are found chiefly in sub-tropical lands having a marked dry season of the mediterranean and monsoon type of climate. Man has bred the mule, which is a better draught animal than its father the donkey and its mother the horse, for use in these same regions, where 80 per cent of the world's number of these animals are found. Like the goat, the ass, donkey, and mule, because they are sure-footed and can live on rough and little forage, are especially useful in the mountainous areas of the world and in temperate lands where

**the people are** very poor, e.g. the Irish Free State. The ox and its **relatives,** which **can** endure the heat, damp, and pests of tropical **lands** better **than** the representatives of the equine genus, are about **equally** distributed between tropical grassland and forest regions **and** the backward agricultural areas of temperate regions. The least important of man's beasts of burden, the dog, is found almost everywhere, but is only used for transport where other animals are not available. Lack of indigenous food supplies makes the use of herbivorous animals too costly in the cold, snow-covered lands of Northern Siberia and North America ; mountainous slopes in some parts of the Alps and Pyrenees are too steep for mules ; and in some densely-peopled areas of North-West Europe the peasants are so poor that they can only afford to keep a dog to pull their carts.

The following table not only shows the distribution of man's transport animals, but also indicates their comparative usefulness to man. It will be seen that the methods of using beasts of burden vary in different parts of the world according to the nature of the work they are called upon to perform and the physical conditions under which they have to work. The decided advantage, both in variety and quality, of animal transport facilities of temperate lands is also indicated.

| Animal | Distribution | Characteristics and Utility |
|---|---|---|
| **Horse and Pony.** | **Temperate and other regions occupied by Europeans. Eurasia, 45%; N. America, 26%; S. America, 9% ; Australia, 2% of world total, approx. 110 millions.** | **Intolerant of extreme heat, cold and humidity. Needs good forage and water.**<br>**(i) Heavy Cart Horse, e.g. Clydesdale (U.K.), Percheron (Fr.), Flemish (Belgium) draws up to 5 tons.**<br>**(ii) Light Van Horse—draws ½ to 1 ton at 6-8 m.p.h.**<br>**(iii) Pack and Saddle Horse—carry 300 lb.** Speedy.<br>**Probably does as much work as all the rest of man's beasts of burden put together.** |

| Animal | Distribution | Characteristics and Utility |
|---|---|---|
| Mule, Donkey and Ass. | Sub-tropical regions having dry seasons, temperate lands having poor peoples and mountainous areas.<br>Countries surrounding Mediterranean Sea, 36%; S.E. United States, 24%; India, 8%; S. Africa, 4%; Argentina, 4%; Ireland, 1% of world's total, about 20 millions. | Hardier, longer lived, surer of foot and able to thrive on poorer forage than horse.<br>Mule carries and draws the same as a light van horse.<br>Ass and donkey carry 150-250 lb. ; draw up to 1 ton, at 4-6 m.p.h. |
| Ox, Buffalo and Carabao. | Temperate lands of backward peoples, humid sub-tropical and tropical lands.<br>India and S.E. Asia, 50% ; Russia and S.E. Europe 21%; Central and S. America, 20%; S. Africa, 2% of world's estimated total of 250 millions. | Slower but stronger pull than horse.<br>Endure heat, humidity and insect pests better than horses.<br>Carrv 150 lb. ; draw 2,000 lb: |
| Dogs. | All regions. Used where other animals not available, e.g. Tundra regions and N. W. Europe. | Eskimo dog draws 100 lb.<br>Belgian dog draws 250 lb.<br>St. Bernard dog carries 30-60 lb. |
| Camel and Dromedary. | Semi-arid and desert regions. N. Africa and Eurasia about 2 millions. Australia 6,000. | Able to go without food and water 3-10 days and live on coarse desert vegetation.<br>Camel carries 450 lb. for 15-20 m.p. day, draws 1,200lb. at 2-3 m.p.h.<br>Dromedary or Bactrian camel carries 700 lb. Saddle camel rivals horse for speed. |
| **Reindeer.** | Tundra and N. Forest regions of Eurasia. Some in N. America. | Withstands cold and exists on poor diet. Carries and draws rather less than an ox. |

| Animals | Distribution | Characteristics and Utility |
|---|---|---|
| Elephant. | Tropical forests of India and S.E. Asia only. 8,000 in Siam. | Needs abundant forage. Useful in hilly and marshy country and where insect pests are found. Carries 900 lb., draws 2-3 tons. |
| Llama. | Andean Highlands of Bolivia and Peru. 1 million. | Sure footed. Carries 1001b., 12-14 m.p. day. at high altitudes up to snow line. |
| Yak. | Highlands of Central Asia only. | Not descend much below snow line. Carries· 90-120 lb. Also draws. |
| Goat, Sheep. | Highlands of Central Asia only. | Carry 25-35 lb. |

## Human and Economic Considerations as Factors in Transport.

**The volume and character of goods to be transported and the ability of men to find ways and means of performing the work demanded, or, if such means of transport are already available, the ability of peoples to pay for such methods of carrying their goods, affect both the modes and facilities for transport available in different regions. It is in the densely-peopled and progressive regions of the world, where large-scale agricultural and manufacturing production is carried on, that modes of transport have become specialized and arrangements for the conveyance of goods are most highly developed. Large-scale production is a comparatively recent development, following upon the progress of scientific knowledge and its application to industry and transport during the last hundred and fifty years. Britain was amongst the earliest countries to take up scientific agriculture, to initiate the era of large-scale manufacturing, based upon power-driven machinery and specialized, mechanically-propelled transport. The first steamship crossed the Atlantic Ocean in 1819, steam railways were unknown in Britain before 1825, motor transport dates from the invention of the petrol engine about 1880,**

*By, kind per,,,,* ***The*** ***Trw!.*** ***f****or India*

FIG. itii·. ELEPHANTS HAULING TEAK LOGS, BURMA

***Photo E. E****. Simpson* *Kindly lent by Egyptian Tourist Bureau*

**FIG. 170. CAMEL CAVALCADE LOADING DATES AT SIWAH OASIS, EGYPT**

**The desert trek to the coast is about 400 miles**

and forms of electrically-propelled transport and mechanically-driven aircraft are creations of the present twentieth century. Roads with prepared surfaces suitable for hard usage by animal-drawn or self-propelled vehicles, steam and electric railways, and efficient water carriage are essential if large-scale production is to be profitable. In lands where division of labour is the rule rather than the exception, only by highly-organized systems of transport can the needs of producers and consumers be adequately met. Such service demands not only speedy, safe, and regular transport from place to place, but also the specialized handling of freights. Thus we find tank vehicles for carrying liquids such as oil or milk, refrigerated conveyances for perishable foodstuffs, like meat, fruit, fish, etc., special vehicles for carrying live stock, and a bewildering variety of conveyances and appliances specially adapted for transporting and handling goods over long or short distances and in bulk, or in packages, or in small loads. There are 50-ton railway wagons for mineral traffic at one end and the warehouseman's trolley at the other end of the scale ; suction plants for quickly emptying cargoes of loose wheat, or conveyor belts and cranes for dealing with parcels of goods. A study of the various types of vehicles used in any town in Britain will reveal many of the ways in which conveyances have been specially designed for a particular purpose and service.

In any country, custom, habit, and environment play a part in the conduct of both passenger and goods railway traffic. Europeans appear to prefer more privacy when travelling by rail than their kinsfolk in North America. Our railway passenger coaches are mostly built with separate compartments, whereas those used in Canada and the United States are usually of the Pullman saloon type, often serving as a communal living room by day and dormitory by night. Night after night on the American transcontinental trains travellers of both sexes undress and go to bed in small bunks about three feet high, with only curtains to separate one bunk from another. On our railways sleeping cars are partitioned off into compartments containing two or four sleeping berths. In the conduct of goods traffic, differences arising from differing circumstances are also distinguishable. In the older established countries railways have tended to carry on the services performed by older forms of transport, whereas in the more recently settled countries, where the

construction of railways has in many cases preceded settlement, their development has been unhampered by the existence of custom and preconceived notions as to the functions and methods of working them. Thus in the newer countries where it also happens that distances are often long, the tendency is for the railways to confine their services to the actual haulage of goods. The actual goods service is cheaper, but slower and more irregular than our own. Goods do not come forward as regularly or in sufficiently large quantities to warrant the establishment of a time table service. During a quiet time a consignment of goods may have to wait several days until sufficient freight has accumulated to make the running of a goods train economically justifiable. It is considerations such as these and the haulage of heavier trainloads at lower speeds which make possible the cheaper goods rates in North America. In the older countries goods traffic is essentially retail in character, and the convenience of the individual traffic consignors receives special consideration. Our own railways cater for traders dispatching goods in small quantities, and in addition to ordinary goods service provide regular express goods services, even though sufficient freight is not always coming forward to justify the running of these trains. Further, on British railways private owners are even given facilities for running their own wagons over the companies' lines. Not only do our railways give a frequent and quick service which is worked to a carefully arranged time schedule, but they also undertake the collection, sorting, delivery, and handling of goods. The European goods system, which is most highly developed in Great Britain, is more costly to operate than is the case with that in operation in areas such as North America, but in view of the quickness and convenience with which goods are transported, the higher cost for the service of our kind of system has until recent years been considered worth while. Opinions now differ as to whether the British system of railway operation goes beyond the economic limit. The post-war development of mechanized road transport, which also specializes in the speedy and convenient carriage of small consignments of goods, may necessitate modifications in the functions and methods of operating our railway transportation systems.

In most of the countries of Europe and the lands overseas peopled by Europeans, especially North America, specialized transport facilities are widespread and highly developed. It must not be

thought, however, that in such countries `unspecialized transport mediums are not employed also. In our own country, for instance, stores employ horse vans or messengers to deliver goods, usually within a fixed delivery area. Customers living outside that area may be served through the post or by railway goods service. The value and nature of the traffic, the competition of trade rivals, the comparative financial advantage and convenience of a selected form of transport are among the factors limiting the range of unspecialized forms of transport in countries where specialized forms are available. The sphere of specialized means of transport also has its limitations in progressive countries, even in our own island. Sparsely inhabited by poorer folk and less productive than the lowlands, the highland and upland areas of Great Britain do not need any form of transport to the same extent as our industrial areas on the plains. Roads are fewer and second-class and third-class roads have a greater mileage than first-class and arterial roads. Railways in our highland areas are also fewer, mainly because the amount of traffic available does not justify the expense of their construction and operation, which is comparatively greater than the cost of building railways in lowland districts.

### Horse-drawn versus Mechanically-driven Road Transport.

The life and usefulness of both of these kinds of road transport depend upon the surface of the roads which they use. Leaving out of account motor traction upon caterpillar wheels, because as yet it is little used, bad roads seriously hamper the efficiency of horse and mechanical transport. All progressive countries therefore endeavour to maintain systems of good graded roads. For short distances, for journeys in congested or restricted areas, and for those involving much stopping and starting, the horse holds its own for cheapness and efficiency. Within such limits, it has been calculated that in England horse transport costs only one-third the cost of carriage by motor-van. Outside these limits, capacity for capacity, mechanically-propelled transport, such as motor, electrical, or steam-driven vehicles, beat the horse for economy, for speed, and for the volume, and the weight of the loads carried. Both types of road transport permit economical door to door service, and both are more flexible in their operations than railways. Mechanically-driven road transport is mostly used in North America and Western Europe.

**Local conditions, such** as cheap motors and motor fuels **and a good** supply **of** horses, vary in different countries. In the United States, the home of cheap motor vehicles, with home supplies of motor fuels, horse-drawn outnumber motor vehicles in the proportion of only 2 to 1, while in Germany, where the horse-breeding industry is well-established, the proportion is 50 to 1, comparing with 4 to 1 in Great Britain. Another consideration which favours the use of horse transport, especially in agricultural countries where forage is plentiful, is that the horse is capable of reproducing its own species.

**Rail versus Mechanical Road Transport.**

Compared with mechanical road transport, railways offer rapid, reliable and economical transport of heavier loads over longer distances. This is especially so in the case of bulky and heavy freights, such as wheat, coal, iron ore, although the actual freight rates in different countries may vary considerably. At the present time wheat is carried twelve hundred miles, from Calgary to Fort William, Canada, for about 25s. a ton, while for only about one-tenth the distance in England, from Manchester to Northampton, the cost is just over 20s. It should not be inferred from this example that in Canada railway carriage is very much cheaper than in England. Both rates are special rates for grain only. The possibility of return freight, volume of goods to be carried, length of time taken over the journey, need for the use of specially-adapted vehicles, the presence or absence of competitive transport facilities, and many other factors, have to be taken into account when rates are decided. In Britain motor vehicles numbered 2,700,000 in 1937, 80 per cent being cars, 17 per cent road transport vehicles, and 2 per cent omnibuses and coaches. The number of passengers carried and receipts from fares were respectively for omnibuses and coach services 6,000 million and £62,000,000, and for railways 840 million and £53,000,000. Two advantages offered by motor vehicles and not by railways are mobility and the elimination of costly transhipment and handling of goods in transit between two points. Motor vehicles can go wherever roads are available, and thus road transport is more flexible **than railway** transport, which needs specially-prepared and costly tracks, specially-timed operating schedules, stations, goods **yards, with** ancillary collecting and delivery services. **The introduction of night** services has extended the range of operations of

**road transport,** and most of the manufacturing areas of Britain **are** now linked together by road haulage services. Cars used for pleasure and business purposes and motor-bus services operating sometimes over quite long distances, e.g. London to Glasgow, have become almost everyday features of our life. Though handicapped by their much greater costs of construction, maintenance, and operation, railways alone can handle huge loads. An average goods train in England hauls a load up to 550 tons, compared with eight to ten tons by a motor lorry with trailer. Road transport concerns do not have to provide and equip a private permanent way costing about £35,000 per average mile of double track main line and a signalling system as our railways have to do. Furthermore, British railways are handicapped because by law they are common carriers, and cannot therefore pick and choose their freights. Until 1928 they were debarred from operating motor vehicles as independent transport media and could not compete with motor transport upon equal terms. To sum up, the sphere of maximum usefulness for motor transport appears to lie midway between those of the horse and the railway, and in the co-operation with, rather than competition between, these forms of transport in the progressive countries of the world where production is highest and the need for transport the greatest, e.g. Western Europe and North America. The United States alone is estimated to have 66 per cent of the world's motor vehicles, and of this number 14 per cent are commercial vehicles. Partly because the cost of providing roads for heavy traffic is only one-tenth that of railroad construction and partly because the initial outlay on motor vehicles is considerably less than for railway rolling stock, motor transport is found to meet the needs of those countries where production has not yet reached the stage at which the expense of constructing railways has become worth while, e.g. in India and in backward areas of temperate regions occupied by progressive Europeans.

**Inland Water Transport versus Land Transport.**

Water transport between points inland is slower, less intercommunicable, but cheaper, than land transport. It is slower because the cost of increasing the rate of speed is greater on water than on **land. On** many inland waterways, both natural and artificial, delays arise owing to the necessity of passing through locks, and

also vessels have to proceed very slowly in order to avoid setting up a " wash " and so damaging the banks. Canal barges hauled by horses seldom go faster than two to three miles per hour, and liners passing through ship canals are generally towed, instead of proceeding under their own power, e.g. at four to six miles per hour through the Suez Canal. Land transport is more flexible than carriage by water, because inland waterways often have to take roundabout routes in order to avoid too many changes of level. It is only in lowland regions, having many lakes and slow-moving rivers, with an abundant and regular flow of water, that canal systems can be laid out so as to make the carriage of goods by water possible in any direction. The cheapness of water transport, compared with land transport, is the result of several factors. Rivers and lakes provide a ready-made highway, and the right to navigate them is often free. In Britain the cost of constructing and maintaining canals suitable for use by 250-ton lighters, though greater than that for roads, is only little less than for railways costing £30,000 per mile. Another important advantage is cheapness of operation, because, work for work, less power is needed for boats than for road or railway vehicles. At the speed of one foot per second, one horse-power can move, in round figures, a load of 1,000 lb. on a good road, 10,000 lb. on a steam railway, and 60,000 lb. on water, which, being a fluid, offers little resistance to movement. Three other factors contribute to the comparative cheapness of water transport: tonnage for tonnage, fewer and less highly-paid transport workers are needed, the cost of building vessels is lower as compared with land vehicles, and since accidents are fewer the cost of insuring goods sent by water is lower. Water transport is thus especially suitable for the conveyance of heavy, non-perishable goods in bulk in cases where quick delivery is not an essential consideration, e.g. coal, grain, minerals, timber. On the Great Lakes of North America cargoes up to 14,000 tons are carried on specially-built ore or grain boats. By means of special loading and unloading devices, e.g. chutes, grab buckets, suction plants, such boats can be loaded or discharged in six to twelve hours without their cargoes being handled by labourers. Forty-eight million tons, or twice that for the Panama and half as much again as for the Suez Canal, passed through the Sault Ste Marie Canals, North America, in 1935. Barge trains, consisting of four or five boats, and carrying a total of 5,000 to 6,000 tons, ply regularly

to and fro on the lower and middle reaches of the Rhine. In England, on the Aire and Calder Canal, trains of barges having special 40-ton compartments which can be transferred bodily from rail to barge, carry coal from the Yorkshire coalfields to the Humber ports. In the highly-productive lowlands of advanced countries, e.g. of Prance, Holland, Belgium, Germany, North America, inland water transport provides a valuable complementary service to that performed by the railways. The northern lowlands of Europe have an intricate system of more than 160,000 miles of navigable rivers and canals. In 1935 Germany's inland waterways carried over 101,369,000 tons, or about one-quarter of the tonnage carried by the railways. Canal transport, except in Holland, does not compete with road transport to anything like the same extent as with railways. In the densely-peopled lowlands of backward countries, e.g. China and Northern India, where railway systems have not been extensively developed, inland waterways are of the greatest importance as carriers of commerce.

