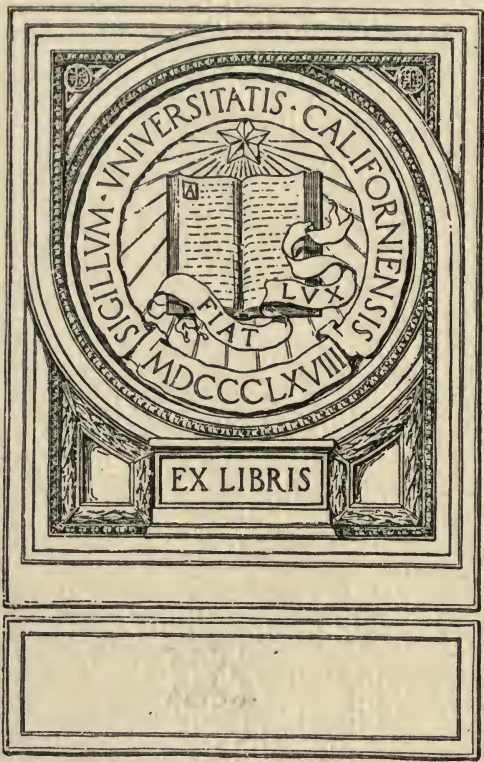




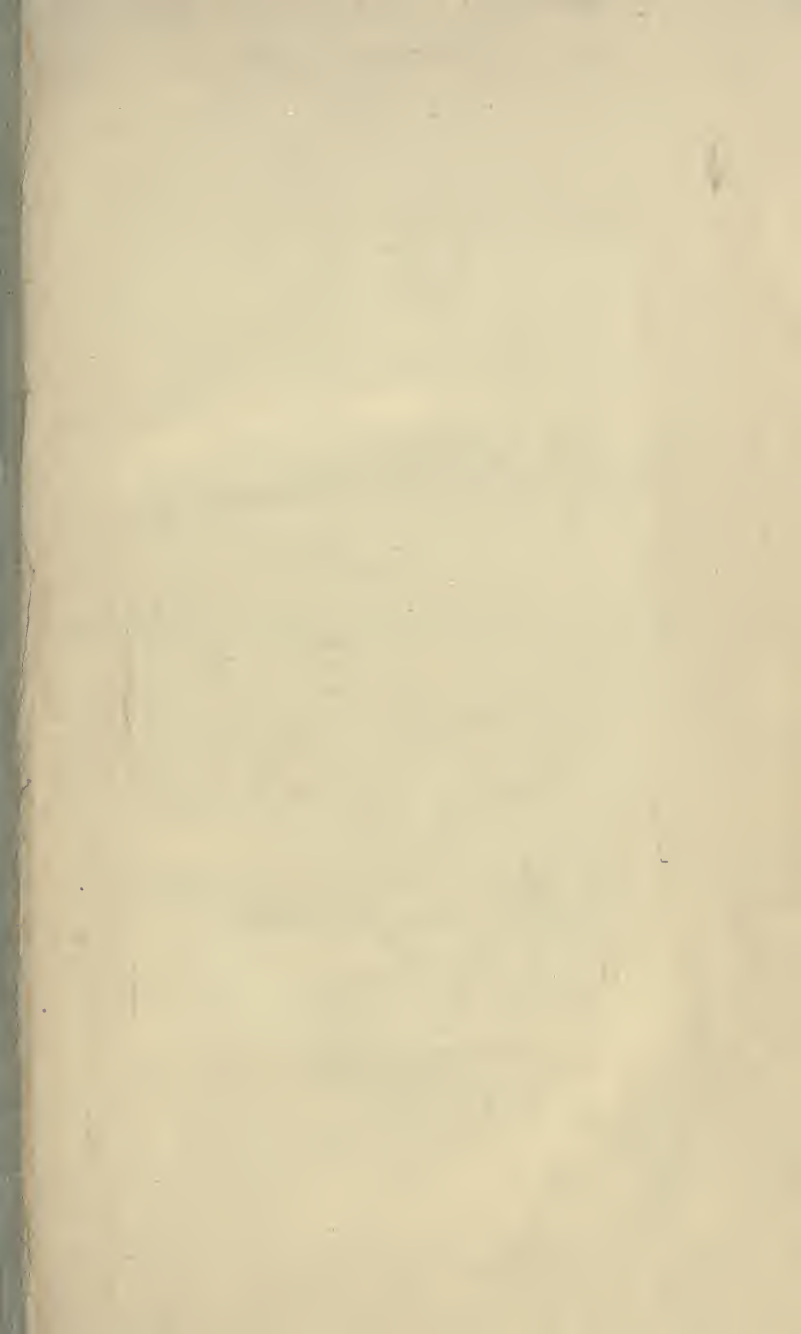
THE
BRITISH EMPIRE
BEYOND THE SEAS

MARION I. NEWBIGIN





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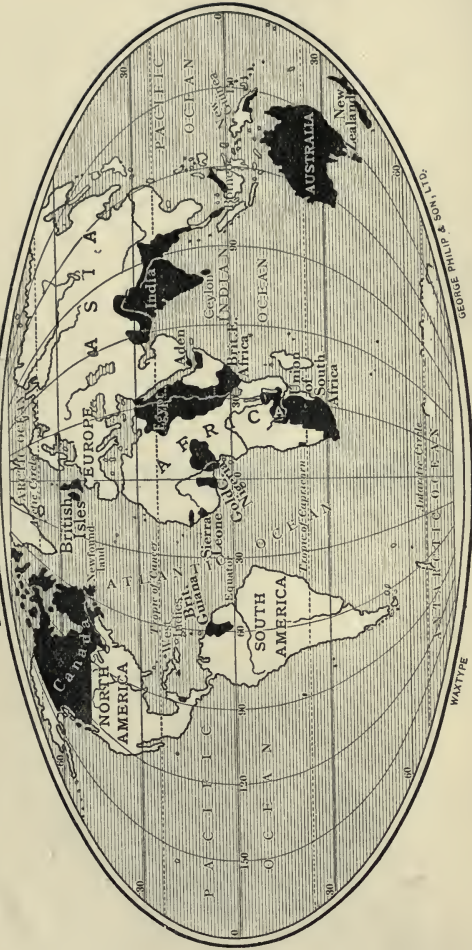


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THE
BRITISH EMPIRE BEYOND THE SEAS

Frontispiece.

THE BRITISH EMPIRE



London: G. Bell & Sons, Ltd.'

NOTE.—Égypt is not strictly a part of the Empire, but both it and the Sudan are discussed in the text,

THE BRITISH EMPIRE BEYOND THE SEAS

AN INTRODUCTION TO WORLD GEOGRAPHY

BY

MARION I. NEWBIGIN, D.Sc.(LOND.)

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AUTHOR OF

"MODERN GEOGRAPHY" "AN INTRODUCTION TO PHYSICAL GEOGRAPHY"

"ANIMAL GEOGRAPHY" ETC.

WITH MAPS AND DIAGRAMS



LONDON
G. BELL AND SONS LTD.

1914

THE UNITED STATES OF AMERICA
DEPARTMENT OF JUSTICE
FEDERAL BUREAU OF INVESTIGATION

7-10-67
N 4

TO : SAC, NEW YORK
FROM : SAC, NEW YORK
SUBJECT: [illegible]

P R E F A C E

THIS book is intended for the use of pupils in upper and middle forms who have already a rudimentary acquaintance with world geography, and a somewhat detailed knowledge of the geography of the British Islands.

As that extensive and heterogeneous area which we call the British Empire contains types of practically all known varieties of climate, surface, and modes of land utilisation, those who have worked through the volume will, it is hoped, have acquired a tolerably wide knowledge of the general subject. Further, such lacunæ as exist can be filled by the teacher, where time permits, by following up the suggestions made incidentally in the course of the present volume, as to the conditions existing in the parts of the world not treated here.

The limitation of the geographical syllabus, during certain years, to territories under British control or influence has been strongly urged from many quarters recently on utilitarian grounds, and has also been, not without justice, criticised for educational reasons. The fact remains, however, that within the limits of the time usually available, it is impossible to treat world geography as a whole in any detail, and the writer is of opinion that to permit pupils to leave school with no knowledge of detail save in the case of our own islands, is to miss a very large part of the value of the subject. Throughout the following pages, therefore, an effort has been made to emphasise the representative char-

acter of the various states and dominions discussed. If the principles involved are clearly grasped, the reproach that a course confined to the British Empire gives a distorted idea of the world at large will not, it is hoped, be justified in the case of students of this book.

In apportioning space to the different regions their importance as types has been so far as possible kept in view. Further, the human side has been kept in the forefront, an attempt having been made throughout to answer such questions as—how do people live? to what climatic conditions are they exposed? what crops do they grow? and so forth in the different areas considered.

Finally, it will be noticed that statistics, especially those relating to trade, have been employed to a somewhat greater extent than is usual in an elementary book. These statistics are not intended to be learnt by rote. They have been inserted to facilitate comparisons between the different regions, and to give vividness to such comparisons. It will be found useful to employ them in the construction of diagrams, similar to those which appear in various parts of the book.

M. I. NEWBIGIN.

EDINBURGH, 1914.

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THE BRITISH EMPIRE BEYOND THE SEAS

INTRODUCTION

THE GREAT STATES OF THE WORLD

THE world at the present time is divided into a large number of separate states which vary greatly in size and importance. At one end of the scale we have small blocks of land, such as the tiny principality of Monaco, and at the other great empires and commonwealths. Among these states four stand out by reason of their size and their large population. These are, in order of size, the British Empire, the Russian Empire, France with its colonies and dependencies, and the republic of China. The accompanying diagram shows the relative areas and populations of these four great states (Fig. 1).

From this diagram we see that the British Empire has by far the largest extension, the Russian coming next to it in this respect. On the other hand, China, with an area slightly less than that of France and its colonies, has a population which exceeds that of the British Empire. Thus China is the most densely peopled of the great states.

If, however, the Russian Empire comes nearest the British in size, and China nearest in population, both

differ markedly in the geographical arrangement of their constituent territories. Both China and the

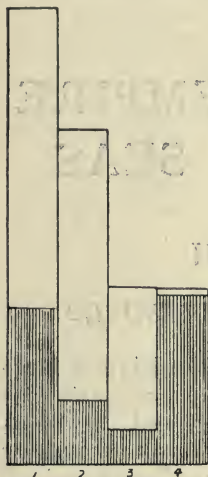


FIG. I.—THE AREA AND POPULATION OF THE FOUR GREATEST STATES OF THE WORLD.

The complete column in each case represents the area, the shaded portion the population, so that the relation of the shaded to the unshaded part is a measure of the density of population.

(1) *British Empire*.—Area, about 11½ million square miles. Population, about 417,000,000. (2) *Russian Empire*. (3) *France*. (4) *Republic of China*.

Russian Empire form continuous masses of land, characterised (especially the Russian Empire) by great extension in longitude. In the case of the Russian Empire the longitudinal extension so far exceeds that in latitude that there is throughout a certain degree of sameness in climate, products, races of men, religion, types of human society, and so forth. With this relative homogeneity the heterogeneity of the territories included in the British Empire is in marked contrast. As we all know, this empire does not form a continuous block of land, for the constituent parts are separated by wide extents of ocean or of foreign territory. Further, while it is true that it includes lands of very different longitudes, yet the differences in latitude of its various parts are even more striking. The result of this is that we have very marked contrasts both in physical conditions and in human life. In this respect, as in the fact that it consists of a mother country with an old civilisation and a dense population, and of overseas possessions often scantily peopled and still in process of development, the British Empire resembles France. The great difference in population

is partly due to the fact that the possessions of France include a large part of the vast but almost unpeopled Sahara, while those of Britain include most of India, a region of dense population with an ancient civilisation of its own.

It is this diversity which makes it possible to study the geography of the British Empire as an introduction to World Geography. By limiting ourselves to the Russian Empire or to the great republic of China we should get but an imperfect idea of the world at large, but within the British Empire we find types of almost all natural conditions of existence, of almost every stage of human society. In our study of the constituent parts we must keep this fact in view, and strive to realise that the conditions described in the particular area are present also in a larger region of which the one described forms a part.

Now, in describing the parts of the British Empire we might classify these according to the continent in which they occur. That is, we might consider the possessions in Asia, those in Africa, in America, and so forth. But we shall soon find that places in different continents may be more like each other than those in the same continent. For example, life in British Columbia shows considerable likeness to life in New Zealand; much the same plants are grown in Natal as in parts of Australia; Tasmania, though so far away, is in many ways like England, and so on. It seems therefore more convenient to consider together places which resemble one another, because this saves much repetition. Such a classification we call a division into natural regions, and natural regions are those in which the climate, the kinds of plants most easily grown, the life of man, are broadly alike. If, therefore, we are to divide the British Empire into natural regions,

we must first discuss some points about climate and the relation of plants to climate.

In reference to plants we should note that, as man almost everywhere cultivates plants, cultivated plants are generally more important in defining natural regions than wild ones. The wild plants of Tasmania are not in the least like those of England, but those wild plants have not much importance for the people who now live in Tasmania, and the plants which they cultivate are largely the plants which their forefathers grew in England. For this and other reasons we may say that Tasmania falls into the same natural region as England.

QUESTIONS AND EXERCISES

1. The frontispiece shows the parts of the British Empire. Classify these under the heading of continents, as Europe, Asia, etc.
2. From your atlas similarly pick out the constituent parts of the Russian Empire and of the states of France and China.
3. Very mountainous regions and deserts, are generally scantily peopled, river valleys are often densely peopled. Which parts of the republic of China are likely to have many people, and which few ?

PART I
CLIMATE AND PLANTS IN THE
BRITISH EMPIRE

CHAPTER I

THE CHIEF KINDS OF CLIMATE

THE variations in temperature, in rainfall, in sunshine, in wind, and so forth, which we experience day by day we describe as weather. Now, when the weather in a particular country has been studied for many years we can obtain a number of average figures, which tell us the probable temperature at different periods of the year, the probable amount of rain, the probable nature of the wind, and so forth. This *average succession of weather* we call the *climate* of a place, and the climate affects greatly the growth of plants and the life of man and animals.

So far as plants are concerned the important points are the temperature variations, the amount of rain, and the season of its fall. Other elements or, as they are called, climatic factors, are the wind, the length of the day at different seasons, the amount of sunshine, and so on, but these are generally less important than moisture and warmth.

All plants require a certain amount of heat during their growing period, and this heat, to be most favourable, should increase steadily. Our garden plants begin to grow in spring when the air gets warm, they grow faster as the air gets hotter, and a sudden change from heat to cold in spring is very dangerous; it may spoil a fruit crop if it occurs when the flowers are

opening ; nearly always it gives plants what gardeners call a set-back. After the height of summer is past growth slackens, and before the first frost of autumn comes our plants, in a favourable season, have ripened their fruits and seeds, have prepared for the winter. It is the cold of late autumn, and especially the first autumn frosts, which stop plant growth with us, and thus plant life in our climate is checked by winter cold.

But plants, in addition to needing warmth, must also have moisture. Generally speaking, they thrive best when they get most moisture in the earlier part of their growing season, when they are making leaves and stems, and they need less later when the flowers are open or the fruits ripening. Plants which are grown for their leaves and stems—like grasses, clovers, cabbages, turnips, and so on—need some water throughout their growing season, and will not thrive if there is severe drought. In our own country growth is not very often stopped by drought, and so our fields look green all the year round unless they are snow-covered or have been ploughed up. But in many countries spells of severe drought come regularly, and then the land gets dried and burnt up, and plant growth stops.

Cold and drought thus form what we call checks to plant growth. In countries where there is no winter and no seasonal drought, plants will continue to grow all through the year. In those where there is a check due to cold, or to drought, or to both, their growth is periodically stopped.

Let us note some of the chief types of climate from this point of view. In countries like our own the winters, whether they are merely cool or really cold, are always cold enough to prevent plants growing much, so that we have a temperature check to growth. Generally there is rain enough at all seasons of the year. Such

climates are called TEMPERATE,—not a very good word, for the winter is sometimes very cold.

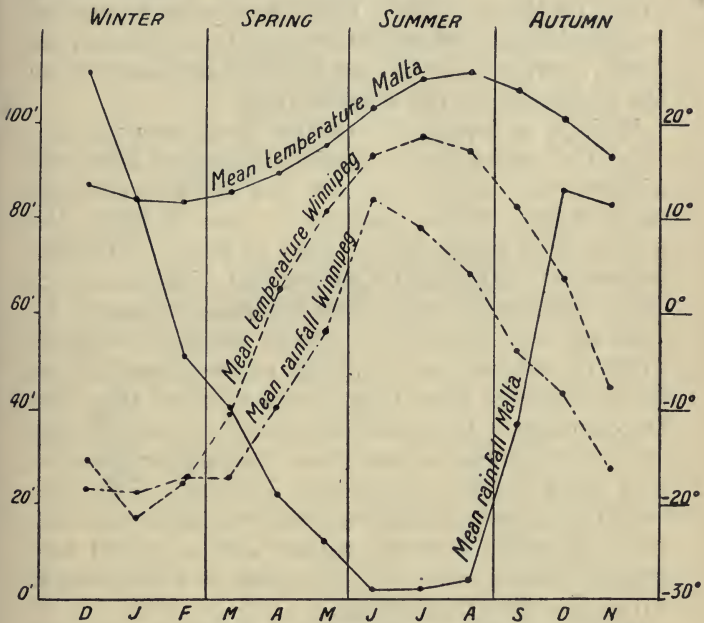


FIG. 2.—THE CONTRAST BETWEEN THE SUB-TROPICAL MEDITERRANEAN CLIMATE AND THE CONTINENTAL CLIMATE, AS ILLUSTRATED IN THE ANNUAL TEMPERATURE AND RAINFALL OF MALTA AND WINNIPEG.

The left-hand figures show rainfall in millimetres, the right-hand ones temperature in degrees Centigrade. The year is supposed to begin with December, the first winter month.

Note first the temperature curves. Malta is warm at all seasons, and the difference between summer and winter is slight. Winnipeg is very cold in winter, but warm in summer; in spring the temperature curve rises very steeply. As to rainfall, note that Malta has least rain—almost none—in the warmest season of the year. Winnipeg has some rain at all seasons, but by far the most in the early summer, when the plants need moisture. This fits the climate for wheat-growing,

When such countries are surrounded by sea, or have a large ocean on their western side, the climate tends to be equable and moist. This is because such countries occur in latitudes where westerly winds prevail, and the winds blowing from the sea cool the summers, warm the winters, and bring abundant rain.

Regions in temperate latitudes away from the sea, or on the eastern side of continents, tend to have cold winters, warm or hot summers, and rainfall sometimes rather scanty, with a tendency for most to fall in the warmer parts of the year. Thus we have a distinction between MARITIME and CONTINENTAL TEMPERATE climates, according as sea or land influences are most felt.

As we travel towards the equator we come to regions where the winters are so mild that some plants at least can continue to grow then. Such climates are called SUB-TROPICAL. We cannot say that they occur in any particular latitude, because New Zealand, for instance, is in much the same latitude as Italy and Sicily, and while they have a sub-tropical climate it has a temperate one. Generally, however, regions with a typical sub-tropical climate occur near the coast of a continent in latitudes of about 30° to 40° .

Though in these regions there is no temperature check to plant growth, there is generally a drought check. When they lie on the western sides of continents, as for example in the Mediterranean region of Europe, in Cape Colony, in Chili, in California, and so on, they have westerly, rain-bearing winds in winter, and dry land winds in summer. Therefore they have summer drought and winter rain, and the land, which looks green and beautiful in winter, is in summer burnt and scorched. Such places are said to have a MEDITERRANEAN type of climate, because this climate is best developed round the Mediterranean Sea.

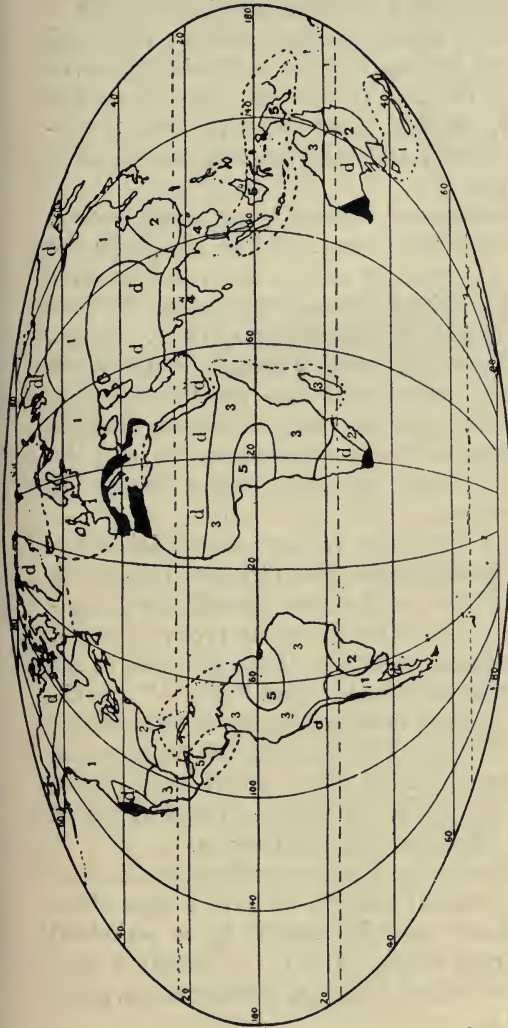


FIG. 3.—SKETCH-MAP TO SHOW DISTRIBUTION OF CHIEF TYPES OF CLIMATE (MOLLWEIDE'S PROJECTION).

- (1) *Regions of Temperate Climate.*—Note that these are much better developed in the Northern than in the Southern Hemisphere.
- (2) *Regions of Chinese Sub-Tropical Climate.*—The smaller areas with Mediterranean sub-tropical climate are black.
- (3) *Ordinary Tropical Climate.*
- (4) *Monsoon Tropical Climate.*
- (5) *Equatorial Climate.*—The regions marked "d" have desert, Arctic, or mountain climate, and are not of great use to man.

Places on the eastern sides of continents with a sub-tropical climate generally have summer rain, and there is a more or less marked check to winter growth owing to drought then. This type of climate occurs in China, in Natal, in New South Wales, in the South-eastern United States, and other places, and is called the CHINESE type.

The Mediterranean and Chinese types mostly occur, as we have said, near the coast. As we pass from the coast the rain gets scantier and scantier, and we have desert and steppe regions, which, except when the land can be artificially watered, produce very little. Again, to the south of the belts of Mediterranean climate desert occurs again, hot desert with no winter, but very severe drought. Examples are the Sahara and Arabian deserts to the south of the Mediterranean Sea, and the similar deserts in the Western United States, in Australia, and so on.

To the south of this desert belt comes a region where the temperature is high all the year, but there is rain only in the hottest months, and severe drought in the intervening period. This is the TROPICAL type of climate, and is best developed in Africa. Both in it and in the desert belt the constant winds called "trades" prevail. Still nearer the equator the temperature is also always high, but there is rain at all seasons, and we have the EQUATORIAL climate, which reigns round the Amazon, the Congo, and in some of the islands of the East Indian archipelago and in part of Central America.

But in the hotter parts of Asia near the coast, instead of the ordinary tropical climate, we have a type where the rainfall is heavy and is brought by a periodical reversal of the trade winds. This is the MONSOON type of climate, which we find in India, Further India, parts of China, and so on.

To sum up, then, we have five main types of climate in the inhabited parts of the globe :—

1. Temperate climates, which may be Maritime or Continental.

2. Sub-tropical climates, either with summer drought (Mediterranean) or winter drought (Chinese).

3. Ordinary tropical climates, in the trade wind belt, with severe drought in the less hot season.

4. Monsoon tropical climates, with heavy rain, due to a periodical reversal of the winds.

5. Equatorial climates, with heat and moisture at all seasons. This type is not very important, for most equatorial regions are not thickly peopled.

In addition to these kinds of climate we have others, such as desert climates, in which rain is very scanty at all seasons, mountain climates and Arctic climates, in both of which there is very severe cold, and so on; but these are not of great importance to us.

In the next chapter we shall consider the chief kinds of products which are obtained in the regions having these different kinds of climates.

QUESTIONS AND EXERCISES

1. In Fig. 2 convert millimetres into inches by multiplying by $\cdot 4$, and the Centigrade figures into Fahrenheit by multiplying by $9 \div 5$ and adding 32.

2. Describe in words the rainfall and temperature of Malta and Winnipeg throughout the year.

3. Name the chief regions of the earth, with the Mediterranean type of climate.

CHAPTER II

THE PRODUCTS OF THE GREAT CLIMATIC REGIONS

I. TEMPERATE CLIMATES

IN the regions of Temperate climate agriculture is generally well developed, and wheat is the most important cereal. The inhabitants of these regions eat bread made of wheat, when they can. Wheat needs a warm dry summer to ripen, and can only be grown on fertile soil. It is only in comparatively recent times that it has been very widely used, for it will not grow in the damper, cloudier, less fertile parts of temperate regions. Barley was in earlier times more widely grown than wheat. It is tolerant of a great range of temperatures, and can be cultivated both in hot and cold countries. Some varieties will grow even within the Arctic circle. Now, however, barley bread is not very much used.

Rye, unlike barley, is fitted for cold climates, and does not thrive in hot ones. It will grow on poor soils, and in Europe is cultivated in cold or infertile regions, and is used as a bread plant by the poorer people in such regions as Russia, the mountainous part of Switzerland, North Germany, and so on. Oats thrive in moist climates, and were once very important in Scotland because of the damp climate.

Wheat, barley, rye, oats constitute the temperate cereals, but wheat and barley will grow also in hotter

climates, and a few other cereals can be made to grow even in temperate regions. Thus maize, which requires warm, moist summers; rice, which demands much moisture, will both grow in the warmer parts of the temperate regions, though they are not generally of great importance there.

Next to the temperate cereals the most important cultivated plants of the temperate zone are the root crops, such as potatoes, sugar beet (grown for sugar), turnips and swedes (grown for domestic animals), and so on. In the cooler, damper regions the potato is nearly always of great importance. Where the climate is warmer and drier, peas and beans are much grown.

Thirdly, in the temperate zone a great deal of orchard fruit is grown, especially apples, pears, plums, cherries, with peaches, apricots, and grapes for wine in the sunnier parts. Minor plants are tobacco, flax, hemp, hops, and so on.

In all the moister parts of the temperate region the pastoral industries are important. Cattle are reared where the grass is luxuriant, and sheep where it is less so. In the drier parts these industries are also carried on if the land cannot be otherwise used, but in this case vast amounts of land are necessary, so that the animals can move about from one region to another when drought comes.

Again, also in the moister parts, forests are abundant, and in new countries give rise to an important timber industry, and often also to trade in furs and skins from the animals living in the forests. Two other sources of wealth are quite often present—the fisheries, fish being usually very abundant in northern seas, and mines, many temperate countries being well supplied with minerals.

II. SUB-TROPICAL CLIMATES

Turning next to the sub-tropical regions, we find that wheat is the most important cereal in the MEDITERRANEAN division, and rice in the CHINESE. Maize occurs wherever the summers are moist enough. Barley is also grown, and sometimes, where the climate is specially cool and moist, as in mountain regions, oats and rye. Among the most valuable crops of sub-tropical regions are cotton, sugar cane, tobacco, the mulberry tree for the use of the silkworm, tea, etc., but the summer drought makes it difficult to grow most of these in the Mediterranean type. Other crops, especially important in regions with Mediterranean climate, are the sub-tropical fruits, such as grapes for wine, oranges, lemons and citrons, olives for olive oil, the different kinds of nuts, such as pistachio, almond, with walnut and chestnut in the cooler parts and many others, also peaches, pomegranates, figs, and so forth.

Forests are more important in the Chinese sub-tropical climate than in the Mediterranean one. In the latter the frequency of nut-bearing trees, especially oaks, leads to herds of pigs being kept. Otherwise the pastoral industries are not very important. Goats and sheep are reared, but cattle and horses are less common. Generally the fisheries are less important than in the seas farther north.

III. TROPICAL CLIMATES (TRADE WIND BELT)

Regions with the ordinary tropical climate are not, as a rule, regions with well-developed agriculture. There is no single cereal which takes the place of wheat in the temperate regions. The Indians of America cultivate maize when they cultivate at all, and this is

also a common plant with negroes. Millets, which are cereals with very small grains, used as bird-seed in this country, are often grown for human food in tropical countries, as is also rice. The races which do not cultivate cereals generally depend upon such starchy foods as bananas (or plantains), yams, sweet potatoes, and so on. Most of these are not very nourishing and not very digestible.

Other plants which are cultivated in the tropics are cotton, sugar cane, many kinds of pumpkins and gourds, tobacco, various kinds of beans, and so forth.

As a rule forests are not very well developed, owing to the recurrent dry season. Pastoral industries also never attain great importance. Fish are often abundant in the rivers and lakes.

IV. TROPICAL MONSOON CLIMATES

In countries with a Tropical Monsoon climate rice is the most important bread plant, and is grown almost everywhere. Millets, sometimes maize, wheat in the cooler season, with some barley, are also grown. As rice does not possess much flavour, and contains very little fat, various kinds of seeds containing oils are grown, and also flavouring matter, such as spices and pepper. Cotton, jute, indigo, sugar cane are widely cultivated. There are often splendid forests, some yielding valuable timber, as for instance teak, and other valuable products such as camphor. Bamboos, which are giant grasses, are very abundant, and the forests and jungle are full of wild animals, such as tigers, wild pigs, elephants, deer, etc. The pastoral industries are not very important, because the fertile land is too valuable to be given over to cattle, and there is not much pasture in the dense woods.

18 PRODUCTS OF GREAT CLIMATIC REGIONS

Cattle and buffaloes are, however, kept in small numbers.

V. EQUATORIAL CLIMATE

The regions of Equatorial climate are clothed with dense forest, the trees being green throughout the year, and bound together by a tangled mass of creepers. The forest yields some valuable products, such as rubber, ivory from the tusks of the elephants (in Africa), dye-woods, timber, the sago palm, from which sago is made, the oil palm, and so on. Where the forest has been cleared bananas, spices, cocoa, coffee, cinchona (for quinine), together with all the tropical crops, can be grown; but there is not a great deal of cultivation in the equatorial zone.

QUESTIONS AND EXERCISES

1. Make a table showing the chief cereals, the climates for which they are suited, and the parts of the earth where you would expect to find them.
2. Figs. 49 and 50 (pp. 296, 297) give the rainfall and temperature in a region near the equator; describe in words the kind of climate shown by the figures.

CHAPTER III

THE NATURAL REGIONS OF THE BRITISH EMPIRE

So far we have been considering the climates and cultivated plants of the world at large, but when we limit ourselves to the British Empire we find that a natural subdivision into regions must take other points into account.

There is one very obvious distinction between the different parts of the empire which is of great human importance. If we hear of a man going to Canada, Australia, or South Africa, we know that it is very likely that he will remain there permanently, and that there is nothing in the climate to prevent him marrying and bringing up children in his new country. But if he goes to West Africa, we know that he will probably come home every year, that it is not easy for him to take his wife with him, and that if there are children they must be sent back to England or Scotland or Ireland to be brought up. That is, we distinguish between places where settlement is and is not possible. Where it is easy we know that in course of time a new self-governing country arises, with its own life, its own traditions; where it is not possible Englishmen, Scotsmen, and Irishmen are but sojourners in a strange land. This gives us, then, a distinction between parts of the empire which are settled by people from the home country and those which are not so settled.

Again, in Canada, Australia, and some other parts of the empire there are great empty tracts waiting for population; but in India, Egypt, etc. the land is already fully peopled and there are few or no empty spaces. Here is another distinction between different parts of the empire.

If, then, we take into account climate, products, the possibility of settlement, the presence or absence of a large native population, we can classify the different parts of the empire in the following fashion :—

I. REGIONS WITH COOL OR COLD WINTERS

Here settlement is possible, except where the climate becomes too cold. The natives are few in number. In the most fertile parts the temperate cereals (and sometimes temperate fruits) are the chief crops. In the less fertile, or less developed, or more arid parts the pastoral industries are very important. Valuable forests sometimes occur. British North America, New Zealand, Tasmania, etc. are the chief regions included here.

II. REGIONS WITH WARM SUMMERS AND MILD WINTERS (SUB-TROPICAL)

These are suitable for settlement, but the native population is sometimes abundant (*e.g.* South Africa). The climate makes these lands also suitable to Asiatics (Chinese, Japanese, Indians), who are generally kept out by legislation (as in Australia). Drought is frequent in these regions, which have Chinese, Mediterranean, semi-desert or desert climates, and the drought makes the pastoral industries precarious. Sheep, which require less water, generally predominate over cattle. Cereals

can only be grown in favoured localities. Mediterranean fruits (see p. 16), sugar cane, tea, some cotton are grown where the climate is suitable. South Africa and most of Australia are included here, as well as the small possessions in the Mediterranean region, *e.g.* Malta and Gibraltar.

III. HOT COUNTRIES WITH EXTENSIVE NATIVE CULTIVATION

Most of these are countries with monsoon climate, but Egypt must also be included. It has a desert climate, but irrigation is easy. In these countries the population is generally dense, and European settlement is prevented both by the climate and by the dense native population. But Britons supply the capital for railways, canals, irrigation works, etc., and construct these; they usually hold the higher government offices; they supervise the working of minerals; they have often introduced new cultivated plants. Finally, they engage in trade and commerce, and, exceptionally, act as planters, that is, hire native labour to grow certain crops; the crops are intended for a distant market, and are usually crops not originally grown by the natives, *e.g.* tea in India. India with Burma, and Egypt, are the chief examples of this type.

IV. HOT COUNTRIES WITH LITTLE NATIVE CULTIVATION

These are mostly scantily peopled, except in favoured localities. Permanent European settlement is only exceptionally possible (*e.g.* in East Africa, the West Indies, etc.), because of the climate. The plantation system is frequent, and native cultivation is also being

encouraged. The people are often negroes, either native (Africa) or the descendants of slaves (West Indies); they generally show little aptitude for agriculture, so that the plantations are often cultivated with introduced labour. All government is carried on by Europeans, who also engage in trade and commerce, often chiefly in natural products (as rubber, dyewoods, cabinet wood, etc.).

The chief parts of the empire which belong here are the different colonies of tropical Africa, the West Indies, Guiana, British New Guinea or Papua, etc., and such colonies tend to be Crown Colonies, *i.e.* to have no representative government, or are protectorates.

QUESTIONS AND EXERCISES

1. From your atlas or the frontispiece make a list of the parts of the British Empire, and classify them so far as you can under the headings I., II., III., IV. given in this chapter. Underline doubtful cases.
2. Where would you expect sugar, fish, oranges, wheat, furs to be obtained on the large scale in the British Empire?

PART II
THE DOMINIONS OF THE BRITISH
EMPIRE

SECTION I

REGIONS WITH COOL OR COLD WINTERS

CHAPTER IV

THE KINDS OF TEMPERATE CLIMATE

THE chief types of climate in these regions are the so-called MARITIME TEMPERATE and the CONTINENTAL TEMPERATE. The former is represented in the United Kingdom, in New Zealand, in Tasmania, in British Columbia, and in many islands. The winters are mild, the summers only moderately warm. Rain is plentiful, and falls throughout the year. Because of the frequency of cloudy skies in summer, regions with this climate are not well suited for wheat-growing on the large scale. Forests are often abundant because of the damp climate, and the plains are well suited to cattle—whence the frequency of dairy industries. Temperate fruits are also grown, and root crops, the latter partly for the cattle and sheep.

The Continental Temperate climate is exemplified in British North America (Canada) apart from British Columbia. The winters are very cold, the summers warm. Rain is apt to be scanty towards the interior, and forests chiefly occur near the coast and towards the north. Where there is enough rain and the growing season is long enough, wheat on the large scale is the typical crop.

A third type of climate is represented in the small area of land which is leased from China round Wei-hai-wei, near the entrance of the Gulf of Pe-chi-li. This is the Manchurian type, a modification of the Continental Temperate. The winters are very cold, the summers hot, the rain abundant but almost confined to the summer season. This kind of climate is very rare in the British Empire, but is widespread in North China. The exports of Wei-hai-wei are therefore interesting as throwing light upon the conditions which prevail in North China generally.

Before considering in detail the temperate British possessions, we must say a few words about the climate of the British Islands. We know that this climate is exceptional in several respects,—the mild, moist winters, especially in the west, and the cool, cloudy summers, again especially in the west, being remarkable for the latitude. The mildness of the winter (Fig. 6) is due to the prevalence of westerly winds, and the vicinity of a relatively warm ocean from which these winds blow. They are chiefly south-westerly winds in winter and north-westerly in summer, and thus warm our winters and cool our summers, and are damp throughout the year.

It has often been pointed out that the mild winter is of great importance both to British agriculture—by permitting winter work in the open, etc.—and also to trade and commerce, for there is little winter interruption to free movement either on land or water, such as occurs in countries with severe frost and heavy snowfall. But we must not forget that with the mild winter is associated a cool, not very sunny summer, which excludes from British agriculture many crops which are freely grown in similar latitudes elsewhere. Among the crops which are not seen, or only seen as

curiosities, in the United Kingdom, but are common on the continent of Europe, are—sugar beet, tobacco, the vine for wine, lucerne as a fodder crop, hemp, maize, and so forth. Few of these are actually excluded by the climate—tobacco is grown to a small extent in Ireland, sugar-beet as an experiment in Norfolk, maize in gardens as a foliage plant, and so on; but they cannot be grown generally with a reasonable prospect of profit. In studying the crops of temperate climates generally, however, we must remember that such plants do not necessarily demand, as we are apt to suppose, a warm *climate*. They do need a warm and sunny *summer*.

We shall begin our study of Temperate British possessions with those having a maritime temperate climate,—that is, one which is equable and moist. As we shall see, in the case of small islands with large masses of water round them, this climate becomes so cool and cloudy in summer that relatively little will grow. On the other hand, in the case of large masses of land it has but a limited extension inland from the coast, the characteristic features becoming speedily modified as we pass away from the sea. This is well illustrated in British Columbia.