### Transport Facilities as a Factor in the Location and Growth of Inland Centres of Population.

The existence or lack of facilities for transport have been from the earliest times, and probably always will be, a factor of considerable importance in determining the location of industrial, commercial, and even political and purely residential inland centres. Under present-day conditions there are few localities which are capable of supplying all the needs of their inhabitants from their own resources. In civilized countries many of the necessities as well as luxuries of life have to be imported. Life has become directly and inevitably dependent upon trade to a greater or lesser extent, and without transport trade would not be possible Broadly speaking, the highways along which traffic moves are not mathematical lines but wide bands having not points but areas for their terminals. Main or trunk traffic ways are fed by subsidiaries. Studied in relation to topographic and geological features, the reasons in physical nature for the particular courses which these traffic-route belts take are revealed. It is along these traffic-route belts that most of our inland centres have arisen during the course of time. Local, physical and human conditions, as well as considerations related to transport, determine the actual sites of settlements inside these belts. Towns

have arisen where two or more inland water, road, or rail traffic routes meet, and where changes in the mode of transport become necessary, e.g. from ocean vessel to river boats (London, Hamburg), from larger river or lake craft to smaller canal barges (Buffalo, U.S.A.), from water to land transport where breaks in navigation occur (Assuan, Egypt). Some towns have arisen where water and land routes cross the frontier from one political unit to another. This is especially so where different gauges of railways necessitate the transference of goods. Ease of access to other parts of a country is one of the characteristic features of political capitals, e.g. Madrid, Berlin. There is also a close connection between transport facilities and the density of population in our industrial areas. Where such facilities are inadequate, people must live near their work, and hence we find congested areas of population. Garden cities and residential suburbs have grown up round our industrial centres, wherever it has been made conveniently possible for people to travel to and fro between their places of residence and of work. Improved transport facilities tend to promote an even distribution of population.

NOTE. Questions, Exercises, and Topics for Discussion are given after Chapter XV.

CHAPTER XIV

# WORLD TRANSPORT AND COMMUNICATIONS (II)

## OCEAN TRANSPORT. SEAWAYS AND SEA-BORNE TRADE

### Introduction,

FOR many centuries after man had mastered the art of navigating inland waters, and later the narrow seas, the oceans remained almost impassable barriers to movement. Not until the maritime peoples of Europe had learnt how to build the right kind of ocean-going ship and had improved their instruments and methods of navigation so as to be able to lay off a course and follow it with a fair degree of precision did the crossing of oceans become practicable. Only since the " Age of Discovery," some five hundred years ago, have the oceans become a help rather than a hindrance to the movement of people and commodities. It has been said that the growth of western civilization has been closely bound up with the progressive utilization of larger and larger masses of water, especially during the last hundred years or so when the evolution of ocean-going vessels has been most rapid. The characteristics of ocean transport, cheap but slow carriage of goods in bulk, have been anticipated to some degree in the preceding section dealing with inland water transport. The cost of shipping wheat from Montreal to Liverpool is about 0-06d. per ton per mile, compared with 20·3d. per ton per mile by rail in England. Moreover, a cargo boat could carry a load of 8,000 to 10,000 tons compared with a train's load of 500 to 600 tons. Many factors have contributed to the comparative cheapness of ocean transport as it is to-day. The oceans provide a ready-made highway, traversible in almost all directions. Because this highway is free, except in some territorial waters, to all nations having an outlet to the sea, the ships of all maritime nations compete for the ocean-borne freights of the world, and consequently shipping rates are, broadly speaking, world rates. To avoid undue competition, many shipping companies have united in what are called

*Shipping Conferences*, which from time to time fix the rates for sea carriage by their members along most of the main ocean traffic routes of the world. It is because of this same element of world-wide competition that shipbuilders have been spurred on to increase the carrying capacity and to reduce the running costs of vessels by improving their design and method of propulsion. Only by such means can ocean transport be made most profitable. The cost of operating a large boat is proportionately less than that for a smaller one. Greater speed makes possible a greater number of voyages, and improved means of propulsion further lower running costs. Two factors appear to limit the size of vessels: harbour accommodation and the available forms of propulsive powers. Whereas in the past attention has been paid to the increase in size and tonnage rather than speed of vessels, in recent years the reverse is the case, since the number of world ports capable of docking large vessels has been reduced almost to a minimum consistent with the needs of world trade by sea. The tendency in the past has been for ports to conform or submit to the size of vessels. Nowadays the tendency is for vessels to conform to the physical limits, e.g. depth of water and turning room of the principal ports they use. The bulk of the world's sea traffic is carried by vessels with a length of from 400 to 500 ft. and needing from 20 to 25 ft. depth of water.

**Sailing Ships versus Steamers.**

Wooden sailing ships of about 500 tons carried the world's ocean trade in 1824. By 1924 the proportion of the world's ocean traffic carried by sailing vessels, including those fitted with auxiliary steam or oil power, had become almost insignificant. For carrying timber, grain, ores, nitrates, oil, and other bulky, imperishable, or offensive cargoes, where speed of passage is not essential, sailing ships are still used between the ports of North and South America and between the ports round the North Sea. The majority of the world's sailing ships are engaged in short trip and coastwise trade, but a little trans-oceanic trade between Europe, South America, and the Far East is still done by sailing vessels. Size for size, compared with sailing ships as units of traffic, steamers have the advantages of greater strength and lightness, 25 to 30 per cent greater carrying capacity, higher speed, propulsion under their own power, and easier

control. Since the length of a voyage by a steamer is conditioned by its bunkering capacity, refuelling stations have had to be provided along and at the terminals of the steamship routes of the world. Steamers thus offer a quicker and more reliable service than sailing vessels.

**Oil versus Coal.**

The increase in the size and speed of steamers has been achieved very largely at the expense of an increased consumption of coal, and thus bunker space has had to be increased by reducing cargo space. Many ways have been tried in order to obtain economy of fuel without sacrificing the carrying capacity or speed of steam vessels. By means of triple or quadruple expansion engines in which the steam is passed successively through three or four cylinders so as to act on the pistons and make the greatest use of its expansive force, and of turbine engines, in which steam is made to impinge at high pressure continuously on a series of blades fixed to a revolving drum, the consumption of coal has been reduced from 7 lb. to about 0-69 lb. per indicated horse-power during the last fifty years. Since 1920 a number of steamers have been equipped for the use of oil fuel for steam raising. Although oil is dearer than coal, it has many advantages. To replenish a vessel with oil fuel is less costly, cleaner, and takes only a quarter the time needed to bunker with coal. The working, that is the profit-earning, life of a vessel is thus increased. As oil takes up, weight for weight, little more than half the room needed for coal, and is capable of being stored in parts of a vessel where coal could not be bunkered, the cargo space of a vessel is increased correspondingly. Compared with a coal-fired ship, an oil-burning vessel needs fewer engine-room staff, and consequently their wages and accommodation space are saved. Against these advantages must be placed the disadvantage of the higher cost of installing oil-burning marine engines. Varying according to the cost of oil fuel compared with that of bunker coal, the all-round gain in running efficiency of an oil-burning steamer has been estimated at 30 per cent. During recent years a number of motor-ships, equipped with internal combustion engines, have been built. In addition to the advantages associated with the use of oil fuel, it is claimed that, tonnage for tonnage, these vessels are more cheaply operated than oil-burning steam vessels.

**Organization of Ocean Shipping.**

As with land transport, ocean transport has been specialized to handle different kinds of traffic. On land specialization has taken the form of different kinds of transport media, on sea the same unit has been adapted to perform different services. Fast passenger liners ply regularly between the leading ports of the world. For them the carrying of cargoes is a secondary consideration. They do carry mails, bullion, and package goods, whose value is high in comparison with their weight or bulk. Less speedy and less expensive freight liners also regularly travel along definite routes, linking ports less frequented by passengers but offering mixed cargoes of agricultural commodities or manufactured articles requiring quick transport. A number of these freight liners are fitted with refrigerating apparatus for the carriage of frozen meat, butter, and fresh fruit. They are often owned by the passenger liner companies. Private lines of vessels used exclusively in their owner's business are also engaged in the regular carriage of fruit, meat, oil, coal, e.g. the fleet of oil tankers owned by the Eagle Oil Transport Co., Ltd. A fourth class of ocean shipping operated upon a definite time schedule are the vessels belonging to railway companies, e.g. the Canadian Pacific Railway, whose boats ply on the North Atlantic and Pacific Oceans, the Southern Railway's cross-Channel services, and the London and North-Eastern Railway's train ferry service between Harwich and Flushing. It is estimated that from 70 to 75 per cent of British ships operate upon a liner basis. These ships, while retaining the greater part of the world's passenger traffic, also offer special inducements to shippers of parcels of manufactured goods, such as textiles, small machinery, and hardware.

Tramp steamers handle by far the greater part of the world's raw materials and heavy manufactured goods sent by sea, e.g. textile fibres, cereals, ores, timber, and railway materials. As their name implies, they keep to no regular routes or time table, but work from port to port wherever cargoes can be picked up. These vessels, sometimes as large as small liners, are specially designed for seaworthiness and for the economical carriage of very bulky manufactured goods or raw commodities of low value in proportion to their weight. Competition for freights in the world's markets is keen, and the running costs of tramps are kept as low as possible. They **are** less speedy than liner vessels. A tramp's movements may be

directed by its owners or their agents, the shippers of the cargoes, or even left to the discretion of its captain, who endeavours to avoid unprofitable voyages in ballast.

**An Example of a Voyage by a Tramp Steamer.**

In June our tramp steamer is chartered at Glasgow, North Britain, to take on a full load of railway material for Calcutta, India. To be economically laden and seaworthy with such a deadweight cargo, any tramp would not be able to carry a large amount of fuel. Happily, the route to Calcutta, via Cape or Suez, is well supplied with coaling stations. Arriving at Calcutta, through Lloyd's agents it contracts to carry a consignment of gunnies to Sydney, N.S.W., Australia. A light measurement cargo of this kind, combined with the large bunkering of coal for the long voyage, would enable the captain to make the most of the full carrying capacity of his ship. Since the wool clip, for the baling of which the gunny (jute cloth) is required, is not yet coming forward for shipment, our tramp proceeds in ballast to the neighbouring port of Newcastle, whence it clears with coal for Valparaiso, Chile. Chile possesses poor coal deposits, and the captain would be fairly certain to find a market for his cargo of coal, which had not been shipped to order like his previous cargoes. In addition, he would save loading time at Valparaiso by not having to refuel his ship, and save a little expense, because even after allowing for the cost of transport, the coal he kept on board for his own use would be cheaper than coal purchased in Valparaiso. Informed that a bumper wheat crop is coming forward for shipment at the Puget Sound ports of North America, the captain decides to proceed northwards instead of rounding Cape Horn in ballast to the Argentine, where freights are reported to be scarcer. The Puget Sound alternative also offers the added inducement of cheap bunker coal from the coalfields situated near that district. A mixed cargo, including mining machinery, timber, and foodstuffs, is loaded at Valparaiso for Arica, North Chile. At this port the shipping agents report that nitrates and tin ore are being offered for shipment to San Francisco, U.S.A. The captain chooses tin ore, because it has weight without bulk, and can be used as ballast. The extra bunkering capacity required on the long voyage northward is thus maintained. It is a more profitable cargo to carry than nitrates, the only alternative freight available.

Moreover, if nitrates were carried, it would be necessary to clean the ship before loading other cargoes. This would involve both expense and delay. Leaving San Francisco in ballast, our tramp proceeds to the busy port of Vancouver, where a full load of wheat is taken on board for Liverpool, England, via Panama.

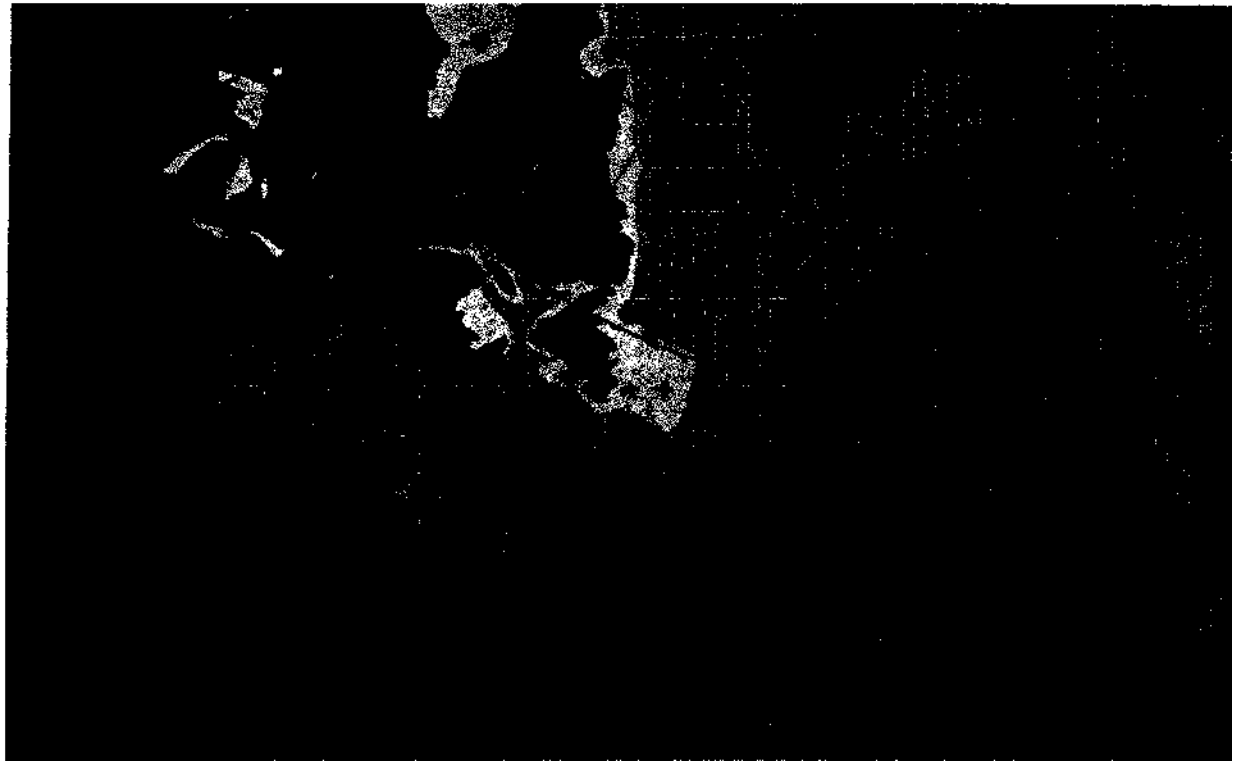
Such a round voyage would last about eight months, and only for a week or so would the vessel not be earning profits for its owners and probably commission for its captain. In addition to the chief cargoes and ports mentioned, it would probably put in at some intermediate ports to take up and set down miscellaneous cargoes. The vessel would also have to refuel at coaling stations along its route. The voyage, as a whole, illustrates some of the factors which dictate the route followed by a tramp steamer upon a particular voyage. It will be seen that as far as local circumstances permitted, the tramp was made to carry the maximum possible quantity or weight of goods in the cargo space it had available at each section of its voyage, and in the minimum of time.