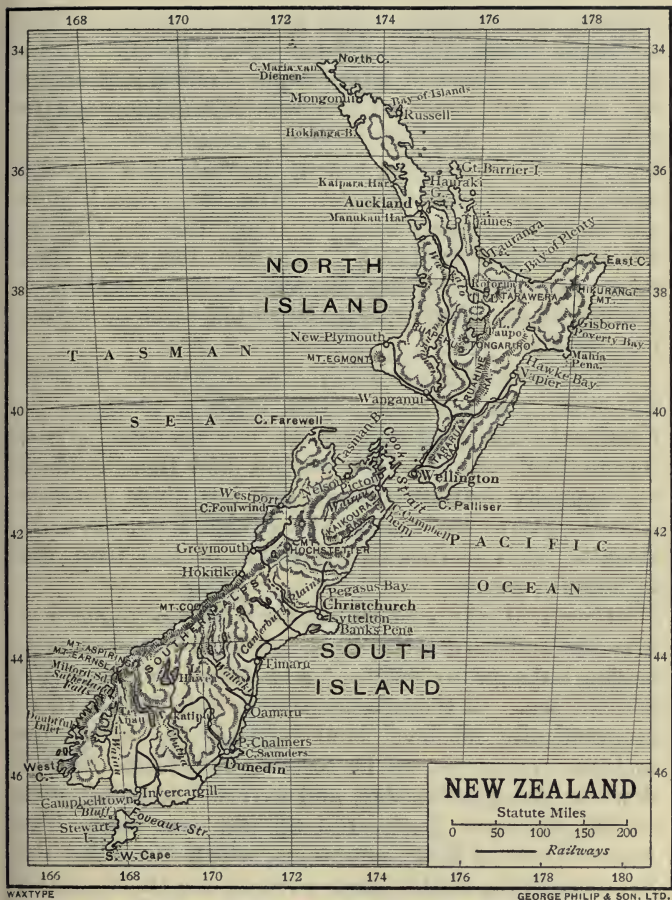
CHAPTER V

REGIONS OF MARITIME TEMPERATE CLIMATE

I. THE DOMINION OF NEW ZEALAND

NORTH ISLAND, South Island, and Stewart Island, together with some minor groups of islands, constitute the Dominion of New Zealand, and are situated in the South Pacific Ocean. Just as the United Kingdom lies approximately at the centre of the Land Hemisphere, so New Zealand lies near the centre of the Water Hemisphere. Its isolated position may be realised from the fact that the nearest large land mass is distant some four days by steamboat (Sydney to Wellington, 1280 miles; Melbourne to Bluff Harbour, 1200 miles).

In latitude the islands of New Zealand extend from about 34° S. to 47° S., having thus an extension some 3° greater than that of the United Kingdom (about 50° N. to 60° N.). They show a certain rough correspondence in latitude to Italy and Sicily, with which, however, they have but little in common. Though no part of the two larger islands is wider than two hundred miles, the Dominion has a considerable extension in longitude, from 166° E. to 179° E. This is because the islands trend generally from south-west to north-east, while the peninsula at whose base Auckland is placed, projects to the north-west, almost at right angles to the rest of the surface.



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FIG. 4.—THE PHYSICAL FEATURES AND RAILWAYS OF NEW ZEALAND.

Size.—The area of South Island, the largest island, is about 58,500 square miles, nearly the same as that of England and Wales (58,300 square miles). North Island has an area of 45,000 square miles, just about one and a half times that of Scotland (30,400 square miles). When, however, we take into account Stewart Island and the outlying islands the total area becomes nearly 105,000 square miles. The two large islands are long and narrow, with the result that no part of the surface is more than 75 miles from the sea. Thus even more than Great Britain, New Zealand is a country whose whole surface is within reach of marine influences.

Physical Features.—These are relatively simple. The three chief islands stand upon a platform or *Continental Shelf* which the sea has invaded, giving rise to Cook and Foveaux Straits, and thus dividing an originally continuous land-mass into three separate islands. As in the case of the British Isles, the Continental Shelf is covered by water of less than 100 fathoms in depth.

In SOUTH ISLAND a chain of mountains, composed of very old and hard rocks, runs down the western coast, leaving but a narrow strip of land between the mountains and the sea. In the extreme south-west, indeed, there is practically no level land between the mountains and the water, for as in Norway they slope steeply down to the water's edge, and narrow branching arms of the sea—true *fjords*—run up into the land. The highest peak of these mountains, which are called the Southern Alps, is Mt. Cook, over 12,000 ft. in height, but there are many other lofty, steep-sided peaks, snow-capped and with their sides furrowed by glaciers larger than those of Switzerland, which travel far down the valleys. The lower slopes of the mountains are

beautifully wooded, and the glaciers come down so low that the great forests with their tree-ferns and parrots seem close to the ice, and the contrast between the luxuriance below and the rocky or snow-clad peaks above is striking and beautiful.

Westwards, as we have seen, the Southern Alps come down close to the sea; eastwards, they slope much more gently. On their eastern slopes we have, especially to the south, narrow, winding, and deep lakes (the Cold Lakes), of which the most striking is Lake Wakatipu. These lakes feed the rivers of the eastern plains, and are themselves glacier-fed; they resemble the deep valley lakes of Scotland or of the Alps.

Eastwards of the region of the lakes the surface, though lower, is still hilly and undulating. Only on the eastern and south-eastern coasts of South Island do true plains occur, and here are the best agricultural lands of the island. The largest and most fertile level area lies at the back of Christchurch and forms the Canterbury Plains. These plains are continued by a narrow belt of more or less level and fertile land which stretches round the south-east extremity of the island, and expands into the plains round Invercargill (see Fig. 5). Almost all the rest of the island is hilly, there being a very narrow plain round Greymouth on the west. The prominent peninsula which juts out to the south of Christchurch (Bank's Peninsula) is built up of volcanic rocks, which are rare in South Island.

The range of the Southern Alps is continued into NORTH ISLAND, in ranges of various names (Tararua, etc.), which lie to the east of the island and do not reach any great height. The highest point, Hikurangi, which lies not far from East Cape, does not reach 7000 feet.

To the north-west of this belt of high ground lies the volcanic zone, which stretches from Wanganui to

the Bay of Plenty and is marked by active volcanoes, of which Mount Ruapehu and Mount Tongariro reach



FIG. 5.—SKETCH-MAP OF NEW ZEALAND, SHOWING THE CHIEF ARABLE REGIONS, WHICH ARE SHADED, WITH THE POSITION OF SIX TOWNS.

Name the towns from your atlas.

a considerable height (Ruapehu over 9000 feet). Farther north is Mount Tarawera, whose eruption in 1886 destroyed the beautiful pink terraces at Lake Rotomahana,

while the extinct Mt. Egmont, with a beautifully symmetrical, snow-crowned cone, is placed on a jutting peninsula on the west coast. The volcanic region is remarkable for its geysers, hot springs, numerous lakes, and other volcanic phenomena, but the ground is not generally very fertile. The most fertile parts of North Island are the plains round Hawke Bay, those near Wellington, and those on the west coast and near Auckland (Fig. 5).

STEWART ISLAND has a rugged forest-clad surface, and contains an extinct volcano.

Climate.—The most important points in regard to this are, first, that South Island, like Great Britain, has a western backbone of mountains; and second, that, like the British Isles, much of New Zealand lies in a region of predominating westerly winds. It shows, however, one striking difference from the British Isles, in that, while England has what we may describe as a continental side as well as an oceanic one, New Zealand is surrounded on all sides by a vast ocean, and has no large land-mass near. In England, and to a less extent in other parts of the United Kingdom, we have a distinction between (1) a western or maritime climate, where the winters are mild, the summers cool, the winds strong, and the rainfall heavy throughout the year; and (2) an eastern or continental climate, where summer is warmer, winter colder, west winds somewhat less prevalent, and the rainfall less. This is because England approaches the continent of Europe closely, and partakes more or less of the climate of that continent, which also affects the eastern side of Scotland. As New Zealand has no adjacent continent we should expect its climate everywhere to be mild, windy, and moist. Even North Island, which in summer to the north enters the region of the trades, has rain at all seasons, though most in winter.

NEW ZEALAND

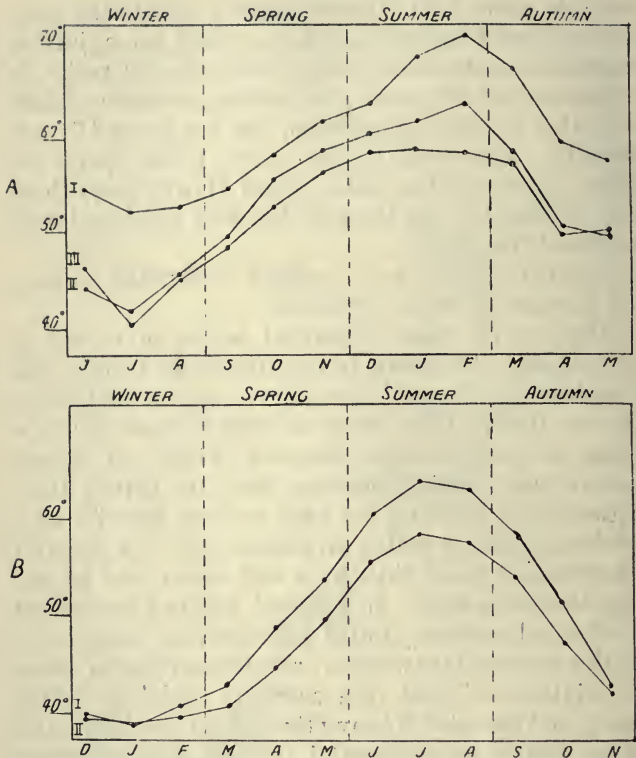


FIG. 6.—GRAPHS SHOWING THE MEAN ANNUAL TEMPERATURE OF LEITH (FIG. B, I.) AND GREENWICH (B, II.) AS COMPARED WITH THOSE OF AUCKLAND (FIG. A, I.), CHRISTCHURCH (A, II.), AND DUNEDIN (A, III.).

The temperature is shown in the vertical column, the months of the year in the horizontal. In the lower figure the year is taken as beginning with December, the first winter month in the Northern Hemisphere, in the upper with June, the first winter month of the Southern Hemisphere.

Auckland, lat. 37° S.; Christchurch, lat. 43° S.; Dunedin, lat. 46° S.; Leith, lat. 56° N.; Greenwich, lat. $51\frac{1}{2}^{\circ}$ N. Note that, in spite of the difference of latitude, the summer is no warmer in Dunedin than in Leith.

Further, while the ocean near the British Isles is warmed by a drift of water from warmer seas, the ocean round New Zealand is chilled by currents from the southern ocean. The diagrams help to make clear to us the effect of these conditions upon the climate of New Zealand.

In Fig. 6 we have a comparison of the temperature of three New Zealand stations with those of Leith and Greenwich. We note that Auckland, which lies in the lowest latitude, is warmer throughout the year than the British stations. But if we compare the other curves we note as a very striking feature, that although the New Zealand towns lie so much nearer the Equator, their summers are not appreciably hotter than those of the two British towns. But their winters are perceptibly milder. Leith, in lat. 56° N., has a summer as warm as that of Dunedin in lat. 46° S., though its winter is colder. Turn now to Fig. 7

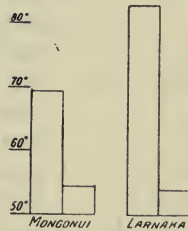


FIG. 7.—THE HOTTEST AND COLDEST MONTHS AT LARNAKA, IN CYPRUS, LAT. 35° N., AND MONGONU I, IN NEW ZEALAND, LAT. 35° S.

Note the great difference in the summer temperatures. Why? The vertical columns show temperatures in degrees Fahrenheit.

which compares the hottest and coldest months in Cyprus and in the extreme north of New Zealand. Both the stations chosen lie in lat. 35° , but while in Cyprus the summers are very hot, the difference between summer and winter great, in Mongonui the summers are cool, the winters mild. In other words, the special feature of New Zealand's climate is that it is equable. The ocean winds which keep it cool in summer prevent the winters from being

very cold, for in winter the ocean parts with its heat more slowly than the land.

The next figure (Fig. 8) does not require much explanation. New Zealand is narrow, surrounded by water, it possesses high mountains with snow and ice, therefore it has a moist climate, for the air rising over these

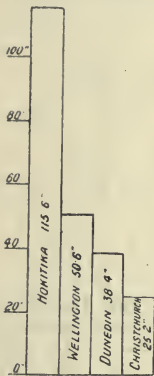


FIG. 8.—MEAN ANNUAL RAINFALL IN INCHES AT FOUR STATIONS IN NEW ZEALAND.

Find the stations in your atlas, and note the position of each.

cold mountains will part with the moisture which it has gathered in passing over the relatively warm ocean. But the rainfall differs greatly in different parts. Where the Southern Alps are highest and approach the shore most nearly, the winds will discharge most of the moisture to the west, and pass on as almost dry winds. Thus Hokitika, to the west, has a very heavy rainfall, while Christchurch, in the lee of the mountains, has a low one, the conditions being similar to those which occur in Scotland. Where the rain-catching barrier is absent, as to the west of Wellington, places to the east will have much rain, as that town has. Where the barrier is lower, or the winds partially avoid it, as at Dunedin, the rainfall will be moderate.

Effect of Climate on Man and Crops.—Before going on to discuss

the vegetation of New Zealand, let us consider the probable effects of this climate. Generally the climate may be said to be that of a milder Great Britain, the winters especially being warmer, the summers hotter only to the north. Such a climate is "healthy." There is no excessive heat, no severe cold; if some parts are very damp, generally the rainfall is

not more than sufficient. Further, it will suit forest growth and even such relatively delicate plants as tree ferns. It will also grow good grass and thus be suitable for grazing animals, which will always find water enough. For agriculture it will, however, be less suitable (see p. 26); for, as we have already seen, many of the valuable crops of temperate climates do not object to cold winters if the summers are hot and bright. British crops, British domestic animals will thrive; British people will find conditions like the home ones, but in some respects more agreeable.

Native Plants and Animals.—These are not in the least like those of Britain, and are further very different from those of Australia, especially of Western Australia. There are splendid forests of cone-bearing trees, but the pines, firs, and larches to which we are accustomed are absent, as are also the gum trees (*Eucalyptus*), wattles (*Acacias*), and horsetail trees (*Casuarinas*) of Australia. There are beeches, but they have small evergreen leaves, are not in the least like our beeches, and are generally called birches by the New Zealanders. Evergreen trees and bushes are indeed very numerous in New Zealand, for the plants have little to fear either from frost or drought. Ferns are abundant, both tree ferns and one like our bracken, but kinds of grasses are not very numerous. There are many curious shrubs, such as the daisy bushes and shrubby speedwells (*Veronicas*), which we now grow in our gardens, but useful plants are few. The most useful, perhaps, is New Zealand flax (*Phormium*).

In regard to the animals, we find no native mammals except two bats, a rat, and a dog, the last two being introduced by the Maoris. There are numerous curious birds, such as the wingless kiwi, the giant extinct moa, which was also flightless, the kea parrot, which kills

sheep, and the ground parrot, which lives in burrows and can scarcely fly.

People.—It seems likely that till the fifteenth century New Zealand had no human inhabitants at all. Then there came to it in boats, from the islands farther north, brown-skinned Polynesians. These, the Maoris, brought with them dogs and (probably involuntarily) rats. They also brought the plants they had been in the habit of cultivating in their own home,—sweet potatoes, taro (a plant related to our English arum, or “lords and ladies”), and a gourd. Different boatloads apparently landed at different parts of the islands, and those which lived farthest north found a climate very near to that of their original home, and one suited to their cultivated plants. They could therefore grow these, while some at least of those living farther south did not cultivate at all, perhaps because the climate was unsuitable to their plants. They were an intelligent, warlike people, and the different groups were in a constant state of warfare and practised cannibalism. They used tussock-grass for house-building. With the wild New Zealand flax they made a rough cloth and mats, nets for fishing, sails, rope, and so forth. Their food consisted of fish, wild birds, the root-stocks of the native bracken fern, the pith of a tree fern, and of sweet potatoes and taro in the case of those who cultivated. They had no metals, and used stone or wooden tools and weapons.

In 1642 Tasman discovered New Zealand, and in 1769 and later Captain Cook sailed round the coast, described the country, its plants and people, introduced pigs, and brought to Europe many specimens of the native plants. Not till about the middle of the nineteenth century, however, was a serious attempt made to colonise the island.

The colonists were mostly inhabitants of the United Kingdom. They took with them not only the cultivated plants and domestic animals which they had at home, but also sparrows, starlings, rabbits, many weeds, and generally a great many of the plants and animals of Great Britain. As in the case of Australia, it has been found that these introduced plants, and animals have thriven at the expense of the native ones, so that, while many of the original plants and animals are dying out, rabbits and sparrows have become a plague, and more and more the introduced plants are replacing the native ones.

Colonisation has been relatively slow. The islands now contain over a million people, of which about fifty thousand are Maoris.

Occupations and Products.—The Maoris, as we have seen, took with them to New Zealand the cultivated plants of their home and their domestic animal the dog. Neither dog nor plants prospered. The British colonists also took with them the cultivated plants and domestic animals of their home, but with very different results. Much of the original forest and the fern brakes, especially round Wellington, have been cleared, and on the more fertile and level lands wheat, oats, barley, potatoes, and other root crops, peas and beans, with some maize, hops and temperate fruit are extensively grown. Elsewhere the lands are sown with clover and European grasses, and these and the original pastures feed vast flocks of sheep and cattle. The wild New Zealand flax is also collected as a source of fibre, and is cultivated on a small scale. Further, the land is rich in minerals, gold being widespread, especially in Westland, the narrow western strip between the Southern Alps and the sea, of which Greymouth is the port. The native trees also yield valuable timber, the most valuable tree being the

kauri pine. As in the case of other conifers, the wood of this tree contains resin, here present in large amount ; and in places where the tree grew formerly, and from

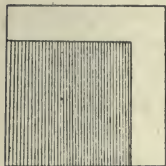


FIG. 9.



FIG. 10.

FIG. 9.—COMPARISON BETWEEN THE NUMBER OF SHEEP AND CATTLE IN GREAT BRITAIN AND NEW ZEALAND.

The larger square represents the number in Great Britain (about 34 millions), the smaller square that in New Zealand (about 26½ millions). The area of New Zealand is about 105,000 square miles, that of Great Britain about 89,000 square miles (with inland water).

FIG. 10.—COMPARISON BETWEEN THE AMOUNT OF WHEAT, OATS, AND BARLEY PRODUCED IN GREAT BRITAIN AND NEW ZEALAND RESPECTIVELY.

The large square shows British production (about 245,500,000 bushels in 1909), the small square New Zealand production (about 19,250,000 bushels in 1910-11).

the predominant one, and because of the damp climate a large amount of meat is produced, which is exported frozen (New Zealand mutton). Wool, however, comes first on the list of exports, then meat, then butter and

which it has now disappeared, deposits of this resin occur in the ground in a sub-fossil condition, and form what is known as kauri gum, which is obtained by digging and is of considerable value.

Finally, there are small manufactures, especially the making up of dairy produce, as cheese and butter, the salting of bacon and ham, the freezing of meat, the working up of flax fibre, of the native timber, and so forth.

In Fig. 9 the number of sheep and cattle in Great Britain is compared with those in New Zealand, and we see that though New Zealand has fewer, despite its larger size, yet it still has a very large number. The pastoral industry, indeed, is

cheese, then gold, while only an insignificant amount of agricultural produce is exported. Sheep greatly predominate over cattle, partly because wool is easily sent to a distant market.

The diagram (Fig. 10) shows the amount of wheat, oats, and barley produced in New Zealand as compared with that in Great Britain, and we see that New Zealand agriculture is still somewhat undeveloped. In spite of its mild climate it does not produce nearly enough fruit to satisfy its own needs, temperate fruits being imported from Tasmania and Australia and tropical ones from Fiji. Tobacco is only grown on a very small scale, and sugar is all imported, mostly from Fiji and Java, though there seems no reason why sugar beet should not be grown. Thus New Zealand at present is chiefly a pastoral and mining country. In 1912 the total exports reached nearly £22,000,000, of which one-third was due to wool. Frozen meat stood second in the list of exports.

CHIEF TOWNS

The largest town, though not the capital, is AUCKLAND, which in 1911 had a population of over 40,000, swelled to about 100,000 when all the suburbs are taken into account. It is thus comparable to Stockport. Auckland has an excellent situation, being within easy reach of both coasts, and has a good harbour. It trades especially with Fiji, the Sandwich Islands, and San Francisco. The surrounding district is given up to dairy farming and fruit-growing, oranges and lemons being cultivated because of the warm climate (Fig. 6). The land here was once abundantly forested, and kauri gum is found; coal and gold are also mined.

WELLINGTON, population including suburbs 70,000, is conveniently situated for access to both islands, and

is therefore the seat of government. It has a good harbour and the surrounding land is chiefly devoted to grazing.

CHRISTCHURCH, including its suburbs, has a total population of 80,000, and is connected by rail with the port, Port Lyttelton. Its importance is due to the level and fertile Canterbury Plains, near which it stands. Cereals are extensively grown on these plains, and they also carry a large amount of stock, much meat (Canterbury lamb) and dairy produce being exported. Coal is found in the surrounding region.

DUNEDIN has a total population of 64,000, and is the centre of the Otago district. The seaport is Port Chalmers. Coal and gold are found in the vicinity, and agriculture and fruit-farming are carried on, with pastoral industries as usual.

INVERCARGILL, with its port The Bluff, the nearest point to Tasmania and Melbourne, is a small town serving as centre to the Southland district, and within reach both of the fine scenery of the Cold Lake District of the Southern Alps and of Stewart Island.

GREYMOUTH is a small port which serves as the centre for the mining and forest district of Westland.

It will be noted from the above that the chief towns of New Zealand are placed on or close to the coast. This is because communication inland is somewhat difficult on account of the hilly surface, and the fertile plains are also mostly on the coast. Railway communication is in consequence chiefly confined to coastal routes connecting the chief towns, and short lines running inland from the towns. In North Island, however, Wellington and Auckland are connected by a railway which runs through the central volcanic district. No continuous route as yet crosses the hillier South Island,

and much of the communication is carried on by water, as in Western Scotland.

SUMMARY

The Dominion of New Zealand has a total area, including outlying islands, of 105,000 square miles, and a thin population of one million. The British Islands have a total area of 121,000 square miles, with a population of 45,000,000. It has a moist, equable climate, resembling, except in the extreme north of North Island, that of Great Britain. The climate and thin population make the islands suitable for pastoral pursuits, and of the total exports, which do not reach £22,000,000, wool forms one-third. Frozen meat and dairy produce, with some gold and timber, are also exported.

CHAPTER VI

REGIONS WITH MARITIME TEMPERATE CLIMATE—*Continued*

II. THE STATE OF TASMANIA

TASMANIA is an island lying off the southern coast of Victoria, from which it is separated by Bass Strait (about 140 miles wide). The parallel of 42° S. nearly bisects the island, so that it lies in about the same latitude as the north part of South Island, New Zealand. In size it approaches Scotland, its total area being 26,000 square miles, or more than five-sixths of that of Scotland. Compared with Scotland, however, it is very scantily peopled, having only about 200,000 inhabitants, about as many as the city of Aberdeen, and half as many as Greater Dublin.

Tasmania was discovered by Tasman in 1642, and was called by him Van Diemen's Land, after the Governor of the Dutch East Indies. It was colonised by the British in 1804, and was for long used as a convict settlement. Later the name was changed to Tasmania.

Surface.—Tasmania has a hilly surface, for it is in reality a continuation of the high ground which stretches down the east coast of Australia, from which it was separated by the sinking of the land which now forms the shallow Bass Strait. The island is a much cut-up plateau rather than a mountain region, the highest hill,

Cradle Mount, being only a little over 5000 feet in height. The highlands stand nearer the western than the eastern shore, and the centre of the island consists of a plateau containing picturesque lakes. Owing to the moist climate rivers are numerous, and two, the Derwent on which Hobart stands and the Tamar with Launceston, are of some importance.

Climate.—This shows a close resemblance to that of New Zealand. Tasmania, like New Zealand, lies in the region of prevailing westerly winds, and has a moist climate, with rainfall more or less evenly distributed throughout the year, but much heavier on the western than on the eastern side (why?). The climate of Hobart shows a very close resemblance to that of Christchurch, which is placed in the same latitude, but its summers are slightly cooler, the winters slightly warmer, the rainfall slightly less. A similar climate prevails on the southern coast of Victoria, which is, however, warmer both in summer and winter. For convenience' sake, however, we shall consider Victoria, along with the other states of the Australian mainland, under the heading of regions of sub-tropical climate.

Plants and Animals.—From what has been already said we should expect to find that Tasmania is extensively forested, especially on the west. In places the forests have been cleared, but in the less settled parts they are still dense. Despite the resemblance of the climate to that of New Zealand, both native plants and animals are very different. In the drier east of Tasmania gum trees (*Eucalyptus*), wattles (*Acacias*), and the curious *Casuarinas*, like giant horse-tails, are the commonest trees. Mingled with these we have ever-green beeches, as in New Zealand, with bracken and tree-ferns. On the west are coniferous forests, but the particular trees are different from those of New Zealand.

Whereas in New Zealand native mammals are absent, Tasmania has not only many kinds, but even some which do not occur in Australia. The curious old-fashioned egg-laying mammals are represented by the platypus and the spiny ant-eater. There are also kangaroos, a destructive animal known as the Tasmanian wolf, and a ferocious burrowing animal, called from its peculiar ugliness the Tasmanian devil; all these are pouched animals, and of simpler structure than the mammals of the Old World. Poisonous snakes are common, and there are a number of interesting birds, though the flightless birds of New Zealand are entirely absent.

Native Inhabitants.—When Tasmania was discovered it contained a small number, perhaps not more than about 2000, of human beings belonging to a dark-skinned, woolly-haired race, apparently related to the inhabitants of New Guinea. They were among the most primitive of known peoples, having only the roughest of weapons, made of unpolished stone, and feeding chiefly on shellfish, the root stocks and shoots of ferns, seaweed, funguses, with such animals as they could catch. When the island was settled by the English, constant fighting went on between the settlers and the natives, and they have now all died out.

Occupations and Products.—The present inhabitants of Tasmania follow much the same kind of occupations as the New Zealanders, and the land yields similar products. The most important difference is that while New Zealand specialises in dairy produce and frozen meat, Tasmania specialises in fruit. Of the fruits produced the apple is the most important, but pears, plums, apricots, and cherries are grown, as well as small fruits such as gooseberries, raspberries, and

currants. In addition to exporting fresh fruit, Tasmania makes and exports much jam. The soil, which is not very fertile, but is light, seems to suit fruit-growing, and great care is taken with the industry, attention being given to the growing of the kinds best fitted for the climate and soil. It is, of course also an advantage to Tasmania that its apples can be sent to London at a time when those from the northern hemisphere are not in the market to compete with them.

In order of importance the exports of Tasmania consist of wool (because the rough upland pasture can be used to rear many sheep); minerals, especially tin, copper, gold, and silver (all widespread, while coal and iron also occur); timber, especially gum timber from the abundant forests; fruit and jam. Of minor importance are the temperate cereals, also hops, hides, and skins.

As we are apt to think of Tasmania as close to Victoria, we should note that it is a two days' journey by steamboat from Melbourne to Hobart. Tasmania trades largely with the Australian mainland and also with New Zealand. It has the advantage over New Zealand of being much nearer to the Australian Continent,—that is, it does not occupy so isolated a position. It forms one of the States of the Australian Commonwealth (see Chap. XI).

CHAPTER VII

REGIONS WITH MARITIME TEMPERATE CLIMATE—*Continued*

III. TRISTAN DA CUNHA AND THE FALKLAND ISLANDS

THE little archipelago of which TRISTAN DA CUNHA, with an area of about 45 square miles, is the largest member, is of considerable geographical interest.

It lies in lat. 37° S. and long. 12° W. The latitude is therefore that of the Azores in the northern hemisphere, and not far removed from that of Malta. The climate is however very different, and the contrast between the Azores and Tristan da Cunha affords an interesting example of the differences between the north and south parts of the Atlantic in similar latitudes. Tristan da Cunha lies permanently in the west wind belt: its climate is rainy throughout the year, and while the winters are not severe the summers are not hot. The Azores, on the other hand, show a Mediterranean climate modified by the surrounding ocean. Thus most rain comes in winter, and the summer is much hotter than at Tristan da Cunha.

The Azores form a land mass arising from near the anterior end of a long curved ridge, interrupted at the Equator, which divides the Atlantic into an eastern and a western half. Tristan da Cunha is a similar land mass arising from near the southern end of the

same ridge, which also bears Ascension and St. Helena (Chap. XVII). All are volcanic in origin. The central peak of Tristan da Cunha rises to a height of about 8500 feet, and is covered with snow during a considerable part of the year. Round the greater part of the coast of the island lofty cliffs rise sheer above the ocean, but to the north-west there occurs a little plain, and here the settlement is placed. Across the plain there runs almost the only permanent stream of the island, for, despite the drenching downpours, the volcanic rock absorbs water so readily that much of it disappears at once, while elsewhere the steepness of the slopes gives rise to short-lived torrents which carry off the rain almost as it falls.

The steepness of the cliffs, combined with the high winds of the region and the breakers which roll uninterruptedly across great expanses of ocean, make landing extremely difficult, and there is no good anchorage. As in the case of the islands which lie to the south of New Zealand, shipwrecks are frequent, the frequency of cloud and mist over the islands being a contributing cause.

As we have said, the climate is mild and moist, but the islands are constantly wind-swept. Thus while the growth of trees is rendered possible by the conditions of temperature and moisture, it is checked by the violence of the wind. There is only one tree native to the island, and it is scarcely more than a shrub so far as height goes, though the bushes, with their gnarled and twisted branches, form singularly dense thickets. This tree is a relative of our buckthorn, and finds its nearest allies in South Africa. Among the other plants the most striking is a tussock-grass, which forms thick bunches and, combined with the ferns and mosses, gives the islands a green and fertile appearance.

As in other islands remote from continents, native mammals are absent. Rats and mice have, however, been introduced, and as they have no enemies but man, they have increased enormously and have become a plague. Sea-birds (including penguins) are abundant, especially in the uninhabited islands of the group, and seals and whales were once common in the surrounding waters, which swarm with fish.

From the above facts it is comparatively easy to deduce the conditions of human life. The archipelago lies about 1850 miles from the Cape, the nearest land mass. It lies on the route of sailing vessels in southern waters, but these only find very precarious anchorage. Large and swift steamers avoid, if possible, the vicinity of the islands. Thus Tristan da Cunha, the only inhabited island of the group, must be isolated. In point of fact, it has no regular communication with the rest of the world. The original settlement dates from the time when the traffic to the east went round the Cape, and when intermediate stations where food and water could be got were important. Now, only occasional sailing vessels and some whalers approach the island for this purpose. Involuntary guests in the shape of shipwrecked mariners are not uncommon.

What has the island to offer passing ships? Water is abundant, and fish; otherwise the native products are few. The inhabitants cultivate potatoes, on which, with fish and meat, they live chiefly; they grow a few garden vegetables, and there is an apple orchard. As pasture is tolerably abundant, they rear cattle, sheep, pigs, and fowls. As, however, no artificial fodder is obtainable, deaths from famine are frequent in the flocks. Grain used to be grown, but the rats make its cultivation now practically impossible. The very meagre products just detailed can be exchanged for

tea, sugar, flour, etc. with passing ships. When we remember that the chief products of the Azores are pineapples, oranges, wine, and cereals, the contrast of climate between the North and South Atlantic is obvious.

The inhabitants vary from fifty to one hundred in number, for emigration of the active and energetic members of the community becomes frequent so soon as the numbers rise. They are largely descendants of inhabitants of the United Kingdom, but there is an infusion of negro blood from the Cape. The houses are built of porous volcanic rock, the wood for the interior being obtained from shipwrecks, which also supply various furnishings. The indigenous buckthorn gives fuel, and the tussock-grass forms the thatch for the roof.

The life of the inhabitants generally is rude and monotonous, and in the wet and stormy climate, the difficulties of communication and the natural poverty of the land, the island may be taken as representative of most of the remote islands of the southern oceans, whatever their latitude. St. Helena, despite its tropical position, is in a scarcely better case.

The FALKLAND ISLANDS, lying to the east of the Strait of Magellan, in the latitude of London, are chiefly interesting because they show the oceanic temperate climate in its extreme form. In size the group is not greatly inferior to Wales, and it lies in about the same latitude. The climate is equable, but the summers are cold, the mean temperature of the warmest month not rising to 50°. Its most disagreeable feature, however, is the combination of almost constant cloudiness with high wind, generally from the west. At Port Stanley, the chief settlement, placed on the east coast of East Falkland, the rainfall is only that of

London, but it rains two days out of three, there being constant light showers. In consequence the ground has never time to dry and, as in the damper parts of Scotland, peat covers a large part of the surface. The high winds prevent the growth of trees, and peat is used as fuel.

Owing to the want of sunshine, wheat will not ripen at all, and barley and oats but rarely, while vegetables can hardly be grown. Only one possibility of utilising such land suggests itself, and that is for sheep-farming. Cattle are also kept, but it is on their flocks of sheep that the islanders depend chiefly. The resultant wool, with some mutton, is exported, with hides, tallow, etc. There are no minerals and no important fisheries in the strict sense, but whaling is carried on in the adjacent seas, especially round South Georgia, which lies much farther south. In exchange for their wool and the products of the whale fisheries, the inhabitants obtain practically all the necessities of civilised life, for their islands produce but little.

The islands are cooled by currents from the cold southern ocean, and their temperature, alike in summer and winter, is perceptibly cooler than that of the Shetland Islands, which lie in a latitude higher by some ten degrees, and have an almost similar range of temperature.

Generally we may note that the continental type of temperate climate does not occur in the southern hemisphere, and that the maritime type tends to occur there in its extreme form.

CHAPTER VIII

REGIONS WITH MARITIME TEMPERATE CLIMATE—*Continued*

IV. BRITISH COLUMBIA

BRITISH COLUMBIA is one of the nine provinces which constitute the Dominion of Canada. It extends roughly from 49° to 60° N. lat. ; like Norway, Western Scotland, Western Patagonia, and the southern part of West New Zealand, it has a fiord coast ; like all these also it has high ground near the coast. We can therefore assume at once that in climate, products, and occupations of the inhabitants it will show considerable similarity to the regions of maritime temperate climate which we have already discussed. As, further, it is in the northern hemisphere, and lies practically in the latitude of Great Britain, we may assume that it will resemble our own country somewhat more closely than the regions in the southern hemisphere already discussed. We should therefore begin our study of the region with a good many probabilities in mind. British Columbia will probably have a climate resembling that of Britain ; as a new country it will probably be forested, for we know that Scotland and England were once forested ; it will probably have valuable fisheries, for the fiords and inlets will make good fishing grounds, and northern waters are rich in food fishes ; it will probably be only

moderately fitted for growing grain. With such probabilities in mind let us turn to the actual facts.

Size and Boundaries.—The size of British Columbia is not very accurately known, but it is three times as large as the British Isles, the total area being about 356,000 square miles. It is thus far larger than New Zealand, though it has not yet half so many people.

The boundaries are interesting, for they illustrate conditions common in North America. In the case of old countries, long civilised, the boundaries are always more or less *natural*,—that is, they correspond roughly to the natural features of the ground. Thus the boundary between England and Scotland is made, generally speaking, either by hills or by rivers. When we ferry across the Tweed, when we go over the crest of the Cheviot Hills, we cross from England to Scotland. That is a distinction perfectly clear to the people who live in the district. Similarly, when we enter the Mt. Cenis tunnel we are in France; as we emerge into daylight again we are in Italy,—and we know that a mountain range here separates the two countries. But in America the land was divided out, not as a result of a prolonged process of adjustment by the people on the spot, but by statesmen who had never seen the actual ground, and had not always proper maps. The result is that the boundaries are purely artificial, and often follow particular lines of latitude or longitude. Now we all know that lines of latitude and longitude are purely imaginary lines, constructed by man for his own special purpose of map-making. They correspond to nothing on the actual surface of the ground. Thus while it sounds very satisfactory to say that British Columbia is separated from the United States by the parallel of 49° N., this means nothing to the people who live near the boundary, to whom it is utterly artificial and unreal.

The line of 60° N. similarly forms the northern boundary of British Columbia, except that a narrow coastal strip, made up of islands and mainland, stretching down beyond 55° , belongs to Alaska and so to the United States. So far the boundaries are purely artificial. Westward, however, the sea forms a natural boundary, and eastward the Rocky Mountains form a natural boundary as far north as 54° . Beyond this, however, we have another artificial boundary, for the meridian of 120° E. forms the limit as far as the point where it cuts 60° N. lat. The result is that while, generally speaking, British Columbia consists of a coastal strip (with the exception just noted) extending from 49° to 60° N., and draining into the Pacific Ocean, it also includes a wedge-shaped piece of land, lying east of the Rockies, and draining by the Peace River and its tributaries and the Liard and its tributaries into the Arctic Ocean. In several respects this wedge-shaped piece of land differs from the rest of British Columbia. It has a colder, more extreme climate; its forest trees are less luxuriant and of somewhat stunted growth, and so forth. Meantime, however, it is but little inhabited and but little developed, and thus need not detain us.

Physical Features.—British Columbia, whose length considerably exceeds its breadth, is divided into a series of zones, running more or less parallel to the coastline.

As in Western Scotland and Norway, the coast has sunk in recent geological times, turning parts of the mainland into mountainous islands, and drowning the river valleys so that they form branching inlets and fiords. Of the islands the most important are Vancouver and the Queen Charlotte Group. Vancouver is an elongated island half as large as Scotland. It has a central range of mountains which reappears in the

Queen Charlotte Group and represents the remains of a once continuous range, now largely submerged. Vancouver extends farther south than any other part of British Columbia, has a mild climate with abundant rain, and is rich in minerals. A warm current, the



London: G. Bell & Sons, Ltd.