**Ocean Shipping Routes, their** Characteristics and Layout.

The shipping routes commonly marked on maps in our atlases indicate more or less accurately the general direction of tracks which have been most frequently followed by a considerable amount of shipping during a fairly long period of time. Except for distances, they usually tell us little about the special characteristics of these routes, and may suggest that these lanes of ships' tracks are fixed like railway tracks, instead of being liable to changes at different times of the year and from time to time. The tracks used by liner services vary less widely and change their character more slowly than those followed by tramps—a tramp follows a different route for almost every voyage it makes. Whether passenger or cargo boat, the function of a vessel is to carry its human or material freight as a commercial proposition. Sometimes this object cannot be achieved without State subsidies or other forms of public or private assistance, e.g. contracts to carry mails, legislation restricting the employment of foreign shipping in a nation's coastwise trade.

**North Atlantic Route.**

On this route between Europe and the East Coast of North America, including the West Indies, nearly one quarter of the



*Photo*

FIG. 171. PORTION OF GLOBE SHOWING NORTH ATLANTIC SAILING TRACKS, JULY

Full-powered steamer tracks

+ + + Great circle through Faatnet and C. Hatteras + + +

tonnage of all trading vessels finds employment. From the point of view of the shipowner, this route offers a number of advantages. It offers favourable conditions for navigation. Since S.W. Ireland and the East Coast of the United States lie on an arc of a great circle, ships can almost make what is a direct and shortest possible voyage between the terminal ports on either side of the North Atlantic. Actually, shipping takes a somewhat longer and more southerly route, particularly in spring and summer, when the danger from floating ice and fog is greater between latitudes 40°-50° N. off Newfoundland and the mainland of North America. All the lanes of Transatlantic shipping knot up or branch off from a small area about four hundred miles S.E. of Cape Race. The North Atlantic ocean way, with the exception of Sable Island, often called the " Graveyard of the Atlantic." and the Virgin Rocks, is also devoid of scattered islands. On this route, too, while winds are usually strong, storms are infrequent, a state of affairs favourable to sailing vessels. For steamers and motor-ships there is abundant fuel on both sides of the Atlantic. This last circumstance is not altogether favourable to British shipping because on all other routes our pre-eminent export trade in coal gives us a decided advantage over foreign competition. Carrying coal cargoes on their outward voyages, British vessels can afford to quote lower rates for cargoes on their homeward voyages than would be the case if like many foreign vessels they had to make their homeward voyage contribute towards the cost of their outward voyage. Thus, in so far as direct traffic between Europe and North America is concerned, British and foreign vessels compete upon more or less equal terms. This is especially so as regards passenger traffic, which is exceptionally large on this ocean route. As regards the availability and character of cargoes coming forward for shipment between Europe and North America, the outlook for shipowners is less satisfactory. With the exception of cargoes of wood pulp and ores from Scandinavia and Spanish ores, Europe's shipments to America for the most part consist of manufactured and semi-manufactured goods of small weight or bulk in relation to their value. On the other hand, America sends to Europe moderate amounts of miscellaneous manufactures and considerable quantities of heavy or bulky raw materials and foodstuffs, such as cotton, grain, and lead. As a result, about three times more shipping space is required

to **bring** American cargoes to Europe than to carry Europe's goods to America. Consequently, many vessels must make the direct westward voyage in ballast or only partly loaded. To some extent **this** uneconomic use of shipping is avoided in the case of British shipping by making triangular voyages—England to the East Coast of South America (a route on which exported British coal is in demand), South America to the East Coast of U.S.A. (carrying coffee and miscellaneous cargoes), and then back to Europe with American and Canadian goods.

### North Atlantic via the Mediterranean to India and the Far East.

As regards the employment of shipping tonnage, this mid-world route is even more important than the North Transatlantic seaway. At its busiest time of the year when cargoes such as wheat, oilseeds, and rice are coming forward for shipment from India, Burma, and S.E. Asia, about one-third of Britain's shipping tonnage finds employment on this route.

This seaway links together not only countries differing in their stages of civilization and economic development but also countries inhabited by the bulk of the world's population. It is also well provided with fuelling depots, and is the best for stopping at intermediate ports of call. Because ships can easily coal it is possible **for** a vessel to adjust its bunkering space to suit the requirements for cargo space. The less bunker coal a vessel carries the greater its cargo space and, therefore, the greater its earning capacity. When cargoes are plentiful, a vessel can reduce its bunker space to a minimum and make frequent stops to refuel. When cargoes are scarce or freight rates low, a vessel can coal well, and so avoid the delay and expense of frequent stops to refuel.

The lands lying in the Mediterranean, Indian, and Far Eastern sections of this route provide on a vast scale and in great variety bulky raw materials and foodstuffs needed by the two great industrial and manufacturing regions of N.W. Europe and N.E. United States. On the other hand, the purchasing power of the peoples of the lands along this route is comparatively low and the volume of their imports is less than that of their exports. Consequently more shipping space is required for westward bound traffic than for that

going eastwards. This is especially so in the Indian, and only a little less so in the Far Eastern sections of this route.

Since the war some 3 to 5 per cent of Britain's tonnage, compared with some 10 to 12 per cent in pre-war years, has been employed in carrying outward bound cargoes of coal, and miscellaneous cargoes of textile and iron and steel manufactures from Britain and the adjoining industrial areas on the Continent to Mediterranean lands particularly Italy, Prance, and Egypt which import large quantities of coal. While some of this shipping finds return cargoes, principally of Mediterranean fruits and fruit products from Spain, Greece, and N. Africa, cotton and onions from Egypt, and transhipped goods at Marseilles, much of it goes in ballast to Black Sea ports for cargoes of barley and wheat. That which cannot find return cargoes either returns in ballast to the Atlantic or proceeds to the Indian Ocean via Suez to meet the demand for extra tonnage when Indian wheat and oilseeds and Burma rice comes forward for shipment. Oil tankers pass through the Mediterranean in ballast and return fully loaded from the Black Sea. Most of the shipping engaged in the trade of India and the Far East and about one quarter of that dealing with the Australasian trade also pass through the Mediterranean. Almost as much tonnage finds employment in handling traffic in the Indian Ocean as in the North Atlantic. Coal, cement, textiles, and iron and steel goods are the chief cargoes carried eastwards, and cargoes of cereals, oilseeds, manganese ore, tin, rubber, tea, fibres, hides and skins, and sugar westwards. More shipping tonnage is needed to carry the west-bound cargoes than the east-bound, particularly during March-April and December-January, when Indian wheat and Burmese rice are respectively ready for shipment. The need for additional tonnage for west-bound trade is satisfied in several ways. Many east-bound vessels carry measurement rather than deadweight cargoes, e.g. manufactured goods, which occupy more shipping space in proportion to their weight than deadweight cargoes, such as coal. Thus a tramp taking out 500 tons of rice mill plant or railway rolling stock to Burma could return with a greater tonnage of rice. Mention has already been made of a stream of shipping arriving in ballast via Suez and a somewhat greater quantity of shipping enters the Indian Ocean by the Cape of Good Hope route. Vessels making indirect voyages also swell the total of tonnage available for carrying west-bound traffic.

On the Indian Ocean section as on the Mediterranean section passengers and most package goods are carried by liner services and mineral oil is mostly shipped in oil tankers. Both Par Eastern and Australasian shipping traverse this section of the route and handle intermediate passenger and goods traffic.

On the Far Eastern section less than half the amount of shipping tonnage used on the Indian section is required to handle the post-war seaborne trade of China and Japan. East-bound vessels carry cargoes such as textiles, manufactures, metal goods, cement, chemicals, and even coal from Europe, and cotton and rice from India, and return westwards loaded with soya beans, eggs, plaiting straw, vegetable fibres and silks for Europe, cotton yarn and tissues for India, and even Japanese bunker coal as far as the East Indies and the Indian Ocean. That part of this section lying between Hong-Kong and Yokahama also forms part of the Northern Transpacific route. Ports north of Hong-Kong and Manila are nearer to the east coast of N. America via Panama than via Suez, and there is a tendency for outward bound traffic from the east coast of America to go via Panama and to return home via Suez. The opening of the Panama Canal has not appreciably affected the flow of shipping from Europe to the Far East. Yokahama is indeed 700 miles nearer to Europe via Panama than via Suez, but the attractions of being able to coal at frequent intervals and to secure cargoes on the Indian Ocean and South China Sea are sufficient to outweigh the disadvantages of the longer steaming distance via Suez or even via the Cape of Good Hops.

**The Suez Canal.**

The opening of the Suez Canal in 1869, at the beginning of the era of steam navigation, resulted in many important changes of sea routes and assisted that rapid expansion of seaborne world trade which is a feature of the second half of the nineteenth century. Compared with the Cape Route from the N. Atlantic to the Indian Ocean and beyond, the saving of steamship distances, with the consequent advantages of journeying-time saved, reduced costs of voyages, convenience to merchants and travellers and greater mobility of shipping, was considerable; e.g. from London the distance to Bombay was reduced from 10,807 miles to 6,260, to Hong-Kong from 12,737 miles to 9,688, to Fremantle from 10,900 miles to 9,340

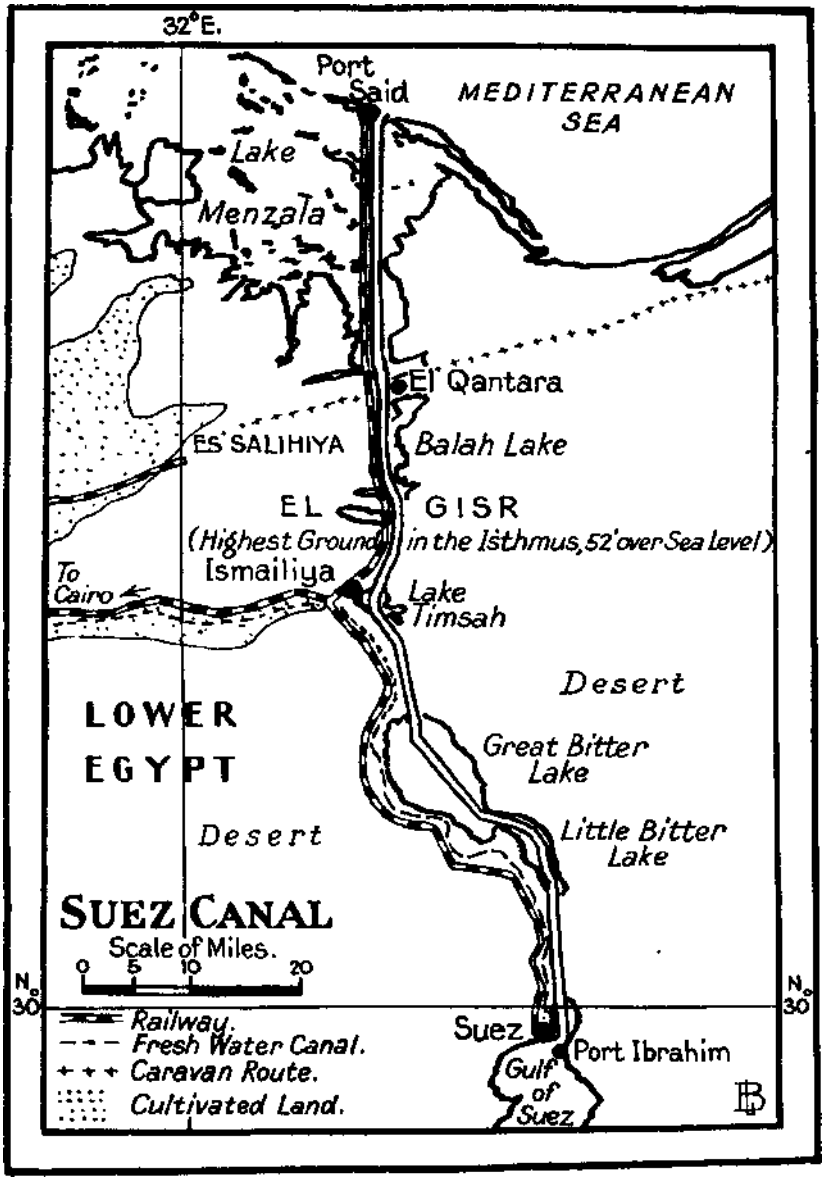



FIG. 172. SUEZ CANAL

**miles. The advantages arising out of the new routes via Suez were of the highest consequence to British shipping and Empire communications. The re-routing of shipping was accompanied by a less marked redistribution of traffic. Mediterranean ports, especially Marseilles, benefited at the expense of London and North Sea ports. Owing to the simultaneous expansion of traffic, however, the entrepot trade of London, though diminished in proportion to that of Marseilles, did not decrease in the actual aggregate. From 486 vessels totalling 437,000 tons of shipping in 1870, the Canal traffic has increased to almost twelve times the number of vessels, representing over sixty times the amount of shipping tonnage at the present time. The quantity of merchandise passing through the Canal shows a corresponding increase. In 1936 the total traffic passing through the Canal in both directions was 32·3 million net tons of shipping, carrying 25·5 million tons of cargo.**

**It has been estimated that pure cargo vessels loaded to their full capacity are capable of carrying twice the weight of their net tonnage. The fact that the net tonnage of the vessels passing through the Suez Canal is about the same as the weight of merchandise transported is accounted for by the fact that of all the ships using the canal only about 70 per cent of the vessels representing the same percentage of the total net tonnage are merchant vessels loaded with cargo. Cargo vessels in ballast, warships, transports, government chartered vessels, and mail steamers carrying some cargo as well as passengers, make up the balance. Some 14 million tons of shipping thus carry most of the 25 million tons as against an estimated possible 64 million tons of cargo. This is largely the case because many cargo vessels going East have already deposited part of their cargoes and are no longer fully laden on reaching Port Said. East-bound vessels also carry a much greater proportion of comparatively light weight, bulky in measurement cargoes of miscellaneous manufactured goods. On the average, shipping proceeding through the Canal from North to South carry rather less than half their estimated possible cargo tonnage, while those going in the reverse direction are almost full to capacity. The character of the merchandise passing through the Canal is shown on page 387 in the table for 1925, a representative year.**

**Of the shipping engaged in carrying merchandise, 1036, approximately 58 per cent is owned in Britain, 11 per cent in Holland, 8**

SUEZ CANAL TRAFFIC
(Merchandise, 1925)

| North to South. East-bound | | South to North West-bound | |
|---|---|---|---|
| Goods | Million tons | Goods | Million tons |
| Miscellaneous manufacturos | 3-6 | Cereals (wheat, rice, others) | 3-9 |
| Iron, steel and machinery | 2-5 | Oil seeds (copra, ground nut, soya beans) | 3-4 |
| Coal | 0-7 | Mineral oil (unrefined) | 2-7 |
| Salt | 0-5 | Fibres and textiles (jute, cotton, wool) | 2 1 |
| Manures | 0-4 | Manganese and other minerals | 1-5 |
| Cement | 0-4 | Sugar(cane) | 0-6 |
| Petroleum | 0-3 | Rubber | 0-5 |
| Wood pulp and paper | 0-2 | Tea | 0-4 |
| Sugar (beet) | 0-1 | Others, including cast-iron, timber, fruit, frozen meat, objets d'art, carpets | 2-7 |
| Total (metric tons) | 8-8 | Total (metric tons) | 17-7 |

per cent in Germany, 7 per cent in France, 5 per cent in Italy, 4 per cent in Japan, and 3 per cent in the United States. Over 97 per cent of the total shipping tonnage using the Canal is owned in Europe and N. America, and since 1920 the proportion of U.S.A. shipping, and since 1935, Italian shipping has tended to increase.

Although the Suez Canal lies entirely in Egyptian territory and is the property of the Compagnie Uni\erselle du Canal Maritime de Suez, an Egyptian company, by a Convention of 1888 it is exempted from any blockade and vessels of all nations, whether armed or not, are allowed to pass through it in times of peace or war. The British Government own about 45 per cent of the shares and when the British Protectorate over Egypt was, by agreement, relinquished in **1922** the right of Britain to garrison the Canal was reserved under the Egyptian Constitutions, 1922-23

### The Cape Route from the North Atlantic to India, the Far East and Australia.

**This route** has two terminals in the North Altantic, N.W. Europe, **and the N.E. seaboard of** N. America, and three terminals east **of the Cape, the ports of the** Bay of Bengal, of the East Indies and

Orient, and of Australia and New Zealand. Unlike the group of seaways using the alternative route via Suez, the seaway of steam **and** sail shipping which knot up off the Cape pass over vast expanses of oceans, and link together countries which for the most part are of comparatively recent economic development. The great length of the sea passages combined with the planetary wind systems of the Atlantic and Antarctic Oceans, and seasonal winds in the Indian Ocean, provide very favourable conditions for sailing vessels, and help to explain the pre-eminent survival to this day of sailing vessels on this route, e.g. those engaged in carrying timber, oil, rice, and copra from Burma and the East Indies, and wool, hides, and wheat from Australia and New Zealand. The alternative route via Suez has always been used almost exclusively by self-propelled vessels because the Suez Canal itself and the Red Sea lie within the tropical belt of calms and light winds Compared with the Suez route, the Cape route has the disadvantages of fewer ports of call, fuelling stations at longer intervals and less favourable weather conditions. Although the sea passages to Australia and New Zealand are only a few hundred miles shorter via Suez than via the Cape, the latter route is some 4,000 miles longer for shipping bound to and from India and the Far East. The tracks of sailing and self-propelled vessels converge as they round the Cape, but elsewhere along their great lengths they differ widely. For sailing ships a circuitous route where winds and currents are favourable is often a quicker way than a more direct and shorter route. The set of prevailing and seasonal winds explains the curved windings of sailing tracks. Self-propelled vessels usually lay off their courses in almost straight lines so as to make the shortest voyage between points. The cost of operating steamers and motor ships, refuelling facilities and the possibilities of securing freights are more important considerations than winds and currents. It does sometimes happen that even self-propelled vessels find a roundabout voyage the more worth while. Of the 15 per cent of Britain's ocean tonnage engaged in the Australasian trade, about 75 per cent of the outward bound traffic, transporting goods such as textiles, hardware, machinery, and also immigrant passengers, and 50 per cent of the homeward bound tonnage carrying wool, wheat, and minerals, use the longer Cape route in preference to the shorter Suez route. For the larger, more seaworthy, and more powerful vessels of to-day, the saving of canal dues and the time

which would be lost in making the slow passage of the canal outweigh the advantages of the shorter voyage. The traffic via Suez consists mainly of mails, passengers, package and perishable goods, and refrigerated cargoes of meat and fruit. While the traffic between N.W. Europe and Australia via the Cape continues to increase, the much smaller volume of traffic between the eastern seaboard of the United States and Australia has in post-war years tended to decrease. America's expanding exports principally of agricultural and mining machinery, lumber and oils, and imports of wool and hides are being shipped more and more via the Panama Canal.

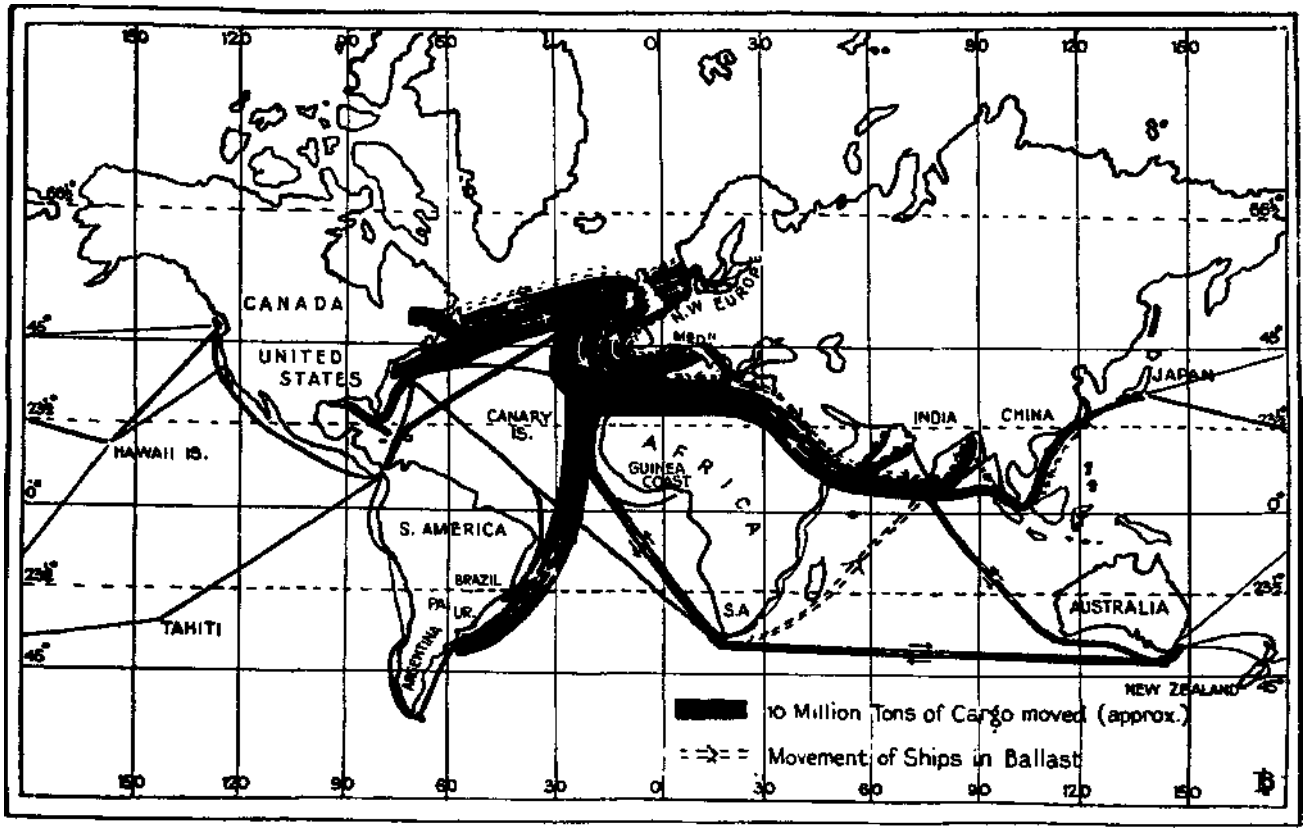
It will be seen from the table below that while the opening of the Panama route has brought the eastern seaboard of North America considerably nearer to Australia and New Zealand, it has only in a minor, but still important, degree shortened the distance from N.W. Europe to Australia and New Zealand.

OCEAN DISTANCES

**(In nautical miles)**

| FROM | Sydney, N.S.W. via | | | Melbourne via | | | Wellington, N.Z. via | | |
|---|---|---|---|---|---|---|---|---|---|
| | Suez | Cape | Panama | Suez | Cape | Panama | Suez | Cape | Panama |
| Liverpool | 12,036 | 12,042 | 12,405 | 11,461 | 12,365 | 12,749 | 12,951 | 13,854 | 12,261 |
| New York . | 13,960 | 13,740 | 9,930 | 13,386 | 13,163 | 10,392 | 14,441 | 14,334 | 8,850 |

A second and much smaller traffic division rounding the Cape is that of vessels bound from Europe and the eastern seaboard of U.S.A. for S.E. Asia via Sunda Straits. About half of the American tonnage is engaged in carrying petroleum, the remainder, like British shipping, carrying miscellaneous manufactured goods to the East Indies and S.E. Asia. Common return cargoes are sugar and tea from Java, rice from Siam, hemp from the Philippines, copra and tea from Singapore. The opening of the Panama Canal effected no shortening of the distance between Europe and Asia or between the **east coast of N.** America and the seaboard of Asia from Hong-Kong **southwards.** This division **of** traffic is not likely to be greatly **diverted** from its present tracks. Even the gain in distance via **Panama from** New York to Shanghai is hardly sufficient to divert **traffio** between these ports from the more profitable route **via the Indian Ocean.**


CANADA
UNITED STATES
HAWAII IS.
TAHITI
CANARY IS.
GUINEA COAST
S. AMERICA
BRAZIL
ARGENTINA
S.A
INDIA
CHINA
JAPAN
AUSTRALIA
NEW ZEALAND
10 Million Tons of Cargo moved (approx.)
Movement of Ships in Ballast

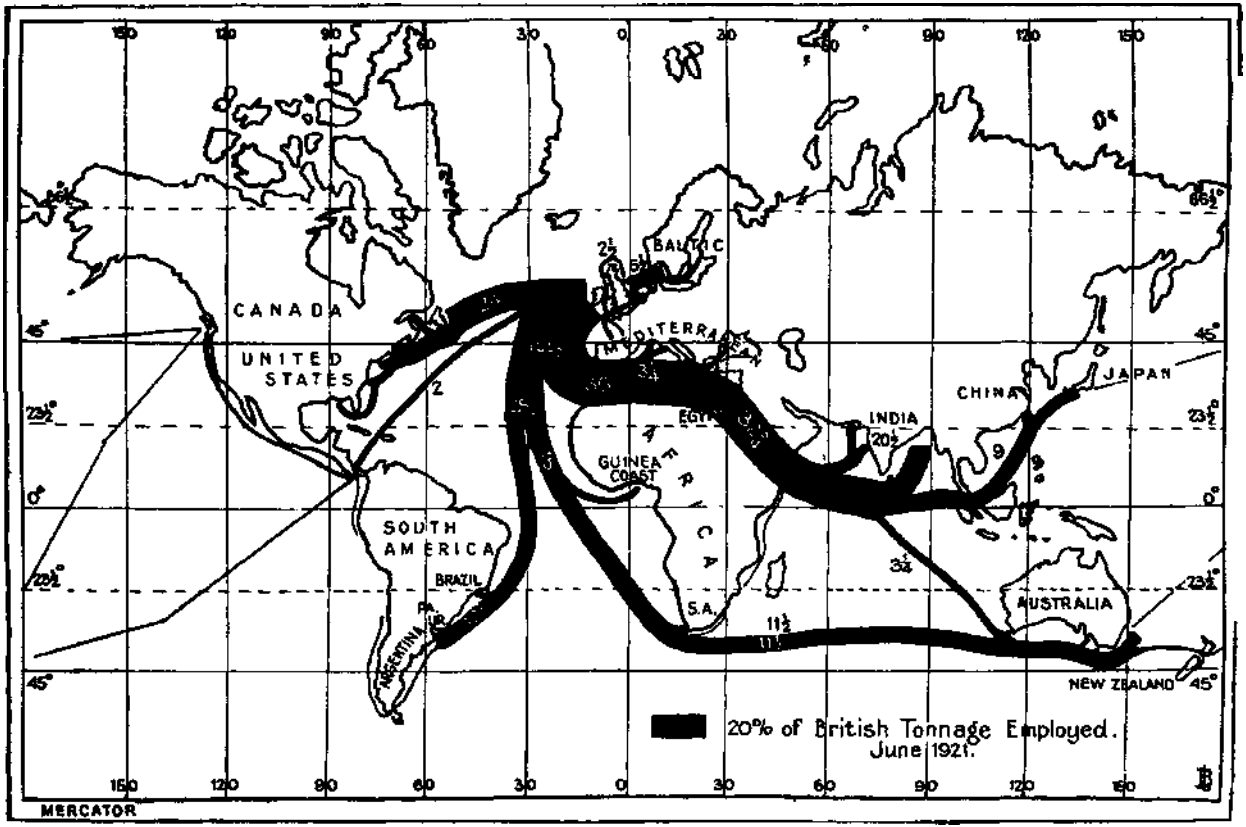



FIG. 174. EMPLOYMENT OF BRITISH SHIPPING TONNAGE

The third group of shipping engaged in the South African trade converges from the N. Atlantic upon Cape Town. Prior to 1922 South African trade was exceptional in character. As with other sparsely populated countries of recent economic development, an export trade in bulky raw materials in return for imports of manufactured goods might have been looked for. Such was not so in the case of S. Africa which imported large quantities of bulk goods such as grain, timber, and machinery, and exported package and parcel commodities such as gold, diamonds, wool, gums, tanning materials, and ostrich feathers, which required a much smaller amount of shipping tonnage than did the imports. Consequently much of the shipping discharging at the ports of the Union of S. Africa dispersed in ballast in search of return cargoes which were usually obtainable at the ports of India, Australia, and the east coast of S. America respectively, in order of importance. The balance of trade has now changed, and South African exports tend to be bulkier than her imports, because the exports of coal for cargo and bunker purposes and of maize have increased during the last ten years approximately from two to four million tons, and from ten to five hundred thousand tons respectively. Less shipping now therefore disperses in ballast.

### Other Transatlantic Routes.

The trackways of shipping engaged in transatlantic traffic fall into three main groups, those linking together Europe and North America, Europe and South America, and the two Americas. While passenger and mail traffic is mainly confined to its own particular group of seaways, cargo vessels tend to make triangular voyages between Europe and the Americas except when the seasonal demand for tonnage to handle the grain and cotton harvests of the Americas makes it profitable for cargo boats to make the outward voyages direct to the River Plate, the " Gulf " ports, and the St. Lawrence. Regular lines of vessels engaged in carrying specialized cargoes also make direct voyages, e.g. those engaged in the Argentine meat trade, the West Indian fruit trade, and in transporting oil in tankers from U.S.A. ports.

### South Atlantic, Europe to South America.

Of Britain's post-war tonnage approximately 15 per cent, or a

**little more than half that engaged in the North Transatlantic traffic, finds employment in transporting goods and passengers between Europe and the east coast of S. America. Following upon the development of steam navigation and improved facilities for carrying perishable commodities, e.g. meat, during the last half century this ocean way has developed until it is now the third heaviest traffic sea route in the world. Several reasons account for the differences in the volume of traffic between North and South America and Europe. Compared with North America, in South America the extra-tropical area settled by Europeans is only about half that of the Northern continent, the density of population of that area is only about one-fifth, and the lack of fuel resources restricts the development of manufacturing industries to those connected with the preparation of agricultural products. In character the traffic is what might be anticipated between temperate Europe and tropical S. America, and between the recently settled temperate countries of S. America engaged in primary production and the manufacturing areas of N.W. Europe. Except in three respects the traffic on this route resembles that between Europe and N. America. Europe chiefly exports to S. America coal, cotton, woollen, iron and steel manufactures, chemicals, cement, and china ware in return principally for grains, meat, wool, hides and skins, linseed and tanning materials from the temperate and subtropical Parana Paraguay region, and coffee from tropical Brazil. The three differences referred to are the much smaller passenger traffic in which emigrants from Southern rather than Northern Europe predominate, the large coal trade of which Britain alone provides over two million tons a year, and the absence in South American exports of miscellaneous manufactures which find a place in North American exports. It has been estimated that ships making the direct voyage outward from Europe and all vessels returning to Europe are more fully loaded than the shipping on any other route in the world. The marked lack of return cargoes from Brazil is compensated by the excess of tonnage available at the River Plate ports. So great is the tonnage of goods coming forward for shipment from the ports of Argentine and Uruguay that much additional shipping arriving lightly loaded or in ballast from S. Africa and the Pacific coast of S. America finds employment and helps to swell the stream of heavily loaded shipping proceeding to Europe.**

**North and South America.**

Although the post-war traffic between the Atlantic ports of North and South America is nearly double that of pre-war days, it is still small compared with the transatlantic traffic taking place between Europe and S. America. The trade of countries of the Atlantic seaboard of S. America is predominantly with European countries. Their trade with the United Kingdom alone is about twice as great as that with N. America, principally with the United States. The trade between the two Americas is very similar in character to that between Europe and S. America, except that in the list of exports from the United States petroleum largely takes the place of coal, automobiles replace railway material, and timber is an important item. Ordinary passenger traffic is small, immigrant traffic almost negligible.

**Seaways of the Pacific Ocean.**

The seaways of this vast watery desert with an area greater than the total land surface of the world are of comparatively recent origin. They were called into being about the middle of the nineteenth century when the mining regions of the then isolated Pacific States of N. America were opened up, and when in 1854 Japan opened her ports to the world's shipping. Unlike the Atlantic and Indian Oceans, the Pacific Ocean has thus, whaling vessels excepted, never had a sailing ship era. The vast zones of equatorial calms, baffling winds off the N.W. coast of S. America, and terrific westerly storms in the Straits of Magellan, together with the fact that the lands surrounding the Pacific had little traffic to offer each other, help to account for the late development of Pacific routes which took place during the epoch of steamships. In fact, a steamship service was established between the Isthmus of Panama and the ports of the west coast of S. America as far south as Peru before steamers regularly traversed the Atlantic. To this day the lands bordering the Pacific have surprisingly little to do with it. With the one exception of the route linking together Sydney, N.S.W., Australia, and Wellington, N.Z., with Vancouver, Canada, and San Francisco, U.S.A., all the shipping routes skirt rather than cross the Ocean, and traffic flows in and out of the Pacific Ocean to the Atlantic and Indian Oceans rather than across it from one side to the other as in the North Atlantic. With coalfields near Puget

Sound, N. America, in S. Japan, S.E. Australia, W. New Zealand, and in Central Chile, and oilfields in California and the Dutch East Indies, fuelling facilities are fairly satisfactory. Although it is the customary practice for steamers to make transpacific voyages without refuelling, steamers can refuel if need be at coaling stations established on mid-Pacific islands at Honolulu, Suva, and Tahiti, near the steamer tracks. As in the other oceans of commercial importance, the customary tracks used by sailing ships in the Pacific Ocean reflect the influence of the planetary winds and ocean currents. The same route is seldom used both for the outward and homeward voyage. The sailing vessels carrying timber and petroleum from the Pacific coast of N. America to China and Japan make use of the trade winds and return eastwards with the " Westerlies " along a northern course. The summer route followed by sailing vessels going from San Francisco to Callao is especially noticeable for its windings and lengthy detours. Using the North-east Trades winds, vessels go almost due south to the Equator, then swing out west and southwards by some thousands of miles across the S.E. Trades, until the north-westerly wind belt is reached and an easterly course to S. America becomes possible. In an ocean as vast as the Pacific, great circle sailing is a very important factor in the location of steamer tracks, especially in the N. Pacific where the terminal regions lie far apart and in about the same latitudes. As far as the position of the land masses permit the actual tracks of steamers voyaging between N. America and the Far East make use of arcs of great circles modified in summer and winter to suit seasonal sea and weather conditions as in the N. Atlantic. The arc of a great circle between Panama and Hong-Kong actually passes over land via Mexico and California to the Pacific, passes just south of the Aleutian Islands to Yokohama and thence with a slight deviation to the west to Hong-Kong. Even allowing for the necessary longer coasting route from Panama to San Francisco before great circle steaming can be undertaken, this route is nearly 1,000 miles shorter than the alternative way via Honolulu—a route which a Mercator map might wrongly suggest was the shorter. The shortest transpacific route from N. America to the Far East is along a modified arc uniting Prince Rupert, British Columbia, and Yokohama.