FIG. II.

Japanese current, flows along its western shore, and combined with the westerly winds helps to make the climate milder and moister than it would otherwise be.

On the mainland the inlets run inwards to the bases of the mountains which form the imposing Coast (or Cascade) Range. Much as in Norway, there is often

only a little patch of level land at the head of the fiords ; elsewhere, as in the vicinity of the Fraser River, the mountains are deeply cut by narrow valleys. Besides the Fraser other important rivers are the Skeena and the Stikine. Another very important stream, the Columbia, though flowing in its upper course through British Columbian territory, in its lower part runs through the United States. All the rivers are swift and carry much water.

The Coast Range has an average elevation of 6000 feet, and some of its peaks rise to 9000 feet. The land to the west of it has a mild, moist climate, and the way in which the surface is interpenetrated by inlets and river valleys allows this climate to extend a considerable distance to the east, especially in the case of the larger valleys.

The Coast Range forms the western bulwark of the Interior Plateau, which has an average elevation of 3500 feet above sea-level, but is deeply furrowed by river valleys, especially the many tributaries of the Fraser and the Columbia. Northwards this plateau region diminishes in height ; here it is as yet unutilised. To the south its numerous valleys often afford considerable expanses of fertile land, which, however, mostly require to be irrigated before they can be used, as the plateau is a region of drought (Fig. 14).

In the southern part of British Columbia this plateau is bounded to the east by a complicated series of mountains to which the general name of Selkirk System is sometimes given, though the name Selkirks is also used in another sense. As the sketch-map (Fig. 12) shows, this system can be divided up into three groups,—the Gold (or Columbia) Range, the Selkirks proper, the Purcell Range. These mountains are separated by river valleys, the Kootenay and Columbia having

extraordinarily circuitous courses, and dividing the land up into a series of blocks.

The mountain system formed by these ranges contains many peaks over 10,000 feet, which condense moisture from the winds which have blown as dry winds over the plateau. The mountains have therefore a heavy snowfall; glaciers furrow their slopes, and places at their base have a heavier rainfall than those on the plateau (Fig. 14). The scenery in these mountains is very fine, but the dense forests make the construction of paths and roads laborious.

Between this mountain system and the Rockies, which rise to heights of 10,000 to 12,000 feet, or even more, there stretches a very curious valley, called the Intermontane Valley or Rocky Mountain Trench. The southern part of this valley is shown on the sketch map, where it is occupied by the Upper Kootenay and the Upper Columbia. The Kootenay is a tributary of the Columbia, and the map shows that though their headwaters rise near together, the Kootenay has a long and indirect course before it reaches the main stream. Farther north the Upper Fraser, the Upper Parsnip, and the Upper Findlay occupy the same great valley, and the Fraser and a tributary of the Upper Columbia and the Fraser and the Parsnip show almost similar relations to those of the Kootenay and the Columbia,—that is, they rise close together on a low watershed, and then flow in opposite directions.

The reason for this has not been worked out in detail, but we may note that, on a very much smaller scale, the same condition occurs in many of the valleys of Highland Scotland, and there is reason to believe that in both cases it is the result of a former great extension of the glaciers during the great Ice Age; these glaciers having greatly modified the original

drainage. The map shows that, as in Scotland, another relic of the Ice Age is visible in the great number of lakes, some of which are of great beauty. Practically

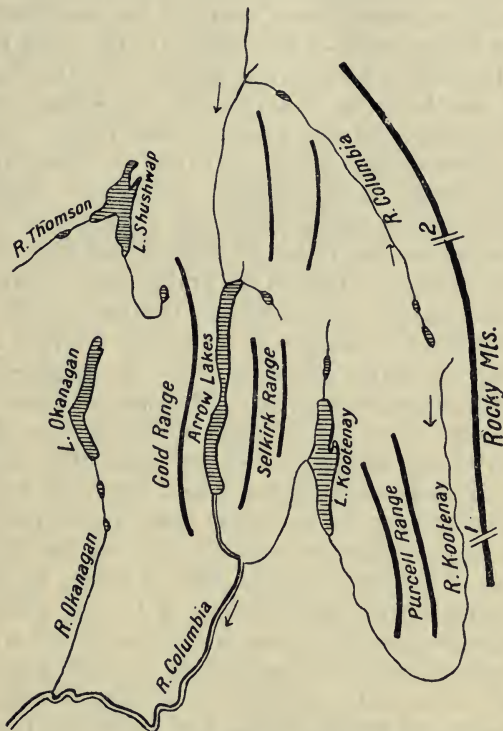


FIG. 12.—SKETCH-MAP OF THE INTERMONTANE VALLEY OR ROCKY MOUNTAIN TRENCH.

the lakes are of importance because they supply water which can be used for irrigation.

Behind the Intermontane Valley rise the Rocky Mountains, which, in contrast to the heavily glaciated

and snow-covered ranges in front of them, have much bare rock, because the winds have lost most of their moisture before they reach these mountains.

From this description it is clear that British Columbia is largely a mountainous country, the mainland consisting to the south of five belts: (1) the Coast Range, with its valleys and narrow plains; (2) the Plateau, deeply furrowed by valleys; (3) the Selkirk system of mountains; (4) the Intermontane Valley; (5) the Rocky Mountains. Land available for agriculture is limited chiefly to the valleys, and occurs usually in somewhat small areas. The vast expanses of arable land found on the plains of Canada are here absent, and the sowing of grain on the grand scale, as practised on those plains, is impossible. Further, as the land is often densely forested it generally requires to be cleared; in many places it must be irrigated; in others drainage is necessary. Because of these facts the tendency will be for the inhabitants to devote themselves to high-priced crops, especially luxuries, which demand much care and labour, but in the long-run bring a return for the somewhat heavy outlay necessary at the start. When we recollect that on the plains to the east of British Columbia grain is grown by wholesale methods, with the minimum of labour, while it is sometimes impossible to grow trees, and there is no time for the finer branches of agriculture, we shall guess that the fruit farmers and gardeners of British Columbia will find there, and in the mining and lumbering towns, a good market for fruit and the more costly vegetables which require special care, no less than for the fine dairy produce, eggs, etc., produced by mixed farming.

Products and Occupations.—But a new, sparsely inhabited land is not in the first instance a suitable place for intensive agriculture. It is calculated that

in British Columbia at the present time it costs about £1700 to lay out and maintain an apple orchard of twenty acres, and the owner must have money enough to live upon for six or seven years till his orchard is in full bearing. Men with so much capital do not usually start farming in a perfectly new country, and if they did they could do nothing until there was population, until roads and railways had been constructed, until the essentials of civilisation were at hand. What led people to British Columbia in the first instance? In this, as in so many other cases, it was the mineral wealth. Gold was discovered in the Fraser valley in 1858, and this led to a rapid increase in the population of a country previously inhabited only by Indians and a few fur traders. The mines are still the chief source of the wealth of the province. As in other parts of North America, the first gold discovered was "placer" gold,—that is, the metal occurred in easily worked surface beds, where it could be reached by miners armed only with pick and shovel. Placer gold is poor man's gold, for it demands little capital for working, and its discovery in a region nearly always causes a rush of population (cf. the Yukon). The accessible gold is soon exhausted, and then the population is obliged to seek other modes of occupation, or the previously independent miner must become the paid labourer of a company provided with sufficient capital for larger mining enterprises.

Gold, placer and lode (*i.e.* gold in the actual rock), is widely distributed in British Columbia, being found, for example, in the Atlin region to the north, in the Cariboo Mountains, in the Fraser valley, in Vancouver Island, in the Gold Range, in the Kootenay district, in the Yale district, which includes the area round the Okanagan and Thompson Rivers, and so forth.

Copper is also widespread, being found in Vancouver Island, the Fraser valley, the Kootenay district, and so on. Coal is also widely worked in Vancouver, the Fraser valley, and in the district near the Crow's Nest Pass. Lead, silver, iron, and many other minerals are similarly abundant, and British Columbia yields more than half the total mineral output of Canada, and, except for the Yukon basin, is the only region where gold is mined in quantity.

In addition to its minerals British Columbia possesses two other easily available sources of wealth. These are its woods and its fisheries. Vancouver Island, the coastal belt in front of the Coast Range, and the slopes of the Selkirk and Gold Ranges are clothed with magnificent coniferous forest, in which the Douglas fir, now often grown in Great Britain, is the most important tree. A number of other firs, spruces, pines, and other conifers, many of which have been introduced into Great Britain, are also represented in the forest, and yield valuable timber, as well as pulp for paper making. Ferns (but *not* tree-ferns!) and mosses carpet the ground, and there is a dense undergrowth of berry-bearing bushes, and an admixture of such deciduous trees as willow, aspen, poplar, crab-apple, and so forth. These forests still lodge a considerable amount of game, as bears, deer, wild sheep, elk, and so forth; while smaller animals with valuable furs, such as beaver, marten, otter, mink, etc. also occur, and still give rise to an export trade in furs and skins. Lumbering is assisted, as compared with Eastern Canada, by the fact that the mild climate generally prevents the streams (which are used to carry the wood down to the coast or railway) from freezing in winter, so that the occupation can be carried on more or less all the year round.

The fisheries also are remarkably rich, salmon being

extraordinarily abundant in the rivers and inlets at certain seasons of the year. As far more are taken than can be used locally, the surplus is tinned (canned) for export. There are several kinds of salmon in the waters of British Columbia, all being slightly different from the salmon of Europe, but they have the same habit of ascending the rivers to lay their eggs. Other important food fish are halibut, cod, herring, etc., in addition to many dogfish, which are used as a source of fish-oil. With the exception of the salmon fisheries those of British Columbia are not yet fully developed, and besides the kinds named there are a number of other fish, as well as shell-fish, crabs, etc., which in the future may become important.

Thus the minerals, the forests, and the fisheries constitute the chief natural wealth of British Columbia, and great numbers of the people are employed in connection with these, both directly and indirectly in the working up of the material for export, as in salmon-canning, the timber trade, pulp making, and so forth. Owing to this primary wealth it has been possible to develop the country, to make roads, to carry railways across the mountains, to establish regular steamer communication with Asia, etc. At the present time intensive agriculture is being added to the primary industries, especially in the south where the climate is better, and access to the markets furnished by other parts of Canada easy, and also in Vancouver Island, which has been longest settled.

We have spoken of the fruit farms. Apples form perhaps the most important kind of fruit,—but in the warmer parts grapes, peaches, apricots, walnuts, almonds, chestnuts, even olives can be grown; and in the less warm, pears, plums, cherries, strawberries, with the more highly prized vegetables, bulbs and

flowers. In the Okanagan district hops and tobacco are grown. In addition to fruit-growing general farming is carried on, a considerable amount of live stock being raised, while dairy-farming is developing.

Population.—British Columbia is as yet but scantily peopled, though the population is increasing rapidly. The native Indians were fishers and hunters; they are not numerous, and show little desire to become cultivators. The white population in 1911 was about 400,000, having doubled itself in the previous ten years. Even so, however, the total population does not greatly exceed that of a comparatively small town like Edinburgh, and is only about half that of Glasgow.

The relatively small population, bringing with it a demand for labour, the easy access to Asia and the mild climate, make British Columbia attractive to Chinese and Japanese emigrants. The Japanese especially are accustomed in their own homes to physical conditions somewhat similar to those which prevail in British Columbia, and both Japanese and Chinese are habituated to that intensive cultivation of the land which is being begun in British Columbia. But these Asiatic emigrants, unlike those from Europe, do not form a permanent part of the community. They do not bring their wives with them, they do not intend to settle permanently, and their standards of comfort and so forth are not those of the other inhabitants. Their incoming is therefore discouraged by the government, by taxation and otherwise. In general the Chinese do not seek the other parts of Canada, partly, perhaps, because of the less easy access, partly because of the severity of the winter, so that in having an Asiatic problem, even if on a small scale, British Columbia differs from the rest of Canada and approaches more nearly the sub-tropical colonies.

Climate.—The two diagrams, Figs. 13 and 14, together with what has been said in regard to the climate of New Zealand, are sufficient to bring out the main points of interest about the climate.

In connection with rainfall, the special feature is the alternation of wet and dry belts, owing to the presence of several longitudinal ranges of mountains. In other words, because of these ranges there is not merely a distinction as in New Zealand (p. 36), between

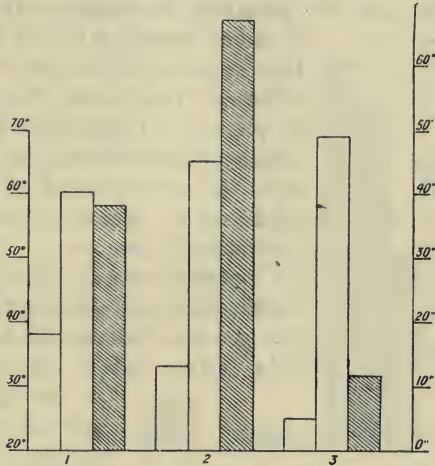


FIG. 13.—TEMPERATURE AND RAINFALL OF THREE STATIONS IN BRITISH COLUMBIA.

The figures to the left show temperatures in degrees Fahrenheit, those to the right rainfall in inches. The blank columns show the mean temperatures of the hottest and coldest months, the ruled columns the rainfall.

(1) *Victoria*, on the coast of Vancouver Island. The winters are mild, the summers cool, the rainfall considerable.

(2) *Agassiz*, in the basin of the Fraser River. The temperatures are a little more extreme, the winter being colder, the summer hotter. The rainfall is very heavy owing to the position of the town at the base of the peaks of the Coast Range.

(3) *Kamloops*, on the plateau at an elevation of about 2000 feet. The winters are now cold, the mean temperature of January being as low as 25°, but the summers are warm. The rainfall is small, as the winds have lost most of their moisture in crossing the coast ranges.

the lee and weather sides of a single mountain range, but a succession of such distinctions.

In regard to temperature, in the interior the elevation and the distance from the sea tend to make the seasonal variation relatively greater, while the coastal belts have a mild equable climate. Thus while British Columbia has in places a typical maritime temperate climate, elsewhere the elevation, combined with the arrangement of the mountains, produces an approximation towards the continental type.

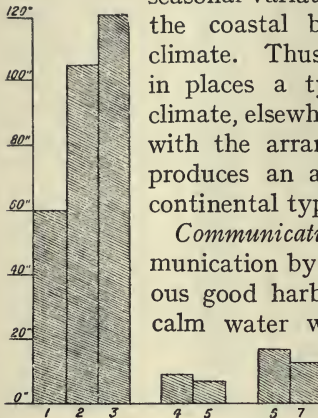


FIG. 14.—RAINFALL AT SEVEN STATIONS IN BRITISH COLUMBIA.

1, 2, and 3 are places on the coast, 4 and 5 places on the plateau, 6 and 7 places at the foot of the Rocky Mountains. On the coast the rainfall is always heavy, the exact amount varying with the precise situation of the place. On the plateau it is always slight, and irrigation has to be employed before crops can be grown. At the foot of the Rockies the fall is slightly heavier, because the air is cooled as it rises up the slopes:

(1) *New Westminster.* (2) *Rivers Inlet.* (3) *Port Essington.* (4) *Princeton.* (5) *Midway.* (6) *Cranbrook.* (7) *Golden.*

Rockies at Crow's Nest Pass, and connects with a line going to the United States, as well as with branches

Communications.—Along the coast communication by sea is helped by the numerous good harbours and by the relatively calm water within the island belt and

in the fiords. Inland, in spite of the natural difficulties, a considerable number of railways have been built. No less than three great routes cross (or will shortly cross) the chain of the Rockies. The Canadian Pacific line, which extends from sea to sea, bifurcates at Medicine Hat, in Alberta, and its main route leads through Calgary, across the Rockies at Kicking Horse Pass, then past Revelstoke and Kamloops to Vancouver town. Its other branch crosses the

which join the main route, and so drain the Kootenay and Yale districts. Much farther north the Grand Trunk Pacific is building a line which is to cross the Rockies at Yellowhead Pass, and reach the coast at the new town of Prince Rupert, opposite Queen Charlotte Islands. This line, with its connections, will help to develop the still backward northern region (see maps, pp. 77 and 93).

In addition to its railways and local steamers, British Columbia has direct steamer connections with various parts of the world. From Victoria and Vancouver boats run to Yokohama, Honolulu, New Zealand, and Australia, the connection between Vancouver and Yokohama being part of the regular route "round the world."

CHIEF TOWNS

The largest town is VANCOUVER, on the mainland, with an excellent harbour, and good communication with the interior by railway. By steamer it is connected not only with the coastal towns, both north and south, but also with Asia, etc. VICTORIA, on the island of Vancouver, is the seat of Government and the capital, as well as the oldest town, though it is smaller than Vancouver. It has a singularly mild climate (Fig. 13), and, being somewhat sheltered from the rain-bearing winds, only a moderate rainfall. With Vancouver it shares the importance of being a port of call for the great ocean steamers, and it is the centre of the island of Vancouver with its minerals, lumber industry, fruit-farming, etc. NEW WESTMINSTER, placed only some 12 miles from Vancouver, is the centre of the salmon-canning industry, on account of its position on the Fraser River, and is an important

lumbering and agricultural centre. ROSSLAND, in the Kootenay district, is the centre of the mining industry there, as CRANBROOK is the chief lumber centre. NANAIMO, on the east coast of Vancouver Island, is the coal centre of the island, and supplies fuel to the ocean-going ships. It has also important fisheries, and is an agricultural centre. It will be noted that, except for mining and lumber centres, the chief towns, as in New Zealand, are on the coast.

QUESTIONS AND EXERCISES

1. Give an account of the type of climate called Maritime Temperate, with examples of regions with this kind of climate.

2. Compare South Island, New Zealand, with England and Wales with regard to size, position, climate, and products.

3. From the figures given in regard to population and area on p. 43 calculate the density of population per square mile in New Zealand and the United Kingdom respectively.

4. Two young men propose to go out to New Zealand; one wishes to start fruit and dairy farming, the other sheep farming. Where would you advise each to go, and why?

5. Compare the life of the Maoris in New Zealand before Europeans came to the country with the life of the Tasmanian aborigines. Which people do you think would get most flesh food? Why?

6. Compare, so far as you can, the native plants and animals of New Zealand with those of Tasmania.

7. Write a short account of Tristan da Cunha and the Falkland Islands, and compare both with the Shetland Islands.

8. Describe the Intermontane valley in British Columbia, and name the rivers which successively occupy it.

9. Name the chief products of British Columbia, and explain why the region is fitted to produce these.

10. Write an account of the temperature and rainfall of the more important regions in British Columbia, taking the diagrams Figs. 13 and 14 as the basis of your account.

11. Write notes on the following towns: Vancouver, Auckland, Hobart.

12. What railways cross the following passes: Kicking Horse, Crow's Nest, Yellowhead. Name two towns on the route from the Kicking Horse Pass to the coast, and give a general description of the course of this route.

13. What is a fiord coast? Give two examples, and explain why, in the northern hemisphere, the peoples of such coasts tend to be fishers.

CHAPTER IX

REGIONS OF CONTINENTAL CLIMATE

I. CANADA EAST OF THE ROCKIES

(A) Physical Geography

General.—We have seen that British Columbia shows a general resemblance to North-western Europe ; Canada east of the Rockies may, on the other hand, be more justly compared with Eastern Europe and Temperate Asia. Among the points of resemblance are : (1) The alternation of forests and treeless areas, as in European and Asiatic Russia ; (2) the climate, which, especially towards the interior, tends to be dry and sunny, with warm summers and cold, cloudless winters ; (3) the presence of large level tracts of land admirably adapted for growing cereals, and so on. Further, Canada resembles Siberia and differs from Europe in possessing an extensive tract of land within the Arctic Circle, which must apparently remain largely useless.

Another striking difference from Europe is the result of the position of the Western Cordillera, the great mountain chain which runs down the west, of which the Rocky Mountains form a part. In Europe the great mountain chains, of which the Alps and their connections are the most important members, run more or less east and west, and are thus *parallel* to the prevailing winds. There is not therefore a marked dis-

inction between the rainfall on the two sides of the chains, but on the other hand the Alps form a "temperature divide." That is, the countries to the south of them are perceptibly warmer than those to the north, and we find, for example in France, that many plants, all but unknown in the north, flourish in the south. Among these are oranges and lemons, olives, myrtles, the noble laurel, and so on. The Rocky Mountains have less effect on temperature, though, as we shall see, the regions immediately to their east are warmed a little in winter by the presence of the mountains. But because they stand directly across the path of the westerly, rain-carrying winds, which they deprive of much of their moisture, the eastern part of Canada, especially the interior, tends to be dry. Further, the fact that the plains of Mid-Canada, like those of Siberia, are widely open to winds blowing from the north makes them liable to sudden falls of temperature owing to cold polar winds. On the other hand, they have the advantage over those of Siberia that no chains lie to the south, so that the plains are equally open to warm winds blowing up from the Gulf of Mexico.

Size and Position of British North America.—As British Columbia (Chap. VIII) is included in the Dominion of Canada, we may conveniently state some general facts in regard to the whole Dominion before proceeding to discuss in detail that part of it which has a continental climate.

British North America, exclusive of the Bermudas, from the point of view of administration is divided into two parts—the Dominion of Canada, with its nine provinces and two territories, and Newfoundland, to which Labrador is attached. The Dominion of Canada, exclusive of Labrador, has an area only slightly

less than that of Europe. If we add Newfoundland and Labrador, the total area is about 3,890,000 square miles,—that is, about 120,000 square miles in excess of Europe, but the additional land is made up by the almost barren Labrador.

In longitude Canada has a considerably greater extension than Europe, from 53° to 141° W. In latitude the two can hardly be compared. The most southern point of Canada, in Ontario, touches the parallel of 42° N.; that is about the latitude of Rome, but only a very small part of Canada extends so far south. Westward its southern boundary over a large stretch of land is formed by 49° N., about the latitude of Paris. In comparing Canada in imagination with Europe, then, we have to move the whole northward, widen it out in longitude, suppress most of the seas which interpenetrate the coastline of Europe, and greatly increase the amount of land within the Arctic Circle. Canada is therefore less favoured by nature than Europe, and we shall see that, in addition to a large part of its surface suffering from an extreme climate, much of it also is rocky and infertile. Therefore, though Canada can hold many more people than it has at present, it is not likely that it will be able ever to support so many as Europe.

Surface and Relief.—In this also Canada recalls Siberia rather than Europe. Europe generally, but more especially to the west, is characterised by the great variety of its surface, which changes in character over very short distances. But Eastern Europe, like Siberia, is uniform over vast areas, and Canada shares this peculiarity. It has, broadly speaking, four great divisions, which are as follows (see Fig. 15): (1) The North-eastern Plateau (Laurentian Plateau); (2) the Eastern Highlands, with their marginal Lowlands; (3) the Western Plains;



FIG. 15.—THE NATURAL REGIONS OF CANADA.

- (1) *The Laurentian Plateau* and included plains, mostly rocky and infertile.
- (2) *The Eastern Highlands*, with their marginal Lowlands. The Lowlands are mostly fertile, and are cleared and cultivated; the Highlands are generally densely wooded.
- (3) *The Western Plains*.—To the south these are very fertile, and here wheat cultivation is extensively carried on; northwards the climate becomes too severe.
- (4) *The Western Cordillera*, where the fertile ground lies round the river-valleys. This diagram should be compared with Fig. 20.

(4) the Western Cordillera. Let us consider each of these separately.

1. *The North-eastern Plateau or Laurentian Plateau*

The boundaries of this are shown in Fig. 15. It extends round Hudson Bay, and includes the greater part of the Northern Territories, Labrador, and much of Quebec. Throughout this area the ground is rocky, treeless to the north, and forested to the south. The elevation varies, but much of the surface, especially in the peninsula between Hudson Bay and the Gulf of St. Lawrence, lies between 1000 and 2000 feet above sea-level, and in the north-west corner of Labrador we have the highest mountains of the east, which reach 8000 feet. Even where plains occur, as round Hudson Bay, the climate is too severe for them to be utilised.

Throughout its extension this area, whatever its elevation, has the characters of a plateau, for it consists of a very old land surface, built up of ancient crystalline rocks, which has been subjected to prolonged weathering. North America, like Europe, passed through an Ice Age long ages ago, and the effect of the ice on the plateau was to scrape away the surface soil and leave the ground bare and rocky. Further, the ice scooped out holes in the plateau in which now lie many lakes, and, as in Norway and Scotland, it disturbed the drainage, so that we have now great numbers of comparatively small streams, running in shallow valleys, and separated from one another by low divides. Owing to these low divides it is not difficult to cross over from the headwaters of one stream to those of another. The whole region has a general resemblance in its rocks, its surface, and its structure to Scandinavia and Finland, and Hudson Bay, which is shallow, lies on a drowned portion

of the Laurentian Plateau, just as the Gulf of Bothnia lies on a drowned part of the Scandinavian Plateau. But the Canadian Plateau is colder, bleaker, and more barren.

2. The Eastern Highlands with their Marginal Lowlands

To the south and east of the Laurentian Plateau lies a region deeply interpenetrated to the east by bays and estuaries, bearing also vast lakes, and consisting of uplands with plains fringing the lakes and estuaries. To the east the uplands, as for example in New Brunswick and Nova Scotia, are but an extension of the Appalachian Highlands of the United States, and here the Coal Measures crop out, as in Pennsylvania in the States. On the inner margin of these Highlands lies the fertile plain which bounds the estuary of the St. Lawrence. Farther west we have the five great lakes, Erie, Ontario, Huron, Michigan, and Superior, round which again we have fertile plains, the peninsula between Erie and Ontario on the one side and Huron on the other being specially important (Fig. 18). The more elevated region which bounds these plains to the west is partly built up of outliers of the Laurentian Plateau, and partly of old sedimentary rocks (that is, rocks laid down in water, like sandstones, grits, limestones, etc.) of similar age to those which build up most of Scotland.

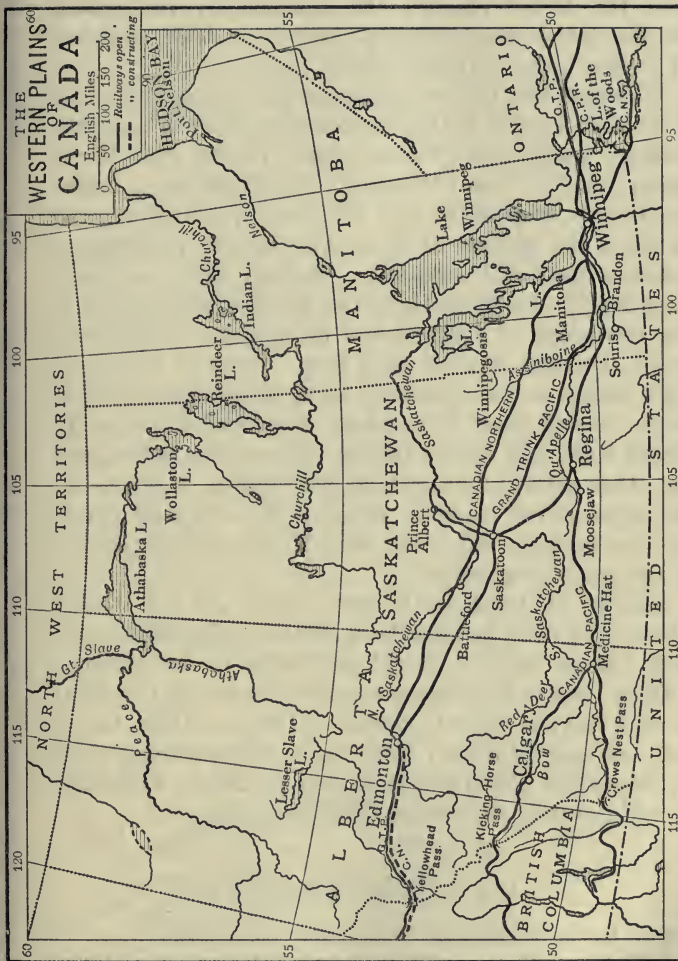
This region of uplands and plains includes the provinces of Nova Scotia, New Brunswick, Prince Edward Island, and Ontario, also part of Quebec and a part of Manitoba. It makes up the older part of Canada, and is still the most populous part. The soils, like the soils of Scotland generally, are due to the glaciers of the Ice Age, and are very varied in character. Sometimes deep and fertile, they may a short distance off

become shallow or not very fertile. As in the midland plain of Scotland and those parts of England which are built up of old rocks, there is much mineral wealth, while the woods which clothe the uplands form a source of wealth which no longer exists in England and Scotland.

The relation of this region to the Laurentian Plateau is best realised in the province of Quebec. The populous part of Quebec consists of the plain on either side of the St. Lawrence. On the left bank a narrow belt of fertile land fringes the river and estuary. Behind this belt of level ground rises the plateau, whose edge gives rise to the appearance of a mountain range, as in Les Eboulements, which rise to 2500 feet in height. The streams, which run in shallow valleys on the plateau, leap from its surface in waterfalls to the plain below, and thus yield much water-power. As compared with the cultivated plain, the plateau yields chiefly timber (often converted into wood pulp by help of the water-power) and some furs. Where the climate, the relief, and the soil permit, cultivation is pushed from the marginal plain into the plateau.

3. *The Western Plains*

which include most of Manitoba, Saskatchewan, and Alberta, with parts of the North-western Territories and Yukon, extend from the western boundary of the plateau and the Eastern Highlands to the slopes of the Rockies, and from the Canadian boundary to the Arctic Ocean. They are characterised, especially to the south, by their fertile soil, by the uniformity of their relief, and by the soft rocks of which they are mostly composed. These rocks are comparable to those which build up the English plain, and like them lie in almost horizontal beds. The climate is extreme, especially



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FIG. 16.

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in the eastern belt. To the north it becomes so severe that the fertile prairies are replaced by the frozen tundra, which can probably never be utilised, and has at present practically no inhabitants.

We must not, however, suppose that these plains lie at or near sea-level. On the contrary, they lie at three distinct levels—the prairie steps. In the Red River valley, that is round Winnipeg, the elevation is under 1000 feet. West of the Red River valley, and stretching to about the latitude of Moosejaw, we have plains lying between 1000 and 2000 feet. Beyond this is a region stretching to the foothills of the Rockies, and including the townships of Calgary and Edmonton, which has a mean elevation of over 2000 feet. Parts of this land, for a reason to be considered later, form ranching land, while the two lower steps where developed form chiefly wheat land. In distinguishing between the plains and the other natural divisions, we may repeat, it is not the elevation above sea-level which is the essential point, but the uniform relief, the deep fertile soil, the nature of the underlying rocks.

As Fig. 20 shows, the western plains are not wholly destitute of trees, but Southern Manitoba, Saskatchewan, and Alberta include vast level tracts of fertile land, with no trees or but scanty trees, which can be ploughed at once and put down to cereals. The conditions, therefore, are quite different from those which prevail alike in the eastern plains and in British Columbia, with their forests and their alternation of hill and plain.

4. *The Western Cordillera*

region has been already considered (pp. 53-68).

Lakes and Rivers.—We have already mentioned the five great lakes which are so conspicuously a natural



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FIG. 17.

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feature of Eastern Canada, and, as we shall see later, are also of such supreme importance in permitting the products of the interior to reach the sea. Of these the most western, Lake Superior, drains by the swift river called St. Mary into Lake Huron. This river drops 20 feet suddenly, giving rise to the rapid called Sault Sainte Marie. The steamers avoid this rapid by the "Soo" canals, of which there are now two, one on the Canadian and one on the United States side. Lake Huron is connected with Lake Michigan to the south by the Strait of Mackinaw, and in addition to containing many islands has a broad extension, Georgian Bay, which it is proposed to connect with the river Ottawa by a canal. From Lake Huron the St. Clair River, which expands into a lake, flows into Lake Erie. From this lake the Niagara River, with the famous Falls on its course, flows into Lake Ontario. The International Boundary Line passes through the middle of the Niagara River, so that one part of the Falls lies within the United States, while the other, or Horseshoe Fall, is Canadian. The two are separated by Goat Island, and the water of the Falls makes a leap of more than 160 feet over a rocky ledge. This, of course, renders them a complete barrier to navigation, but the Welland Canal, running parallel to the river, permits steamers to sail from Erie to Ontario (Fig. 18).

Lake Ontario, the last of the great lakes, gives rise to the St. Lawrence, a magnificent waterway which, above Montreal and near the entrance of the Ottawa, expands to form Lake St. Louis. This lake drains into the river below over the Lachine Rapids, which can be passed by small steamers, but are avoided by the larger ones by means of a canal. Below Quebec, on its lofty rock, the river widens into a huge estuary, which again expands into the Gulf of St. Lawrence.

The river and the great lakes, by the aid of the canals named, form a complete waterway, enabling large steamships to pass from Quebec or Montreal to Port Arthur on Lake Superior, distances of 1000 or 1200 miles, and thus to reach almost the heart of the continent.



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FIG. 18.

A number of streams fall into the St. Lawrence from the Laurentian Plateau. The most important are the Ottawa and the Saguenay, both of which are navigable and afford a means of access to the interior of the country. The Saguenay drains Lake St. John. The other streams are mostly small, and, in addition to the marginal waterfall which is usually present

(p. 76), they generally show on the plateau above an alternation of smooth and rapid reaches. Further, the divide between the streams flowing into Hudson Bay and those flowing into the St. Lawrence is low. It is therefore possible, especially in the birch-bark canoe, the boat of the Indian, to travel in summer time great distances over the plateau, the canoe being carried from one head stream to another, or past the reaches too rapid for navigation (portages). It was thus that the French fur traders—the *voyageurs*—and explorers did their journeying in the hinterland of Quebec.

Apart from the St. Lawrence, Canada east of the Rockies has two other great drainage systems, both of far less importance from the point of view of navigation. These are the Nelson-Saskatchewan system and the Mackenzie system. The divide between the two systems is very low, and farther east there is great uncertainty of drainage, Reindeer Lake, for example, appearing to drain both into Hudson Bay and into the Arctic Ocean direct through Lake Athabasca. These uncertainties of drainage are to be ascribed to the action of the ice of the Ice Age. The actual conditions, however, no doubt vary greatly with the season of the year.

The Saskatchewan rises in the Rockies in two great branches, the North and South Saskatchewan. These have a generally eastern course, and after their junction pass through a lake-besprinkled country to Lake Winnipeg. This great lake also receives the Red River, which drains very fertile and productive land. The whole region here was, in the later part of the Ice Age, occupied by a much larger lake of which the existing ones are remnants. The old lake bottom forms fertile wheat land, just as the similar old lake beds in southern Russia form wheat lands.

From Lake Winnipeg the river Nelson emerges to the north, and after passing through many lakes reaches Hudson Bay. Obviously it would be a great advantage to Manitoba and Saskatchewan if this waterway could be used as a line of export for the wheat of the region. Hitherto, however, the difficulties of navigation in Hudson Bay, and the shortness of the period when its upper portion is ice-free, has made this impossible. The Nelson also is much obstructed by rapids.

The Athabasca is usually regarded as the headwaters of the Mackenzie. It rises near the North Saskatchewan, but flows north to Lake Athabasca. The stream which drains this lake is called the Slave River, and is joined by the great Peace River as it leaves the lake. The united stream enters the Great Slave Lake, from which the Mackenzie emerges to the east. The Mackenzie is joined by the Liard, which drains the northern part of British Columbia and enters the Arctic Ocean by a huge delta. The Great Bear Lake, the northernmost of the large lakes of Canada, drains into the Mackenzie by the Bear River. The whole of this region is almost unpeopled, and shows many uncertainties of drainage, in connection with which we must remember that running water only exists for a limited period in each year, the streams being frozen for many months.

One other river must be named, though its mouth does not lie in Canadian territory. This is the Yukon, on whose banks lie the famous goldfields of Klondike.

Climate.—The most important points in regard to climate can be made out by a study of Figs. 2 and 19, and by comparison with Fig. 13.

Canada east of the Rockies, no less than west of them, is in the region of westerly winds, therefore the

east coast has not a distinctly "maritime" climate, for the prevailing winds do not blow from the sea. Nevertheless there is a difference between the climate of the east coast and that of the western plains. This difference especially affects rainfall, which is distinctly greater in the east (see Fig. 19); and, further, while the west has its rain chiefly in summer (Fig. 2), the east has rain at all seasons. This is because the east is in the track of winter storms, which travel down the valley of the St. Lawrence and deposit abundant moisture on the surrounding lands, just as the winter storms, travelling from Ireland across England and Scotland, bring winter rain to the two latter countries. In summer inblowing winds from the ocean replace the heated air over the land, and bring rain to all parts, but most to those in the vicinity of sheets of water, as the Hudson Bay coast, the east coast, the vicinity of the great lakes, etc.

As the winters in Canada are very cold, the precipitation of winter comes as snow, and we thus have far more snow in the east than to the west.

The coldness of the winters in the western plains is due to distance from the sea and to free exposure to cold northern winds. The winter cold in East Canada is due to the cold Labrador current which chills down the whole coast and turns Hudson Bay into an ice chamber, which affects all the surrounding lands. The result is that Montreal, in the latitude of Venice, has its river blocked by ice from about the end of November till the end of April.

Let us note next a few details in regard to the climate. The summers are warm. Broadly speaking, we may say that all the *well-peopled* parts of Canada have a mean summer temperature of 60° or over during the three summer months. In the populous parts of

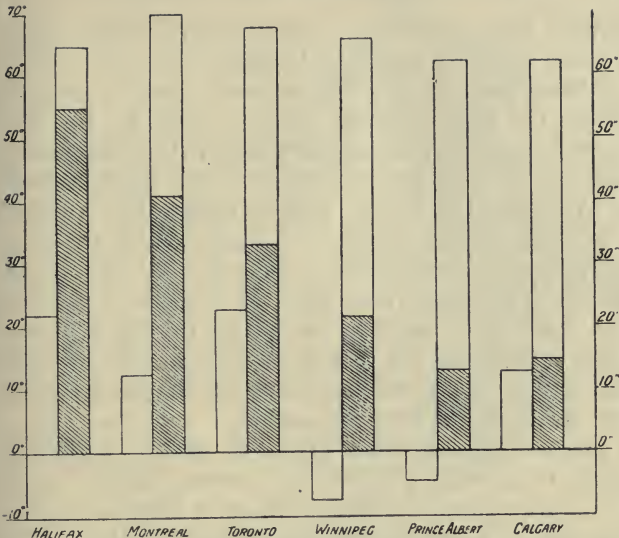


FIG. 19.—MEAN TEMPERATURE OF HOTTEST AND COLDEST MONTHS, AND MEAN ANNUAL RAINFALL OF A SERIES OF STATIONS IN CANADA EAST OF THE ROCKY MOUNTAINS.