Since the war, between two and two and a half million tons of shipping, mostly American, British, Japanese, and Canadian, have

used the N. Pacific trunk seaways, carrying mostly bulk cargoes of raw cotton, lumber, prepared foods, including tinned meat and salmon, flour, iron and steel goods, textiles and petroleum westwards and returning with lighter cargoes of silk, soya beans, oil, woven silk, toys, tinned crab, and tea from Japan, hides and skins, bristles and furs from China, hemp, copra, sugar, rubber, and rice from the Philippine Islands, S.E. Asia, and the East Indies. On both sides of the North Pacific there is a fair amount of coastwise traffic. The great entrepot ports of Yokohama, Shanghai, Hong-Kong, Singapore, and Manilla serve as bases for this traffic on the west coast of the Pacific. On the eastern seaboard there is a small but steady flow of traffic between Juneau and Skagway, and the Puget Sound ports and San Francisco. This last port also handles the bulk of the traffic between U.S.A. and its dependency Hawaii, and is, with Vancouver, a terminal port of traffic from the Pacific coast of N. America via Panama to the Atlantic coast of that continent and also to Europe.

In the S. Pacific, Australasia and S. America have very little to do with the Pacific Ocean. With the exception of a small mail, passenger, and light freight traffic between Australia and New Zealand and British Columbia and the east coast of U S.A. via Panama, most of Australia's traffic moves westwards across the Indian Ocean. This traffic has already been mentioned in a previous section. Similarly the traffic arising on the Pacific coast of S. America mostly avoids the Pacific and enters the Atlantic via Panama or via Cape Horn. Heavy traffic, both sail and steam, chiefly in nitrates, copper ore, hides, wool, and tobacco from Chile in return for clothing, machinery, and miscellaneous manufactured goods from Europe and the Atlantic coast of N. America, uses the Magellan route. Steam traffic carrying mails, passengers, and a limited freight of tropical products northwards from countries north of Chile, and miscellaneous manufactured goods and petroleum southwards from the N. Atlantic, uses the Panama route.

**The** Panama Canal.

The Panama Canal is a comparatively new factor affecting the circulation of the world's ocean traffic, and as yet its influence has hardly had time to make itself felt. The opening of this sea canal provides alternative sea routes from the N. Atlantic to the Pacific

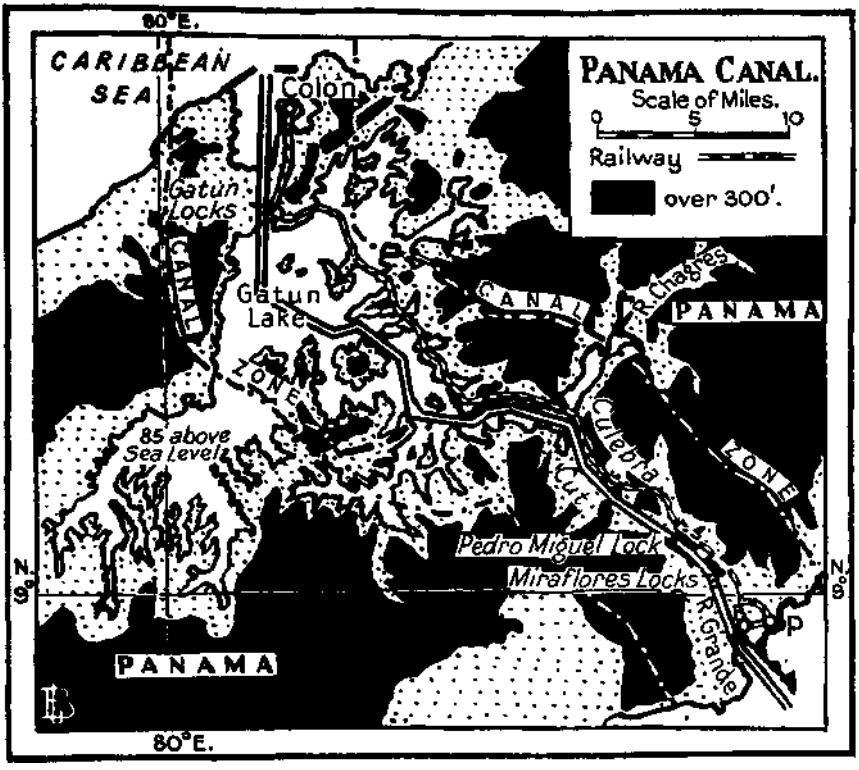



FIG. 175. PANAMA CANAL

coasts of N. and S. America, to Australia and New Zealand and to the Far East. All of these zones except the first have established alternative routes and the extent to whioh the movement of traffic to and from these zones will be rearranged to make use of the Panama route depends upon the comparative costs of voyages by the different routes and the magnetic influence of availability of freights and fuel along them.

COMPARATIVE DISTANCES VIA PANAMA AND ALTERNATIVE ROUTES

(Distances in nautical miles)

| To | Via | From New York | From Liverpool |
|---|---|---|---|
| Seattle | Cape Horn | 13,910 | 14,320 |
| | Panama | 6,039 | 8,654 |
| *Distance saved* | | *7,871* | 5,660 |
| Valparaiso | Cape Horn | 8,380 | 8,747 |
| | Panama | 4,033 | 7,207 |
| *Distance saved* . | | *3747* | *1,540* |
| Melbourne | Cape of Good Hope | 13,162 | |
| | Suez | | 11,654 |
| | Panama | 10,392 | 12.966 |
| *Distance saved* . | | *27 70* | *lost l,312* |
| Hong-Kong | Suez | 11,691 | 9,785 |
| | Panama | 11,673 | 13,957 |
| *Distance saved* . | | *18* | *lost 4,172* |

It will be seen from the above table that the opening of Panama has effected a saving in distances in all cases for vessels operating from New York and for shipping engaged in trading between Europe, represented by Liverpool, and the Pacific coast of the Americas. The greatest saving is on the routes from the N. Atlantic seaboards to the west coast of N. America, especially between the Atlantic and Pacific coasts of U.S.A. It is on those routes that a rearrangement of the world's ocean traffic is chiefly to bo expected. Between 1934-36 a yearly average of over twenty-eight million tons of cargo and one hundred and fifty thousand passengers have passed through the canal. The distribution of the traffic using the canal is shown in the table on page 399.

Since the war a little over 2 per cent of Britain's ocean tonnage

| ROUTE | Percentage of Total Shipping Tonnage | REMARKS |
|---|---|---|
| U.S.A. coastwise . | 42 | Considerable "tanker'· oil traffic, which has doubled since 1921-22. |
| Europe to west coast of U.S.A. and Canada | 12 | Shipments of Canadian wheat via Vancouver rapidly increased since 1921. |
| East coast, U.S.A. to west coast of South America | 14 | Increase since 1921 in shipments of copper, tin, wool, nitrates in return for textiles, machinery from U.S.A. |
| Europe to west coast of South America | 9 | Mostly mails, passengers and measurement cargoes—textiles, machinery, chemicals. |
| East coast, U.S.A. to Far East | 7 | Traffic increase since 1921, especially in foodstuffs and timber, for tin, rubber, sugar of Malaya and Dutch East Indies. |
| Europe and east coast, U.S.A. to Australia; South America, coastwise ; Europe to China and Japan. | 12 | Mails and passenger traffic by liners—including luxury cruise traffic. Direct trade U.S.A. to Australia and New Zealand increasing, also South American coastwise trade. |

has been employed in the Pacific routes of the western coasts of the Americas. Before the war nearly twice as much shipping was engaged on this route.

### North Sea and Baltic Area.

In many respects the sea traffic of the North and Baltic Seas differs markedly from that passing along the ocean seaways. Routes which are short and direct mix with and intersect each other rather than follow collateral tracks. Traffic between the closely neighbouring countries is handled mainly by coasting vessels, packet boats, and ferry services. Large ocean-going liners and cargo ships entering and leaving the North Sea areas also pick up and set down passengers, mails, and sometimes cargoes at ports other than their base ports, e.g. vessels bound for Hamburg may call at Southampton and Cherbourg. A smaller amount of shipping carries a larger quantity of cargoes than in any other sea area in the world partly because a vessel can make more trips in a given time and partly because of

27—1K.1139) 21 pp.

the enormous interchange of foodstuffs, raw materials, and manufactures of local and foreign origin. Before the war, while only some 5 to 6 per cent of British shipping was regularly employed in this traffic zone, compared with 15 per cent in the N. Atlantic, Britain's coal exports alone to the North Sea and Baltic ports were more than twice the total tonnage of all oargoes shipped over the North Atlantic route. With the exception of coal, mainly British, which is the principal commodity of the traffic in the North and Baltic Seas, most cargoes are carried by scheduled services plying between definite ports. The pre-eminence of Britain's coal exports gives rise to a considerable movement of shipping returning to the United Kingdom in ballast. On short voyages it often pays the shipowner to return empty rather than to await cargoes. Compared with other vessels, those engaged in the export trade of coal are not so favourably placed by reason of their occupation for securing return cargoes. A vessel engaged in shipping coal to Denmark might return with bricks or pit props, but hardly with eggs, butter, or bacon. As on the ocean shipping routes, so in the North Sea and Baltic shipping zone, the amount of traffic is not uniform throughout the year. In particular, trade with the Baltic, which is icebound in winter, is seasonal in character, and consequently considerable diversions of traffic take place during the year.

### Sea Ports.

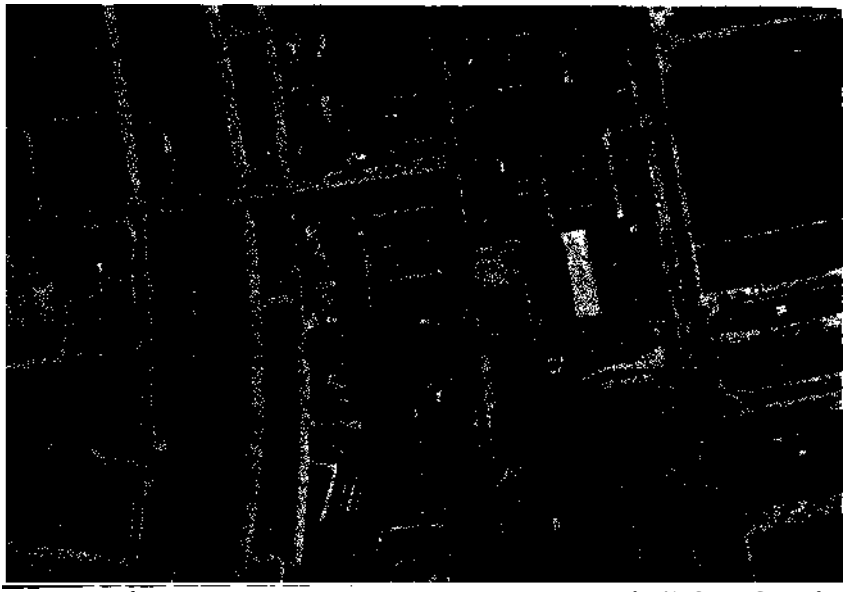
Without adequate port facilities, ocean transport could not be utilized as fully as possible, and trade by sea would be greatly hampered. Seaports are necessary because of the change over from the carriage of goods by sea to their transport by land. This change in the mode of transport often involves the breaking up of bulk cargoes, partly because the units of traffic by sea are usually larger than those used on land, and also because it is seldom that the whole of any ship's cargo is forwarded to one inland destination. Such operations need to be carried out in safety both for the ship and its cargo, hence harbours, warehouses, and other forms of protection from adverse conditions of the sea and weather are needed. Easy access to a productive hinterland is equally as important as a good harbour. Valetta in Malta and Trincomalee in Ceylon have excellent natural harbours, but are naval stations rather than seaports,

because of the absence of traffic and difficult inland communications. To benefit from the comparative cheapness of carrying goods by sea, ports are located as far inland as possible, e.g. Montreal, London, Hamburg, Rotterdam, Antwerp, Buenos Aires, on the estuaries of the St. Lawrence, Thames, Elbe, Rhine, Scheldt, and Plate Rivers respectively, and Port Augusta in Spencer Gulf, Australia. The situation of a seaport on the estuary of a river often offers the additional advantage of cheap inland water transport, and valleys usually provide the easiest routes for land transport by road and railway to the hinterland which the port serves. Other seaports located inland are connected to the sea by ship canals, e.g. Manchester, Amsterdam, New Orleans.

During the last fifty years the ocean borne trade of the world has tended to be restricted to fewer ports. As the processes of the construction of ships have been perfected the units of traffic have been larger, and the larger the ships the fewer has become the number of ports capable of accommodating them. Of the established seaports of the sailing ship era, those which had naturally good harbours, and those whose safety of anchorage, berthing, turning accommodation, and access inland have been capable of improvement by harbour works, dredging, dock construction, the creation of outports and other means, have continued to increase in importance as the traffic of their principal local hinterland and of their subsidiary or optional markets has increased. In the first category may be classed New York, San Francisco, Vancouver, Cape Town, Colombo, Sydney, Yokohama, Valparaiso, and Marseilles, all of whose naturally fine harbours owe their existence to the fact that the coastline has sunk and allowed the sea access to a valley behind a coastal range. Ports having equally good harbours arising out of the presence of an island near the mainland, e.g. Bombay and Hong Kong, or upon river estuaries, e.g. Montreal and Quebec, may also be included in the group of seaports having naturally fine harbours. The second group of improved natural harbours includes all the remaining first-class seaports of the world, e.g. London, Liverpool, Hamburg, Antwerp, Calcutta, and Buenos Aires on river estuaries, Singapore on an island site, and ports created by man, e.g. Glasgow·

First class ports of to-day offer shipping a depth of from 25 to 30 ft. of water at high tide at least, and sufficient room for navigating

and berthing vessels from 450 to 1)00 ft. long. Such facilities are likely to meet the needs of the bulk of the world's ocean shipping for some time to come, because at present the tendency is not to continue to build bigger ships. The limits as regards the size of economically useulf vessels appear to have been reached. Other



*By courtesy of* *The Air Surtvy* Co., Ltd.

**FIG. 176. PART OF RIVER FRONT AND DOCKS, LIVERPOOL**

River, canal, road, and railway communications are shown. Note that the docks are built out from the river bank. Better types of houses can be seen on the higher ground skirted by the railway and the canal which follows a contour at a lower level **and crosses** over the rail connection to the dock side

seaports which have been unable to conform to the requirements of the large steam and motor vessels of to-day have declined in importance, unless either they happen to be the only available ports, e.g. Kingston, Jamaica, or factors such as the reluctance to accumulate large stocks of goods at any one port, preferential railway rates, and facilities for fuelling have helped them to hold their own. Changes in the direction of the flow of world trade have accounted for the rise to importance of some seaports and the decline of others. While the opening of the Cape Route to India brought about the growth of Lisbon at the expense of Mediterranean ports, as the

political and economic supremacy in India and S.E. Asia passed from Portugal to Holland and finally to Britain, so Lisbon lost its trade to Amsterdam and Rotterdam, which in turn gave place to London as an entrepot or collecting and distributing centre for Oriental commodities. The opening of the Suez Canal route has

*By courtesy of* *The Air Survey Co., Ltd.*

FIG. 177. PORTION OF SOUTHAMPTON

**The peculiar lay-out of docks Indicates their construction on reclaimed land. Open, wet. and graving docks can be recognized. The transit sheds, warehousing accommodation, railway facilities for handling passenger and goods traffic, the method of mooring vessels, and the use of lighters in unloading ships should be noted**

rejuvenated Marseilles and Genoa, and the opening of the Panama Canal has stimulated the seaports on the Pacific coast of N. America, particularly Vancouver, which was used by over eleven million net tons of shipping in 1935 compared with one million net tons in 1920, showing an increase of over 1,100 per cent in fifteen years. The gradual supersession of raw coal by electricity as a source of industrial power, and with it a more widespread distribution of manufactures, tends towards the development of some lesser ports, e.g. Fredrikstad, Drammen, and Kristiansand, all in Southern Norway. The growth of the passenger, mail, and meat traffic of Southampton

during recent years illustrates the influence of improved land communications upon the development of a seaport. Southampton is a typical railway port, and its growth has to some extent been at the expense of London. It is quicker and more convenient for passengers and mails to be landed and meat cargoes discharged at Southampton and then go by rail or road to the London area or the Midlands than for them to be taken by sea to London. Continental lines of steamships also find it more convenient to make Southampton rather than London a port of call as they voyage between their base ports.

The character of traffic handled by many of the world's seaports has also undergone a change during the last half century. The tendencies for entrepot traffic to decline and for ports to specialize in handling particular raw materials or classes of manufactured goods are increasing. As the seaborne trade of the world continues to expand and countries more and more develop and take part in overseas trade, direct shipping services are being established, and cargoes are being shipped in bulk rather than in small consignments. The United States have established a direct service with Australia and a fair amount of the traffic between these countries is now handled without the intermediary services of London. Since the consumption of tea in the United States is still insufficient to warrant direct shipments from India and Ceylon, London still remains an entrepot for tea which it receives from the East and then sends on to U.S.A. and other countries. When only small consignments of goods are handled, it is cheaper to ship them in large ocean-going vessels, even though the route followed between the places of origin and destination is not the most direct and shortest possible. Two other factors which have contributed to the decline of entrepot trade at seaports are first the combination of land and sea transport under single control, e.g. the Canadian Pacific Railway which also owns a fleet of cargo and passenger vessels, and secondly the increase in the proportion of graded goods entering into the world's traffic. Where land and sea carriage are under one ownership, through traffic, even over roundabout routes, tends to increase. One of the chief functions of an entrepot is the sorting, sampling, and grading of small consignments of particular commodities arriving from different places of origin, e.g. the Port of London Authority, among other commodities, sample and grade wool, rubber, tobacco, ivory,

gums, resins, and also blend tea. Since the grading of many goods is^now done before they are dispatched from the places of origin this function of the entrepot is now being curtailed.

Seaports vary considerably in their characteristics. Some are no more than places at which a particular commodity is transferred from land to sea carriage. Chittagong (Bengal) and Galveston (U.S.A.) are tea and cotton ports respectively. The majority of seaports act as transfer centres for many classes of goods. Offering facilities for centralized buying and selling, many ports combine commercial with transport activities. The world's cotton exchange is at Liverpool, London is the world market for wool, rice, rubber, and several other commodities, while Hamburg specializes in the marketing of tobacco. So cheap and widespread is ocean transport to-day that adequate services for importing and exporting goods are forthcoming for all the major ports of the world, and the lower cost of many raw materials at such ports compared with those prevailing at inland centres is a strong inducement for the establishment of industrial concerns at seaports. In Britain, during the present century, there has been a marked tendency for industries where possible to migrate to within easy reach of the seaboard in order to obviate the heavy costs of inland carriage. This is particularly so in the case of industries depending upon the movement of goods in bulk, e.g. ores, timber, wheat, sugar, oilseeds, mineral oil. Thus our metallurgical industries drawing upon Iberian and Scandinavian ores are located at or near the ports of S. Wales, N.E. England, and the Clyde, wood working and paper industries are chiefly found in the London area, the greatest industrial region in Britain, half of our matches are made in Liverpool, which is also the second largest flour milling centre in the world, sugar refineries are located on the Clyde and Thames, the largest oil refinery is at Llandarcy, and the seed crushing industry upon which is based our margarine, soap, candles, lubricating oils and paints industries, is mainly established at seaports. What has been illustrated by examples drawn from British ports is also true of the major foreign ports, e.g. those of the New York and Philadelphia area, the second largest industrial region in the world, Hamburg with its tobacco, rubber, and seed crushing industries, Rotterdam with its cocoa and margarine manufactures, Marseilles specializing in seed crushing, and Calcutta with its jute industry.

**To carry out commercial and industrial undertakings financial facilities are a necessity, and thus seaports tend to become minor or major banking centres and money markets, e.g. London and New York, the first and second financial centres of the world. More than half the world's financial exchanges, whence the world's money matters are regulated, are seaports. Similarly thirty-two out of the sixty largest cities in the world are seaports. Eight of the thirty-two are also political capitals, and several of the remainder are the seats of governments of states or provinces.**

**Questions, Exercises, and Topics for Discussion are given after Chapter XV.**

## CHAPTER XV

# WORLD TRANSPORT AND COMMUNICATIONS (III)

## AIR TRANSPORT, POSTS, TELEGRAPH, TELEPHONE, WIRELESS, AND NEWSPAPERS

### Geographical Factors in Aviation.

OF the geographical factors which have a controlling effect upon air transport, climate is by far the most important. Just as shipping is more at the mercy of the elements than land transport, so commercial flying is more susceptible to weather conditions than shipping. Air disturbances such as heavy rain or snowstorms which would do little more than delay shipping are sufficient to compel aeroplanes to make forced landings or to suspend flying operations temporarily. Ground fogs, too, despite wireless telephonic communication between aeroplanes and landing grounds and the provision of fog flares and beacons, make a safe landing difficult. Whereas a ship at sea can, if necessary, ride out a fog, an aeroplane cannot remain for an indefinite time in the air. The force and direction of the wind is perhaps the most important, the most variable, and the most common meteorological factor which has to be reckoned with in aviation. It is noticeable that, although time tables of air liners give the departure times of their services, no times of arrival

TRANSATLANTIC AEROPLANE FLIGHTS

| Passage | Distance Miles | Flying Speed m.p.h. | Actual Speed m.p.h. | Following Wind | | Head Wind | | Time Taken Hours |
|---|---|---|---|---|---|---|---|---|
| | | | | m.p.h. | Force | m.p.h. | Force | |
| Lindbergh W.-E., 1927 | 3,625 | 87i | 109· | 22¼ | 5 | — | — | 33½ |
| Kohl . E.-W., 1928 | 1,875 | 98½ | 62½ | — | — | 36 | 7 | 30 |

Data re the first crossings by British flyers in 1919 are not comparable.

In 1937 Imperial Airways' machines crossed from Foynes (I.F.S.) to Botwood (Newfoundland) and vice versa in 14 hr. 24 min. and 10 hr. 33 min. respectively.

are stated. The variations in the time which a particular air journey may take, due to meeting with adverse or favourable winds, are often great upon long distance flights. The table on page 407 shows the advantage of a following wind. The prevailing westerlies increased Lindbergh's flying speed by nearly 25 per cent. The reduced time for the W.-E. crossing, 1937, was due to the same factor.

Rapid variations in temperature and pressure in hot desert regions partly account for the fact that trunk airways avoid such regions. Low temperatures bring the danger of ice formation on the wings.

The topography and relief of the land over which flying takes place also has to be taken into account. Level country free from swamp is needed for landing grounds. High mountain ranges form barriers to movement by air. Varying principally according to the type of machine, the load it is carrying, and the state of atmospheric pressure, every machine has its maximum flying altitude, higher than which it would be unsafe to fly. A machine might thus be unable to rise high enough to pass over a mountain range. Air conditions, too, over highland regions are often stormy and unstable, and the risk of flying is greater in such regions than in lowland areas. For these and other reasons, commercial flying has developed in lowland regions and air routes go round rather than across mountainous zones. The air route over the Alps from Munich to Milan and that over the Rockies from Chicago to San Francisco both make every use of valley routes and gaps.

Terrain covered with ice or snow or densely forested does not offer good facilities for the provision of landing grounds.

Since air transport is essentially a product of progressive civilization, commercial flying has been developed in those parts of the world occupied by progressive peoples. In the more established, industrial and commercial regions of Europe and North America, where good land communications already existed, transport by air has provided a quicker mode of travel, and so promoted a general speeding up of commercial intercourse. In countries recently settled by progressive peoples, e.g. Australia, Argentina, and the agricultural areas of N. America, where land transport has not yet been extensively developed, air transport has done much to bring the benefits of civilization, particularly medical services, within reach of settlers in out-of-the-way districts.

**Where** long flights over water have to be undertaken, flying boats **are** used in place of aeroplanes, e.g. on the Trans-Mediterranean section of the India service, on the Trans-Pacific routes, and on the proposed Transatlantic service, 1938. In 1937 Imperial Airways and its associated companies had a fleet of over sixty air liners in addition to machines used for charter purposes and freight traffic. Their air liners used on the European routes are the largest in regular service. On these liners ordinary conversation is possible and meals are prepared and served on board. They have accommodation for thirty-eight passengers or 4 tons of mail. The new empire flying boats used on the Trans-Mediterranean route have similar amenities with the addition of smoking cabins and promenade saloons. They can carry twenty-four passengers by day or sixteen sleepers by night and 3 tons of mail. A special class of aircraft has been designed for tropical flying on the African, Indian and Eastern Routes.

**Air Transport Compared with Surface Transport,**

Compared with railway trains and steamships, aeroplanes travel faster, and almost as safely, but have a much smaller carrying capacity.

The safety of service by air is partly shown by the fact that freight insurance premiums are much less for goods carried by air than by surface transport. During the years 1926-28 Imperial Airways carried over 52,000 passengers, and flew 2,500,000 miles without injury to a single passenger. The record of the greater national air transport combine in Germany was almost as good, only 0-2 people being killed or injured per million kilometres flown compared with an accident rate of 6-8 per million kilometres of railway travel. During 1931-35 British civil aircraft carried over 300,000 passengers, flew 16,000,000 miles over four continents with the loss of only 126 lives.

When the small amount of work it can do, the expense of highly trained pilots and of highly skilled mechanics, and the costly ground organization of hangars, repair shops, fuelling, meteorological and wireless equipment **are** considered, a four-engined air liner, costing over £40,000, and capable of carrying anything approaching a paying load, is an expensive unit of transport. For general merchandise the ton-mile rate for British air carriage is Is. 10d., compared with about 3d. on our railways. For journeys of about 300

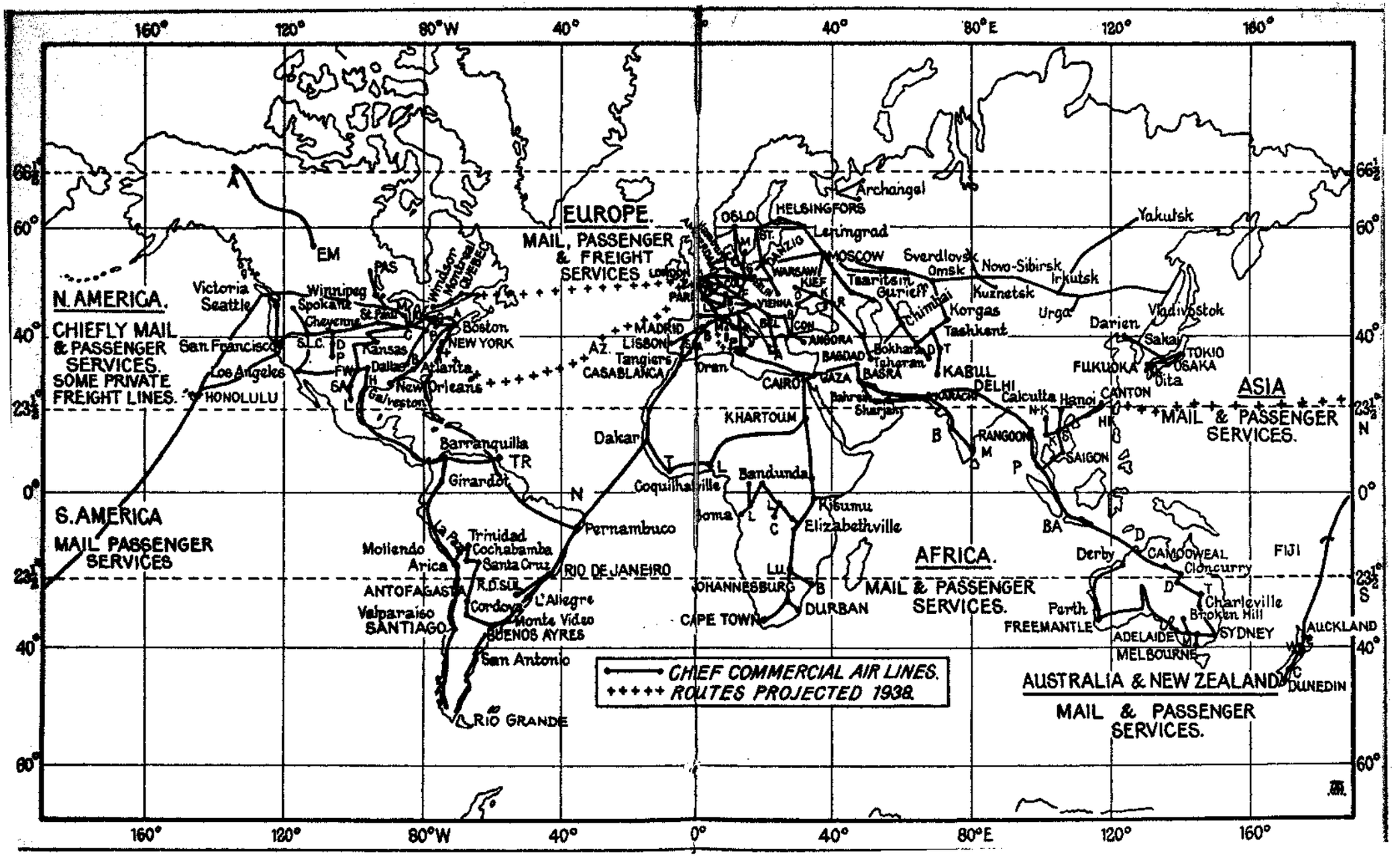



Fig. 178. PRINCIPAL AIRWAYS OF THE WORLD. 1938

MERCATOR'S PROJECTION Parallels and meridians are parallel straight lines Intersecting at right angles Meridians are equal distances apart. The distances between parallels increase polewards and are so arranged that the increase in the latitudinal distance is in the same proportion as the exaggeration in the longitudinal distance at all latitudes, This map-net gives the *true direction* of one point to another. Distances are true only at Equator. Shapes and areas are greatly exaggreated towards the poles. 45° N. and S., and the bearing of one point to another is not correct.

*Gall's Projection resembles Mercator's except that poleward exaggeration is less,* distance, are true only at latitude.

**miles, passenger** rates by **air** are **approximately** twice as high as ordinary railway fares. For shorter journeys the difference between air and railway fares increases, while for longer journeys the cost of travel by air and by railway tends to approximate. The greatest economy in air travel is obtained on the longest journey, since it is only upon such a journey that the superior speed of aircraft gives air transport a decided advantage over surface transport.

On the average, commercial 'planes travel twice as fast as trains, and four times as fast as steamships. It is the amount of travelling time saved rather than the amount of load carried that is the paying factor in air transport. Time has a definite market value, and of this commodity aviation offers business men and others very good value for money. Occasions are always arising in trade and commerce when it is essential to effect a quick transit of business documents or a delivery of samples or consignments of goods in a minimum of time. Between two large cities in the United States, the daily transference by air of funds and securities valued in millions of dollars takes place, and a large saving in interest is effected. Air travel offers business men a quick and comfortable means of paying more frequent visits to branch offices and works, and of keeping in closer personal touch with agents and customers. Operating by day and by night over organized air routes with rapid Customs facilities, aircraft are able to save days, and in some cases weeks, of the time surface transport would require to convey passengers, mails or freight the same distances, e.g. by normal transit mails to Australia take 30 days, by air 13 days. From 1937 all first-class British mails for overseas have been sent by air.

### Air **Traffic: Its Character and Quantity.**

Mails and parcels of perishable and of non-perishable goods of light weight or small bulk in proportion to their value are now established as regular air freight. Table fruits and delicacies, silk, ladies' millinery, hosiery, perfumery, drugs and dyestuffs, furs, cinematograph films, motor-cycles and motor parts, and musical instruments, are among the goods most frequently received or dispatched from Croydon (London). Even live animals, such as dogs and horses, have been carried by air. Air transport offers special advantages for the safe carriage of bullion, jewellery, and *objets d'art.* During

one period of six months, over four million pounds sterling of bullion was carried by our cross-Channel services.