The shading shows rainfall in inches; the temperatures are in degrees Fahrenheit. The diagram should be compared with Fig. 13.

The left-hand station is the most easterly, the right-hand the most westerly; the latitudes range from 43° N. (Toronto) to 53° N. (Prince Albert), and the elevation above sea-level varies from about 100 feet (Halifax) to over 3500 feet (Calgary). It will be noted that the summer temperatures vary but little throughout Canada, but there is great variation in the winter minimum. At Halifax and Toronto the mean January temperature is only some 7° to 10° below freezing. This is because the sea in the one case and the great lakes in the other have a moderating effect. Toronto also lies far to the south. Montreal, with no great body of water near at hand, has a cold winter. In middle longitudes (Winnipeg) the winter cold is very severe (nearly 40 degrees of frost), because places here are farthest removed from the influence of the sea. Calgary, in spite of its elevation, has a moderate winter temperature; this is because it is warmed by the Chinook winds descending from the Rockies. Broadly speaking, rainfall steadily diminishes from east to west, but Calgary (in lat. 51°) has a slightly greater fall than Prince Albert (in lat. 53°) because it is nearer the Rocky Mountains.

Ontario the summer mean temperature is 65° , which must be regarded as distinctly high.

Winter presents a great contrast. As the diagram shows, the least extreme regions, those on the east coast, have a mean temperature some 10° below freezing-point. On travelling westward to the neighbourhood of Winnipeg the mean January temperature steadily falls, till it becomes about -7° , that is, there are about 39° of frost. Farther west conditions improve, because the air which has risen over the Rockies is warmed and dried as it sinks to the plains on the east, and there appears as the chinook winds, which are warm and dry, and therefore give places like Calgary relatively high mean winter temperatures.

The annual rainfall is about 55 inches at Halifax, drops to about 33 inches at Toronto, and to about 22 at Winnipeg. Farther west, as at Regina, it sinks to below 10 inches, to rise again slightly as the Rockies are more nearly approached.

As already seen, in the east much of the precipitation falls as snow, giving Montreal, for instance, an average fall of about 10 feet. With the diminution in winter precipitation on passing westward the amount of snow diminishes, till at Winnipeg it varies from 30 to 60 inches. Farther west again, as about Macleod, the maximum fall does not exceed 30 inches. Moreover, here, instead of lying till spring comes, the snowfalls are quickly licked up by the chinook winds, so that the grass projects through the snow cover, and cattle can be kept out of doors all winter.

The amount and distribution of the rainfall affects the amount of sunshine greatly. The east coast, with its heavy rainfall, is liable to fogs and mist, and lacks bright sunshine. The milder winters make fruit-raising possible, *e.g.* apples in Nova Scotia, and the



FIG. 20.—THE FOREST ZONES OF CANADA.

- (1) *The Western Forest*, predominantly coniferous.
- (2) *The Central Forest*, of conifers mingled with such broad-leaved trees as maples, poplars, birches, oaks, elm, ash, etc.
- (3) *The Southern Forest*, predominantly broad-leaved, and including warmth-loving trees such as Judas tree, tulip tree, chestnut, honey locust, etc.
- (4) *The Far Northern Forest*, much lighter than (2), and consisting chiefly of conifers with birch and poplar.
- (5) *Scattered Woodland and Grass mixed*.
- (6) *The Treeless Prairies*.

abundant moisture allows the dairy industry to develop. A little farther west (Ontario) the winters become severe, but snow falls early in the autumn, so that the ground is protected from frost. In consequence wheat can be sown in autumn, and in spite of the cold trees will thrive. Farther west, again (on the plains), wheat must be sown in spring, as autumn wheat is killed by the winter frost, and we come to the treeless prairies, for no tree will stand the cold, dry winter winds. Still farther west we have the ranching country, where the chinooks melt the snows. In all the westerly region the air is clear and dry in winter, and both in winter and summer bright sunshine is abundant, so that in summer plants grow quickly.

Plants and Animals.—The chief features of the vegetation of Canada are shown on Fig. 20. North of the belt of coniferous forest stretch the barren lands, a region comparable to the tundras of Siberia. Here are no trees, only low bushes, and the surface only thaws for a short time in summer. Such a region must apparently always remain useless, owing to the absence of fuel and the severity of the climate.

Canada has numerous native mammals, many of which recall those of Europe. Thus the reindeer (caribou) occurs as in Northern Europe and Asia; the moose is all but identical with the elk of Europe; there is beaver as in Europe, and so on. Bison were once extraordinarily numerous, especially in those regions swept in winter by the chinook winds, which are now used for cattle-ranching; as wild animals they are now extinct. The forests produce many fur-bearing animals, such as bear, marten, mink, muskrat, skunk, wolverene, lynx, and fox. But the recent developments in wheat-growing have thrown into the shade the earlier type of Canadian trade which depended

upon the fur-bearing animals, and these are necessarily reduced in numbers as the forests are exploited.

(B) People, Trade, and Communications

People.—When Canada was first discovered it was sparsely inhabited by two kinds of people—the “Indians” and the Eskimo or Innuits. The first are tall, with brownish skins (“Red” Indians), straight lank hair, and prominent noses. When they first came into contact with Europeans all the Indians of Canada were exclusively hunters. The forest tribes used birch-bark canoes on the streams in summer time, and snow-shoes in winter for moving about. Their northward extension was therefore, broadly speaking, limited by that of the forest which supplied game, fuel, material for boat-making and house-building (birch-bark wigwams), and for the manufacture of snow-shoes. There were very many tribes, including, for example, the Crees and Blackfeet. In detail the life differed in different parts of the forest region, and on the treeless plains in the south the bison was the chief object of the chase, and its skin formed the curious “bull-boats” used on the streams. Till the European brought the horse, the dog was here the beast of burden. The forest Indians also had some dogs, which were used to pull sledges in winter.

The barren ground yielded too little to be the permanent home of any tribe, but on its sea margin the short, broad-nosed, brown-skinned Eskimo still live, and obtain from the ocean all that the land refuses to give. Thus it gives fuel (blubber), clothes (sealskin), food (flesh and fat of seals, also fish, etc.), materials for boat-building (the canoe or kayak being made of sealskin with a framework of drift-wood). In winter

the houses are built of snow, while in summer tents of skin are set up. The kayak is the boat of the men, the women have larger boats, and movement on land is carried on by means of sledges drawn by dogs, of which the Eskimo have many.

The Eskimo are found along the whole coastline of Labrador, and also extend over parts of the shore of Hudson Bay, and then right along the coast of the mainland to Alaska. But their numbers are small, and they are decreasing. The Indians are also decreasing, and now number about 111,000.

Canada was discovered by Jacques Cartier, a native of St. Malo, who took possession of the country in the name of France. France was, however, slow in colonising the country, and there was considerable friction between French and British colonists till, in 1763, the country was ceded to Britain under the Treaty of Paris. Now the French-speaking population (almost all in Quebec), numbers over $1\frac{1}{2}$ millions out of a total of $7\frac{1}{4}$ millions (1911).

Great Britain and other parts of Europe are pouring emigrants into Canada every year in hundreds of thousands, so that it is difficult for us to realise how scanty the population still is. We hear and see so much of these emigrants that we naturally think of the country as crowded. But, we may repeat, Canada is nearly as large as Europe, and it has $7\frac{1}{4}$ million inhabitants while Europe has about 430 millions. If we added together the population of our five largest towns—London, Glasgow, Liverpool, Manchester, and Birmingham—and spread them over the whole of Europe we have a picture of the conditions in Canada. As we have said, it is not likely that Canada, which has so much waste land, will ever hold as many people as Europe, but it still has room for many millions more.

Trade and Communications.—The first point of importance about the trade of Canada is that, as regards exports, wheat and wheaten flour largely predominate. In 1912-13 goods to the total value of £81,000,000 were exported, and of this total more than one quarter—about £24,000,000—was made up of wheat and flour. Thus, in marked contrast to regions of maritime climate like New Zealand, and to those of sub-tropical climate like South Africa and the Australian colonies, Canada is a wheat producer. Wool, so important in the countries named, constitutes a very insignificant item in Canada's trade.

The second point is that the centre of gravity of the wheat-producing region is steadily shifting westwards. Some thirty years ago Ontario had a large acreage under wheat. With the development of Manitoba, especially of the Red River valley, the acreage in Ontario diminished and Manitoba became the wheat-producing province. In 1908 for the first time the yield from Saskatchewan exceeded that of Manitoba, while in 1912-13 the order was as follows: Saskatchewan, with 52 per cent. of total; Manitoba, 28 per cent. of total; Alberta, 10 per cent. of total; Ontario, 8 per cent. of total; other provinces, chiefly Quebec, 2 per cent. of total.

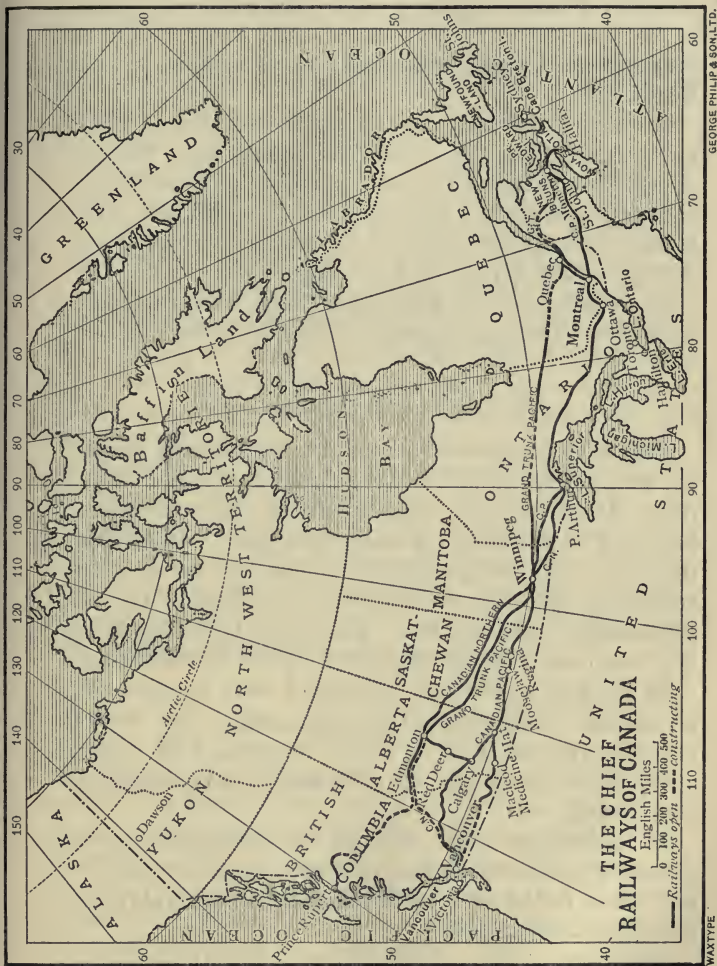
The other main products of Canada are wood, articles manufactured of wood, wood pulp, etc.; mineral produce, especially silver, gold, copper, coal; dairy produce including bacon and ham, cheese, butter, and also live stock. Broadly, it may be said that while the western provinces of Manitoba, Saskatchewan, and Alberta produce little but cereals and live stock, the eastern provinces produce cereals, especially oats (also extensively grown in Manitoba and Saskatchewan, but not exported like the wheat), and maize (Ontario), but in addition large amounts of dairy produce and

live stock, and also fruit. Thus Canada is chiefly, so far as its export trade goes, a food producer. Its imports are largely manufactured goods.

Why do the western provinces produce wheat for export? Some of the reasons—the large tracts of level land, not requiring to be cleared before use, the fertile soil—we have already discussed. But we must notice also that for wheat there is a very great demand, especially in Great Britain with its crowded population, and that—and this is very important—the splendid system of waterways formed by the Great Lakes and the St. Lawrence make it possible to send the crop to Europe very cheaply. Siberia, no less than Canada, has splendid wheat lands, but in Siberia it is difficult and costly to get the grain to the market; in Canada it is comparatively easy.

As we have seen, the severe Canadian winter is not a drawback to wheat growing, but it means that the crop must be harvested in time to be shipped before the waterways are closed by ice. It is for this reason that so many canals have been built (see p. 80), and these canals widened and improved so that they will carry large ships. The western farmers can only live on condition that their crops can be conveyed to the eastern seaports before winter sets in. To facilitate this, railway construction is being carried on with great rapidity. The Canadian Pacific Railway (C.P.R.) runs from Halifax to Montreal, and then by the valley of the Ottawa to Port Arthur, Winnipeg, Regina, Medicine Hat, Calgary, the Kicking Horse Pass, and the Fraser valley to Vancouver. It has also branches going to Edmonton in the north and Macleod in the south.

From Winnipeg—a great railway centre—another great transcontinental line, the Grand Trunk Pacific, connects with Edmonton, and will ultimately cross the



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FIG. 21.

WAXTYPE

Rockies at Yellowhead Pass to descend to the Pacific Coast at Prince Rupert (p. 67). Eastward this line is to be continued through the plateau region of Quebec province to Quebec town and to Monckton in New Brunswick.

A third great line, the Canadian Northern, though not transcontinental, is building many lines with the object of developing the more northern parts of Alberta and Saskatchewan. Already their lines connect Athabasca Landing and Prince Albert with Regina, Winnipeg, and Port Arthur on Lake Superior.

In addition to the lines mentioned, Eastern Canada has a well developed railway system of its own.

(C) Government and Divisions

Canada, as one would expect from its size, is divided up into regions which have a large measure of home rule. There are, as already stated, nine provinces, and each of these has its local parliament. In addition there is a central parliament, composed of a Senate and House of Commons, both of which meet at Ottawa, the administrative capital. The head of the Legislature is a Governor-General, appointed by the British Crown.

In addition to the nine provinces there are two territories, the North-West Territories, which are scantily peopled, and the Yukon, chiefly important for its gold fields. The Territories are governed by a Commissioner and Council.

In discussing, quite briefly, the characters of the different provinces and territories, it is convenient to refer back to the division of Canada into natural regions given on page 72.

Into (1) the Laurentian Plateau region fall the North-West Territories, also Labrador, which we shall consider

under Newfoundland, the almost barren hinterland of Quebec, and we may also include here the Yukon Territory.

Under (2) the Eastern Highlands and their marginal Lowlands fall to be included all the older provinces of Canada, Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Ontario.

Under (3) the Western Plains come Manitoba, Saskatchewan and Alberta, the wheat-growing regions.

(4) The Cordillera region has been already considered.

Obviously, then, the important provinces of Canada fall into two groups, the Eastern and the Western. At the present time emigration is going on fastest into the latter; they are therefore changing most rapidly, and bulk most largely in the public eye. But we must not let this, a perhaps temporary condition, blind us to the real facts of the case. The single province of Ontario has twice as many inhabitants as the three provinces of Manitoba, Saskatchewan, and Alberta. The two provinces of Quebec and Ontario contain 63 per cent. of the total population of Canada (1911 census). The western provinces are interesting because of their promise for the future, but the present belongs to the east, which is the stable region of Canada.

I. *The Eastern Provinces*

In the eastern provinces generally wheat is not grown on a large scale, except in Ontario, but other cereals, especially oats and (in Ontario) maize, are grown, also root crops and fruit, especially apples in the colder regions, as in the Annapolis valley in Nova Scotia, and in Lower Ontario fruits of warmer climates, such as grapes, melons, peaches, etc. We have already mentioned the dairy farming. In the eastern provinces

generally, therefore, farming is a matter which requires skill and experience, and the methods adopted in the Old World, *i.e.* rotation of crops and manuring of the land, are regularly practised. In the west the virgin land is so fertile that it will go on producing crops of wheat without manure and without rotation of crops. But this is not likely to go on indefinitely, and indeed there has in the last few years been an extensive movement of American farmers across the border, from the lands which they have largely exhausted by farming on these lines into the virgin lands of Canada.

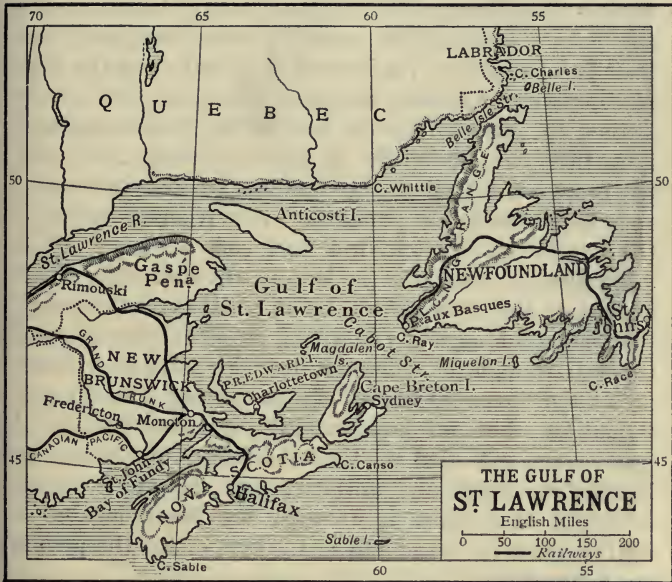
While the western provinces depend chiefly upon their cereal crops, or in the ranching regions upon their live stock, in the eastern provinces the still abundant forests and the mineral wealth afford other resources. The water-power also, and the settled, relatively dense population, make manufacturing possible. We may now say a few words about the provinces in detail.

NOVA SCOTIA is a peninsula about two-thirds the size of Scotland, having Cape Breton Island off its north-eastern extremity.

The narrow neck of land which connects it with New Brunswick is hollowed out by the great Bay of Fundy. The surface is rugged, especially on the Atlantic side, and the climate damp and variable. The best land lies on the side near the Bay of Fundy. The fisheries are very rich, cod and lobster forming the chief catch. Halifax, the capital, on the Atlantic coast, is a very important harbour, used especially in winter when the Canadian liners cannot make the passage of the St. Lawrence owing to the ice. Sydney, in Cape Breton Island, has another fine harbour. Near the town coal is worked.

PRINCE EDWARD ISLAND, the smallest province, is very fertile, root crops, oats, and dairy produce being obtained. The fisheries are also good, but the population is decreasing. Charlottetown is the capital.

NEW BRUNSWICK is densely forested, and the timber



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FIG. 22.

is the chief source of wealth. St. John, on the Bay of Fundy, is an important port, ice-free all winter; but Fredericton, a much smaller town in the interior, is the capital.

QUEBEC is a large and important province, having nearly six times the area of the British Islands since

recent boundary readjustments. Of this area, however, much is densely forested and has a rugged surface (p. 76). Of the total population of two millions, about 80 per cent. are of French origin, and of the two large towns Quebec is entirely French in aspect and feeling, while Montreal is at least superficially English. The French Canadians, while retaining many characteristic French traits, differ markedly in two respects from their compatriots in the France of to-day. In the first place, they are devout Roman Catholics,—that revolt against the authority of the Church which is so marked a feature of public life in France being absent in Quebec, and they have large families, whereas in France, as is well known, the population is stationary owing to the small number of children born each year.

In Quebec the land is largely divided into small holdings, the cultivators being called "habitants." On these holdings a variety of crops is grown, even tobacco, though the climate is not very suitable. There is a high standard of comfort among the French Canadians, but no great wealth, and the French of Quebec are regarded by the inhabitants of Ontario as lacking in energy and initiative. It should be noted, however, that there is at least the beginnings of a native literature here, and in the arts of life the people are advanced.

Quebec is beautifully situated on a rock above the St. Lawrence. It is the capital of the province, has a university and a citadel, and is one of the oldest cities on the continent. Commercially, however, it is far less important than Montreal, up to which the great liners steam in summer when the St. Lawrence is open for navigation.

Montreal, the largest town in Canada, had in 1911 about half a million inhabitants. It is placed where

the Ottawa enters the St. Lawrence, just below the Lachine Rapids (p. 80), and therefore at the head of ocean navigation. It commands the route up the Ottawa and that which passes by the Richelieu River, Lake Champlain, and the Hudson River to New York, no less than the waterway of the St. Lawrence and Great Lakes, so that it is superbly situated. Here the imports arrive from overseas, and here also the exports are collected before they leave the country. The water-power in the neighbourhood gives rise to manufactures, mostly connected with the using up of raw material, as sugar refining, tobacco manufacturing, paper and pulp making. There is a university, as well as many banks, shipping offices, insurance offices, and so forth.

ONTARIO, the most important and most densely peopled province of Canada, is, as compared with Quebec, thoroughly English, or perhaps we should say Scottish. It is about two-thirds the size of Quebec, but contains far more fertile land, the region west of the St. Lawrence and the lake peninsula being especially prosperous. In 1911 more than one-third (two and a half million) of the people of Canada were found in Ontario. Agriculture is highly developed, and in addition to lumbering the province has considerable mineral resources. The nickel and cobalt mines of Sudbury, the iron, silver, and copper of the north shores of Lakes Superior and Huron generally are especially important. These ores are partly sent to the United States or Montreal to be smelted, but Hamilton, in Lower Ontario, also does much smelting with coal imported from the States. An interesting point about agriculture in Ontario is that while the area devoted to farming has not been enlarged of recent years, the produce has increased. This is be-

cause it will not pay to clear fresh lands from forest, in competition with the virgin lands of the west which do not require clearing, and the established farmers can only compete with those of the west by improved methods.

As compared with Quebec, Ontario has more large towns. In addition to Toronto, with less than 400,000 inhabitants, there are Ottawa the capital, Hamilton, London, etc.

Ottawa is placed on the right bank of the Ottawa River, about ninety miles above its confluence with the St. Lawrence, and at the point where its navigation is interrupted by the Chaudière Falls. Immediately opposite, on the left bank of the river, is Hull, in Quebec. The Rideau, a tributary of the Ottawa, flows through the town and enters the main stream by falls. The Rideau canal (Fig. 18) avoids these falls and connects Ottawa with Kingston on Lake Ontario.

Apart from its significance as the Dominion capital, the great importance of Ottawa is in connection with the lumber industry. Behind it lies a region still largely clothed with the splendid "southern" forest (see Fig. 20); the region is one of heavy winter snowfall (see p. 84); the streams are many and swift. The snowfall and the swift streams are of great value to the lumbermen. In autumn and through the early part of the winter the trees are cut down, and roads are cleared from the cutting ground to the nearest lake or stream. The heavy snowfall of the latter part of the winter is compacted by the traffic on these roads into an icy mass, whose surface is smoothed by artificial watering. Thus it is easy to sledge heavy loads of timber down to the waters' edge, where the logs accumulate till the spring thaw comes. Then they are pushed in, fastened together into rafts, and are carried

by the spring freshets far down stream. Finally, the water-power of the falls near Ottawa makes it easy to carry on timber industries, also pulp and paper making.

Still another advantage which its lumber industry gives to Ontario is that the work provides abundant labour during winter when farming occupations are at a standstill. No strong man in Ontario need be out of work during the winter months.

Toronto, situated on a sheltered bay on the shores of Lake Ontario, is an important shipping and railway centre, and the market city of the fertile lake peninsula (p. 75). It possesses the somewhat doubtful advantage of having a winter climate which for Canada is mild (see Fig. 19). It is a doubtful advantage, because the relatively high winter mean is due to an alternation of mild and frosty spells, with the result that the streets are frequently a sea of slush, and the characteristic Canadian winter mode of progression—sledging—is often difficult. There are a number of minor manufactures, mostly more or less connected with agriculture. Thus we have meat-packing works and distilleries, also manufactories of agricultural machinery, and so on.

2. *The Provinces of the Western Plains* (Fig. 16)

These three provinces are developing in the order of their distance from the eastern seaboard, through which they export their produce, and from which most of their supplies come. Thus MANITOBA (population, 456,000 in 1911; area, 252,000 square miles, 1912) is the oldest western province, and Winnipeg, with a population less than half that of Toronto (about 140,000 in 1911), by far the largest town. Winnipeg is placed in the fertile wheat-growing Red River valley, at the junction of

that river with its tributary, the Assiniboine, and practically at the beginning of the prairie region. As, however, it lies some 95 miles within the Manitoba boundary, we see that the whole province is far from lying within the prairie region. Indeed, the extreme east of Manitoba is an outlying portion of the Laurentian Plateau, which as usual is forested and floored with granitic rocks. This region is not particularly fertile, so that it forms a little cultivated region, separating the western plains from those of Ontario. The forest ceases near Winnipeg, but all the region round it is floored with old, hard sedimentary rocks, and owes its fertility to the lake silt which covers the surface. The region forms the first prairie step, and the soft sedimentary rocks of the western plains do not begin till the second prairie step, in Western Manitoba. It is in this westerly region, which may be said to begin at Portage-la-Prairie, that the most productive wheat land is found, the ground immediately west of Winnipeg being largely used for cattle rearing. Brandon and Souris are other wheat centres here.

Manitoba has no important minerals, and suffers much from lack of fuel, for wood is scarce and coal must be got from a distance. Further, owing to the severity of the winter and the rapidity of growth in spring, there is a great demand for farm labour in the warmer months and very little in winter. In winter also the train service is diminished, which still further reduces the amount of work available. Thus there is a large unemployed element in Manitoba every winter, much of which drifts to Winnipeg, where all the necessities of life are dear. In this absence of winter work Manitoba is at a marked disadvantage as compared with Ontario.

SASKATCHEWAN, with a total population in 1911 of

nearly half a million (two-thirds of that of Glasgow in the same year), and an area of 252,000 square miles, or twice that of the British Isles, occupies parts of the second and third prairie steps, and is changing so fast that almost any statement made in regard to its people or products is out of date before it can be printed.

Its southern half is bare of trees, or has only scattered trees, but north of Prince Albert forest appears. The extreme south, especially the south-west, is more or less arid, and wheat, though theoretically possible with special methods (dry farming), or irrigation, is here scarcely grown. About Regina, the capital, however, an enormous development of wheat growing has taken place recently, with the result that the population has increased tenfold within the last ten years. In the north-west, round Battleford and Saskatoon, a similar development is in process.

There is some coal in the south, but on the whole minerals are of little importance.

ALBERTA includes the western part of the third prairie step and the eastern slopes of the Rockies. Thus the province is characterised, even in the east, by its great mean elevation. It differs also from Manitoba and Saskatchewan in its wealth of minerals, which recalls that of British Columbia.

The most important minerals, so far as the future development of the province is concerned, are coal, which occurs both to the south (as round Medicine Hat and Lethbridge) and to the north at (Edmonton), and natural gas (Medicine Hat and vicinity, also north of Edmonton). At Edmonton the coal is said to be so near the surface that it can be shovelled out of the banks without mining. It is lignite or brown coal, not of high commercial value, but of enormous importance

in a region where fuel is very necessary and is otherwise difficult to get.

As yet wheat growing is not very well developed in Alberta, but enormous developments are expected round Edmonton, the capital but not the largest town. Edmonton is outside the limits of the arid belt and lies near the forest margin. Theoretically, the climate should permit of wheat cultivation for perhaps hundreds of miles north of Edmonton, but it remains to be seen how far this is actually possible.

Southern Alberta, like Southern Saskatchewan, is semi-arid or arid, and is meantime a ranching country, so far as it is developed at all. The position of this ranching country is best realised by taking a journey along the C.P.R. (see Fig. 21). Travelling west from Regina we find that the Regina wheatfields cease near Moosejaw, where, for the first time, the influence of the chinooks begins to make itself distinctly felt. From Moosejaw to Medicine Hat there is as yet but little settlement, but at the latter the ranching country begins. North and west it extends to Calgary, and beyond Calgary northwards to Red Deer, about halfway to Edmonton. Here the influence of the chinooks disappears, and the rainfall increases. South of Calgary the ranching country extends to Macleod, but here as compared with Calgary the ranches are much larger. The rainfall here is probably sufficient for wheat growing, but the chinooks seem to be a disadvantage, as they carry away the snow which elsewhere melts slowly in spring and supplies the needs of the growing crop. Recent developments in Alberta, therefore, have taken place round two main centres—Calgary as a ranching centre, Edmonton as a wheat centre. Both places show a similar proportionate increase of population in recent years (Calgary, 1901, 4400; 1911, 44,000 :

Edmonton, 1901, 2600; 1911, 30,000). Edmonton is described as the Winnipeg of the future, but meantime it is smaller than Calgary. It is very important to realise the tendency, in newly opened out regions like Alberta and Saskatchewan, for development to take place round special centres separated by vast tracts of almost unpeopled land. This is a very characteristic feature, and it produces effects which remain even after the "centres of settlement" have more or less fused together.

It should also be noticed that it is not true to say, as is sometimes done, that the far west of Canada is a ranching country. Edmonton is west of Medicine Hat, and yet it is in the wheat region; while Medicine Hat is on the verge of the ranching country. Ranching is carried on in that part of Southern Alberta and Saskatchewan which has an arid or semi-arid climate, but is influenced by the chinook winds. Wheat growing here is possible with irrigation, which is carried on to a small extent. It is possible also with special methods, so that this region may—in the distant future—also become wheat-growing.

3. *North-west Territories and Yukon*

We need say very little of these. In both cases the population is small and *decreasing* (Yukon, 1911, 8500; North-West Territories, 17,000), but a recent rearrangement of provincial boundaries has added enormously to Ontario, Quebec, and Manitoba at the expense of the North-West Territories. The chief importance of Yukon is due to the presence of the Klondike goldfield. This supports the city of Dawson on the Yukon River, whose population dropped from 9000 in 1901 to 3000 in 1911, showing that the goldfield has not fulfilled expectations.

CONCLUSION

To sum up, then, Canada was once chiefly a fur-producing country. The east was first settled, and here the farmers required to clear their land of forest before it could be cultivated. There came next, therefore, a time when timber was the chief export, for only by exporting the wood could the settlers develop their lands. As time went on, however, agriculture became more and more developed, especially in Ontario, where the plains are most extensive. Still later it was found that the western plains were adapted for wheat growing on the large scale, and within the last few years wheat growing has taken a tremendous leap forward, and wheat has come to be Canada's largest export. With the great development of wheat growing there has been an enormous increase in population, brought about by emigration, especially to the west. We thus see that Canada must be regarded as an advanced country, for it has definitely passed from the first stage of a new country, that of exploiting natural wealth, to the second stage, that in which the land is made to yield new products.

CHIEF FACTS IN REGARD TO CANADA

Total area, 3,730,000 square miles. Total population, 7,200,000 (1911).

Divided into nine provinces and two territories.

EASTERN PROVINCES

1. NOVA SCOTIA, with Cape Breton Island.—Area, 21,000 square miles. Population (1911), 492,000. Capital, Halifax. Sydney, in Cape Breton Island, is another important town.

2. PRINCE EDWARD ISLAND.—Area, 2000 square miles. Population (1911) 94,000. Capital, Charlottetown.

3. NEW BRUNSWICK.—Area, 28,000 square miles. Population (1911), 352,000. Capital, Fredericton, but St. John is the largest town.

4. QUEBEC.—Area, 707,000 square miles. Population (1911), 2,000,000. Capital, Quebec, but Montreal is the largest town.

5. ONTARIO.—Area, 407,000 square miles. Population (1911), 2,500,000. Capital, Ottawa, which is also the Dominion capital, but Toronto is the largest town.

In all these provinces mixed farming is carried on, most successfully in Ontario, also fruit growing, dairying, and the rearing of live stock. The forests are rich and give rise to a lumber industry, and minerals are plentiful.

WESTERN PROVINCES

6. MANITOBA.—Area, 252,000 square miles. Population (1911), 456,000. Capital, Winnipeg, the largest city of the west.

7. SASKATCHEWAN.—Area, 252,000 square miles. Population (1911), 492,000. Capital, Regina.

8. ALBERTA.—Area, 255,000 square miles. Population (1911), 375,000. Capital, Edmonton, but Calgary is the largest town.

These western provinces are predominantly cereal growing. Wheat is produced for export, oats are also largely grown, but for the home markets. Ranching is also carried on. Except in Alberta, minerals are few. Forests occur to the north, but are not exploited to any extent.

TRANS-CORDILLERAN PROVINCE

9. BRITISH COLUMBIA.—Area, 356,000 square miles. Population (1911), 392,000. Capital, Victoria, but Vancouver is the largest town.

A small amount of mixed farming is carried on and some fruit growing. The great resources are the fisheries, minerals, and woods.

THE TERRITORIES

1. NORTH-WEST TERRITORIES.—Area, over 1,000,000 square miles. Population (1911), 17,000. The people are distributed in small settlements, and there are no towns of any importance.

2. YUKON.—Area, 207,000 square miles. Population, 8500. Chief city, Dawson.

Yukon is important for its goldfield. In the North-West Territories furs are obtained, and agriculture is carried on to a very small extent round the settlements.

TRADE OF CANADA

In 1912-13 the total value of the exports of Canada was £81,000,000, of which wheat and wheat flour formed by far the largest item, about £24,000,000. Minerals accounted for over £11,000,000; wood and wood products about £8,500,000; cheese, bacon, and ham, live stock, etc., together for about £6,000,000.

The import trade had a value of £139,000,000, the biggest single item being iron and steel goods, £30,000,000. The great difference between the exports and the imports means that capital, chiefly British capital, is being poured into the country to develop its land, railways, manufactures, etc.

RAILWAYS

The most important continuous line is the CANADIAN PACIFIC, which runs from Halifax to Vancouver, crossing the Rockies at Kicking Horse Pass. This is the route taken by most of the emigrants into Canada.

The GRAND TRUNK PACIFIC is building another transcontinental line which will ultimately run from Monckton in New Brunswick to Prince Rupert in British Columbia, crossing the Rockies at the Yellowhead Pass. Only parts of this route are meantime in use.

The CANADIAN NORTHERN, though not transcontinental, is building many lines in Northern Alberta and Saskatchewan, especially in the wheat regions of Edmonton and Battleford.

CHAPTER X

REGIONS OF CONTINENTAL CLIMATE—

Continued

II. NEWFOUNDLAND AND WEI-HAI-WEI

Position.—Newfoundland is a large island, roughly triangular in shape, lying off the mouth of the Gulf of St. Lawrence. It extends, broadly speaking, from lat. $46\frac{1}{2}^{\circ}$ N. to lat. $51\frac{1}{2}^{\circ}$ N.; thus its most northerly point lies on the same parallel as London, and the greater part of the island corresponds in latitude to Northern France. It forms the part of North America nearest to Great Britain, the shortest distance from Cape Clear in Ireland to St. John's harbour in Newfoundland being 1675 miles.

The island lies just athwart the opening of the great gulf, the base of the triangle facing the entrance. From the nearest part of the mainland, the coast-line of Labrador, it is separated by the narrow Strait of Belle Isle (12 miles wide), while the wider Cabot Strait (60 miles) separates it from Cape Breton Island. Both of these are highways of commerce, the Strait of Belle Isle being part of the shortest route between Liverpool and Montreal. Both straits, however, are subject to ice obstruction. The strait of Belle Isle is usually closed to navigation from mid-November to mid-April, but icebergs may be encountered at almost any season. Cabot Strait has a somewhat longer period of open

water. These statements, however, apply only to the big passenger steamers; sealing vessels, which are specially built to resist ice pressure, habitually steam along the coast of Labrador in March.

Newfoundland, though it has a more southerly position, projects into the Western Atlantic much as the British Isles project into the Eastern Atlantic. It further resembles those islands in standing upon a broad continental shelf, which extends into the ocean in a south-easterly direction. This broad shelf, together with the numerous inlets of the coast, suggests that Newfoundland, no less than the British Isles, has undergone recent submersion. Indeed, the island is structurally but a partially submerged fragment of the land mass which extends into the Atlantic as Nova Scotia and Cape Breton Island. Between Newfoundland and Cape Breton Island, however, the continental shelf is hollowed out by a channel exceeding 100 fathoms in depth, which is a prolongation of the St. Lawrence valley. Such submerged valleys are common where the continental shelf is wide, the Hudson River, for example, farther south, having its valley continued by a deep submarine cañon which crosses the continental shelf.

The continental shelf is of great importance to Newfoundland, in that an accumulation of silt has taken place over parts of it to such an extent as to permit of the formation of the famous "Banks," upon which the prosperity of the island may be said to depend. These banks lie to the south and south-east of Newfoundland (Fig. 23), the part nearest to the coast being some 30 miles distant. The Great Bank, the largest, may be compared in size to the island of Newfoundland, and is covered by water having a general depth of 30 to 45 fathoms, and in places of less.

The Virgin Rocks, which stand on a small bank some 90 miles south-east of Cape Race, rise to within 5 or 6 fathoms of the surface. The surface of the banks is covered by sand, broken shells and gravel, and



FIG. 23.—NEWFOUNDLAND AND THE FISHING BANKS.

The island is shaded.

- (1) *The Great Bank.* (2) *St. Pierre Bank.* (3) *Banquereau.*
(4) *Sable Island.*

there can be no doubt that they have been built up on the shallow bottom by the land waste brought down with ice in the waters of the Labrador current, mingled with the finer matter carried in suspension by the Gulf Stream, precipitated where the two currents mingle.

These two currents, the warm and the cold, meet off the coast of Newfoundland, the colder water hugging the coast-line, and the warmer lying farther out in the ocean. With the cold Labrador current there come from the polar ocean masses of the small floating organisms which are so abundant there. These feed hosts of other organisms, upon which again the food fishes, especially cod, feed. Further, the banks afford the shallow water habitually chosen by cod as spawning grounds, and the mingling of the warm and cold currents causes local variations in salinity and temperature which seem to be specially favourable to fish. The conditions which occur in the North Sea are thus repeated here, but, owing to the coldness of the bottom water, the cod, a northern fish, predominates greatly over all other forms.