It will be seen from the following table that on the chief European airways, passenger traffic is more important than goods traffic. This characteristic feature of air traffic is even more pronounced on the Australian air routes where, in view of the demand for passenger accommodation, it has been found necessary to limit strictly even the amount of luggage accompanying passengers.

Two-thirds of the aeroplane operating companies in North America handle only mail and passenger freight.

**COMPARATIVE AIR TRANSPORT STATISTICS, 1935**

| Airways | Passengers Carried | Cargo (metric tonnes) | Miles Flown (thousands) | Remarks |
|---|---|---|---|---|
| British . | 200,000 | 2,612 | 8,412 | European, London-Singapore and London-S. Africa |
| German . | 209,875 | 5,292 | 9,934 | European and inter-continental |
| Dutch . | 102,847 | 1,800 | 3,270 | European and Ani-sterdam-Batavia |
| French . | 61,576 | 3,566 | 7,440 | European and to N. Africa and S. America |
| Italian | 57,321 | 7,029 | 3,000 | Excluding colonial |
| U.8.A. . | 1,030,000 | 10,120 | 72,000 | Excluding private lines—includes S. American |
| Canadian | **117,472** | 13,283 | 5,620 | Domestic |

Although commercial flying is a development of the last sixteen years, there are throughout the world more than 100,000 miles of organized air routes, while not far short of 1,000 towns and cities are linked by scheduled aeroplane services. As yet, air transport, considered universally, does not pay its way without state assistance, e.g. British civil aviation vote, 1937-38, provides for

**subsidies and grants of nearly** £2,000,000, **besides other** financial assistance. As traffic increases, air lines will become self-supporting. About one-third of the air mail lines in the United States are earning a reasonable return on their investments, and the Dutch and Swedish air lines almost pay their way. As air transport becomes established as a paying and integral part of modern transport, trunk routes will be extended stage by stage by aeroplane and flying boat, and it is becoming possible to make regular journeys to most parts of the world. When in the near future the main Empire routes are in operation with their land sections fully equipped for extensive and regular night flying, India will be brought within three days, South Africa four days, Australia seven days, and Canada one day of England. Recent years have seen not only rapid improvements in the design, efficiency and travelling comfort of air liners but also in the aids to making flying easier and safer, e.g. by better meteorological services and by the equipment of machines with automatic pilots, artificial horizons which make for surer flying in fog; and flaps for assisting take off and landing, especially in bad weather. Along routes in high latitudes since blind-flying through cloud became general, ice-accretion has become a serious problem for which a solution is being sought.

Progress in commercial aviation has been equally rapid and extensive in other countries, particularly the United States, Netherlands, Belgium, France and Germany who, excluding the latter, operate long over-seas routes like ourselves.

Political as well as economic reasons underly this rapid expansion in civil aviation.

Germany's Zeppelin made 500 ocean trips to North and South America before its loss, 1937. Britain, U.S.A., Italy, and Japan who lost airships by fire or storm, 1919-35, have abandoned construction.

## COMMUNICATIONS BY POST, TELEGRAPH, TELEPHONE, WIRELESS, AND NEWSPAPERS

The development of these specialized means of communication **has** been partly due to, and partly responsible for, the expansion in **the** world-wide production and exchange and consumption **of goods, particularly during the last hundred years. This recent expansion**

**was** most marked in the lands occupied or controlled **by the most progressive** peoples of European stock, and thus it is in the **British Empire,** the United States, and in Western Europe, that modern means of communication have been most rapidly evolved and most extensively used. The following table shows how comparatively recently such means of communication have come into use.

**1790. *Morning Post* and *The Times* both in circulation.**
**1840. Penny post introduced in Britain.**
**1849. Reuter's News Agency established.**
**1800. Electric land telegraph in use.**
**1855. Penny newspapers became common and many of our existing daily newspapers were in circulation.**
**1866. First Atlantic cable laid.**
**1874. General Postal Union formed.**
**1876. Electric land telephones in use.**
**1901. Marconi wireless transmission, Lizard to Isle of Wight.**
**1902. First Pacific cable laid.**
**1907. Transatlantic wireless communication.**
**1927. Transatlantic wireless-telephony service and beam-wireless signal stations in various parts of the British Empire established.**

The exigencies of modern commerce compel merchants, producers, and consumers to maintain the closest touch with the continual developments in the production, movement, and consumption of goods, not only in their own countries but also in other lands. To this end the telegraph and telephone are employed respectively where messages need to be sent quickly and where personal conversation and explanations are advantageous. To effect a further saving in time, expense, and also to ensure privacy in business, various telegraphic codes have been devised and are used freely. Technical improvements have made it possible to transmit several telegrams simultaneously over the same wire or cable, and such messages across the Atlantic take less time in half-hours than a letter takes days. American interests obtained the concession to lay their new "Permalloy" cable from Newfoundland to Ireland, and negotiated for permission to extend it to England or to Spain in 1929. This cable is claimed to be capable of accommodating at one and the same time easy and confidential telephony together with telegraphy up to about five hundred words a minute. It thus represents a tremendous advance on previous cable systems, and greatly facilitates inter-continental communications. Many business houses have tape machines to keep them continually informed of market reports and news.

The introduction of short-wave beam and omni-directional wireless services has made it possible to flash telegraphic news round the world in a few minutes. The speed, reliability and accuracy of such a service may be gathered from the fact that messages between England and India, in spite of monsoon atmospherics, can be accurately transmitted at the rate of 130 to 150 words per minute during a period of eighteen to twenty-one hours per day. This newer system of wireless communication is less subject to atmospherics, cheaper in capital costs and operating charges, and more secret by reason of its directional characteristics than the older system of super stations working on long wave lengths.

Wireless telephony is now possible between most countries and ships at sea. Compared with the cost of sending a cablegram, conversation by wireless is much more expensive, and means for making such a conversation private have been devised. The sending of messages by post is ordinarily cheaper, but slower, than by wire or wireless, and in Britain and some other countries business circulars, catalogues, and other documents not in the nature of letters may be sent at specially reduced postal rates. Samples and small parcels of goods may be sent by parcel post. The convenient and cheaper "cash on delivery" postal service in Britain and the United States has led to greater use being made of postal facilities. In some cases, upon the payment of an additional fee, the delivery of letters and parcels can be expedited by causing them to be sent by express post.

Nowadays the Press is extensively used as an advertising medium. Besides trade-papers and periodicals supplying the needs of particular producers and merchants, most of our newspapers also give the general public financial, commercial, industrial and shipping information, as well as reviews of the condition of trade and industry at home and abroad.

These specialized means of communication have both their advantages and disadvantages. Rapid dissemination of news is a powerful factor in minimizing harmful fluctuations in prices. Supply can be more readily regulated to meet demand, and merchants do not need to carry huge stocks of goods. The better contact between producer and consumer has a benevolent steadying and stabilizing effect, minimizes risks, and renders easier business transactions to the benefit of all concerned. On the other hand, unreliable reports

can be circulated just as readily as reliable news, and when this happens much harm may ensue and markets may become "jumpy," e.g. a report exaggerating the damage to wheat or cotton crops may cause prices to rise sharply.

Improved communications have not only facilitated commercial transactions, but also the actual transportation of goods. The use of telegraph and telephone for signalling purposes has greatly increased the efficiency and scope of railway transport. Railway traffic has been speeded up and the running of a greater number of trains has been made possible. Since 1919 all British ships of 1,600 tons and over have been compelled to carry wireless apparatus, thereby assuring both greater safety at sea and greater flexibility in the movement of shipping at sea. At twelve stations round the British Isles a "ship and shore" wireless service was established in 1925. Not only can instructions be readily transmitted to vessels and the time hitherto lost by ships having to heave to, or put into port to receive orders saved, but also vessels, by the aid of wireless messages, more easily establish their bearings and check their courses. Wireless time signals are especially helpful in the determination of the longitude of the position of an observer whether on land or at sea. The aircraft of all the principal companies operating regular air services throughout the world are equipped with wireless telephones. Pilots are in constant communication with the various air ports and other aircraft. In foggy weather, wireless communication is also used to guide aeroplanes safely to their destination.

Throughout the world during the last hundred years, far-reaching advances have been made in the development of means of transport and communication. The means themselves have been speeded up and the use made of them has been greatly extended. Every increase in speed has amounted to a reduction in distance, and so, in a sense, the whole world has shrunk to a fraction of its former size. Better and more widespread means of transport and communications have tended to make the world a co-ordinated unit. Economic, political, and, perhaps even more important, social intercourse has been greatly facilitated, and so, despite differences of natural environment, race, culture, and needs, the material and moral universality of the world is being increasingly recognized by its inhabitants.

## QUESTIONS, EXERCISES, AND TOPICS FOR DISCUSSION

1. What is meant by the term " transport and communications " ?

2. " All the world over there is evidence of man's very skilful adaptation of transport to suit geographical conditions." Expand this statement in reference to any selected natural region.

3. " The relief of a region has an important bearing on transport facilities." Discuss this statement with special reference to any area with which you are familiar.

4. " Everywhere man has to reckon with plant and animal life as a help or hindrance to his movement." Select any region and point out the truth of this statement.

5. Give an account of the world distribution of man's chief beasts of burden.

6. Point out the principal human and economic factors influencing the modes and facilities for transport in progressive countries.

7. Discuss the advantages and disadvantages of the routes from London to Yokohama via Fort Churchill, via the Great Lakes, via Vancouver, and via Prince Rupert Island.

8. Select from your tea-table any article of diet, and on a map mark its primary place of origin, a possible route by which it came to your town, and the various ways in which it was transported from point to point on its journey. Find out what proportion of its final cost was incurred in transportation.

9. Compare and contrast the merits and demerits of horse-drawn and mechanically-driven road transport.

10. " The sphere of maximum usefulness for motor transport appears to be midway between that of the horse and the railway." Is this so ? Give illustrations, drawn from your own locality.

11. Why are the excellent roads of the Scottish highlands or the Swiss Alps a good investment despite the high cost of construction ?

12. Why is it difficult to construct roads in Bengal, on the Canadian Prairies, or in Ukraine ?

13. In 1935 the buses, trolley buses or trams, railways and motor coaches operated by the London Passenger Transport Board carried respectively 58 per cent, 29 per cent, 12-5 per cent, and 0-5 per cent of the passenger traffic. Discuss these figures as indicating relative carrying capacity, fluidity of movement, and convenience.

**14. NUMBER OF MOTOR VEHICLES, 1926 AND 1936 (000's omitted)**

| | 1926 | 1936 | | 1926 | 1936 | | 1926 | 1936 |
|---|---|---|---|---|---|---|---|---|
| United State· | 20,000 | 26,382 | Spain | 106 | 194 | Cuba | 33 | 32 |
| Great Britain | 903 | 2,043 | Sweden | 82 | 159 | Netherlands | 31 | 137 |
| France . | 735 | 2,065 | New Zealand | 80 | 191 | Mexico | 30 | 97 |
| Canada | 720 | 1,162 | British India | 75 | 105 | Swizterland | 30 | 90 |
| Germany | 426 | 1,122 | Denmark . | 60 | 132 | Haiwaii . | 23 | 51 |
| Australia | 310 | 644 | South Africa | 52 | 242 | Norway . | 17 | 63 |
| Argentina | 178 | 248 | Brazil | 45 | 140 | Irish Free State | 16 | 54 |
| Italy . | 115 | 396 | Dutch E. Indies | 36 | 58 | Rest | 308 | 3,454 |

Compare and contrast this table with those referring to railways and suggest reasons for what you find out.

15. " Motor transport is a comparatively recent development, and its adoption by any country is influenced by *(a)* the state of civilization of its inhabitants, (6) the availability of established alternative means of transport, (c) peculiar conditions of traffic." Discuss the above table in relation to this statement.

16. " Motor transport is specially useful for the haulage of small loads over moderate but not long distances. The United States is a country of long distances, and produces vast quantities of products needing transport, and has the greatest number of motor vehicles." Explain the apparent contradiction in this statement.

17. Explain the part played by railways in opening up the Prairie Provinces of Canada.

18. Describe one transcontinental railway route and say how it is influenced by *(a)* relief, *(b)* climate, (c) international boundaries.

19. Show how railway routes have made Winnipeg a collecting and distributing centre.

20. Why are there few through routes on railways in Australia ?

21. Comment on the position of De Aar in relation to the South African railway system. Account for the entire absence of railways over a large area of South Africa.

22. U.S.A. is three-quarters the size of Europe and yet has 20,000 more miles of railway. To what extent do the following considerations account for this ? (1) Size of the regions compared, (2) degree of progress in civilization, (3) density of population and ability to pay, (4) productivity, and the extent to which resources have been developed, (5) alternative facilities for other means of transport, (0) future prospects.

**23. Draw a map showing the principal railway systems of South America and account for their territorial, distribution.**

**24. Why are electric railways especially useful in *(a)* suburban areas, *(b)* mountainous districts ?**

25. PRINCIPAL COUNTRIES SERVED BY RAILWAYS, 1934 OR LATER
(Mileage in 000·8, Traffic in 000,000·8)

| Country | Mileage | Tons | Passengers | Country | Mileage | Tons | Passengers |
|---|---|---|---|---|---|---|---|
| U.S.A. | 241 | 832 | 448 | Brazil | 21 | 24 | 155 |
| Canada | 42 | 68 | 21 | Italy | 15 | 33 | 81 |
| India | 43 | 86 | 497 | Union of South Africa | 14 | 24 | 83 |
| Germany | 34 | 366 | 1,360 | Spain | 10 | 39 | 107 |
| Australia | 27 | 31 | 356 | Japan | 15 | 104 | 1,413 |
| France | 26 | 209 | 629 | Belgium | 3 | 60 | 174 |
| Argentina | 25 | 44 | 136 | | | | |
| United Kingdom | 22 | 273 | 879 | | | | |

**Express the above table in the form of bar graphs and find out from your diagrams in which countries railways are chiefly used for *(a)* passenger service, (6) goods traffic. Suggest reasons for what you discover.**

**26. Arrange the countries in order of the use made of their railways in proportion to their mileage. Compare your list with the table giving the countries in order of mileage, and account for any differences.**

27. TOTAL MILEAGE OF RAILWAYS BY CONTINENTS (000·S omitted)

| | 1926 | 1936 | | 1926 | 1936 |
|---|---|---|---|---|---|
| Europe | 222 | 220-6 | North America | 294 | 300-0 |
| Asia | 71 | 83-5 | South America | 133 | 67-6 |
| Africa | 31 | 32-4 | Australasia | 28 | 30-7 |

**Express the above table by means of bar graphs, and explain to what extent mileage alone is a suitable standard of comparison in discussing the value of railways to a region. Note changes 1926-36.**

28. APPROXIMATE RAILWAY MILEAGE PEB 100 SQUARE MILES

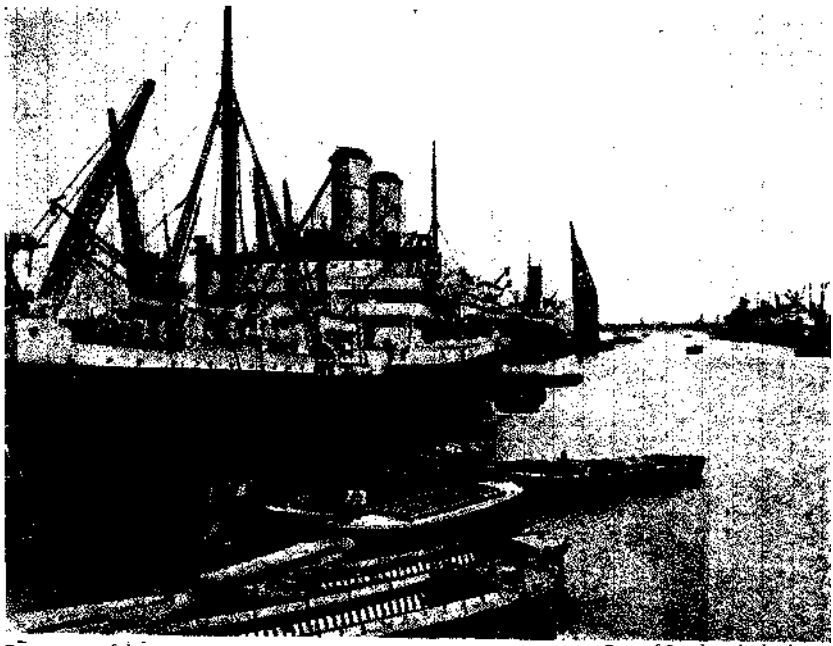
| | | |
|---|---|---|
| Belgium· | 59 | Germany 19 | Czechoslovakia 15 |
| Luxemburg | 34 | Denmark· 19 | Austria with Hungary[41] 17 |
| Switzerland | 21 | Netherlands 16 | Italy· **13** |
| Great Britain | 25 | France 15 | U.S.A. 8 |

· includes light railways.

**Discuss the above figures and point out the underlying factors which give rise to them.**

29. Compare and contrast the usefulness of inland water transport with that of other modes in use in progressive and backward countries. Support your statements by actual examples.

30. Describe the river systems of Australia as a means of transport. Point out the effect of *(a)* relief, (6) rainfall on their usefulness.



*By courtesy of the* *Port of London Authority*

FIG. 179. A PORTION OF KING GEORGE V DOCK, LONDON

**The characteristics and uses of the four types of vessels and three types of unloading gear shown should be noted—particularly of the passenger steamer in the foreground, and of the cargo steamer with the huge floating crane alongside**

31. "Ocean transport caters for the comparatively slow but cheap carriage of goods in bulk." Expand this statement and give examples.

32. Compare and contrast sailing ships, steamships, and motor ships as units of traffic.

33. What are normally the respective functions of liners and tramp steamers ?

34. Give an account of the traffic on one of the world's ocean trunk routes.

35. Discuss the effect of the Suez and Panama Canals on Cape Town as a focus for world traffic.

36. Using the shipping news of a daily paper, plot the voyage of a selected liner, noting distances covered, time taken, ports of call.

*By courtesy of the* *Port of London Authority*

FIG. 180. TYPES OF LAND AND WATER APPLIANCES USED IN THE HANDLING OF CARGOES IN AN UP-TO-DATE PORT

**Safe and speedy handling of cargoes is essential in the interest of shipowners, permitting a quick turn round of vessels, of port authorities making possible the attraction of profitable business, and of shippers whose overhead charges are reduced**

37. Account for east-bound and west-bound shipping routes in the North Atlantic. Are their positions the same all the year round?

38. PASSENGER TRAFFIC IN THE NORTH ATLANTIC (000'S omitted)

| | 1st class | 2nd class | 3rd class | Total |
|---|---|---|---|---|
| **1913** . | 215 | 483 | 1,888 | 2,586 |
| 1922 | 159 | 343 | 467 | 969 |

1936 British boats carried 44%, German 22%, French 11%, U.S.A. 7%, of total of 550,000 passengers.

Discuss these figures and suggest reasons for the decline of the post-war traffic.

39. In 1926 passenger traffic handled by Liverpool in thousands

of persons was west-bound, first class, 7 ; cabin, 16 ; second class, 7 ; third class, 57 ; and east-bound, first class, 5 ; cabin, 14 ; second class, 4 ; third class, 26. Express this information in diagram form. Give reasons for any differences in the character and volume of the east-bound and west-bound traffic.

40. In 1934, of the 35,000 passengers who crossed the North Pacific Ocean, 15,000 travelled in Japanese vessels, 14,000 on U.S.A. lines, and 6,000 on C.P.R. boats. How does the volume of this traffic compare with that of the North Atlantic ? Suggest reasons for the differences.

41. In 1935 the traffic in millions of net tons using the following canals was estimated at: Sault St. Marie, 48 ; Suez, 32 ; Panama, 25 ; Kiel, 17 ; Manchester Ship, 6. Would you or would you not expect this state of affairs ? Give your reasons.

42. Quoting examples, give an account of transport facilities as a determining factor in the location and development of towns.

43. What are the characteristics of a first-class seaport ? Support your statement by referring to conditions at actual seaports.

44. Explain the terms—port of call, terminal port, entrepot.

45. Compare Montreal and Quebec as ports.

46. Transport facilities tend to bring about an even distribution of population in urban areas. Discuss this statement in relation to any urban area with which you are familiar.

47. Give, as accurately as you can, the sites of the following towns : St. Louis (U.S.A.), Basle (Switzerland), Assuan (Egypt), Cologne (Germany), Hankow (China). Show what geographical factors have led to their foundation and growth or lack of development.

48. Study carefully the position of Madrid (Spain), San Francisco (U.S.A.), Winnipeg (Canada), Birmingham (England), Belgrade (Yugo-Slavia), and show how geographical conditions have helped to determine the site of each.

49. Discuss the relative advantages of Manchester (England), Chicago (U.S.A.), New Orleans (U.S.A.), Sydney (New South Wales), Buenos Aires (Argentina), as ports.

50. Examine the position of Philadelphia (U.S.A.), Liverpool (England), Hamburg (Germany), Antwerp (Belgium), Marseilles (France), Kobe (Japan), Valparaiso (Chile), Calcutta (India) and show what factors have led to their becoming great world port·.

**51. Describe, by means of sketch maps, the position of New York (U.S.A.), London (England), Hong-Kong (China), Singapore (Malay Straits), Cape Town (S. Africa), in relation to the trade routes of the world.**

**52. What special advantages does air transport offer ?**

53. STATISTICS OF TELEGRAPHS AND TELEGRAMS FOR REPRESENTATIVE COUNTRIES OF DIFFERENT NATURAL REGIONS, 1935-36

**Telegraph lines in 1,000 miles ; Telegrams dispatched in millions**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| United States | 216 | 40 | China | 61 | 3 | South Africa | 20 | |
| Germany | 83 | 17 | Argentina | 79 | 7 | Norway | 8 | |
| France | 223 | 35 | Australia | 105 | 15 | Netherlands | 24 | |
| Great Britain | 222 | 53 | Italy | 41 | 25 | Belgium | 6 | |
| British India | 106 | 17 | Japan | 32 | 117 | Denmark | 13 | |
| Canada | 52 | 9 | Sweden | 14 | 4 | Switzerland | 22 | |

**State clearly what the above statistics tell you about the use made of the telegraph in the countries named. The use of telegraphic communications in connection with railway operation and business transactions, the availability of cheap electricity, and the area and population of the countries concerned should be taken into consideration. The following pairs of countries approximate in area : U.S.A. and Canada, Italy and Great Britain, Germany and Sweden, China and Australia, Denmark and Switzerland.**

54. APPROXIMATE NUMBER OF TELEPHONES PER 100 PEOPLE (1935, or latest available)

**Countries arranged in order according to total number of telephones**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| U.S.A. | 14-3 | France | 2-7 | Italy | 12·1 | Denmark | 4-4 |
| Germany | 4-6 | Japan | 1-6 | Switzerland | 9-6 | Norway | 5-0 |
| Gt. Britain | 5·1 | Sweden | 10·0 | Netherlands | 4-3 | | |
| Canada | 10-9 | Australia | 7-8 | Austria | 3-8 | | |

**Compare the position of the countries as regards the actual number of telephones in use and telephones per 100 head of population. Suggest reasons for any similarities or differences.**

**55. Of the world's submarine cable mileage of about 364,000 miles, Britain controls 50 per cent, U.S.A. 25 per cent, France 11 per cent, Denmark, Japan, and Netherlands each about 2·5 per cent, Germany, Spain and Italy, each about 0·8 per cent. Is this what you would be led to expect in view of the external trade and shipping, distribution of foreign possessions, etc., of these countries ? Give reasons for your opinion.**

56. LETTER POST OF PRINCIPAL COUNTRIES, 1935, OR LATEST AVAILABLE YEAR

| | Total letters. Millions | Per head | | Total letters. Millions | Per head |
|---|---|---|---|---|---|
| United States | 23,571 | 183 | British India | 1,144 | 4-2 |
| Great Britain | 7,345 | 84 | Belgium | 1,140 | 130 |
| Germany | 5,570 | 163 | Netherlands | 1,121 | 127 |
| France . | 5,490 | 102 | Australia . | 948 | 141 |
| Japan . | 4,357 | 17 | Argentina . | 678 | 56 |
| Italy . | 2,441 | 58 | | | |

Arrange the countries in order of the use their inhabitants make of postal facilities and compare your list with the one above, giving the countries in order according to the number of letters sent through the post. Suggest explanations of any differences you find, e.g. road, rail, and air facilities for goods and parcels, distribution of population, etc.

57. Give the advantages and disadvantages of communication by beam wireless and by telegraph.

58. In what respects is wireless transmission of service to farmers, merchants, navigators on sea or in the air, and the general public?

59. The United States has 2,300 daily newspapers, 13,200 weeklies, 473 semi-weeklies, 3,613 monthlies, and 280 semi-monthlies, compared with Canada's 114 dailies, 1,000 weeklies, 30 semi-weeklies, 317 monthlies and bi-weeklies, and 36 semi-monthlies. Express these statistics in diagram form and give as many reasons as you can for the differences you notice.

60. North America has nearly as many newspapers in circulation as Europe. Would you or would you not expect this to be the case? Give your reasons.

61. Having a hundred daily newspapers, Chile, with about half the population of Australia, has four times the number of newspapers circulating there. Suggest reasons for this.

62. The exigencies of modern commerce compel merchants, producers, and consumers to maintain the closest touch with the continual developments in the production, movement, and consumption of goods. Giving their particular advantages, describe some of the chief ways by which they may do so.

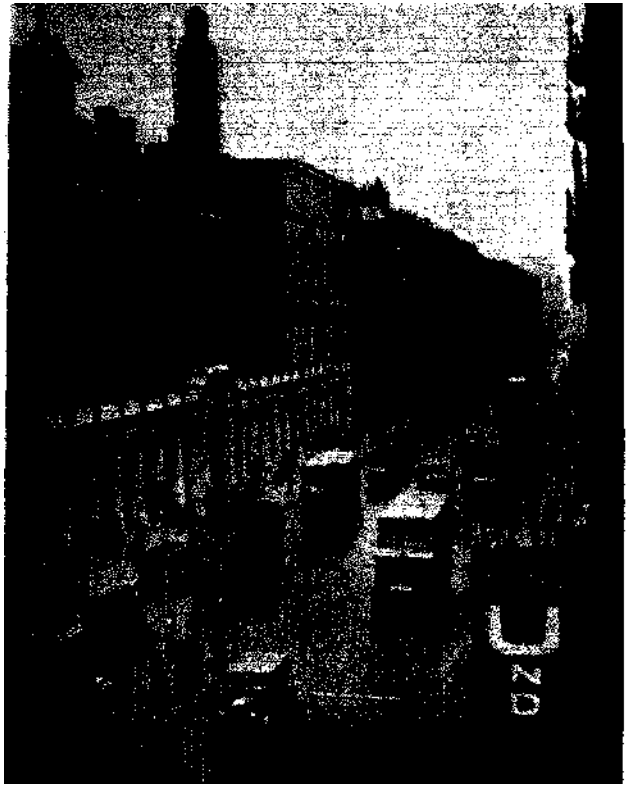
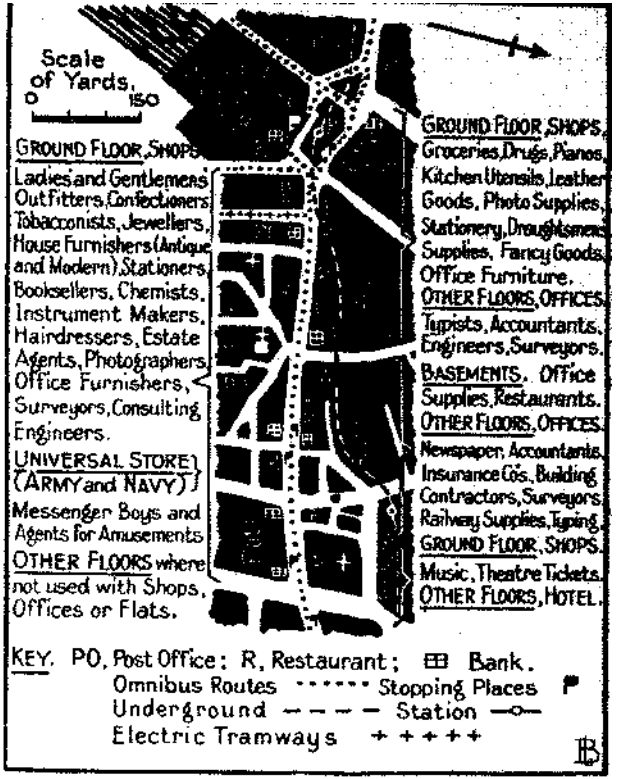


*Photo* *(a)* *L. Brettle*




**(b)**

FIG. 181. VICTORIA STREET, AWESTMINSTER, LONDON

63. Improved communications have created improved transportation. How has this come about ?

64. Have improved means of transport and communications had any bearing upon the political and social life of mankind ?

65. Name and give the peculiar characteristics of the different types of shipping shown in Fig. 179. Point out how each type of vessel is specially suitable for the performance of its particular class of work.

66. How is the dock equipped for the handling and storage of different kinds of cargoes ?

67. Examine Fig, 181 *(a)* and (6), and indicate the position of the observer on the plan. By comparing the two illustrations, the following exercises in street geography can be worked out—

(a) Prove from the picture that the street runs roughly from east to west, as shown in the plan.

(6) Has the street a right side and a wrong side from the shopkeeper's point of view ? Give reasons for your answer.

*(c)* Why is the left-hand side of the street best suited for shops displaying drapery goods ?

*(d)* Is there any connection between the shop sites and bus stops and the proximity and position of the railway station ?

*(e)* What industries are (1) actually carried on or (2) represented in the street?

(f) Where are the banks situated? What advantages do such sites offer?

*(g)* Does the choice of such sites for banks, and the presence of so many post offices give any clue to the character of the business transacted in this street and its neighbourhood ?

*(h)* Would you classify the district shown as a residential or business quarter ? Give your reasons.

*(i)* How many means of transport are indicated ?

(j) How is such traffic regulated?

*(k)* Is such local traffic likely to be passenger or goods traffic ?

*(I)* Is the street designed for heavy, medium, or light traffic ?

(m) Is this street in an old-established shopping and business quarter of London?

(n) Point out the advantages to the theatre of its site.

# PICTURE ANALYSIS

**The pictures in this book are screened to stand enlargement by epidiascope or other means. The author's *Geography Through Pictures with Outlines of Answers* provides an instructive introduction not only to the technique of picture reading, but also to a more critical observation of actual scenes at home and abroad.**

**In picture analysis the following points should be remembered—**

**(1) A scene covers a segment of a circle of which the observer is the centre and, therefore, allowance has to be made for perspective and the gradual widening out of distances from foreground to background.**

**(2) Home geographical conditions and familiar things are the most useful standards of comparisons. Likenesses and differences should be noted and explanations sought.**

**(3) The examination should be done systematically. A landscape usually shows—**

***(a)* People and some indication of the extent of their needs.**

***(b)* Human activities as organized for the satisfaction of human needs,**

**(c) Natural environment conditions and the extent, to which man has adapted them or is influenced by them in achieving his purposes.**

***(d)* Some evidence of the historic past and of the length of time during which the adjustment of man and his environment has been going on.**

***(e)* Some clue by which the view can be oriented and placed.**

**Pig. 1 (page 5) and the following suggestions will be found useful—**

| ITEM | FACTS WHICH MAY BE LOOKED FOR |
|---|---|
| PEOPLE AND THEIR NEEDS | Racial and physical characteristics; foodstuffs and water supply; clothing—amount, materials, type and usefulness; buildings—number, shape, size, grouping, sites, materials and uses; tools, machines and weapons—kind, materials and uses; sources of power; means of transport and communication; facilities for and evidence of the satisfaction of political, social, religious and recreational needs. Extent to which people appear to supply their own needs. |
| HUMAN ACTIVITIES | Primitive or otherwise; destructive or productive; processes used to obtain raw materials directly or indirectly from the earth; products of field, forest, mine or water; production of power; manufacturing processes; transport and exchange of goods; recreational, social, political and religious activities; sexes and ages at work; specialization of labour or work; evidence of historic changes in the use of natural resources. |
| NATURAL ENVIRONMENT | Landforms; drainage system and other topographical features; geology and structure; soils; work by agents of erosion, past or present; natural vegetation and crops; extent and intensity of cultivation; effect of relief, slope, drainage as helping or hampering man's efforts; animal life—wild or domesticated, its uses; weather conditions—kind and amount of precipitation, strength of sunlight; prevailing direction and force of winds, temperature. People's clothes, buildings, plant and animal life, methods of cultivation, modes of production, industry and transport may provide clues to weather conditions. |

| ITEM | FACTS WHICH MAY BE LOOKED FOR |
|---|---|
| LOCATION | **Given some indication of the time of day and season of the year, a picture can be oriented and the latitude of a scene roughly ascertained by noting respectively the direction and comparative length of shadows. Photographs are normally taken round about midday when the light is best.** |

**By observing the range of man's needs, the amount of care, thought inventiveness and specialization displayed in the ways and means by which he satisfies his needs and also the extent and degrees to which man directly or indirectly makes use of ^natural resources, much can be deduced as to his degree of civilization, his standard of living, the organization of his economic life and his political and social economy.**

# INDEX

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