Area and Surface.—The area of Newfoundland (see map p. 97) is estimated at nearly 43,000 miles, or almost half that of Great Britain. Owing to the numerous bays and inlets the coast-line is long, with an estimated length of 2000 miles, and good harbours are frequent. The best-peopled part is the peninsula of Avalon in the south-east.

Geologically, the island is built up of ancient sedimentary rocks (Palæozoic), apparently containing valuable mineral deposits, though these are meantime but little worked. Like Nova Scotia, the island is really a part of the Appalachian region, which it resembles in showing a series of parallel ridges forming low mountain chains alternating with longitudinal valleys having a general south-west to north-east direction. The highest of the ridges scarcely exceed 2000 feet in height, and the most obvious range is Long Range on the western side. The valleys are clothed with forest and are traversed by numerous streams and

rivers. A feature of the surface, which it shares with other recently glaciated regions (*e.g.* Scotland), is the abundance of lakes, here often called "ponds" though they reach a large size. Other indications of the recent passing away of an ice sheet are the numerous erratic boulders which, as in Highland Scotland, strew the surface of the ground. A peculiar feature is the occurrence of steep-sided, isolated hills of granite, locally known as "tolts," useful as landmarks in the interior, where roads are almost absent.

As a general rule the ridges are bare and rocky, forming the so-called "barrens," where the chief vegetation is dwarf rhododendron and berry-bearing bushes. The valleys often contain fertile land, and are usually densely wooded. In the interior and to the west the trees apparently reach a large size. To the east they are small and stunted, and the lumber trade is but slightly developed. The trees are chiefly the coniferous trees of Eastern Canada (*cf.* Fig. 20), such as spruce, tamarack, pine, fir, etc., but, as in the Canadian forest, deciduous trees like poplar, birch, and maple also occur. Of the animals the most interesting is the caribou or reindeer; beaver and otter are also found.

Climate.—The climatic conditions are of great interest. It is sometimes stated that Newfoundland enjoys a mild climate, or one without extremes, but it should be noted that this is only in comparison with the adjacent regions of the American continent. The conditions are well brought out by the following table:—

STATION.	LATITUDE.	HOTTEST MONTH.	COLDEST MONTH.
		MEAN TEMP.	MEAN TEMP.
		F.	F.
St. John's . . .	47° 34'	60°	24°
Nantes (France)	47° 15'	66°	40°
Quebec . . .	46° 48'	66°	10°

Of these three stations, which are approximately in the same latitude, Quebec lies farthest south, St. John's in Newfoundland farthest north. Thus the summer temperatures may be regarded as roughly similar, having regard to the slight difference of latitude. Quebec has a slightly cooler summer than one would expect for its latitude, as has also St. John's. The winter temperatures are, however, very different. Nantes has a very small range, for it possesses the maritime temperate climate. Quebec has a very cold winter, a very considerable temperature range, and shows in a mild form the continental temperate climate. St. John's shows a modified continental climate, the winter cold being diminished by the fact that it lies on a relatively small island, so that all winds reach it after passing over water, and thus after losing some of their coldness. That they do not lose more is the result of the fact that the surrounding waters are chilled by the polar stream which, under the name of the Labrador current, passes the east coast of Newfoundland and brings with it so much ice. Thus, while St. John's is not hot in summer, in winter it is very much colder than places of similar latitude on the eastern coast of the Atlantic. At the same time the absence of the summer heat, which is so oppressive on the coast of continental America, is causing Newfoundland to find favour as a summer resort with the people of the Eastern United States.

The rainfall in Newfoundland, as in islands generally, is somewhat heavy, St. John's having a mean annual fall of 55 inches. Even more important, however, are the conditions as regards winds. Newfoundland lies near a great storm centre, and is itself on a storm track of great importance. The North Atlantic is

continually being crossed by moving areas of low pressure, with a general eastward direction, into which winds sweep in a counter-clockwise direction. These eddies are called cyclones, and as they cross a particular spot changes of wind occur, the winds often being violent. The passage of the cyclone is accompanied by rain, which may be greater or less in amount, and by changes of temperature. It is found that these cyclones tend to follow particular routes, called cyclone tracks. Great Britain lies on such a cyclone track, and the changeableness of our weather is due to this fact. Newfoundland is even more liable to cyclones than are the British Isles. In consequence sudden changes of wind are frequent, and the winds are often stormy.

Again, as we have seen, off the south and east coasts of Newfoundland warm and cold currents occur, the warmer water being more to the east. When the wind blows from the east, relatively warm air which lay originally above this warm water is driven over the surface of the cold current. In consequence, the warm moist air is suddenly chilled, and the water condenses as fine droplets, just as our warm moist breath condenses on a cold winter's day. The result is that fog occurs, which may be very dense. Thus the east and south coasts of Newfoundland are liable to fog, especially in the summer months. Fog may similarly be produced by icebergs, brought down by the polar current, chilling the air in their vicinity. These fogs, which are a great danger to shipping, do not as a rule extend far inland, and are not frequent on the west coast.

To sum up, then, Newfoundland, has moderately warm summers and cold winters; the latter are, however, much less cold than on the American continent. The

rainfall is considerable everywhere, and is distributed throughout the year. At St. John's most rain falls in January and October, least in June, but there is no trace of a dry season. As one would expect from its position as an outpost in the ocean, the island is liable to winds and storms, and on the east and south coasts fogs are frequent.

Products and Trade.—To all intents and purposes Newfoundland may be said to depend upon its fisheries ; the products of the land are insignificant in the extreme. Though the island was discovered by John Cabot in 1497, parts of its interior still remain unexplored, and very little of the surface is cultivated. Potatoes, cabbages, and some cereals are grown, but mostly in small patches. Forests, as we have stated, are abundant, but there is only a small lumber industry, partly because the woods are sometimes not more than thickets. The timber is, however, suitable for paper pulp, and there are falls which can be used for power in the mills. Minerals are probably abundant, but only iron and copper are worked to any extent. Though the island seems to be rich in coal the iron ore is carried to Nova Scotia to be smelted, the native coal being hardly worked at all. Iron is found on the shores of Conception Bay and on the west coast, copper on the western shore of Notre Dame Bay. The island is poor and scantily peopled, but its poverty would be infinitely greater were it not for the fisheries, and the fact that they form the principal occupation is shown by the way in which the settlements cling to the shore.

If we use the word fishery in the technical sense to include all animal products derived from the sea, we find that the fisheries fall into three sets—(1) The inshore fishing, (2) the Banks fisheries, (3) the sealing industry. The inshore fisheries include lobsters, now canned on a

fairly large scale ; salmon, caught both in the sea and the rivers ; herring, with other less important kinds, including capelin, small fish of the salmon family used both for food and bait. The inshore fisheries can be carried on whenever the weather permits, chiefly, of course, in the warmer months. The rivers abound in salmon and trout, but are little fished except by tourists.

The Banks fisheries last from June to November, and, as we have seen, by far the most important part of the catch is formed by cod, which come south to the Banks to spawn. The fishery begins in the southern part of the Banks in May or June, and the schooners follow the fish as they return northwards when spawning is over. As the Banks lie in extra-territorial waters, they are visited by fishermen of many nationalities, and not exclusively by Newfoundlanders.

The sealing season is short, lasting four to six weeks, from about the middle of March. It thus immediately precedes the Banks fishery. The seals are not the fur-bearing kind, and are killed for their blubber, which furnishes oil, and for the skin, which supplies leather. The seals bring forth their young on the ice floes off the coast of Labrador, and are pursued by the sealers among the floating ice.

In the last ten years or so the total export trade of Newfoundland has varied between 2 and 2½ million pounds in value. Of this total an amount varying between 1 and 1½ millions is supplied by dried cod, which is exported to Roman Catholic countries, especially Brazil, Spain, and Italy, as food on fast days. After cod come, in order of importance, seal oil and skins, herring, salted or frozen, tinned lobsters, cod-liver oil, pickled salmon. Much less important are copper and wood, but iron ore has of late years reached a total value of about one quarter of a million.

Population and Towns.—St. John's is the capital and chief town. The total population of the island does not greatly exceed a quarter of a million (239,000 in 1911), of whom 32,000 live in St. John's, the only town of any size.

Means of communication are bad, roads being very few. There is one main railway, with a few branch lines. This line runs from St. John's on the east to Port aux Basques on the west, but it takes a very circuitous route, and supplies almost all the villages of the eastern coast, the most populous part (see map on p. 97).

It will be seen from the above figures of population and trade that for an old colony Newfoundland is relatively backward. The reasons for this are partly geographical and partly historical. For a long time settlement was discouraged by the Bristol merchants and others, who wished to keep the lucrative fisheries of the Banks in their own hands. Then Newfoundland presents its least favourable aspect, as regards climate, soil, and natural wealth, to the Old World, for the eastern shore is much more barren than the west. Again, the existence of a great source of wealth in the fisheries, whose exploitation does not demand great enterprise nor much capital, has tended to check organisation and development. The fishermen obtain during the short fishing season enough to supply their needs, and are indifferent to the possibilities of the land. Communication, as we have seen, is difficult, and the land generally, in contrast to the west of Canada, suffers, as does also eastern Canada, from the fact that it must be cleared of timber before it can be cultivated. Newfoundland is even worse off than eastern Canada in that much of the timber does not seem to be of great value, though it can be used in the paper pulp industry, and is beginning

to be so used on a considerable scale. The climate also is probably less favourable to cereal growing and less favourable to the lumber industry than that of eastern Canada (cf. what is said on p. 100 about the importance of the severe winter for the lumber trade). Newfoundland is, however, beginning to attract tourists, and its beautiful scenery and abundant attractions in the way of fishing and shooting suggest that it may have a future here.

CHIEF FACTS IN REGARD TO NEWFOUNDLAND

Newfoundland is an island considerably larger than Ireland (area, 43,000 square miles nearly), but with a population in 1911 of only 239,000. The people are mostly settled upon the sea-coast, nearly one-seventh of them living in St. John's, the capital. The fisheries constitute the chief wealth, and the majority of the inhabitants are fishermen. Cod is the most important fish, and dried cod forms by far the largest single item among the exports. With Newfoundland is associated for administrative purposes Labrador, the two being under a Governor with a Legislative Council and a House of Assembly. As the nearest point to Great Britain, Newfoundland has considerable importance as a landing-place for Atlantic cables.

WEI-HAI-WEI.—The small territory of Wei-hai-wei (area about 285 square miles) is placed on the north coast of the peninsula of Shantung, and has been leased from China since 1898 to serve as a naval base. It lies in latitude $37\frac{1}{2}^{\circ}$ N., or approximately the latitude of Malta, and the climate illustrates admirably the conditions which prevail on the eastern sides of continents even in relatively low latitudes.

The total rainfall is not heavy, but by far the greater part falls in the summer months, and the crops are sometimes damaged by the continuous rain of July. The range of temperature is great; snow is not in-

frequent, and both January and February have a mean temperature of below freezing-point (February, the coldest month, mean temperature, 30° F.). In August, the hottest month, the mean temperature reaches 77° F. In Malta, on the other hand, snow and frost do not occur, and the mean temperature of the coldest month is 56° F., of the hottest nearly 80°. Malta is slightly farther south, which accounts for the higher summer temperature, but the difference in the winter temperatures of the two places is very striking.

As one would expect, the climatic differences are reflected in the crops grown. In Wei-hai-wei the oranges and early potatoes of Malta are replaced by beans, cereals such as wheat, ground nuts, and silk. The winters are too cold for the mulberry tree, and the silkworms feed upon the leaves of scrub oak.

Like the peninsula of Shantung in general, the territory of Wei-hai-wei is hilly, with fertile valleys between the ranges. The density of population is great—over 500 per square mile (population in 1911, 147,000), and in addition to the cultivation of the land, fishing is extensively carried on, with some mining. Ground nuts form the chief item in the small list of exports. Ground nuts, called peanuts in the United States, are the fruits of a small annual plant belonging to the pea family, and are so named because of the way in which the nuts thrust themselves into the ground as they ripen. The nuts are eaten fresh, and an oil is also extracted from them. As they are short lived plants the winter cold does not affect them, and this also applies to the beans.

The summer climate of Wei-hai-wei is healthy and it is used as a sanatorium, but its principal use is as a naval base.

Wei-hai-wei resembles Newfoundland and Canada east

of the Rockies in having the continental type of climate, much modified, however, by its southerly position, but we should note that it differs very markedly in having so dense a population that colonisation is impossible ; there is practically no unoccupied land. In this respect it resembles Malta and Gibraltar. All three are of great importance as naval bases, but this is their chief significance.

QUESTIONS AND EXERCISES

1. What are chinook winds? Do you know any wind in Europe which can be compared with them? Of what importance are they to the farmers of the Far West?

2. Compare the life of the Forest Indians of Canada with that of the Eskimo and explain the reason for the differences.

3. Name the nine provinces of Canada and give their capitals.

4. Into what four natural regions can Canada be divided?

5. It is said that the St. Lawrence and the Great Lakes permit steamers to penetrate into the heart of Canada, but the St. Mary River has rapids on its course, and great falls occur on the Niagara River. How do steamers pass these obstacles?

6. Write a note on the Ottawa River. Why would it be an advantage to connect this river with Georgian Bay?

7. Compare as carefully as you can the climate of Winnipeg with that of Toronto.

8. What kinds of forests occur in Canada? Can you explain why trees native to British Columbia are now often grown in Scotland?

9. In the town and province of Quebec there are a great many French-speaking people; how do you explain this? What occupations do French Canadians chiefly carry on?

10. In winter there are far more people out of work in Manitoba than in Ontario. Explain this. What occupation can be easily carried on in Ontario in winter, and why is this occupation impossible in Manitoba?

11. What parts of Canada chiefly grow wheat? Why?
12. Describe carefully the position of the town of Montreal. Large towns generally stand at a crossing-point of lines of communication. Draw a sketch-map to show that this is true of Montreal, and give another example of a Canadian town which illustrates this.

13. Read Kipling's *Captains Courageous* and then write a short account of fishing over the Newfoundland Banks. How is it that the fishers in this story were not inhabitants of Newfoundland, or even Canadians? Is there any Bank nearer home where fishers of many nations congregate in the same way?

14. Why is it that the people of Newfoundland are chiefly fishers?

15. Write an account of the trade of Canada. Why does Canada send so much wheat to England?

16. The distance from Liverpool to Montreal is 2786 knots or nautical miles. A fast mail steamer travels from port to port in about seven days, how many knots does it go per hour; how many statute miles per hour? (60 knots = 69 statute miles).

17. Canada is divided into a series of time zones, each 15° wide, the following meridians being the centre of each zone: 60° W., 75° W., 90° W., 105° W., 120° W. If it takes the sun (apparently) four hours to travel from Greenwich to the eastern or Atlantic zone, how long will it take it to travel to the western or Pacific zone? What is the difference of time between the successive zones?

18. Give an account of the products of Wei-hai-wei, and explain how they are suited to the climate. What is a naval base?

SECTION II

REGIONS WITH WARM SUMMERS AND MILD WINTERS (SUB-TROPICAL)

CHAPTER XI

I. AUSTRALIA

(A) Physical Geography

It may seem absurd to include Australia among the regions with mild winters, in view of the fact that the Tropic of Capricorn, roughly speaking, bisects the continent, so that nearly one-half the total area lies within the tropics. In point of fact, however, settlement in Australia is predominantly in the regions of sub-tropical climate, and not only is by far the greater part of its tropical area as yet unsettled, but much of it will probably remain permanently incapable of utilisation. The extent to which the population is at present extra-tropical may be gathered from the fact that Victoria and New South Wales, the two States which lie entirely outside the tropics, contained in 1911 two-thirds of the total population, while the remaining third occurs chiefly in the extra-tropical part of Queensland and Western Australia.

Size and Position.—Australia is the smallest of the continents, but none the less it reaches a considerable

size. Its area is four-fifths of that of Europe, and almost precisely the same as that of the United States (Australia, with Tasmania, 2,974,581 square miles; U.S.A., 2,974,159 square miles). But the importance of these figures can only be realised when we consider them in relation to population. In 1911 Australia contained about $4\frac{1}{2}$ million people; in the census year 1910 the United States contained nearly 92 millions. The whole of the population of Australia could be comfortably housed in the single city of New York (population in 1910, 4,766,000), and the congestion in the city would then be considerably less than at present. The first point then to realise is that for its size Australia has a very small population, found chiefly outside the tropical region.

Let us note next its position. Australia extends from about 11° S. lat. to 39° S. lat., and from about 113° to 154° E. long. That is, it has an extension of about 41° in longitude and about 28° in latitude. Roughly speaking, it is widest in the region crossed by the tropic. Look at a map of the world and note that it is the only land-mass in the southern hemisphere which has great width along the line of the tropic. In the northern hemisphere, only Africa has a greater width in the region of the Tropic of Cancer, and this part of Africa contains the Sahara. Generally, indeed, by looking at the map we gather that regions which lie near the tropics and form wide belts of land tend to show desert characters. We may begin then with the assumption that deserts are likely to occur in Australia, and that part of the reason for the scanty population may be this.

The extension in latitude is also interesting. The most northerly part of Australia lies in about lat. 11° S. (strictly speaking, lat. $10^{\circ} 41'$); this is almost within the equa-

torial region. The most southerly point nearly reaches 40° S. ; that is, lies within the region swept by the westerly winds in winter. Thus Australia extends from about the latitude of Lisbon and northern Greece to that of Aden.

Shape and Structure.—Like South Africa and Southern India, Australia is a partly submerged plateau, and in detail it shows a considerable resemblance to South Africa. It stands upon a wide continental shelf, and that it was once, though long ago, connected to New Guinea and the islands to the north, is suggested by the fact that the Arafura Sea and the Gulf of Carpentaria are less than 100 fathoms deep, and thus lie upon the continental shelf.

Like some other plateau regions, Australia has a very compact coast-line, with but few indentations. To the north lies the great bay of the Gulf of Carpentaria, to the south the Great Australian Bight ; to the east of the Bight are the twin gulfs called Spencer and Vincent—with these exceptions there are no important coastal features. We must note, however, the presence, off the north-east coast, of the Great Barrier Reef, which is nearly continuous for 1200 miles, and extends up to Torres Strait. The Reef is separated from the coast by a channel which varies from ten to twenty miles in width, and affords a calm though not very safe passage for steamers. At low tide the Reef reaches the surface of the water, and its strong breakers make it dangerous for shipping to approach too closely. As we shall see later, the Reef affords valuable fisheries.

The uniform nature of the coast-line may be gathered from the fact that while in England and Wales there is one mile of coast-line for every 25 miles of area, and in Europe generally one for every 75 miles of area, in Australia there are 244 miles of area for every mile

of coast-line. This is an unfavourable circumstance, for it makes communication more difficult—no inland sea penetrates into the heart of Australia as the Mediterranean penetrates into Europe; and also it prevents sea-influences passing far into the land, as they do in Europe generally and in the British Islands in particular, and so increases the aridity of the inland climate.

We have said that Australia is a slightly submerged plateau. Let us consider in a little detail the topography of the continent. Along the eastern coast, extending from Cape York peninsula to Cape Howe and then turning westwards with the coast-line to end at about long. 142° , is a ridge of high ground which, though of less mean elevation, is comparable to the Drakenberg Range in South Africa. To this ridge of high ground the general name of the Great Dividing Range has been given; it forms the margin of the plateau, and rises more or less abruptly from the sea, so that only narrow plains lie between it and the sea-margin. To the different parts of the range, which is not everywhere continuous, special names are given. Thus behind Grafton we have the New England Range; behind Sydney, the Blue Mountains; while to the south the highest part of the range forms the Australian Alps, which contain in Mount Kosciusko (7350 feet) the highest point in Australia (contrast the heights of the European Alps and the Rockies, and note the absence in Australia of folded mountains).

Westwards, the Dividing Range slopes gradually down to the plains. These are especially well-developed in the southern part of the continent, for a belt of high ground runs just north of the tropic and separates the low land round the Gulf of Carpentaria from the more extensive lowlands to the south.

In the western part of these lowlands lies Lake



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FIG. 24-

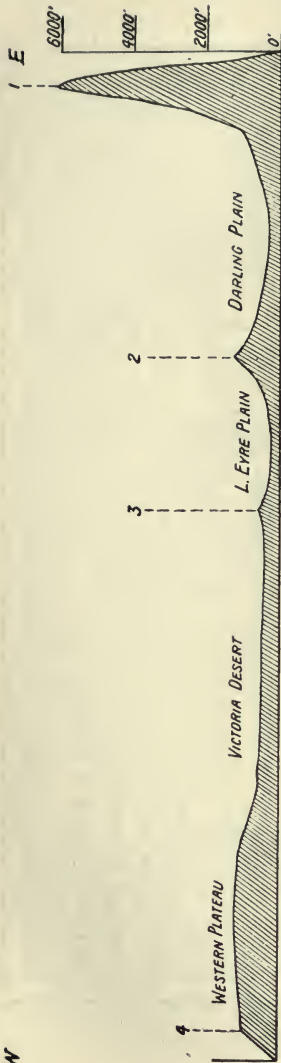


FIG. 25.—DIAGRAMMATIC SECTION ACROSS AUSTRALIA, ALONG LAT. 30° (SLOPES GREATLY EXAGGERATED).
 (1) *New England Range.* (2) *Grey Range.* (3) *Stuart Range.* (4) *Herschel Range.*

Eyre, which sinks a few feet below sea-level. The rift-like depression in which it lies, as indicated in the diagram (Fig. 25), is a narrow valley bounded by the Grey and Stuart Ranges. To the east of the Grey Range lies the wide plain of the Murray-Darling, which includes the important Riverina District, and extends to the sea between the western end of the Grampians and the southern end of the Flinders Range. From the Grey Range a curving ridge runs to the south-west and connects with the Flinders Range, which in its turn runs south to reach the coast near Adelaide. The result is that the Murray-Darling Plains are more or less cut off from the Lake Eyre Depression (the "Dead Heart of Australia"). Lake Eyre is the equivalent of Lake Chad in Africa, and, like it, is a basin of internal drainage (cf. Fig. p. 54),

receiving from the surrounding desert areas many, mostly temporary, streams. The other lakes of the region, such as Lakes Torrens and Frome, similarly send no water to the sea.

Stuart Range, mentioned above, may be regarded as the margin of the western plateau, which fills up all the western part of Australia. It has a mean elevation of over 1000 feet, and its surface is diversified by various areas of greater elevation, notably the MacDonnell Range, which is part of a large central mass of high land. Westward, the plateau ends somewhat abruptly, especially towards the south, where its margin, though not high (under 1500 feet), presents the appearance of mountain ranges (*e.g.* the Darling Range behind Perth, and the Herschel and Victoria Ranges farther north).

This description, if followed on a good orographical map, should make clear the essential points in regard to the topography of Australia. We have already said that it is the sub-tropical half that is the more important, and we notice that this sub-tropical part has steep eastern and western margins, the eastern being steeper and higher than the western. The western rim is but the edge of a relatively high plateau, which is largely desert, and mostly useless. Only in the eastern region do low plains occur behind the marginal rim, these lowlands being subdivided by a ridge of higher ground into the Murray-Darling plain and the Lake Eyre plain.

The Rivers.—Now it is obvious that settlement on the eastern coast of sub-tropical Australia is hampered by its background of hills—New South Wales, the oldest state, never prospered till its pioneers found a way through the Blue Mountains to the plains beyond. But at first sight it may seem as if, once this obstacle

was overcome and roads and railways built, the inland plains should offer an unlimited field for settlement, for they constitute the greatest extent of available lowland in Australia. In a sense they do offer a great field for enterprise, but two difficulties intervene—the rainfall diminishes steadily as one passes from the western slopes of the coastal hills inland, and the plains have no easy natural outlet to the sea.

The last statement may seem absurd when we look at the river Murray-Darling on the map. Why, it may be said, does this great river system not fulfil the same function as the St. Lawrence and the Great Lakes in Canada, as the Mississippi in the United States, and thus allow for the drainage of the products of the interior lowlands? Let us consider the river in a little detail in order to answer this question.

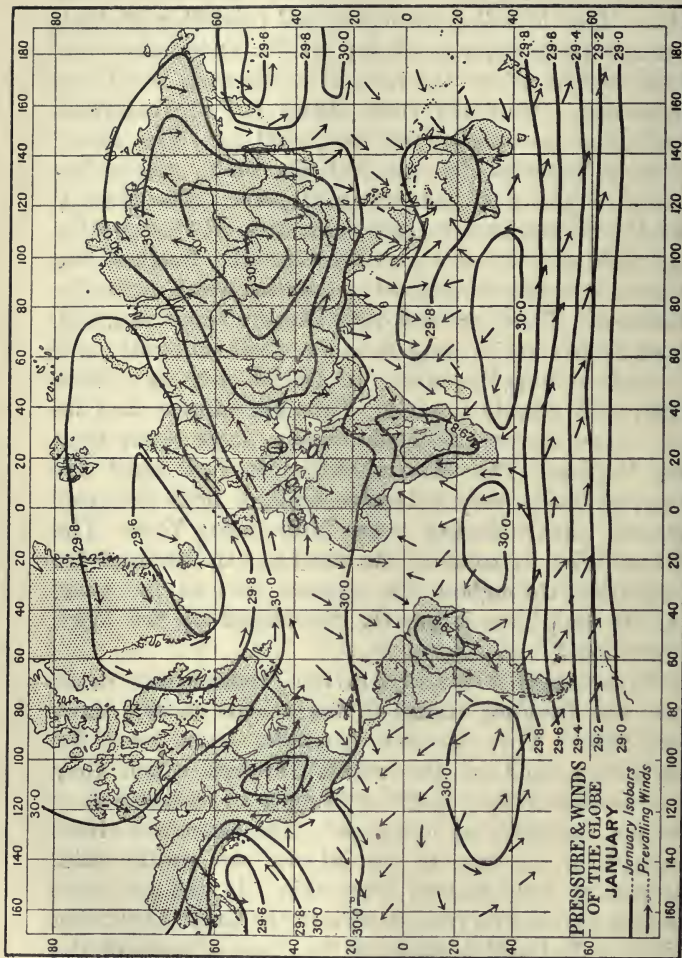
In origin it is comparable to the Orange River in South Africa, for, like that stream, it arises from the western slope of the plateau rim, and flows westwards. Owing to the width of the Australian continent, however, it does not, like the Orange, enter the western ocean, but, turned southwards by the ridge of high ground made by the Grey, Stanley and Flinders Ranges, reaches Encounter Bay by a shallow lagoon called Lake Alexandrina. This lagoon is too shallow for anything but small ships, and its mouth is closed by a bar which renders communication with the southern ocean impossible. This, then, is one great disadvantage of the river as compared with the St. Lawrence or the Mississippi.

The two rivers, Murray and Darling, unite at Wentworth. The Darling drains the western slopes of the New England Range and the hills farther north. The Murray drains the Australian Alps, while its large tributaries, the Lachlan and Murrumbidgee, flow from

the Blue Mountains. The Darling drains a region where there is well-marked seasonal rainfall, with high summer temperatures. Many of its tributaries also drain regions where the rainfall is not only small but precarious. Thus the river shows the characteristic Australian uncertainty of flow, and at times many of its tributaries dry up and the main stream becomes in places a mere chain of pools. The Murray and its tributaries arise in regions of somewhat greater and also of somewhat steadier rainfall. Further, the Murray arises in the highest mountains which Australia possesses. These are not permanently snow-clad, but snow lingers for a long time on their summits, and its melting supplies water to the Murray at a time when it is greatly needed. Thus the Murray and its tributaries are on the whole more reliable rivers than the Darling. The Murrumbidgee is now used for irrigation on a very extensive scale, a huge reservoir (Barren Jack) having been built near Yass. The Murray also in some of its reaches can be used for navigation throughout the greater part of the year, but its usefulness is greatly diminished by the block at its mouth.

Of the other rivers of Australia those which drain from the Dividing Range to the sea are mostly short and swift. They are not generally much used for navigation, and as the region through which they flow has generally a sufficient supply of moisture they are not required for irrigation. The numerous rivers marked on the map in the interior are mostly quite temporary, only flowing after rain. It will be noted on the map that no river flows into the Great Australian Bight, a fact which suggests the great dryness of the southern part of Australia.

To sum up, then, Australia has vast plains in its



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FIG. 26.

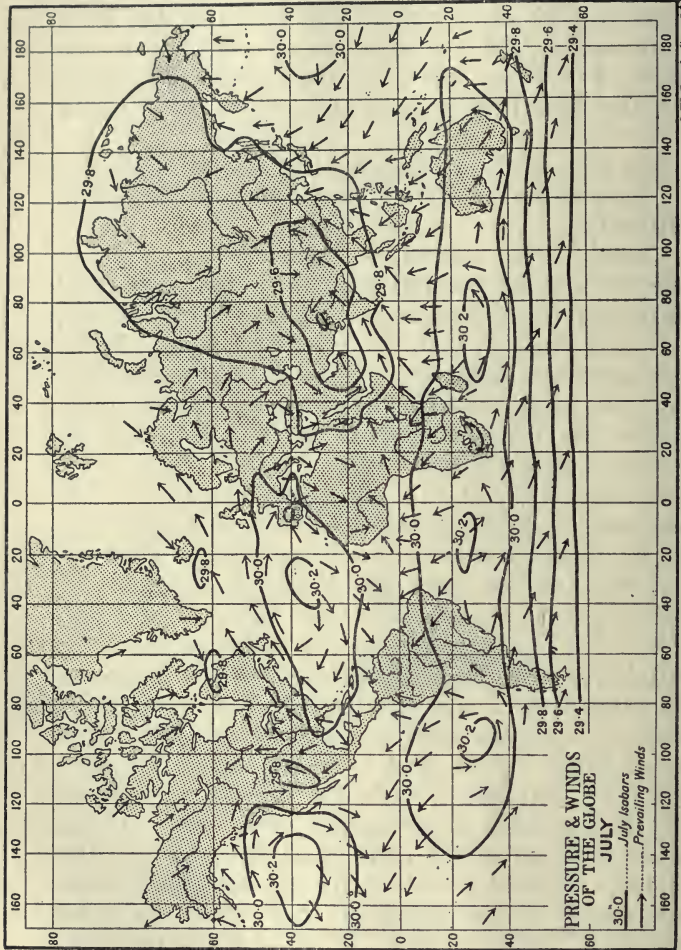
sub-tropical half, these plains lying to the east of the country. The plains suffer, however, from the great disadvantage that the high rim of the plateau cuts them off more or less from the rain-bearing winds, and that they have no easy and natural outlet to the sea.

The great plateau region to the west is at present for the most part unutilised, except at its south-western extremity.

Climate.—The climate of Australia is of great interest both on theoretical grounds and because of its relation to the possible development of the country.

Let us consider, first, the conditions which obtain, more or less precisely, as to pressure, winds, and rainfall over the great oceans; the conditions which would obtain over the whole surface of a theoretical globe, composed wholly of water.

Round the Equator, in mid-ocean, is a belt of high temperature, with constant ascending currents of air. As the moist air rises it cools and deposits moisture, and thus this equatorial belt is one of frequent rain. Further, as the air is constantly rising, there forms here a belt of low pressure. The winds are light and variable, and the region is called by sailors the doldrums. At either side of this equatorial belt, and extending from a few degrees north and south of the Equator to about 30° to 35° N. and S. lat., comes a belt, from which currents flow towards the Equator to make up for the air which is continually rising there. Owing to the rotation of the earth these indraughts appear as the north-east (north of the Equator) and south-east (south of the Equator) trade winds, so called because of their constancy. When we follow the trade-wind belt away from the Equator, north or south, we find that the winds diminish in strength, and we reach



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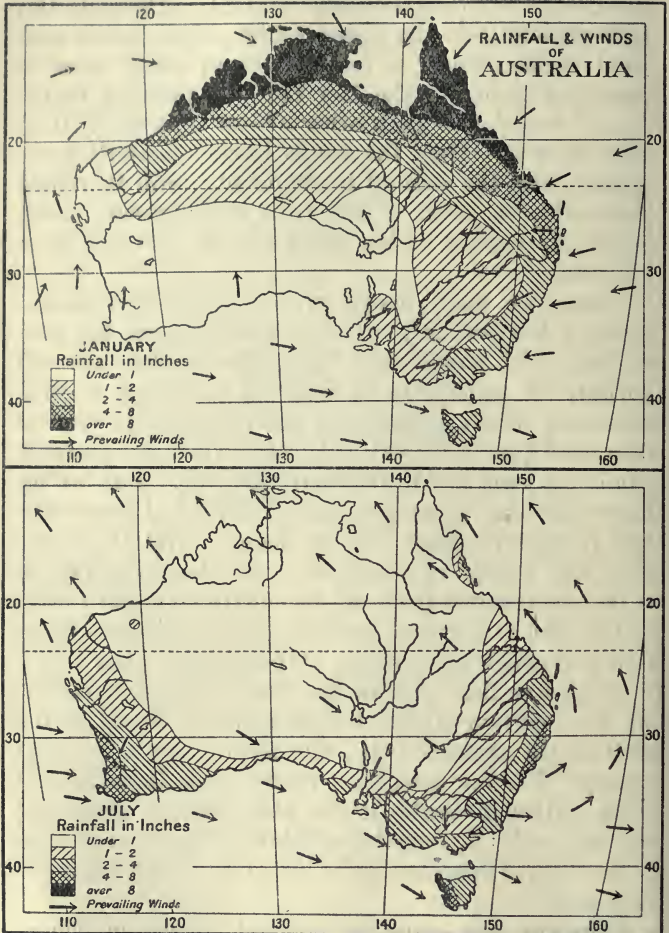
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FIG. 7

the high-pressure calms, or horse latitudes, where the winds are characteristically variable. Beyond this high-pressure belt the pressure diminishes to the west wind region, where a constant low-pressure zone is produced owing to the fact that low-pressure swirls, or cyclones, follow each other almost constantly, from west to east. Here the winds have a westerly component, and the rainfall is abundant. Still travelling polewards, we come to the polar high-pressure areas, which are regions of low precipitation, like the horse latitudes.

These, we may repeat, are the conditions found, more or less precisely, over the great oceans, the conditions which would exist throughout a globe covered entirely by water. If, in addition to having a globe composed wholly of water, we had a sun always vertical over the Equator, then this régime of winds and pressure would be constant throughout the year. But, as we know, the sun is on 21st June vertical at noon over the Tropic of Cancer, and at noon on 21st December over the Tropic of Capricorn. As the noonday sun moves northwards it carries its equatorial calms northwards also, as it moves southwards the doldrums again follow—though the distance through which they travel is much less than that of the sun. The result is that we have certain critical latitudes where, owing to the shift of the pressure belts, the winds show a seasonal change. For our purpose now the most important of these critical latitudes is the belt between about 30° and 40° , which is, roughly speaking, within the influence of the trades in summer and within that of the westerlies in winter.

Thus the first cause of seasonal change in winds, and therefore in the amount of precipitation, is to be sought in the movements of the sun. The second



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FIG. 28.

cause is the different relation of land and ocean to heat absorption. The actual globe does not consist of ocean only, like our theoretical one, but of a combination of land and water. Land heats more quickly than water, but also cools more quickly. Where we have a great extent of land exposed to the vertical, or almost vertical, rays of the sun throughout the summer the differential heating is very marked, and the result is the development of a summer low-pressure area over tropical lands, and a consequent powerful indraught of moist air from the sea, overpowering the normal circulation and bringing heavy summer rain. As the sun's rays become more oblique the land cools, and the heavy air above it settles down, giving a high-pressure area from which air swings out in great swirls to the sea. Thus in tropical lands the cooler months tends to be dry with prevailing land winds. This periodical reversal of the winds is the monsoon effect, and, though best marked in the case of India (Chap. XV), it has a considerable effect on the rainfall of the northern part of Australia.

With this preliminary account let us turn to the actual conditions as to seasonal winds and rain which exist in Australia.

In the southern summer the northern part of Australia, under the influence of a vertical sun, becomes intensely heated, so that a low-pressure area forms. Into this low-pressure area winds swing from the surrounding regions. Now in the southern hemisphere the winds swing into such a low-pressure area in the direction of the hands of a clock. Thus on the west of Australia the winds will have a generally southerly direction (see Fig. 28), that is, they blow from a cold southern ocean to a warm land. Thus they are not likely to bring rain, and the west coast in summer will be dry.

As these winds travel northwards they swing round to the north-west, and, blowing from a warm ocean towards the land, they will bring heavy rain to northern Australia.

As we follow the circulation eastwards it is obvious that the winds at the north-eastern side will tend to blow from the north-east in order to enter the clockwise swirl. These again will bring rain, so that the north-east will be wet (Fig. 28).

Continuing down the eastern coast the direction tends to change to south-east, the trade wind direction, but the presence of the Great Dividing Range, which causes the air to rise, leads to the deposition of moisture, not only on the east slopes, but also, though to a less extent, on the inland slopes.

Southwards, Victoria projects far into the southern ocean, so that even in summer it comes near the west wind belt. This is shown by its winds, which in summer range from north-west to south-east, and the result is to give the coast at least a fairly good rainfall even in the summer months. But as the coast curves northward to Adelaide, the southerly component predominates and the summer rainfall diminishes (Fig. 29), to be finally reduced to a minimum round the shores of the Bight.

Now let us turn to the winter conditions. With the sun the low-pressure area in northern Australia travels northwards, and a high-pressure area invades the southern half of Australia. The circulation is now anti-cyclonic, that is counter-clockwise, as compared with the cyclonic circulation of summer. Thus the wind which was southerly in summer on the west coast becomes north-westerly, and, blowing from a warm sea to a colder land, brings rain to the south-western corner of Australia, which has thus a Mediterranean climate (Fig. 30).

The coast-line of the Bight, swept by north-westerly winds, gets some rain, though this has a limited extension. Victoria, also with westerly winds, gets winter rain as it got summer rain, and the same result is obtained far up the coast of New South Wales. Even farther north, in Queensland, the southerly or south-easterly wind brings some rain, partly owing to the presence of the Dividing Range; but the north coast with south-easterly, and thus land winds, is very dry.

Summing up the rainfall conditions, therefore—the north-east and north of Australia, in regard to which we shall have little to say here, has summer rain and winter drought. In Queensland, summer rain predominates, but there is no absolutely dry season. In the coastal belt of New South Wales there is some rain at all seasons, with a summer maximum, at least towards the north. In Victoria the rainfall is more or less evenly distributed throughout the year. The coast of South Australia has winter rains, not large in amount, with in some places absolute summer drought. The south-western corner of Western Australia has copious winter rains and summer drought (Mediterranean climate). The rest of the west coast has scanty rain, tending to occur in winter to the south and in summer to the north (Fig. 29).

On the north and east coasts the rain has a considerable extension inland. In the south and west there is at best a rainy margin, and the deserts all but touch the sea. As the settlements, as we have seen, are mostly in the south-east, and to a lesser extent in the south-west, the prosperity of agriculture in any particular year depends upon the extent to which the rain-bearing winds reach the interior, especially the eastern plains. These plains have not only a scanty but also a highly variable rainfall, and this is

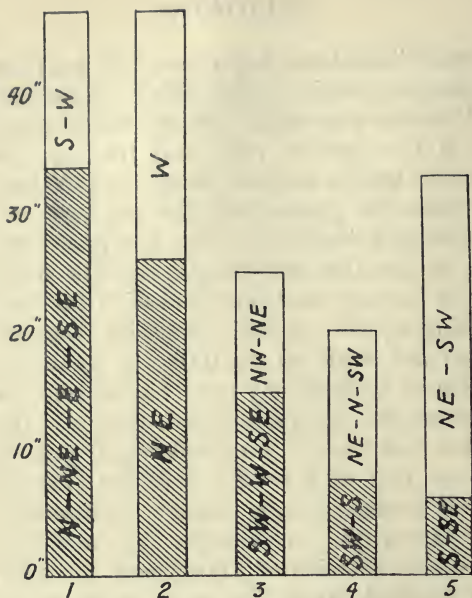


FIG. 29.—DIAGRAM TO SHOW SEASONS OF RAINFALL AND PRE-VAILING WINDS IN THE FIVE STATE CAPITALS OF AUSTRALIA.

The columns represent the total rainfall in inches.

- (1) *Brisbane.* (2) *Sydney.* (3) *Melbourne.* (4) *Adelaide.*
 (5) *Perth.*

The shaded part of each column represents the rainfall of the seven warmer months (October to April), the unshaded portion that during the five cooler months (May to September). The winds are indicated by lettering. Note that at Brisbane the rain is chiefly summer rain and comes with northerly and easterly winds, which blow from warm seas towards the land. In winter the southerly winds, blowing from a cooler ocean, bring little rain. At Sydney most rain still comes with the north-easterly winds of summer, but the westerly winds of winter bring also much rain. At Melbourne westerly winds may occur at all seasons, and the rain is nearly equally distributed throughout the year. Adelaide has a low total fall, with a tendency to the predominance of winter rains, because the winter winds blow from the north—that is, from warmer to cooler regions. At Perth nearly all the rain comes with the winds of winter, the southerly winds of summer bringing but little rain. Cf. also Fig. 30.

one of the greatest obstacles to Australian agriculture.

As regards the temperature conditions in sub-tropical Australia little need be said. The diagram (Fig. 30) indicates the important points. In Victoria and New South Wales the temperature is generally moderate, not excessively hot in summer and not more than cool in winter. Queensland has a tropical climate.

NOTE

The above account of the rainfall of Australia has been generalised for the sake of simplicity, and must be regarded as based upon the average figures which are represented on maps like those on p. 136, rather than upon the actual weather conditions, as they occur from day to day. In point of fact, the cyclonic circulation spoken of on p. 137 as predominating in Australia in summer is caused, not by an immovable low-pressure area, but by a succession of moving cyclones, crossing the continent from west to east. The anti-cyclonic circulation of winter is similarly caused by the passage of high-pressure air swirls in the same direction. The actual rainfall of any season depends upon the characters of these two types of pressure systems, and their course across the continent. Generally speaking, cyclones having their origin in the west wind belt bring rain only to the southern part of Australia, while the cyclones which originate in monsoon regions bring rain chiefly to the northern half. Anticyclonic rains chiefly affect the coastal districts. One result of this is that it is rare to find exceptional drought or specially good rains over more than a limited region of the continent. Generally, good rains in one part are compensated for by drought in another. The result, we may repeat, is that from season to season there is great variation in the total fall, and this is especially true of the interior.

Plants and Animals.—We have already pointed out that Australia is a very isolated continent, and there is reason to believe that its isolation has continued through long ages. Further, the shallowness of the sea which separates it from New Guinea suggests that its most

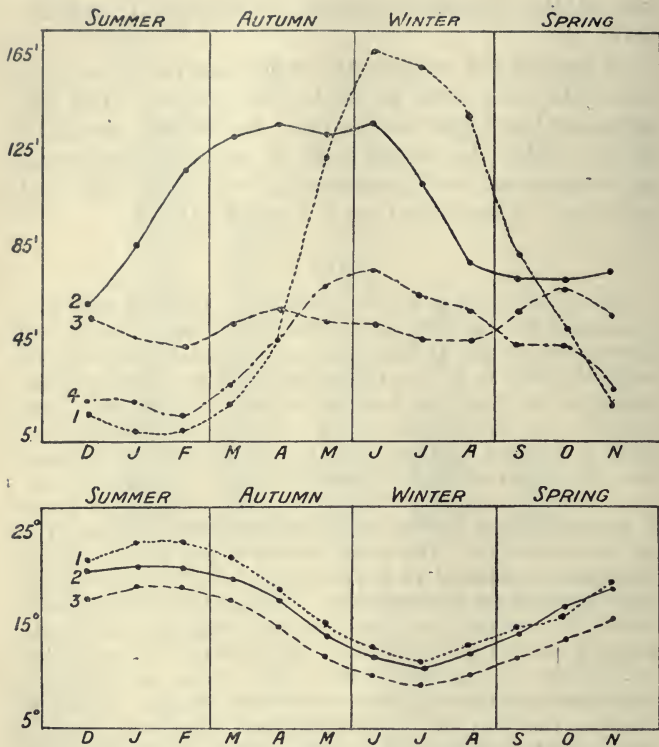


FIG. 30.—RAINFALL AND TEMPERATURE IN AUSTRALIA.

The upper figure shows rainfall in millimetres, the year being taken as beginning with December—that is, with the Southern summer.

(1) The curve for Perth showing summer drought and winter rain. (4) That for Adelaide, with also a winter maximum but a smaller fall. (2) Sydney, with rain at all seasons, but most in autumn. (3) Melbourne, with almost equally distributed rain.

The lower figure gives the temperatures in degrees centigrade. The curves show the moderate climate, the temperatures corresponding generally to the latitude.

(1) Perth. (2) Sydney. (3) Melbourne.

recent connection with other land-masses was in this direction. Thus we should expect to find that its plants and animals are very different from those of other continents in similar latitudes, and that they will show nearest affinities with those of New Guinea. Both these expectations are fulfilled.

The plants and animals of Australia are indeed highly peculiar, and both display the peculiarity that they are more nearly related to fossil forms in the northern hemisphere, than to living forms there. For example, with one or two exceptions all the mammals of Australia are what are called marsupials, or pouch-bearers. Marsupials are animals in which the young are born in a very imperfect state of development, and are carried about by the mother after birth in a pouch or pocket. They have also simpler brains, and in several points of structure are much less developed than the mammals which live in the other continents. Now fossil marsupials occur in Europe, but living forms, except for two kinds in America, are only to be found in Australia.

Again, in Europe, as well as elsewhere, during the period when the chalk was being laid down, there occurred curious flowering plants, called *Proteaceæ*, because of the variety of structure ("protean" structure) found among nearly related forms. No members of this family now live in Europe, but in Australia there are many, often with beautiful flowers, and therefore often grown in hothouses here. The fern-like plant called *Grevillea*, grown in almost every greenhouse, is a *Protead*. The same thing is true of many other kinds of plants. The eucalyptus trees which now grow so abundantly in Australia once lived in southern England, where their fossil remains occur. We may say, indeed, that Australia is a kind of natural museum, keeping living specimens

of strange plants and animals which once lived far to the north, but have now died out there.

We assume that the marsupials, the Proteads, the eucalyptus trees, and many another strange form died out in Europe because plants and animals more fitted to survive developed there, but owing to its isolation such highly developed types were unable to reach Australia, so that the primitive types there had no competitors. We find, indeed, that when animals and plants from Europe are introduced into Australia they often thrive so greatly as to kill out the native forms. The native weeds are not serious enemies to the farmer's crops, but such introduced plants as the thistle become terrible pests, and this is also true of rabbits, which have multiplied enormously in Australia since they were brought there, and constitute a very serious nuisance to farmers.

The first point, then, about Australia is that, broadly speaking, its plants and animals are very different from those living in other parts of the world. There is some, though not a very great, resemblance between its plants and those of South Africa; some, but again not a very great, resemblance to both the plants and animals of South America; but generally Australia is characterised by its old-fashioned and peculiar types of plants and animals, never more than suggested elsewhere among living forms.

The second point of importance is that none of the native plants and animals are of very great value to man. North America gave to the civilised world maize, tobacco, pumpkins, and some other useful plants, as well as the turkey among animals; South America gave the potato, a very valuable gift; but Australia has given no plant nor animal of outstanding importance. Its eucalyptus trees are useful both for their

timber and because they help to dry up swampy ground, and are now extensively planted in southern Europe and elsewhere for this latter purpose. Australia has also enriched the parks and gardens of southern Europe with many curious and beautiful plants, but none of these are of great economic importance. Further, though many trees yield timber, and some bark useful for tanning, some of the animals furs, and so forth, no product of very great value, like the ivory of Africa, the furs of North America, the dyewoods and drugs of Brazil, is yielded by the animal or plant world of Australia, and their interest is scientific rather than commercial.

The animals we may dismiss in a very few words. The open plains of Australia, now grazed by sheep, were inhabited by no wild hoofed animals, as were the similar plains in Africa, but in their place occurred grass-eating marsupials, such as the kangaroo. Forest, desert and plain had also other types of marsupials, some flesh-eating and some grass- or seed-eating. Two very peculiar mammals, the spiny ant-eater (*Echidna*) and the duck-billed platypus (*Ornithorhynchus*) (also found in Tasmania, see p. 46), lay eggs like birds, and, with another ant-eater from New Guinea, are the only living mammals which do this. Birds are numerous and are often brightly coloured, though few sing. Two great running birds, the emu and cassowary, are notable. Poison snakes are numerous, but do not cause very serious accidents because their teeth are not strong enough to bite through clothing, and Australians do not go about so lightly clad as do Asiatics.

Of the plants we must speak in a little more detail, for they are of great importance in connection with possibilities of utilising the land. We have spoken of the mountain rim which nearly, though not quite,

encircles Australia, and of the fact that, wherever this mountain rim is present, the seaward slope at least is watered at some season of the year by a fairly abundant rainfall. Now from what we already know about the distribution of forests in relation to rainfall, it will be gathered at once that there is likely to be an interrupted rim of forest round the coast of Australia.

Where are the most notable interruptions to be expected? We have seen that the head of the Australian Bight gets little rain at any season. Here the forest belt is at best light. Again, the north-west coast similarly gets but little rain; here again, therefore, the coastal forest belt will be interrupted.

Let us now put the distribution of forest more positively. The north-east coast, drenched in summer with monsoon rain, is fringed by monsoon forest, which extends to a greater or less extent towards the interior, according to the local conditions. The fact, however, that the monsoon region is but little peopled as yet, makes this forest not of great importance.

On the east coast the eastern slopes of the Great Dividing Range are forested, and this forest belt extends along the south coast to about long. 140° . Round the mouth of the Murray-Darling there is an arid region with but little true forest, but woods reappear round St. Vincent and Spencer Gulfs. Absent all round the coast of the Bight, the forest belt does not reappear till the curve of the coast to the south gives the south-western extremity of Western Australia a rainfall high enough to permit once again of tree growth. Not everywhere, however, is the forest belt very dense. It is densest in New South Wales, and in the south-western extremity of Western Australia. In Victoria the forests are generally light, the trees standing sufficiently far apart for grass to grow freely in between.

We have spoken of this interrupted belt of coastal forest in connection with the marginal mountains. We must not suppose, however, that the trees are limited to the seaward slope. Just as the relatively abundant coastal rainfall extends towards the interior beyond the watershed, so does also the forest belt. As the rainfall diminishes, however, the forests begin to thin. The trees cluster round the watercourses, or upon elevations of the surface which may receive a slightly higher rainfall, or over soils specially retentive of moisture. Thus gradually the dense forest thins into the scrub or scrub forest, the formation which touches the coast round the Bight and on the north-west of Western Australia. All stages in the thinning of the forest occur, and sometimes, especially round the tributaries of the Murray and Darling, the rainfall is sufficient for a periodic growth of grasses but not of trees, and we have the open grassy plains so favourable to sheep. Somewhat similar conditions prevail in the north, where grassy savannas occur, and may in the future lead to the Northern Territory being a stock-raising country. It should be noticed, however, that these grassy plains suffer, from the sheep-farmer's point of view, from one great disadvantage. Many of the native grasses, as one would expect from the climate, are short-lived. After rain the seeds, which have lain dormant in the earth, sprout, and a very rapid growth of grass occurs. When the drought comes, the grasses wither away completely, leaving only seeds and no living rootstocks—that is, there is nothing to correspond to the winter crop of grass left on the cattle-rearing plains of Calgary (see pp. 86 and 104).

This fact has two important consequences. The first is that the sheep-farmers must have an enormous territory. Nothing, we are told, strikes the Australian

who visits England for the first time so much as the number of sheep to be seen in one field. In Australia, the sheep-farmer must have so large an extent of land that the sheep can be driven from one part to another in search of fresh fodder. Further, though many of the native grasses and other plants yield good fodder, this habit of dying off makes it necessary to introduce foreign grasses and fodder plants, especially that valuable plant lucerne. This, however, is mostly done where a certain amount of mixed farming is carried on in addition to sheep farming.

As contrasted with the scantily wooded areas where grass grows intermixed with scattered trees, we have various forms of scrub proper, which often offer great obstacles to progression, and render the unimproved land useless. One common type is the mallee scrub, which consists of a dense growth of a shrubby eucalyptus. Mallee lands occur especially in the north-western part of Victoria, and are cleared in a simple fashion. It is found that if a heavy roller is dragged by means of oxen over the scrub it is completely crushed and flattened out. The shrubs then die and are burnt off, the roots being left in the ground. The land can then be used for wheat production.

Other types of scrub land are covered with various forms of acacia, some being very spiny, so that it is impossible to penetrate into the thickets.

Everywhere, however, as one passes from the coastal rain belt towards the arid interior, the vegetation takes on more and more of a desert type. In some places salt bush, a plant related to our sea-purslane, grows, its presence indicating that some salt is present in the soil. Salt bush is relished by sheep, and such land offers some, though scanty, pasturage for sheep. Elsewhere the sandy desert is covered with tussocks of the

spiny grass called *Spinifex*. Such desert regions are practically useless to man.

Generally, then, except round the Bight, Australia has a fringe of forest round the coast. Then comes scrub land mingled with grassy plains. Towards the centre are deserts with a few desert plants. Generally speaking, only land which in a natural state bears forest or scrub is worth cultivation—that is, unless irrigation can be employed. Thus one disadvantage which Australia suffers from in comparison to the western plains of Canada is that land must be cleared before it can be sown. The grassy plains, the thinly forested lands, and even the salt bush semi-deserts will carry sheep, but a large amount of land is necessary, and sheep-farming is also hazardous, for a dry season in a particular area may lead to an enormous loss of stock.

We may add a word in regard to the characters of the forests. In by far the greater part of Australia, even on the coast, rain tends to be deficient at certain seasons of the year. Generally, therefore, the forest trees show adaptations to drought. They must economise water, and therefore their leaf surface is generally small, the leaves are arranged at an angle to the sun's rays; sometimes the leaves are absent, and flattened stems take their place. Characteristic trees are the numerous kinds of eucalyptus ("blue gum") with silvery or bluish leaves, and the curious habit of shedding the bark. There are also many kinds of acacia, which the Australians call wattles, many of these being spiny or having other adaptations to diminish the loss of water. Very curious trees, called sheoaks by the Australians, and *Casuarina* by botanists, occur, and look like giant horse-tails. There are also different kinds of conifers.

Many of the eucalyptus trees produce useful timber,

but Australia is not on the whole a timber-producing country. Of late years its exports of timber, chiefly from Western Australia and New South Wales, have averaged about one million pounds per annum in value, but the imports are more than twice as valuable as the exports.

(B) The Occupations of the People

Agriculture and the Pastoral Industry.—We have seen that in Australia the land yields no native animal products of any importance. As regards plants, the denser forests, such as those of south-western Western Australia and of New South Wales, as well as, though to a less extent, the tropical forests of the north-east, produce some commercial timber. Apart from this timber, and from the fisheries, to be considered later, the animal and vegetable products of the country are derived from introduced plants and animals.

Of the introduced animals the sheep is by far the most important. In 1789 there were only twenty-nine sheep in New South Wales. Two years later Captain John Macarthur, one of the first to appreciate the possibilities of Australia as a wool-producing region, arrived in the country, and in five years' time he had accumulated a thousand sheep. He paid very great attention to the problem of getting sheep with fine wool, and the result of his labours is shown in the great wool export of Australia to-day.

As we stated above, New South Wales began to prosper when its pioneers pushed through the mountain rim to the plains beyond, and used the grass of these for sheep-rearing. These plains, we need scarcely repeat, are regions of uncertain and never large rainfall. Thus the first sheep farmers took up large areas of land, and they were necessarily men of considerable capital,

for only such could engage in a business so full of risks, and demanding so large an initial outlay. From the plains of New South Wales the sheep industry spread north and south, and we have now a great belt of country,



FIG. 31.—THE MAIN SHEEP-REARING AREA IN AUSTRALIA
(AFTER GRIFFITH TAYLOR).

The shaded areas show where sheep are chiefly reared.

(1) *Victoria*. (2) *New South Wales*. (3) *Queensland*. (4) *South Australia*. (5) *The Northern Territory*. (6) *Western Australia*.

The boundary between Victoria and New South Wales is partly formed by the Murray River.

lying behind the coastal mountains of the east and stretching from near the tropic, through southern Queensland, the whole of New South Wales and Victoria, to Eyre Peninsula in South Australia, which is chiefly

used for sheep (Fig. 31). Another belt, of more recent development, lies in the south-western corner of Western Australia.

Between the sheep belt and the sea, except in South Australia and Western Victoria, where the pastoral region touches the sea, lies the forest belt. Now this belt, as we have seen, is by no means uniformly dense, and, further, as the export of timber goes on the forest is necessarily cleared. Generally the region has a good rainfall, but there are no extensive plains. Here therefore, more successfully than in the interior, cattle can be reared, especially dairy cattle in New South Wales, and beef cattle farther north.

Again, as the coastal belt is the region with densest population, many minor crops can be grown for home consumption. Among these are bananas, coffee, pine-apples, oranges, lemons, etc., in the hotter parts; apples, pears, cherries, peaches, etc., in the cooler, with the vine in many places; vegetables, especially those for which there is a large demand, such as potatoes and onions and so on. Thus we may say broadly that on the eastern and south-eastern coasts, the most populous part of Australia, a coastal belt with a small timber trade, with cattle-raising, with mixed farming, separates the sheep-rearing area from the sea.

But, generally speaking, the coastal belt is hilly, with no great expanses of level land, and it is more or less unsuitable for wheat. In contrast to sheep-farming, which means a scanty, much-scattered population, wheat makes for closer settlement. Now it is found that, even without water artificially supplied, the outer fringe at least of the sheep plains will grow wheat; with water artificially supplied, much of the region will grow wheat.

Here, then, we come to one of the several difficult problems with which Australia is confronted. Much of this potential wheat land was early taken up by the sheep farmers. But Australia needs population, especially an agricultural population; it is difficult to see how it is to get this without wheat as a starting-point. To keep the balance even between the interests of wool, still the chief product of the Australian Commonwealth, and of wheat, which may in the future become highly important, is thus one of the great problems of government there. Within recent years, with some minor set-backs, the yield of wheat has steadily increased. We must repeat, however, that, except where water is artificially supplied, wheat can only be grown on land which in the unimproved state carries some wood. Wheat land must therefore be cleared, either by the process of crushing the scrub, described on p. 148, or by ringing the trees, and so killing them, after which they are burned.

We have spoken above of the possibility of supplying water artificially to the drier lands. Such water may be derived from one of two sources. In the east, some at least of the tributaries of the Murray-Darling system can be dammed back as they emerge from the hill regions, and the stored water used to irrigate the dry lands. This is surface irrigation, and immense sums of money are being spent in building great reservoirs; the reservoir at Barren Jack near Yass on the Murrumbidgee has been already mentioned (p. 131).

The second source is the artesian water which is found over a very large area in Australia, and can be obtained at the surface by putting down bores ("wells"). Throughout a very large area in the interior of the eastern half of Australia, artesian water can be obtained, while another basin occurs in the west on the coast

of Western Australia. The water so obtained, however, though of great importance for stock, and sometimes also as domestic or town supplies, is not as yet used, except on a very small scale, for agriculture, and it is stated frequently to contain salts which in the long run are injurious to the crops.

The Future of Agriculture.—If we sum up the chief facts in regard to wheat-growing in Australia, we find that within the last fifteen or twenty years great progress has been made, and in a favourable year Australia can not only supply her own needs but also a large margin for export. At the same time it is not probable that wheat will come to form a main staple of Australian agriculture. Much of the land is not well-fitted to the crop; the coastal belt is generally unsuitable because of the liability of the plant there to such diseases as rust, owing to the summer rain (cf. p. 139); and, finally, as the crop is chiefly grown on the margin of the arid lands, there is perpetual risk of failure.

A few figures may illustrate this latter point. In 1902-3, more than 5 million acres were under wheat, but the total yield was only some 12 million bushels, and a large import was necessary to make up the deficit. In 1908-9, practically the same acreage yielded $62\frac{1}{2}$ million bushels, sufficient to supply the home market and allow a large margin for export. So precarious a crop obviously cannot be the main support of the farmer. What other possibilities lie before him?

Let us consider first the crops favoured by the agriculturists round the Mediterranean, for the south-west of Western Australia and to a less extent the coast of South Australia have Mediterranean climates. In the Mediterranean region the farmers, incapable of growing wheat on the same scale as those of

the wheat regions of the New World, specialise in the more costly crops, which demand warmth, great care, and skilled labour for their production. Such crops are: the vine grown for wine, the olive, the mulberry for silk production, the more delicate fruits, especially the orange and lemon. In regard to these crops they have little competition to fear from the farmers of temperate continental climates. Now all these crops, with the addition of tobacco, tea and some others, are grown in Australia, but mostly only on a very small scale, in some cases only as experiments. Possibly some or all will increase in importance, but at present the farmers are handicapped by the absence of a local tradition of skill, and by the fact that the cultivators of the older parts of the world have captured the market. Both these statements are especially true in regard to the wine industry. The higher grades of wine are only produced in regions where the inhabitants have been engaged in the industry for long generations, and know all the possibilities of their lands. But even if the Australians could produce high-grade wines it is doubtful if they could command high prices for them, for some time must elapse before the public becomes accustomed to new brands. Even in Australia there is not a very good market for home wine.

The crops just mentioned are those especially suited to the sub-tropical parts of Australia. What about those suited to its hotter regions? Here another element has to be considered.

From what has been already said in regard to climate, it will be seen that there is one striking difference between eastern and western Australia. On the west a belt of desert touches the sea between the area of sub-tropical Mediterranean climate and that of tropical

monsoon climate. This is true, not of Australia only, but of the western coasts of continents in general (cf. p. 12). In consequence, on the western sides of those continents which extend both far north and far south, the sub-tropical region tends to develop towards the temperate and not towards the tropical region. From the Mediterranean region in the Old World civilisation spread north to the temperate countries, not, or only to a very slight extent, southwards across the desert to the damp regions near the Equator.

On the eastern side of Australia, as in the continents generally, no such belt of desert separates sub-tropical from tropical regions; and settlement, which began in sub-tropical New South Wales and temperate Victoria, can spread northwards, without the intervention of a desert belt, to tropical—almost equatorial—north Queensland. Similar conditions occur in South Africa, where British settlement has spread from sub-tropical Natal to tropical northern Rhodesia, with no such intervening belt of desert as separates Cape Colony from the tropical countries to the north. Now the mode of life of the Briton—or western European generally—in tropical countries, such as the West Indian Islands, the tropical African possessions, and so on, is quite different from his mode of life in sub-tropical climates, such as those of south-eastern Australia and the south of South Africa. Obviously some difficult problems are bound to arise, therefore, when settlement spreads from the one region to the other.

Of these problems one of the most difficult is that connected with labour. In tropical regions generally (with some exceptions), the agriculture which pays is that which can be carried on with cheap labour under European supervision, and against regions where this type of agriculture prevails all other tropical regions

must compete. Further, hitherto at least, not only is cheap labour necessary for tropical agriculture (and white labour is not cheap in the tropics), but the white races have not shown themselves capable of continued labour under a hot sun.

Here, then, is one of Australia's great problems. Agriculture in its hotter regions can (apparently) only be carried on at a profit with cheap coloured labour, and no such labour is available in the country.

When Australia was discovered it was inhabited by aborigines, possibly some 150,000 in number over the whole continent. These natives have gradually decreased in number, and possibly some 70,000 or so only now exist. They are a fairly tall race, with dark brown skin, and straight, curly, or wavy hair, quite different from the woolly hair of the native Tasmanians. Like the Tasmanians, however, they practised in the old days no cultivation, but lived on such animal and vegetable products as they could collect, and they have shown no desire to learn methods of agriculture from the whites. Their skill in finding water, and in tracking, has led to their use as guides by white explorers, but they seem incapable of steady labour, like that involved in agriculture. In consequence, in contrast to the conditions which exist in South Africa, no native supply of agricultural labour is available in Australia.

When sugar was first grown in Queensland, therefore, attempts were made to import the cheap labour without which, it was believed, such a crop could not be produced. Polynesians from the islands of the Pacific were brought in, and, as in all similar cases, the labour, though nominally free, tended to become in practice more or less servile. "Blackbirding," as it was called, became a paying speculation, carried on often with much cruelty. Though sugar is grown both in the

north of New South Wales and in Queensland, it was in the hotter climate of Queensland, as one would expect, that coloured labour was chiefly employed. But as the balance of wealth and population in Australia has always lain to the south, in Victoria and New South Wales, where coloured labour was not required, and where the numerous disadvantages associated with it were more clearly perceived, there was a long struggle between the north and the south. When, in 1900, the separate States were federated to form a Commonwealth, there could be no doubt that the party opposed to coloured labour would predominate. The Commonwealth Government, now, as for some years back, has opposed the use of non-white labour in the sugar industry, both by direct legislation and also by bounties on sugar grown with white labour. Similarly, all other forms of non-white labour, that is Asiatics of all kinds, are so far as possible kept out by legislation.

The problem which remains for the future to settle, then, is: Will Australia succeed in developing her vast tropical territory with white labour only? Meantime her tropical lands are all but empty, but we cannot suppose that this condition can last indefinitely when the world is daily growing smaller, and the more fertile parts of Asia are densely packed with human beings.

The Fisheries.—In the zoological as opposed to the commercial sense the fisheries of Australia are insignificant, for most of the products are not fish at all. To the south fish are not taken in very large amount, though probably the industry is capable of great development.

On the other hand, the tropical waters of Australia produce a considerable amount of pearl shell, pearls, and the famous trepang or bêche-de-mer, so greatly relished in China, as well as tortoiseshell. These

“ fisheries ” are mostly in the hands of Asiatics, a point of some interest in view of the attempts to prevent so far as possible Asiatic settlement on land. Trepanng, which is the dried body of a sea-cucumber, an animal related to the starfish, is found chiefly on the Great Barrier Reef. The pearl shell and pearl industry is largely limited to the coasts of Queensland, especially Torres Straits, but is also carried on off the coast of West Australia.

The Mining Industry.—Like many others of the new countries, Australia has much mineral wealth, and this has greatly aided the development of the less promising regions. The initial stimulus to the development of West Australia, for instance, came from its mines.

We have seen already (p. 61) that gold is the mineral which exercises the most powerful attractive force on population, and Australia is fortunate in having large supplies of this mineral. As in similar cases elsewhere, the superficial deposits were first worked by simple methods, but now gold-mining is an elaborate and well-organised industry.

The first gold discovered was in New South Wales, but now most is obtained in Western Australia and in Victoria. All the States, however, contain some deposits.

In Western Australia the gold mines occur in the arid region, especially round Kalgoorlie and Coolgardie, and water has to be carried in a huge pipe from the wetter coast, the installation of the pipe line having cost nearly three million pounds. Other important fields are round Ballarat and Bendigo in Victoria.

Less important are silver, worked especially at the Broken Hill mines in New South Wales, and copper, especially in South Australia and Queensland, also tin.

Coal is abundant, especially in New South Wales, the

most important field being that round Newcastle. From its abundant coal Australia could become a manufacturing country, but meantime its population is too small for manufactures to be undertaken on a large scale.

Trade of Australia.—In 1911 the total export trade was 79½ million pounds. The chief exports, in order of importance, were the following :—

Wool	£26,000,000
Gold	12,000,000
Wheat and Flour	11,000,000
Butter	4,000,000
Copper	2,350,000
Meat (of all kinds, frozen and tinned)	3,000,000
Silver	2,000,000

Summing up these figures we may say that Australia is primarily a pastoral country, secondly a mineral-producing country, while agriculture stands third in the list of its activities. The imports for the same year reached £67,000,000, and were chiefly manufactured goods.

(C) Government and Divisions

The Commonwealth of Australia consists of six States—New South Wales, Victoria, Queensland, South Australia, Western Australia, and Tasmania, the last of which we have already considered (Chap. VI). In addition there are two dependencies, the Northern Territory, which till 1911 was part of South Australia, and Papua.

The government of the Commonwealth is vested in a Governor-General, a Senate and a House of Representatives. At present Parliament sits at Melbourne, but a site for a federal capital has been selected at Yass-Canberra, in an area of land which formerly belonged

to New South Wales. The surrounding land has been ceded to the Commonwealth, and a railway is to be constructed from the capital to Jervis Bay. In addition to the central parliament each State has a parliament of its own for the management of its internal affairs.

NEW SOUTH WALES.—The relative sizes and populations of the States are shown in Fig. 32, from which it will be seen that New South Wales is about three and a half times the area of Great Britain, but the population is not much more than one twenty-fifth of that of Great Britain. New South Wales has the largest total population of any State, but the density is less than in Victoria.

Though no part of the State touches the tropics the climate is warm enough in the north for sugar. Sydney, the capital, situated on a beautiful bay, is some 2° nearer the Equator than Malta. New South Wales is the oldest State in Australia, for it became a

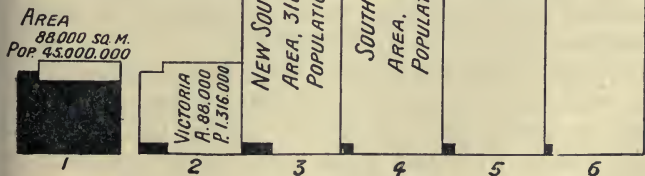


FIG. 32.—DIAGRAM SHOWING IN ROUND NUMBERS THE RELATIVE AREAS AND POPULATION OF THE FIVE MAINLAND STATES OF THE AUSTRALIAN COMMONWEALTH (EXCLUDING THE NORTHERN TERRITORY) AS COMPARED WITH GREAT BRITAIN (1).

The blank space in each case shows the area, the shaded part the population.

British possession in 1788, and Sydney also is the oldest town. Under these circumstances it is natural to find a well-developed railway system, especially in view of what has been said in regard to the difficulties of internal communication by water in Australia.

The railway lines centre about Sydney, the main port of the State, and may be divided into three sets, the southern, western, and northern. The southern system connects with Melbourne and so with Adelaide, and the course of the main route is of some interest. Owing to the proximity of the highlands to the sea, the railway cannot run along the coast. But, in New South Wales, the highlands do not form a continuous range. Easy gaps allow access to the interior, and the railway traverses one of these. The line then passes near the site of the federal capital, and goes through the wheat-growing district of the Riverina, to Albury on the Victorian boundary.

The western route has a more difficult course, for the Blue Mountains, if not very high (about 3000 feet), are steep. This western line ends at Bourke, on the Darling Plains, and though it traverses sheep-rearing and wheat-growing plains it was primarily the mineral wealth (especially of gold and copper) which justified the cost of construction.

The northern route runs for a time on the coastal plain, and thus taps the coal-mining district of Newcastle. It then takes advantage of the Hunter River to ascend to the plateau, which is followed to the Queensland boundary near Tenterfield.

The productions of New South Wales may be gathered from what has been already said, but we may sum up briefly by saying that the narrow coastal belt yields in its valleys fruit and minor agricultural products, while dairy farming is also carried on, much butter being

made. The plains of the interior carry sheep, and also yield wheat. Minerals are especially abundant in the hilly regions.

VICTORIA.—This State is almost precisely the size of Great Britain, a useful fact to remember. The capital, which is also by far the largest town and a great centre of population, is Melbourne, placed at the head of the deep inlet of Port Phillip on the southern coast (population 600,000; that of Sydney is 666,000, so that the towns are of nearly equal size). As Figs. 29 and 30 show, Melbourne has a cooler climate than Sydney and one with a characteristically temperate type of rainfall. Victoria, indeed, is the most temperate of the States, its climate resembling that of Tasmania. It should be noted, however, that Melbourne is practically in the latitude of Palermo in Sicily.

Victoria was separated from New South Wales in 1851, and is thus the second of the States in regard to age. It owed its early development to the gold discoveries, made in the same year as that in which it became a separate colony, but wool has played a great part in its prosperity. Of late years agriculture, especially wheat-growing, has made considerable progress.

Owing to the way in which the eastern highlands curve to the south much of Victoria is hilly, and this is especially true of Gippsland, where the hills make railway construction difficult. On the other hand, to the north the country slopes to the Murray plains, and to the north-west also extensive plains extend to the lower Murray. It is in these plains, wherever the rainfall permits, that wheat is grown.

Victoria has a considerable cattle-rearing industry, and, as would be expected from the climate, such cereals as oats and barley, such vegetables as potatoes and onions, are extensively grown, as well as much

fruit. The last includes both Mediterranean types, like oranges, lemons, loquats, pomegranates, figs, grapes, etc., and the more northern forms such as apples and pears and the small fruits. The mineral produce has already been alluded to (p. 159).

In regard to railways, we left the main line at Albury, in a sheep and wheat district. Thence it runs south-westwards through an upland region with gold mines (Ovens River basin) to Melbourne. From Melbourne the line is continued west through hilly country, and at Ballarat touches the southern part of an important goldfield. After emerging from the highlands it runs north-west across the mallee plains to enter South Australia near Border Town.

SOUTH AUSTRALIA.—This State, even after the separation of the Northern Territory, retains a large extent of land of which meantime little use is made. Settlement is chiefly limited to the southern coastal belt, where a large amount of wheat is grown and sheep are reared. Eyre and Yorke Peninsulas, especially, are wheat-growing regions, and the industry is greatly assisted by the deposits of rock phosphates, used as manure, found in the State within easy reach. Fruit of all kinds is also grown, including even the date palm, not far from Hergott Springs. The olive is cultivated and ostrich farming has been started.

South Australia was declared a province of the British Crown in 1836 and was granted self-government in 1857. Its capital and chief town is Adelaide on Spencer Gulf, with less than 200,000 inhabitants.

Inland from the coastal belt with its agriculture and stock-raising stretches the pastoral country, soon thinning out into desert. The sheep runs here must necessarily be of huge size to compensate for the deficiency of pasture, which consists chiefly of desert

bushes. From Adelaide the railway is pushed out into this desert region as far as Oodnadatta, north-west of Lake Eyre, whence the Overland Telegraph runs north to Port Darwin. From Oodnadatta southwards the route passes Hergott, already mentioned, and then Petersburg, the junction of the line from Broken Hill. Broken Hill silver mine, as already mentioned (p. 159), is in New South Wales, but the natural outlet is by this branch line, which carries the crude ore to Port Pirie, north of Adelaide.

The main route continues from Petersburg to Adelaide, and then across the Murray River and the plains to Border Town and so to Melbourne.

WESTERN AUSTRALIA.—The huge tract of land forming Western Australia (see Fig. 31) has, as has been already indicated, two chief areas of settlement—the goldfields, placed in the arid interior, and the south-western corner where, with a Mediterranean climate, wheat (still on a small scale) and fruit are cultivated, sheep reared, and timber (especially jarrah and karri) produced. Jarrah and karri are valuable kinds of eucalyptus, of which the former is specially prized for its durability and resistance to insect attack (*e.g.* to “white ants”). Karri is used chiefly for wood pavements. Mining is still the most important pursuit, but though agriculture is chiefly confined to the region named, the pastoral industry is carried on also farther to the north.

The railway system of Western Australia is meantime not connected with that of eastern Australia—that is, there is no transcontinental line. The existing railways may be described in general terms as constituting (1) routes from the coast to the goldfields, and (2) routes connecting the coastal towns. Thus Perth is connected to Coolgardie and Kalgoorlie, while Gerald-

ton, Perth and Albany are also linked up. Perth, the capital, is connected by rail to Fremantle, the port; it has some 54,000 inhabitants.

QUEENSLAND.—Queensland was originally united to New South Wales, from which it has been separated since 1859. Its large area is somewhat sparsely peopled. Compared with New South Wales, Queensland has fewer sheep but more cattle, and its warmer climate is reflected in the produce. Thus the greatest acreage of agricultural land is devoted to maize (not wheat as in New South Wales), bananas come next, then sugar cane, then wheat, while smaller areas of land are devoted to a great variety of tropical and sub-tropical products, such as pineapples, cotton, tobacco, oranges, coffee, yams, and so forth. There is a considerable production of cabinet woods, together with minerals such as gold, copper, tin, gems, etc.

In regard to the railway system the main north line, already mentioned (p. 162), after leaving Tenterfield passes the coal town of Ipswich and reaches Brisbane, the capital, on the river of the same name, with a population of about 140,000. It is the outlet of the fertile Darling Downs area, devoted to agriculture and sheep-rearing, and also of the coal area. Its southerly position is interesting, for it is characteristic of Australia that even the States which extend into the tropics have their centres of gravity in the extra-tropical area.

North from Brisbane the railway is a coastal one, tapping various mining and sugar towns till it reaches Rockhampton, the outlet of the gold and copper mine of Mount Morgan, and also a meat-preserving town, on account of the cattle pastures in the neighbourhood. From Rockhampton the line turns inland to end at Longreach, passing through sheep-raising country.

Another western line is that which runs from Brisbane to Cunnamulla and serves a wheat-growing, cattle-raising and sheep-raising country. The main line connecting Townsville with Rockhampton is approaching completion, and the former is connected by rail with the gold-mining centre of Charters Towers and the copper-mining region of Cloncurry.

THE NORTHERN TERRITORY.—Of this we need only say that it is as yet scarcely peopled at all, though the Commonwealth Government has now under consideration schemes for its development. The coastal belt will apparently produce all the usual tropical crops, while farther inland is a grassy zone well fitted for cattle. The capital is Darwin (Palmerston) on Port Darwin. From the coast a railway runs inland to Pine Creek, and the Commonwealth has undertaken to construct a transcontinental railway line from this point to another on the South Australian boundary, which shall connect with the Oodnadatta line and so with Port Augusta in South Australia.

SUMMARY

The mainland of Australia forms a huge island with an area (excluding Tasmania) of 2,950,000 square miles, and a scanty population of less than $4\frac{1}{2}$ millions. It is practically bisected by the Tropic of Capricorn, but the greater part of the population is settled in the extra-tropical area, and the characteristic products are temperate or sub-tropical. As it forms a wide stretch of land, with marginal highlands, placed in the dry belt, we naturally expect to find that water is deficient, except on the coast. A very large part of the interior is indeed unutilisable desert, and round the margin of the desert sheep, reared for wool and not for meat, constitute the best method of using the land. The outer margin of the sheep belt is available for wheat, the damper coastal areas for cattle, including dairy cattle, and for a great variety of sub-tropical and tropical

produce, including sugar. As yet, however, this coastal produce only enters to a small extent into the world's commerce.

The country is rich in minerals, especially gold and copper. In spite of the smaller population, the export trade (£79,500,000 in 1911) till 1912 exceeded that of Canada ; partly because of the large output of gold.

The five mainland States are New South Wales, with Sydney as the capital and largest town of the Commonwealth ; Victoria, capital Melbourne, not greatly inferior in size to Sydney ; South Australia (from which the Northern Territory is now separated), capital Adelaide, a town about one-third the size of Melbourne ; Western Australia, chiefly a mining State with Perth as capital ; Queensland, a State with more than half its total area within the tropics, capital Brisbane, with a population three-quarters that of Adelaide.

Victoria and New South Wales, the most important States, produce wool, wheat and minerals, New South Wales predominating as regards wool. Dairy produce, especially butter, is steadily increasing in importance in both. Much wheat is also produced in South Australia. In Queensland, wheat production is slight, but maize, sugar and tropical fruits, especially bananas, are much grown. Queensland exports a good deal of wool, but cattle for meat are also important.

Australia yields a considerable amount of certain special kinds of timber, but imports a much larger quantity of other kinds. Biologically the country is interesting on account of the peculiar nature of both plants and animals. The scanty population is partly due to the dry climate, partly to the predominance of the pastoral industry, which demands few hands in proportion to area. A large increase of population can only be expected with an increased development of agriculture, and this in the extra-tropical areas will require to be based on wheat and the sub-tropical crops, especially those which require much skill for their production and yield a correspondingly high-priced product.

CHAPTER XII

II. THE UNION OF SOUTH AFRICA

(A) Physical Geography

SINCE 1910 the Cape of Good Hope, Natal, the Transvaal and the Orange River Colony have been united under a Governor-General to form the Union of South Africa, the separate colonies forming provinces of the Union. The territories so united constitute a fairly compact mass of land, having, broadly speaking, a sub-tropical climate. Rhodesia, with a tropical climate, is excluded from the Union.

General Characters of South Africa.—We have already pointed out certain resemblances between Australia and South Africa, so that it may be well to begin our more detailed study of the latter with a consideration of some of the contrasts.

The four provinces of the Union include a very much smaller area than Australia, for the total of 473,000 square miles is comparable in size to South Australia added to Victoria only. On the other hand, the density of population is much greater, for South Africa has a total population of nearly 6 millions, as compared with the $4\frac{1}{2}$ millions of Australia.

When we look at the composition of the population, however, the contrast is even greater. In Australia the population is predominantly of European descent ;

the aborigines are diminishing in number and there are few Asiatics. In South Africa, nearly 5 of the 6 million inhabitants are of non-European origin. Not only are there very large numbers of Kaffirs, etc., but in Natal Asiatics actually outnumber the white population.

Again, as we have seen, in Australia the aborigines do not form a labour supply, and, except in Queensland, there has been little tendency at any time to depend upon non-white unskilled labour for any industry. In South Africa the Kaffirs, of sturdier physique than the Australian native, form a labour supply which has been so extensively called upon that there is very little unskilled white labour; the tendency, as in the tropics, is to regard the white man's sphere as confined to the superintendence of black labour. Further, since the native blacks have been found unsuitable or inadequate in certain cases, East Indians have been extensively imported into Natal to work in the tea and sugar plantations there, while a few years ago another race was added to the number which already existed in South Africa by the importation of Chinese labour for the Transvaal gold mines. The Chinese coolies have now returned to their own country, and the Indian Government has put obstacles in the way of further importation of Indian coolies, but we must note that in the proportions which the whites bear to the non-whites, and in the attitude of the former to labour questions, South Africa generally resembles tropical rather than temperate regions. As we have already seen (p. 156), sub-tropical settlements on eastern coasts tend to spread towards tropical regions. If the Australian States are examples of sub-tropical communities which have definitely adopted temperate standards in regard to labour and similar questions, South Africa is an example of a community where tropical

standards have prevailed. The result has been to discourage white immigration.

In South Africa the drought, the high mean elevation, the deficient fertility in many regions, has tended to encourage the pastoral industry rather than agriculture. But this is handicapped, much more than in Australia, by the presence of many diseases, which render it impossible to keep horses in many parts of South Africa, and has made the ox rather than the horse the characteristic draught animal. To the scanty pastoral industry, however, the discoveries of large quantities of gold and also of diamonds has added the mining industry; at the present time it is the mines which render South Africa important. But the fact that the original pastoral farmers were of Dutch extraction (Boers), while the mining community is predominantly British, has added another complication to the tangle of South African politics, and has rendered its recent history eventful.

History.—As a plateau region, with steep slopes rising from a very narrow coastal plain, South Africa offers no very great attractions from the sea, and it was first settled by Europeans only on the coast, the settlements being used as stations for ships trading with India. The Portuguese were the first in the field (note Algoa Bay, *i.e.* on the road to Goa in India), and throughout the sixteenth century had almost a monopoly. At the close of that century the Dutch appeared and settled on the Cape Peninsula. Their geographical names may be read over the map of Cape Colony. Later, the British made their appearance, and in 1806 Cape Colony was declared a British possession. Differences of opinion on various points developed between the British and Dutch settlers, and in 1834 many of the latter migrated (the migration

being called the "Great Trek") northward across the Orange River. This was the beginning of the Orange Free State, while a still further trek, across the Vaal to the high veld beyond, laid the foundations of the republic of the Transvaal. After the Boer War (1899-1902) these two republics were annexed to the Empire, and now, as already stated, form part of the Union.

Position.—Cape Agulhas, the southern extremity of Cape Colony, does not quite reach lat. 35° S., while the northern boundary of the Transvaal does not quite touch lat. 22° S. Thus, broadly

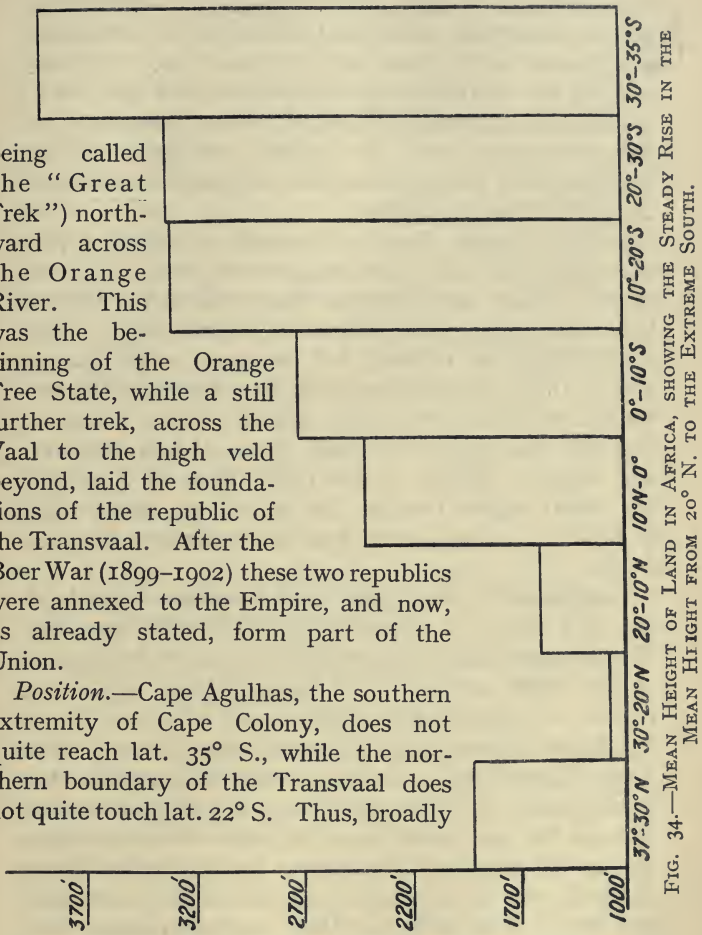


FIG. 34.—MEAN HEIGHT OF LAND IN AFRICA, SHOWING THE STEADY RISE IN THE MEAN HEIGHT FROM 20° N. TO THE EXTREME SOUTH.

speaking, the Union of South Africa lies in the same latitude as that part of Australia which lies between Sydney and Rockhampton. In other words, the south-

ward extension which gives Victoria an almost temperate climate, is absent in South Africa. Comparing the towns with those of Australia, we find that Sydney nearly corresponds in latitude to Cape Town; Grafton in Queensland to Durban; Brisbane to Johannesburg. But the greater elevation of the South African towns gives them a cooler climate than their Australian analogues.

On the grounds already discussed, we should expect that Cape Town and its vicinity would have a Mediterranean climate analogous to that of Albany; Durban the Chinese type—that is, one with summer rains. These expectations are fulfilled, but we must notice that as South Africa is much narrower than Australia the sea-winds are not so completely robbed of their moisture, and the arid region in South Africa is less extensive, and appears farther to the north than in Australia. No desert region reaches the sea on the south coast in Africa, as it does at the head of the Great Australian Bight.

Configuration.—In regard to the surface of the land, the first point to notice is its high mean elevation. This is true of Africa generally (Fig. 34), but especially of the south and east. In South Africa, which lies, it will be remembered, entirely south of lat. 20° S., as the figure shows, the land generally lies above a mean level of 3000 feet. In the southernmost portion, that south of lat. 30° , the mean level is nearly 4000 feet. Though the high mean is partially due to the presence of the Drakenberg Mountains, yet in South Africa generally low-lying land is confined to the sea margin and to the river valleys. There are no extensive low-lying plains.

The two diagrams, Figs. 35 and 36, and the map show the essential points as regards the form of the land. In

Fig. 35 we see that the Drakenberg Range comes close to the east coast, so that Natal consists chiefly of its steep seaward slopes. The highest peaks of the Drakenberg lie at the point where the frontiers of Natal, the Orange River Colony and Basutoland join. The culminating point is Mont aux Sources, which exceeds 11,000 feet in height. While the seaward slopes of the range are steep, the western slope is gentle, the land falling to a high plateau, whose eastern part exceeds 4000 feet in height. On the extreme west the plateau slopes steeply to a narrow coastal plain.

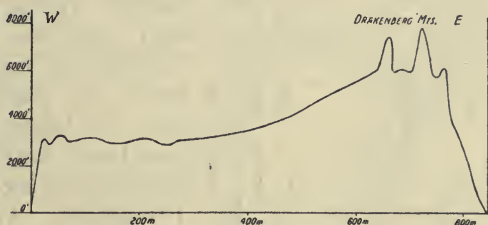


FIG. 35.—GENERALISED SECTION FROM DURBAN TO BUFFALO RIVER, SOUTH AFRICA. (Vertical Scale greatly exaggerated.)

Note that the country forms a plateau, highest to the east and sloping steeply to the coast both to the east and the west.

On the south coast (Fig. 36) the conditions are somewhat different. There is a coastal plain, sometimes narrow sometimes fairly wide, bounded to its inner side by hill ranges of which the Lange Berge and the Outeniquas form a part. To the inner side of these ranges is the low plateau of the Little Karroo. Beyond this rises another range of hills, part of which is called the Zwarte Berge. This range bounds the second terrace, that of the Great Karroo. This is bounded in its turn by the edge of the High Plateau, whose margin gives

rise to the appearance of mountain ranges, known by

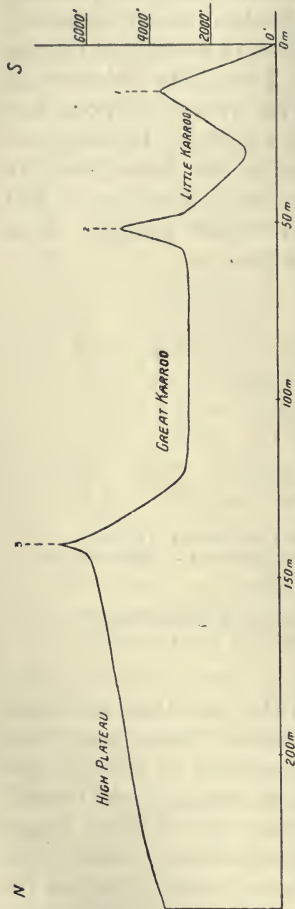


FIG. 36.—DIAGRAMMATIC SECTION FROM MOSSEL BAY TO THE ORANGE RIVER, TO SHOW THE TERRACES OF THE SOUTH AFRICAN PLATEAU.

(1) *Outeniqua Mountain*. (2) *Zwarte Berge*. (3) *Nieuwveld Range*.

various names, such as the Nieuwveld Range. This High Plateau stretches away to the north-east into the Orange River Colony and Transvaal, where it is known as the High Veld, and varies from 4000 to 6000 feet in height. To the north-west, on the other hand, the level is lower, the desertic regions of Great Bushman Land and Namaqualand sinking below 4000 feet. In the south-western corner of Cape Colony the coastal plain is fairly wide, its inland boundary being formed by the Drakenstein Mountains. The plain here, especially round Malmesbury, has long grown wheat, which is also cultivated on the coastal plain of Cape Colony generally. The Little Karroo is also

fertile, as are the steep coastal slopes in Natal, but the Great Karroo and the High Veld have a scanty, seasonal

rainfall, of uncertain amount, are but scantily clothed in vegetation and, except where irrigation is possible, are chiefly suited to sheep and cattle. The scantiness of the vegetation may perhaps be appreciated from the fact



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FIG. 37.

that nowhere in Cape Colony can sheep survive on unirrigated land unless 2 to 2½ acres of land are allotted to each animal, while in some parts of the Karroo 12 acres per sheep are necessary. Ostriches do well on the Karroo, but where no food is supplied 20 acres of land must be allowed per head. Such figures indicate

clearly the unproductiveness of the unirrigated land. With irrigation, and lucerne as a food crop, four or five ostriches can be kept to the acre.

Rivers.—The figures just given indicate clearly that, as in Australia, the great lack in South Africa is water. As in Australia the rivers are such as to render irrigation difficult, and are indeed best suited for the purpose on the eastern coast, where the heavier rainfall renders this use less necessary. As in Australia, further, the compact form of the land, with the absence of bays and inlets, and the marginal mountains and hills, renders internal communication difficult, and the rivers, unfortunately, are not of a nature to facilitate this. Even less than in Australia, indeed, can the rivers be used for purposes of navigation. The reason is, of course, that before entering the ocean they must necessarily leap over the rim of the plateau, so that there are falls and rapids on the lower course of all the important streams. Again, on the plateau the rivers run mostly in deep valleys, rendering access difficult. Finally, few are permanent throughout the year, and all are liable to sudden and destructive floods in the wet season, and then shrink to pools in the dry season. The floods make irrigation works more difficult than they would otherwise be, and as yet no elaborate irrigation schemes have been carried out, though they have been shown to be possible.

The most important river is the Orange, with its great tributaries the Caledon and the Vaal. It arises in the western slope of the Drakenberg and flows westwards to the Atlantic. The eastern streams are mostly short and swift. On the south-east the Great Fish River is of interest as being one of the few rivers which flow at all seasons of the year.

Climate.—The most important point in regard to the

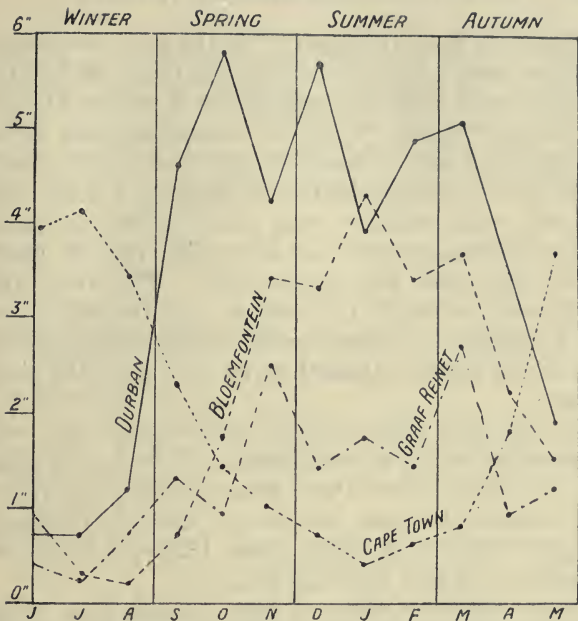


FIG. 38.—DISTRIBUTION OF RAINFALL (IN INCHES) THROUGHOUT THE YEAR IN BRITISH SOUTH AFRICA.

The curve for Cape Town (lat. 34° S., long. $18\frac{1}{2}^{\circ}$ E., height of observatory above sea-level 40 feet) shows the characteristic Mediterranean features, *winter* being the *wet* and *summer* the *dry* season. But this condition has a very limited extension, and at Graaf Reinet (lat. 32° S., long. 24° , height 2500 feet) it has already disappeared. Here the rainfall is scanty; there is winter *drought*, and most rain comes in *spring* and *autumn*. At Durban (lat. 29° S., long. 31° E., at sea-level) the rainfall is abundant; least falls in winter, most in spring and summer, but there is also a heavy autumn fall. On passing inland to Bloemfontein (practically the same lat., but long. 26° and height above sea-level 4518 feet) the rainfall diminishes, the winters being dry; as in the interior of continents generally there is one maximum, the summer one. Here, though the actual distance from the sea is not great, the mountains deprive the winds of much of their rain before Bloemfontein is reached.

climate is the season of rainfall. In the southern summer a low-pressure area lies over the continent, while high-pressure areas form on either side of it, in the Atlantic and Indian Oceans. Thus the circulation tends to be cyclonic, and winds sweep in from the Indian Ocean to the land in the direction of the hands of a clock. On the east coast, whether these winds appear as north-east or south-east winds, they bring rain; thus the whole of the east coast has summer rain. The winds also carry moisture over the crest of the Drakenberg, so that about half the breadth of South Africa has summer rain, diminishing in amount as we pass from the coast inland.

By the time these summer winds reach the west they are dry winds, so that the west, as far as a slanting line extending from Port Elizabeth past Beaufort West to Warmbad near the Orange River, has summer drought. Thus much of the Great Karroo has summer drought and is then burnt up and dry.

In the southern winter a high-pressure area forms over the land, and gives rise to an anticyclonic type of circulation. This counter-clockwise circulation brings north-west winds to the south-west corner, which, coming from a warmer sea to a cooler land, bring winter rains to Cape Town and its vicinity. The winds which reach the east coast at this season are nearly dry. The essential points in regard to the rainfall may be appreciated from Fig. 38.

The winter rain and summer drought of the western half of Cape Colony make it suitable for wheat and the vine and Mediterranean plants generally. On the east the heavy rain of summer and autumn is unfavourable to wheat, which suffers much from rust, but suits such plants as maize, tobacco, tea, sugar, and so forth. On the plateau the clear, dry winters, with much

radiation and consequent night frosts, are unsuited to delicate perennial plants, though they render the climate very healthy for Europeans. Further, the sometimes heavy precipitation at the harvesting season, followed by severe drought at a time when winter crops might be put in, is a drawback to farmers, a drawback increased by the precarious nature of the rains at other seasons.

The conditions as to temperature may be gathered from Fig. 39, which represents the mean temperatures (Fahrenheit) of the hottest and coldest months in four South African stations.

Plants and Animals of South Africa.—The plants show several features of great interest, for they reflect directly the varying climatic conditions. We have to notice first

that, as already stated, the south-western corner has a Mediterranean climate, with severe summer drought and a short rainy season in winter. The dryness of the air is even greater than it is round the Mediterranean Sea, for in the winter season the rain is far from continuous and during the dry spells the evaporation of moisture is great. In consequence we find that

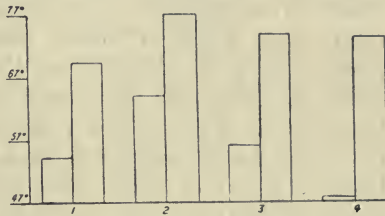


FIG. 39.—HOTTEST MONTHS AND COLDEST MONTHS IN FOUR SOUTH AFRICAN STATIONS (cf. Fig. 38).

(1) *Cape Town.* (2) *Durban.* (3) *Graaf Reinet.* (4) *Bloemfontein.*

Note that Durban, which is nearer the equator than Cape Town, is warmer alike in summer and winter. At Graaf Reinet the elevation makes the winters a little cooler, the summers a little less hot than they would otherwise be. Bloemfontein, at a much higher level, shows the effect of elevation in the cool winters, as compared with Durban in (nearly) the same latitude. The dryness of the air in the winter months here helps to lower the temperature by increasing radiation.

the native plants here show, even more markedly than those round the Mediterranean Sea, a reduction in the size of the leaves, a tendency to develop hairs, and to produce aromatic substances. Even more than in the Mediterranean area proper, also, the trees tend to be stunted, so that they become mere shrubs. Thus the characteristic plants are low bushes, with small leaves, rarely pure green in colour, associated with bulbous plants which die down after the flowering season is over. Further, as the south-western extremity of Cape Colony is the end of a great continent, stretching far to the south, there is a tendency for old-fashioned types of plants to collect here, plants which have been displaced farther north by more modern types. The same tendency is indicated in the human inhabitants, for the Bushmen are a primitive type of mankind, pushed to the south by more highly organised tribes.

On the other hand, on the eastern slope of the Drakenberg we have a Chinese type of climate, with fairly abundant summer rain, no absolute winter drought, and a high temperature. Here the vegetation is more luxuriant and more varied in form. Trees, shrubs and grasses flourish; in favourable situations, forests almost tropical in type are found, and the vegetation is generally of a greener tint, the grey and silvery plants of the Cape being absent.

The Great Karroo lies, as we have seen, mostly in the region of winter rains, but the rainfall is scanty. The characteristic plants of the south-west are here absent, but the aspect of the vegetation is similar. Trees are few, very many of the plants are low, thorny or hairy shrubs, and after rain there is a short-lived glory of bulbous plants.

In the High Veld the lack of moisture is accentuated, and the night frosts exclude tender plants. Here

again trees are all but absent; in the valleys are found grassy stretches, while shrubs predominate on the higher levels. Composites, that is plants belonging to the daisy family, are the commonest kinds, and, while all our daisy plants are herbs, on the veld there are many kinds of shrubs belonging to this family.

Let us add to this general description a few words about the plants in the different regions.

In the south-west the plants are remarkable for the beauty of their flowers, which often contrast vividly with the dull, withered-looking foliage, and have led to great numbers of Cape plants being grown in our conservatories. Almost all the beautiful heaths grown in greenhouses come from the Cape, which is very rich in plants of this family. The Proteads, mentioned on p. 143, are also common. An interesting example is the Silver Tree, found on Table Mountain, which gets its name from the appearance of the leaves. It is one of the few trees in the region which furnish firewood, and has been greatly reduced in numbers on this account. It grows to a height of 25 to 30 feet. Among other bushes are many kinds of plants related to the geraniums (really pelargoniums) of our greenhouses. Most of the plants and shrubs flower in May, that is at the beginning of the southern winter, and at this time there are many kinds of irises, lilies, orchids, and other bulbous plants. In the damper places the beautiful arum lily, which we grow in greenhouses, occurs in great masses, and in the wet season sends up its great green leaves and stately white flower-masses.

Forests are rare in this region, which extends along the coast to the limit of winter rains. The chief forest area is near Knysna on the south coast. Among its constituents are yellowwood, a conifer; stinkwood,

a laurel whose timber when fresh has a disagreeable smell ; sneezewood, a tree related to the horse chestnut which has the property of making the sawyers sneeze violently if the strong oil contained in its wood reaches the nostrils. All these are valuable timber trees. It is probable that forests were once more widely spread in south and south-western Cape Colony, but that they were largely destroyed by the natives in order to obtain the rich forest soil for cultivation. As in the Mediterranean the trees are generally evergreen.

On the eastern coast yellowwood trees occur in the forests, which are rich in orchids. In contrast to the Cape flora, we find that here plants of the pea family are common, and there are also many kinds of "everlastings."

In the Karroo, trees are rare except for thorny acacias in the river valleys. In contrast to the Cape region heaths are absent. Among the numerous shrubs are several which form good forage for sheep and cattle. Such are bushes related to our purslane and sea-purslane, many kinds of daisy plants, and various spurges. There are few orchids but many lilies, including aloes and asparagus. The curious plants called Mesembryanthemums often grown in greenhouses, are very common, and illustrate the tendency of the plants to become fleshy. Many others are thorny.

To what has been said of the High Veld plants above, we need only add that here trees are represented by a few willows near the streams.

In regard to introduced plants, we may note that the eucalyptus has been planted in many parts of South Africa and has done well. Some of the Mediterranean pines are also used in forestry operations. Owing to the drought desert plants thrive and, as in the Mediterranean region, the American prickly pear

has run wild, and in some parts has become a pest to farmers.

In regard to the animals of South Africa, we need only note that the special feature was originally the enormous number of hoofed animals. These were of many different kinds. There were more than thirty different kinds of antelopes, rhinoceroses, elephants, the quagga, a buffalo, and so on. These animals fed on the grasses and bushes of the Karroo and High Veld, and wandered about from place to place in search of food over the vast area available. They have now greatly diminished in number, some, like the quagga, being entirely extinct. To some extent this is a necessary consequence of the utilisation of the land for stock-raising, but there has also been ruthless and needless slaughter by big game hunters. In addition to the great ungulates, there were many flesh-eaters, such as the lion and many smaller cat-like animals, also wild dogs. These have diminished in number or disappeared with the spread of civilisation.

(B) People, Occupations, and Means of Communication

Native Races.—South Africa was apparently originally inhabited by the Bushmen, a race of small, yellow-skinned men, with woolly hair growing in little tufts over the skull. They had no cattle nor sheep, did not cultivate the land, and were chiefly hunters, killing their prey with the help of bows and poisoned arrows. They also ate roots, honey, and insects. Primitive as they were in many respects they possessed, in common with the men who lived long ages ago in the caves of southern Europe, considerable artistic skill, and were in the habit of drawing pictures, in red, black and yellow colours, on the walls of caves,

just as the ancient men of Europe drew pictures on the walls of caves in the Pyrenees and elsewhere. Probably in both cases the pictures were magical in intention. The Bushmen no doubt believed that if a picture of an antelope transfixed with an arrow was drawn, with as much care as possible, it would make them more likely to hit an antelope on the next hunting expedition—it gave luck!

Once widely distributed over South Africa, the Bushmen, who were very intractable to civilisation, are now nearly extinct, only a few living near the edge of the Kalahari Desert.

The next race in point of development, as well as in time of appearance, was that of the Hottentots, who somewhat resembled the Bushmen, but were bigger, fatter, and spoke a different language, which had the curious clicks of the Bushmen but not the grunts which they interspersed with the clicks. The Hottentots had cattle and sheep, and led a wandering life with their flocks and herds. They did not cultivate the ground, but were in several respects higher than the Bushmen. When the Dutch first came to Cape Colony they used the Hottentots as servants, and the gradual taking up by the colonists of the best grazing grounds reduced the numbers of the independent groups. Introduced diseases, also, especially smallpox, killed off many Hottentots, and they are now largely extinct, though a considerable admixture of Hottentot blood remains in Cape Colony. By many people the Hottentots are believed to be a race of mixed origin, derived from an intermixture of Bantu and Bushmen stocks.

The third native race is of a different stamp. These are the Kaffirs, dark-skinned negro-like people of the Bantu stock, who invaded South Africa from the north.

They are as tall as Europeans, and are well-built and strong. At the time of the arrival of Europeans the Kaffirs were both pastoralists and agriculturists, and some of the tribes, especially the Zulus, were well organised and excellent fighters. Among their favourite crops are maize and Kaffir corn (millet). The Kaffirs generally have shown considerable adaptability, and many individuals have become highly civilised. Owing to the diminution of wars since the country became settled, their numbers have increased, and they form a striking exception to the rule that native races tend to die out on contact with Europeans. As already explained, the Kaffirs form the great labour supply of South Africa.

Mineral Wealth.—As we have seen, recent developments in South Africa have been especially due to the discovery of its mineral wealth, which has turned the barren, almost useless High Veld into a region of great value. The important mineral products are gold, found especially in the Transvaal; diamonds, found especially in Cape Colony on the western boundary of the Orange River Colony; coal, especially in Natal, and in the Transvaal close to gold; copper, with some silver, lead, and tin.

Gold is by far the most important mineral. In 1911 the Transvaal yielded 36 per cent. of the world's production of this metal, the value of the output being nearly £35,000,000. The most important mines are situated on the Witwatersrand, a ridge of high ground separating the tributaries of the Vaal from those of the Limpopo. Here, on the slope of the ridge, at an altitude of nearly 6000 feet, has arisen the town of Johannesburg, with about 240,000 inhabitants, of whom nearly half are whites. The town lies in an arid region, originally devoid of trees, and with, for the

latitude (which is that of such towns as Benares and Patna in India), a somewhat extreme climate owing to the elevation. Night frosts are frequent and sometimes severe, owing to the great radiation in the cooler season.

The gold is obtained by crushing a conglomerate rock (reef mining), and the unskilled labour is supplied by natives, who live in compounds. The working of the gold is greatly facilitated by the proximity of coal, which in some cases is obtained from the same mine as the gold. Owing to the costly machinery required, the mines are worked by large companies.

Apart from these Rand mines, as they are called, rich deposits of gold occur in the Barberton district, farther to the east, as well as less important deposits in other parts of South Africa.

The largest diamond mines in the world are the De Beers Mines at Kimberley, which, like Johannesburg, is a town which has arisen in an arid, barren region, solely under the stimulus of the presence of a valuable mineral. The diamonds occur in a hardened volcanic mud, found in pipes in the rocks, and, from its colour, called "blue" by the miners. The blue is removed from the pipes, exposed to sun and air so that it partially crumbles, then crushed and washed, the diamonds being obtained from the crushed and washed deposit. Again all the heavy work is performed by natives, who are kept under strict regulations in compounds to prevent the stealing of the diamonds. The total population of Kimberley is about 30,000, nearly half being whites.

In addition to the Kimberley Mines other deposits of diamond-bearing rock occur in the Orange River Colony, near Jagersfontein, and also in the Transvaal. The total value of the diamonds produced in 1911 was over £8,000,000.

In addition to the coal found near the Transvaal goldfields and in the surrounding region, as at Vereeniging and Middelburg, valuable deposits also occur in Natal, especially near Newcastle. Cape Colony is less fortunate, for the beds found in the Stormberg Mountains, near Molteno, do not yield a product of very high value. Coal is exported from South Africa, especially from Natal, to a value of about £1,000,000 (1911).

Copper is found chiefly in Cape Colony at Ookiep in Namaqualand, and is exported through Port Nolloth, which is connected by railway with the mines. The amount produced is not very large, and the mines are chiefly of importance because they have brought a certain amount of population to a region which is so arid and barren that it could not have been settled in any other way.

In addition to its gold the Transvaal contains a number of other minerals, such as lead, silver, tin, and so forth ; meantime these are not worked to a very large extent.

It should be noted that none of the minerals mentioned occur in such a way as to attract men of small means to the country on the large scale. In all cases costly machinery is a necessity, and the labour is chiefly supplied by the natives, except where much skill is required. No part of South Africa contained at the time of its colonisation by Europeans rich deposits of alluvial gold such as brought a large white population to parts of Australia, the United States, and Canada. This is possibly because most of the visible deposits had been worked out by earlier visitors ; in any case it has helped to produce the small proportion of whites noted on p. 171.

But if the gold deposits are somewhat costly to work in the Transvaal, it is believed that their un-

exhausted wealth is very great, and that profitable mining can be continued on the Rand for a very prolonged period. This is an important point, for meantime it is only in connection with the higher branches of the mining industry that any considerable number of white men find employment in South Africa.

In other words, though the proportion of white men might have been greater if large deposits of alluvial gold had attracted many men of small or moderate means, it would be very much less if the finer kinds of work at the mines did not demand a considerable amount of trained labour, which can only be supplied by whites.

Means of Communication.—As in Africa in general, good ports are not frequent. The important ones are Cape Town, Port Elizabeth, and East London (the latter two much exposed), Durban, and Lourenço Marquez on Delagoa Bay. The last is the natural outlet of the Transvaal, as Beira is the natural outlet of Rhodesia to the north, but both ports lie in Portuguese, not British territory. Communication between the ports is still chiefly carried on by sea, for though they are now connected by rail, the railway connections are roundabout. As in the east of Australia, so here it is difficult to construct a coastal line, and no continuous line yet follows the coast, though a considerable number of short sections exist.

As regards communication with the interior, the great difficulty is the carrying of the railways up the rim of the plateau, and this means that most of the inland lines have very heavy gradients near the coast. Once the plateau is reached, however, communication is fairly easy, for, as we have seen, there are practically no forests, and the surface is moderately level. These facts made the ox wagon the original method of transport



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FIG. 40.

in South Africa, and it is still important in the more remote districts. Made roads over the plateau were scarcely necessary, for the wagons with their teams of oxen could be dragged over almost any part of the surface, except where the deeply cut valleys presented obstacles—often difficult to surmount. Horses in South Africa are very liable to an epidemic disease called "horse-sickness," which is excessively destructive; in consequence horse transport has never been greatly used. In the earlier days also, and in the less developed regions, it was difficult to give proper food and care to this delicate animal. The ox has, therefore, always been the great transport animal in South Africa.

So long as the country was chiefly pastoral the ox wagon sufficed for the needs of the inland farmers. Only when the mines began to be worked, and heavy loads of coals, dynamite for blasting purposes, and ores had to be carried, did railways become necessary, and therefore those that were first constructed ran from the ports, especially Cape Town, to the mining districts.

The main line runs north-east from Cape Town to De Aar junction, and there branches. One branch runs northward to the diamond mines of Kimberley, and then continues to Mafeking, and on to Bulawayo in Rhodesia, whence one branch runs to Salisbury and another to Victoria Falls.

The other main route from De Aar passes through Bloemfontein to Johannesburg and Pretoria, and is now being extended northwards to the Limpopo River. From De Aar also branches run to Port Elizabeth and East London, while Durban is connected to Kimberley and also to Johannesburg and Pretoria, Pretoria being again connected to Lourenço Marquez. There are many minor lines.

As a glance at the map will show, the poverty in

minerals of western Cape Colony is reflected in the scarcity of railway lines.

(C) Government and Divisions

The Union of South Africa consists of four provinces—the Cape of Good Hope, Natal, the Transvaal, the Orange Free State. Though they do not form a part of the Union, we may conveniently include here also Basutoland and Swaziland and the Protectorate of Bechuanaland. The governing body consists of a Parliament, constituted by the King, represented by a Governor-General, a Senate, and a House of Assembly. The Union only came into force in the spring of 1910, so that its effects have scarcely had time to make themselves felt.

Trade of the Union.—Before proceeding to discuss the separate provinces, let us note the general characters of the trade. As already stated, the exports are predominantly minerals, especially gold and diamonds. The only other important items in the export list are wool (nearly £4,000,000 worth in 1911), ostrich feathers, and hides and skins. The imports are still very largely food, for South Africa is far from being able to supply its own needs, even as regards such articles as cheese, butter, milk, etc.; also manufactured goods, especially cotton goods and clothes, and material, such as machinery and chemicals, for the mining industry. Thus South Africa, as compared with Australia and Canada, remains in the destructive phase of development. It is living upon its stored mineral wealth (robber economy), and is as yet not utilising the surface of the soil to any extent.

THE CAPE OF GOOD HOPE.—This province has an area of about 277,000 square miles, that is one and a

quarter times that of Austria-Hungary, with a population of $2\frac{1}{2}$ millions (Austria-Hungary has $49\frac{1}{2}$ millions). Of the $2\frac{1}{2}$ million people only rather more than half a million are white.

Apart from the diamond industry of Kimberley, sheep-rearing is the most important occupation. Ostriches are also reared on a considerable scale, especially in the Little Karroo, round Montagu, Robertson, and Oudtshorn. Cattle are also reared, but on a smaller scale, and there are only few horses. In the south-west, fruit-growing is carried on, the fruits including grapes (grown for wine), oranges, lemons, peaches, apricots, plums, etc. This fruit is giving rise to a still small but increasing export of fruit, which reaches British markets at a time when fresh fruit of this kind is not available, and thus commands high prices. The fruit is carried to England in the "cold stores" of the great liners. In addition to fruit-growing, wine-making, and the cultivation of tobacco, cereals are also grown. The crops, in order of importance, are oats, wheat, maize, barley, and the produce is not as yet large.

In the east of Cape Colony sheep-rearing predominates, Grahamstown being the outlet of a pastoral district. In addition to the towns already mentioned, and the ports named on p. 190, we may note those of Mossel Bay and Knysna, the last in a wooded district. Population in Cape Colony is chiefly centred in the coastal districts; the Great Karroo and the north-west (Namaqualand) are scantily peopled.

British Bechuanaland is included in Cape Colony, but the Protectorate, a huge expanse of land, almost equal in size to the province of the Cape of Good Hope, is under a Resident Commissioner, and has a very small white population. The rainfall is scanty, the climate

not healthy. The natives rear cattle, sheep, and goats, and grow small crops of maize and Kaffir corn.

Basutoland, which is not yet included in the Union of South Africa, lies between the Orange Free State and Natal, and is a small highly mountainous stretch of land, chiefly inhabited by natives. Whites, at present few in number, are not allowed to settle without special permission. Many of the natives here periodically hire themselves out as labourers on the Rand or at Kimberley, returning with money to purchase fresh stock. The chief occupations are stock-raising and the cultivation of cereals on a small scale.

Attached to Cape Colony is Walfish Bay, a small area of land lying on the coast of German South-West Africa, north of the tropic, but forming a British possession. Its chief importance lies in its harbour, the only refuge in a long stretch of inhospitable coast. The climate is interesting, for it is at once relatively cool and practically rainless. The reason is that the cold Benguela current washes the shore, and the sea winds, instead of depositing moisture, become drier when they reach the warm coast lands. What moisture is condensed appears in the form of heavy mists, very characteristic of the region.

NATAL.—This province has an area of 35,000 square miles—that is, it is somewhat larger than Ireland. Of the total population of over 1,000,000 nearly 800,000 are natives, less than 100,000 are whites, and more than 100,000 are Indians and other Asiatics, so that the whites are relatively very few in number. Natal is picturesque and hilly. The towns near the coast are hot, but owing to the rapid slope upwards of the land those farther inland are much cooler. On the coastal belt, sub-tropical and even tropical crops can be grown. The most important are tea and sugar

(for which Indian labour is used), maize (which, owing to the summer rain, thrives better than wheat), wattles (acacia) grown for the bark, which is used in tanning. Tobacco and fruit (especially oranges, bananas and pineapples), with a small amount of coffee and a little cotton are also grown. Sheep are also reared. Broadly speaking, it may be said that from the agricultural point of view Natal is formed of three belts. The moist, almost tropical coast-belt produces tea, sugar, and tropical fruits. A little higher up, and therefore farther inland, cereals, wattles, with the more temperate fruits are grown; on the plateau, sheep predominate.

Durban, the largest town but not the capital, lies on the coastal belt. Pietermaritzburg lies in the second zone, while Newcastle (height 3890 feet), in a district producing wool, grain, and such crops as potatoes, may be said to represent the third belt.

THE ORANGE FREE STATE.—This province was given the name of the Orange River Colony at the time of the annexation of the former State, but when the Union of South Africa was formed the old name was restored.

The Orange Free State has almost the same area as England exclusive of Wales (50,000 square miles), but has a population of slightly over half a million. Except for the mountain slopes to the east the surface is a gently undulating plateau, once roamed over by countless herds of wild game, and now chiefly used as pasture land for sheep and cattle. Some ostriches are reared, and in the eastern provinces wheat, maize, millet with barley and oats are grown, together with the more temperate fruits. In spite of the latitude the climate is temperate, for the plateau (High Plateau) lies between 4000 and 5000 feet above sea-level, and

at Bloemfontein, which is nearer the Equator than Cairo, snow is not unknown. The winters are indeed somewhat severe, and this prevents the autumn rains being taken advantage of for the sowing of crops.

Apart from its pastoral industry, the Orange Free State's chief importance lies in its diamond mines. The famous Kimberley mines (p. 188) lay originally in Orange territory, though they were taken over by Cape Colony.

The capital is Bloemfontein, with about 15,000 inhabitants, blacks being to whites in the proportion of 4 to 3.

THE TRANSVAAL.—This province has an area not greatly inferior to twice that of England and Wales (110,500 square miles), with a total population of over 1½ million, of which nearly half a million are whites.

To the south and east most of the country is included within the High Veld, which consists of grassy, treeless plains, well suited to sheep and cattle, lying between 4000 and 6000 feet above sea-level. Here the climate is somewhat extreme, owing to the elevation. The plateau slopes down in terraces, the terraced region being called the Middle Veld. This is well watered, and bears trees. The climate is less extreme, and maize, wheat, temperate fruits, etc., can be grown. To the north and north-west the land (Low Veld) lies within the tropics, and is comparatively low-lying. Here malaria is prevalent, and the climate is unhealthy. Such tropical products as coffee and sugar can be grown. In Swaziland, a small area of land in the south-east corner of the Transvaal, with a predominantly native population, administered by the British Government, attempts are being made to grow cotton. Here also, in addition to maize, the staple crop, such tropical products as ground nuts, sweet

potatoes, etc., are cultivated, though only for local use.

In the Transvaal the mining town of Johannesburg (p. 187) is larger than Pretoria, the capital (population, 42,000). This fact reflects the great importance of the mines as compared with the pastoral and agricultural industries.

SUMMARY

The Union of South Africa comprises an area of 473,000 square miles, or about four times that of the United Kingdom. The total population is less than 6 millions, of which rather more than 1 million are whites. The original inhabitants were apparently the pigmy Bushmen, now practically extinct, who were followed by the Hottentots, now also largely extinct. The Kaffirs, apparently somewhat recent immigrants, are numerous and increasing, and perform most of the unskilled labour of South Africa. There are also many Indians and other Asiatics. In the proportion of white to coloured races, and in the attitude of the whites to labour questions, South Africa is tropical rather than temperate.

The country forms a high plateau, trees being everywhere few, and sometimes entirely absent. In the south-west corner a very peculiar flora, the Cape flora, still exists. This region has a Mediterranean climate; elsewhere the climate is of the Chinese type, but inland the rains are almost everywhere scanty, and to the north-west the country becomes desert. Except on the narrow coastal plains, agriculture is almost everywhere carried on with difficulty. The usual sub-tropical and temperate crops are grown, wheat predominating in the south-west and maize in the east. In the east, especially the north-east, sugar, tea, with some tobacco, coffee, cotton, etc., are cultivated. Inland stock-raising, chiefly of sheep and cattle, everywhere predominates, but dairy farming is so little developed that large supplies of butter, cheese, condensed milk, etc., are imported. By far the most important exports are minerals, especially gold (£35,000,000 in 1911) and diamonds (£8,000,000 in 1911). Wool comes next (nearly £4,000,000 in 1911), and there is also a considerable export of ostrich feathers. The total value of the exports was £57,000,000 in 1911. The imports (about

£38,000,000) include much food as well as manufactured goods. The large excess of exports is due to the fact that much European money is invested in the costly mine machinery, and interest on this is paid by the surplus exports.

The Union includes four provinces, the Cape of Good Hope (formerly Cape Colony), capital Cape Town; Natal, capital Pietermaritzburg; the Orange Free State (formerly the Orange River Colony), capital Bloemfontein; the Transvaal, capital Pretoria, but the mining town of Johannesburg is the largest town. Though they do not form part of the Union, we may include with it the Protectorate of Bechuanaland and the States of Basutoland and Swaziland all with a small white population.

CHAPTER XIII

III. THE MEDITERRANEAN POSSESSIONS

THE Mediterranean region includes three small areas administered by Britain which, in spite of their size, are of importance because of their resemblance in climate and productions to the Mediterranean lands generally. Thus we may take Gibraltar, the Maltese Islands, and Cyprus, the areas alluded to, as representative of these regions.

Malta and Gibraltar are Crown Colonies and lie in the European part of the Mediterranean; Cyprus is administered by Britain under a convention with Turkey, and, lying as it does only some 46 miles from the coast of Asia Minor, belongs geographically to Asia.

In all three cases limestone predominates among the component rocks, and the porous nature of this rock, which permits water to sink down through it, instead of forming surface streams, contributes greatly to give the land a desolate appearance during the heat of summer. In all cases also trees are few, partly because they have been cut down for firewood by the inhabitants (especially in Cyprus), and partly because the summer drought and the limestone rocks are unfavourable to tree growth. Further, because there is practically no fodder for cattle in summer, goats

are generally kept to yield milk, and these animals, which browse on bushes and young trees, tend to prevent the existing trees from reproducing themselves. This again is especially true in Cyprus. These conditions—summer heat and drought, limestone rocks and therefore streamless slopes, lack of trees and of summer herbage—recur over a large area in Mediterranean lands, as in Greece and parts of southern Italy. On the other hand, with the autumn and spring rains water flows in the dry valleys, the land clothes itself with flowers and herbage, and the gorgeous show of spring flowers accounts for the honey of Malta, as it does also for that of Greece.

Climate.—We have spoken already of the general characters of the Mediterranean climate, and its special features are shown in Figs. 2 and 7 (pp. 9, 35). A few figures, however, will help to make the picture clearer.

Let us note first that Gibraltar and Malta are in practically the same latitude, about 36° N. Cyprus lies a little farther south, but the parallel of 35° N. nearly bisects the island. The town of Adelaide in South Australia lies practically on 35° S., and it is well to associate this parallel with the Mediterranean climate and Mediterranean products.

At Gibraltar, the most westerly of the three regions, the annual rainfall is considerable, about 32 inches. Most rain falls in March and December; July and August have practically no rain, but there is some rain in June. In this connection we have to remember the position of the rock—close to the great Atlantic. Its position gives it a heavier rainfall, a slightly warmer winter, a slightly cooler summer than one would expect.

At Malta the mean annual rainfall is about 21 inches. December is the rainiest month, while June, July, and August are all dry; this is the time when the island

becomes burnt up and parched. The winter is a trifle cooler, the summer considerably hotter than at Gibraltar.

In Cyprus, which is a large island, the rainfall naturally differs in different parts of the island, but at Larnaka on the south coast the mean fall is only 14 inches. Most rain again falls in December, and there are four dry months in the summer, these being June, July, August, and September. The summer is notably hotter than in Malta, partly because the island lies a little farther south, and partly because it is so near the great land-mass of Asia.

Products.—Gibraltar has no products of any importance, but those of the other two are very interesting. Malta is extraordinarily productive. Its soil, though thin, is very rich, and the inhabitants are skilful cultivators, making the most of their land. Malta has also the great advantage of being on a high road of commerce, having especially constant communication with the United Kingdom, which takes much of its produce. Cyprus suffers severely from drought, its soil also is less fertile, and it is much more remote from the main lines of communication. Formerly also locusts were a great pest, though the destructive measures undertaken by the Government have been very effective, and the insects are said now to do no appreciable damage to crops.

A consideration of the climate helps us to understand the kinds of plants which are likely to be grown. The winter, we may repeat, is warm and rainy. Thus the mean temperature in the month of November in Malta is the same as that of London in August, and Cyprus is somewhat warmer. December in Malta has a temperature intermediate between that of May and June in London, and, again, Cyprus is warmer. Thus

the plants which are grown in Great Britain as summer crops can be grown in the Mediterranean islands in winter. The particular plants grown depend upon local conditions. Malta, with good steamer connection with Great Britain, grows early potatoes (sold in shops as "Maltas"), as well as other temperate vegetables and cereals. Cyprus produces especially barley as a winter crop, also wheat, oats, flax, various vetches, peas, and beans, and so forth. The cereals are sown in autumn and are reaped in April, so that they are true winter crops. The growth of a number of leguminous plants, such as beans, peas, vetches, lupins, etc., is very characteristic of the Mediterranean. Some of these are grown as green fodder for animals, others are cultivated for their seeds, used both by man and beast.

In Cyprus, cotton and maize are cultivated as summer crops, the cotton being mostly but not entirely grown on irrigated land. A little cotton is also grown in Malta. More characteristic of the Mediterranean is the wealth of fruit trees. In Cyprus the most important is the carob, or locust tree, whose pods (locust "beans") are used for animals, and to a small extent for human food. They form the largest single item in the exports of Cyprus, and are chiefly sent to the United Kingdom, where they are ground down to make patent cattle foods. The dark green leaves of the tree, which has a certain resemblance to the ash, though it belongs to the pea-flower family, make it a conspicuous object in Mediterranean lands. Grapes are grown for the fruit (exported largely from Cyprus as raisins), and for wine-making. Other fruits are oranges, lemons, mandarines, figs, and so forth. The olive is cultivated for oil, as in Mediterranean lands generally, and in Cyprus the mulberry is grown for the sake of the small silk-worm rearing industry.

In both islands goats and sheep predominate over cattle, and are the chief milk-yielding animals. In Malta, however, it has been found that goat's milk, which used to be drunk largely by the soldiers of the garrison, is the means of distributing a very serious disease known as Malta or Mediterranean fever, due, apparently, to the goats being kept under unhealthy conditions and becoming infected with a minute parasite. Cattle are used as draught animals. Donkeys and mules predominate over horses, which are mostly small. The relatively small numbers and poor quality of the cattle is the result of the difficulty of supplying them with fresh grass in summer; goats, donkeys, and sheep are hardier and less particular as to diet.

In the nature of the domesticated animals, in the tendency to devote much of the ploughed land to winter crops of plants belonging to the temperate zone, and to give attention during the summer months to the valuable fruit trees, Cyprus and Malta are thoroughly Mediterranean in character. With these conditions should be compared those which prevail in regions of Chinese climate, where the most important crops are summer ones of cotton, sugar, maize, etc.

We may add to this general account a brief note on each of the three regions separately.

GIBRALTAR is a rocky promontory which juts out from the coast of Spain into the Mediterranean, and commands the entrance into that sea. It is connected with the mainland by a narrow spit of sand, and is precipitous on almost all sides save the west, where the town lies. Fortified at enormous expense, and provided with a large and deep harbour, Gibraltar is an important naval base, as well as a much frequented calling station for ships. The total area is under two square miles, but nearly 25,000 people live upon this

bare rock. It rises to a height of about 1400 feet, and presents from the sea a very imposing aspect.

THE MALTESE ISLANDS include the main island and the island of Gozo, with some minor islets. The total area is only some 120 square miles, but the population is exceedingly dense (228,000 in 1911). Few trees are present and there are no streams, but during the rainy season short-lived torrents appear in the valleys. The islands are much exposed to the wind, and the cultivated patches of land are all enclosed by stone walls for the sake of the shelter, these walls giving a very bare appearance. No great elevations exist, the highest point being about 760 feet above sea-level. Valetta, the capital, in the main island, is an important port and a naval base.

CYPRUS is the third largest island of the Mediterranean, being smaller than Sardinia and Sicily, but larger than Corsica and Crete. The total area is 3500 square miles, but the population does not greatly exceed that of the far smaller Maltese islands (population of Cyprus in 1911, 274,000). Much of the surface is mountainous, Mount Troödos rising to over 6400 feet above sea-level. Though the map shows a considerable number of streams, none of these is permanent. Nicosia, the capital, lies on the central plain between the northern and southern belts of mountains.

QUESTIONS AND EXERCISES

1. What conclusion can we draw from the fact that the Gulf of Carpentaria and the Arafura Sea are shallow? What economic importance has their shallowness, especially that of the margins of the Gulf of Carpentaria?
2. Compare the Darling Downs and the Canterbury Plains as to position and products. What is the port of exit for the products of each?
3. Scientific men in Australia are greatly interested in

the meteorology of the Antarctic and sub-Antarctic region. Can you offer any explanation of this ?

4. Discuss the rainfall of the state capitals of the Australian mainland, with special reference to the amount of rain and the season of its fall.

5 Can you explain why the population of Victoria is much denser than that of Western Australia ? Is Australia as a whole densely or thinly peopled ?

6. Write an account of the Murray-Darling River, explaining why it does not form a convenient outlet for the products of the interior of Eastern Australia. How does the difference in the climate and structure of Australia and Canada help to account for the difference in their river systems ?

7. What is the Great Barrier Reef, and why is it important ?

8. How do you explain the fact that Australia both imports and exports timber ?

9. Draw an outline map of Australia and mark upon it the position and nature of the chief mines. Why have the mines been so important to Australia ?

10. Give some account of a railway journey from Brisbane to Adelaide.

11. How would you travel from Melbourne to Perth ? Describe the position of both towns.

12. What resemblances do Australia and South Africa offer as regards climate and physical features ?

13. What is the chief draught animal in South Africa, and why ? Explain the peculiar arrangement of the railways in South Africa.

14. What is the Karroo ? Describe its appearance and vegetation, and state the uses to which it can be put.

15. What are the important minerals of South Africa, and where are they chiefly mined ?

16. Compare the density of population and its composition in Australia and South Africa. Add a note on the various native races in South Africa.

17. Compare in a little detail the export and import trade of Australia with that of South Africa.

18. State the products of Malta and Cyprus, and give a concise account of the Mediterranean type of climate.

SECTION III

HOT REGIONS WITH EXTENSIVE NATIVE CULTIVATION

CHAPTER XIV

I. EGYPT AND THE ANGLO-EGYPTIAN SUDAN

EGYPT is a State tributary to Turkey, ruled by a sovereign called the Khedive. It is thus in no sense a part of the British Empire. But with the opening, in 1869, of the Suez Canal, which forms the direct route to India and Australia, Egypt became of great importance to Great Britain, for the Canal runs through Egyptian territory. At one time England and France together exercised considerable authority in connection with Egyptian affairs, but now there is in Egypt an English financial adviser, without whose consent the Khedive can take no decision involving money affairs. Further, the Egyptian army is under a British general officer called the Sirdar, and most of the officers of the army are British.

THE ANGLO-EGYPTIAN SUDAN is under the joint control of the British and Egyptian Governments, the British and Egyptian flags being used together. The geographical explanation of these somewhat curious and complicated conditions is to be sought in the fact that the Nile, which flows through the Sudan, alone gives

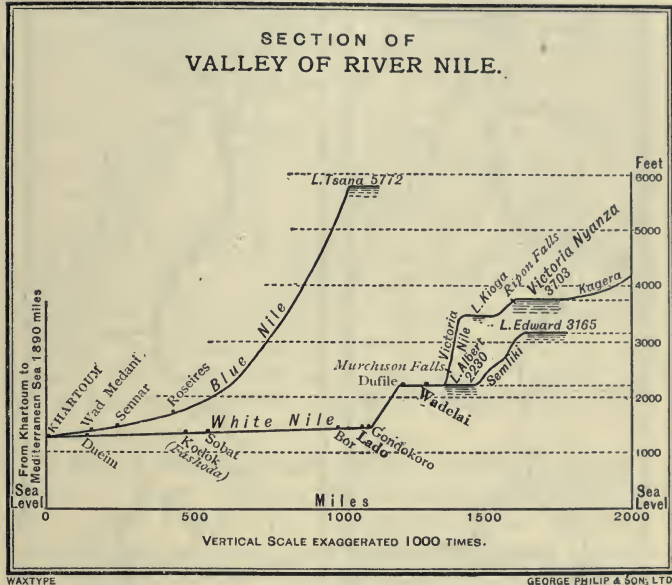
life to Egypt, and a firm government in the Sudan is therefore essential to the prosperity of Egypt. Fundamentally, as we shall see, that country is but a strip of land won from the desert, and just as physically the desert is always tending to encroach upon the sown land, so the nomads of the deserts are a perpetual menace to the patient husbandmen of the Nile valley.

THE NILE (Figs. 41 and 42).—Together, Egypt and the Anglo-Egyptian Sudan form a huge tract of land, much of it useless, which has no geographical unity save that given by the Nile. Within this vast area are tropical forests and sheer desert; steppe lands and park-like savannas; regions absolutely rainless, and others with heavy tropical rainfall: the great river Nile is the only link which binds these separate parts together.

Measured from the exit from Lake Victoria to the sea, along the curves of the stream, this river has a total length of 3473 miles, about half its course being through desert lands. As we shall see in Chap. XVIII it rises in the great equatorial lakes, and is fed by the almost continuous equatorial rainfall.

Lake Victoria stands at a level of about 3700 feet above the sea. Gondokoro, where the Nile enters the Sudan, is only some 1500 feet above sea-level. The intervening part of the course of the Nile is therefore swift and much intersected by falls and rapids. At Gondokoro, however, the river enters upon its plain track. The load of waste which it has carried from the Central African plateau is deposited near the point where it emerges on the plain, and farther north the river, usually called the Bahr-el-Jebel, becomes a meandering, sluggish and vegetation-choked stream, spreading out into marshes and swamps. These marshes are swept by drying winds, and thus much of the Nile water is lost by evaporation. In the

swamps papyrus and other reeds and marsh plants grow and form dense masses, often swept about by winds and currents, but capable of taking root again wherever they come to rest. These masses of vegeta-



London: G. Bell & Sons. Ltd.

FIG. 41.

tion form the sadd or sudd which is such an obstacle to navigation in the Upper Nile.

As the meandering sluggish stream travels northwards it receives on the west the Bahr-el-Ghazal, with its many tributaries, draining the low hills which form the Nile-Congo watershed. The two join at Lake No to form the White Nile, but as the Bahr-el-Ghazal also

spreads out into marshes and sudd-choked swamps, where evaporation is great, it adds little if anything to the volume of water in the main stream. Thus before the White Nile is joined by the next tributary,

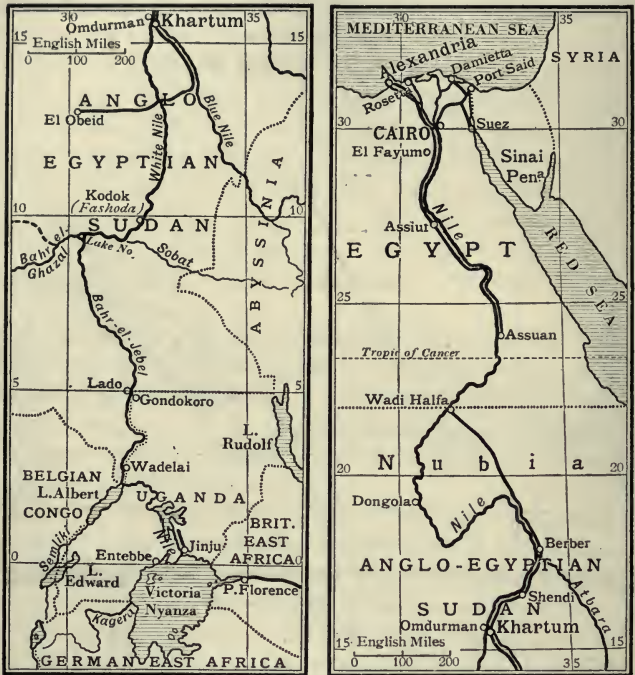


FIG. 42.—THE RIVER NILE.

the Sobat, it has lost volume as compared with the original stream which left the lake plateau. Indeed we may say that if no other source of supply intervened, the great river which emerges from Lake Albert would tend to die away in the desert, and this in spite of the

fact that there is a comparatively heavy rainfall in the south-western Sudan, a rainfall which drains into the Bahr-el-Ghazal.

The great lakes on the course of the White Nile act as regulators, so that in spite of the seasonal differences in the equatorial rainfall, as shown in Fig. 50, there is relatively little difference in the volume of the river throughout the year. But the heavy rainfall of April and May accumulates in the lakes, and causes the river to be high in the summer months, and the ponding back of this summer water by the floods of the Abyssinian tributaries helps to ensure the winter flow of the White Nile.

We have spoken of two regions from which the Nile derives water, the rainfall of the equatorial plateau, and, to a very much less extent, that of the south-western Sudan. The third source, and that which from the point of view of Egyptian agriculture is by far the most important, is the rainfall of the highlands of Abyssinia.

During the greater part of the year the prevailing winds in Eastern Africa are the north-eastern trades, which reach North Africa after having blown over land surfaces and are thus excessively dry, tending to suck up moisture rather than to deposit it. But in the northern summer, when the sun is vertical over the Tropic of Cancer, the land-masses to the north become intensely heated, and the air above them rises. A low-pressure area is thus produced which extends towards the east of Africa. The result is that the south-east trades are drawn northwards beyond the Equator, and, owing to the effect of the earth's rotation, are turned into southerly or south-westerly winds. As they came originally from the Indian Ocean, they are moisture-laden. These winds strike against the Abyssinian

highlands, and are forced upwards. As the air rises it is cooled, and copious moisture is precipitated, causing the heavy summer rains of Abyssinia. These rains appear with remarkable punctuality. Their exact season varies a little in different localities, but though there may be some rain in April, the heavy fall is in the period between mid-May and mid-September. The actual amount of fall varies, and the variations are the cause of the variations in the Nile flood.

The heavy summer rain pours off the higher parts of the Abyssinian plateau into the deep valleys with which the surface is scored, and finds its way into three great river systems — the Sobat from Southern Abyssinia; the Blue Nile from the central region; the Atbara from the more northern region.

The Sobat joins the White Nile south of Fashoda and has but little effect on the Nile flood, though it raises the level of the winter stream.

The Blue Nile joins the White Nile at Khartum, and is high in flood in the summer months, especially July, August, September, and October. Generally the river flows throughout the year, but after January its volume is small.

The Atbara is high during the same months, but after January it generally ceases to flow. The Atbara enters the main stream south of Berber, and from this point to the sea, a distance of about 1700 miles, no important affluent reaches the Nile.

From Khartum to Assuan the river runs in a valley which is mostly narrow, and is crossed by six sills of hard rocks, over which the stream breaks in cataracts, as they are called, though rapids is a better name. These cataracts act as natural dams (barrages), holding up the water, and preventing the flood running off with too great rapidity. Throughout this stretch only

narrow tracts of alluvial land occur, and no large amount of cultivation can be carried on.

A little north of Assuan the river enters a trough, apparently produced by earth movements, and filled with the silt and gravel brought down by the stream. At low Nile therefore great stretches of fertile alluvial soil are left on either bank, moistened by previous flooding, fertilised by fresh deposits of silt, and therefore eminently fitted for cultivation. Here then begins, geographically though not politically, Upper Egypt, with its green strip of cultivated ground fringing the brown Nile waters, and bounded in its turn by the walls of the trough and the desert sands beyond. At high Nile the two cultivated strips are or can be flooded by the swollen stream.

North of Cairo the delta region begins. Here the stream once divided into seven arms, but the whole region has been so modified by man that but two arms remain, the Damietta and Rosetta mouths, while the triangle of land between is crossed and recrossed by irrigation canals and streams. This is Lower Egypt, with a somewhat different climate from the region lying farther south, with more water available for irrigation, with a more elaborate system of agriculture.

From this description we can obtain an idea of the geography of Egypt and the Anglo-Egyptian Sudan. The Sudan consists of the slopes of the Central Plateau, sinking down to plains which become gradually drier as we pass northwards, till steppe fades into desert. Egypt is largely desert, cut off by the Nubian desert from the Red Sea, bounded westward by the Libyan desert with its scattered oases and wandering nomads; but bearing in its heart the long fertile strip of Upper Egypt, which northwards widens into the fertile, well-cultivated delta region.

THE NILE FLOOD.—We have spoken of the sources of the Nile water. Let us note now the effect of the seasonal variation of the right bank tributaries. As we have seen, the waters of the White Nile show no great seasonal variation. In summer these waters are more or less ponded back by the floods which the Blue Nile and Atbara pour into the main stream, and the river is thus able to flow even during the early months of the year when the Blue Nile and Atbara are contributing little or nothing. These spring months form the period of low Nile, one of great agricultural activity in Upper Egypt, for the moistened alluvial land yields an abundant harvest. It is also the period when navigation is most impeded, especially in the rapid-obstructed stretch between Khartum and Assuan.

The Blue Nile is lowest at the end of April, and reaches its maximum about the end of August. At Assuan the main stream is lowest in May, and reaches its maximum in early September, while this maximum does not occur at Cairo, at the head of the delta, till the end of September.

But though the times of high and low Nile are constant from year to year, the height of the flood is very variable, owing to variation in the Abyssinian rainfall.

The whole system of irrigation upon which Egypt depends must necessarily be based upon the *mean* flood; in consequence a flood below the mean brings scarcity because the water does not reach the land. Again, a flood much in excess of the mean is disastrous because of the resultant damage to the irrigation works. These two risks have always menaced Egyptian agriculture, and the object of the engineer is to obviate them as much as possible.

EGYPT

Egyptian Agriculture.—Egypt is necessarily a purely agricultural country. It has no minerals of any account; it has no natural resources in the way of forests or game animals; it has no supplies of fuel which would permit of the establishment of large manufactures; it is not on a highway which would give it an important carrying trade; in short, the narrow, easily-watered tract near the Nile is its only wealth. This, combined with the fact that the climate is warm and sunny, makes it a region of agriculture, as it has been throughout all the historic period. Civilisation in Egypt goes back about six thousand years, and yet under the Turks the condition of the agricultural population was miserable in the extreme. Into all the reasons for this combination of an early development of civilisation, and a more or less complete collapse later, we cannot go here, but it is important to notice the geographical factors. As we shall see, it has always been comparatively easy in Egypt to obtain a certain amount of food from the land—hence it was a region which could be developed by a people with small resources, that is, by one emerging from barbarism into civilisation. On the other hand, not only was there always risk of famine if the Nile flood failed, but the difficulties in obtaining high yields are great. Further, while in regions like the wheat lands of Canada individuals can break up new land and raise crops, in Egypt combination of many individuals has always been necessary in order that the indispensable water may be obtained. Thus a centralised government has always been needful, but such governments tend to degenerate into tyrannies.

Egyptian crops are usually classified as summer,

autumn, and winter, but it is important to realise that there are practically no seasons in our sense. In the southern Sudan summer rains occur, but these gradually diminish to the north, and beyond Shendi, which lies north of Khartum, the country becomes practically rainless till the Mediterranean seaboard is approached. Cairo has about an inch of rain per annum; Alexandria, on the coast, shares in the winter rain of the Mediterranean area, and, though the summer is absolutely dry, about $8\frac{1}{2}$ inches of rain fall during the cooler months.

There is considerable variation in temperature both throughout the year and during the day, but from the farmer's standpoint the essential point is that the so-called "winter" is warm enough for all the temperate crops. Thus March at Cairo is nearly as warm as a London July; April is much hotter. Therefore autumn-sown wheat or barley will ripen in early spring.

At Assuan the coldest month (January) is nearly as hot as the hottest month (July) in London, while the hottest month has a mean temperature of over 92° . Thus given water, temperate crops can be grown in Egypt during the cooler months, sub-tropical crops during the hotter.

Let us consider this question of the water supply. The Nile flood, we have seen, reaches its maximum about September, the exact date varying with the position of the place selected. Before that date the Nile is rising, after that it is falling. Now the simplest method of watering the land is to lead off the flood water into enclosed areas (basins) and allow it to stand for some weeks, usually about six. This takes place between the months of August and November. The standing water deposits fertilising silt, and when it

is drained off, the land is left ready for crops. On the portions of the ground above water-level during the season of flooding, the peasant can grow maize, millet, rice, and vegetables, which he calls *autumn* or *flood crops*.

On the wet land after the water has been drained off, the peasant in autumn sows wheat, barley, peas and beans and other pulse crops, also clover (berseem) for his beasts and to improve the land, with minor crops like flax. He does not manure the land, but relies upon the silt to renew the substances removed with each crop, and he gives but little attention to the crop once sown. The plants grow through the warm winter, and the harvest is reaped in the period corresponding to our spring (about mid-February to April), though some of the crops are of course short-lived. These are called *winter crops*, and are those on which the peasant depends for food.

By May and June the heat is becoming intense, the land is drying, and the river is lowest. During this period in a considerable part of Upper Egypt the peasant does little and the land is largely unutilised. In the delta, however, conditions are different, as they are also in the curious Fayum depression, another region of more elaborate agriculture, and in parts of Upper Egypt.

In the flood season there is more water than is wanted, and much of it runs to waste. Obviously if it could be stored and canals dug, then water could be carried to the land in summer, and the hot summer sun used for valuable crops. This is called perennial irrigation, as opposed to basin irrigation, and the great aim of the British Government, through the financial adviser, has been to press forward measures which will increase the land under perennial irrigation. Among the

measures adopted have been the construction of dams (barrages) and reservoirs. The great dam below Cairo has been repaired and has made perennial irrigation possible throughout a great part of the delta region. There is also a barrage at Assiut, and the huge reservoir at Assuan has increased the amount of land under perennial irrigation in Upper Egypt.

Where perennial irrigation is carried on *summer crops* are grown, and these are, first and most important, cotton, chiefly in the delta region, then sugar-cane, chiefly in Upper Egypt, also rice, especially near the Mediterranean seaboard. Other tropical or sub-tropical crops such as indigo, henna, sesame, and so on, are also grown, but there is more and more a tendency to concentrate upon cotton.

The cotton is grown for export, chiefly to the United Kingdom, and forms a money crop, by means of which the peasants pay their heavy taxes. The sugar-cane is to a considerable extent used locally.

Perennial irrigation has a number of very obvious advantages. It greatly increases the yield of the land, for two or more crops can be taken off annually; the extra crops help to pay for irrigation works, which diminish the risk of scarcity at times when the flood is exceptionally low. On the other hand, it brings with it certain disadvantages. As the water is not allowed to lie upon the land, as in basin irrigation, less silt is deposited, and much labour is required to keep the canals and ditches clear. The land tends to become exhausted for want of the silt, and manuring and rotation of crops is necessary to an extent to which the peasant is not accustomed. Further, as the land is less thoroughly washed than by the basin method, salts tend to accumulate, and greatly diminish the natural fertility. Finally, the cotton seems to show a gradually diminish-

ing yield, apparently because [too much moisture accumulates in the lower layers of the soil, and constant care is necessary in the selection of the seed and the management of rotations.

Among the minor cultivated plants of Egypt we may mention the vine. Once Egypt was a wine-producing country, but the Mohammedan religion makes this impossible, and the vine, chiefly grown in the Fayum, yields only raisins. The date palm also flourishes.

In the Sudan as yet little cultivation is carried on, and this little yields chiefly local supplies of food. The cultivated land lies near the banks of the river, and it seems possible that irrigation works undertaken here would make it possible to grow cotton on a very considerable scale. Meantime no very large amount is produced.

Area and Population of Egypt.—Egypt, including the oases of the desert, has a total area of more than three times that of the United Kingdom (total about 400,000 square miles), but of this only a space (12,000 square miles), equivalent to considerably less than one-half of Scotland, is cultivated. On this area is clustered a dense agricultural population of more than 11 millions (Scotland has less than 5 millions). In the deserts there wander some 100,000 Bedouins or nomads, who rear cattle, horses, sheep, and goats, and travel with their flocks from one patch of vegetation to another, living in tents.

Politically Egypt ends at Wadi Halfa in lat. 22° , but there is here no natural boundary line. Northwards the delta extends beyond 31° N. lat. More useful figures to remember are that Cairo, the capital of Egypt, lies in lat. 30° , and Khartum, the capital of the Sudan, in about lat. 15° N.

Communications and Trade.—From Assuan to the sea,

a distance of about 750 miles, the Nile gives uninterrupted communication, but navigation in the delta region has always been more or less difficult, and is carried on chiefly by canals. The Egyptians have always been cut off from the sea by the shifting sands and muds of the delta, and are not in any sense a seafaring people. The present ports, Alexandria to the west, and Port Said to the east, are artificial, and Alexandria is cosmopolitan rather than Egyptian. It looks towards the sea, and not like Cairo towards the fertile delta.

From Alexandria and Port Said, as well as from Rosetta and Damietta, railway lines run through the delta region, forming a network, whose branches converge on Cairo, which commands the route down the Nile. From Cairo a single line follows the stream to Assuan. There is also a railway to the Fayum region.

We have already mentioned this region. It is a depressed area, once occupied by a large lake, of which all that remains is a patch of brackish water, the Birket-el-Kerun, which lies below sea-level. Owing to the sunken position it is possible to irrigate the Fayum from the Nile, the great canal which does this being called the Bahr Yusuf, because the peasants believe that it was constructed by the Joseph of the Bible. The surplus irrigation water flows into the Birket-el-Kerun, and the whole region is very fertile, and produces the usual Egyptian crops, and also fruit.

In addition to the Fayum, but very much farther to the west, another series of depressions lie in the desert. These, however, lie above not below sea-level, and owe their limited water supply to the fact that they are underlain by water-bearing rocks, from which water can be obtained either by boring or from

natural springs. These are the oases, of which the most important is that of Dakla, lying some 200 miles due west of the ancient Thebes. In these oases wheat, barley, fruit, etc., are raised for local use, but a more extensive cultivation of the date palm yields dates for export. The flocks also yield wool and skins. In some cases the primitive camel tracks which used to bind the oases to the Nile valley have been replaced by light railways.

This description, and what was said above in regard to Egyptian agriculture, enables us to realise the nature of the trade of Egypt. The region of perennial irrigation in the Nile valley yields raw cotton, and lesser amounts of wheat, sugar, beans, etc., are also exported. The oases give dates, and small amounts of skins, leather, woollen articles, etc. Cotton manufactures and coal are imported. The importance of the cotton trade may be gathered from the fact that Egypt now supplies more than one quarter of the material required for Great Britain's great cotton manufacture. Of the remainder the United States supplies about seven-tenths, and all remaining parts of the globe only about one-twentieth. The cotton of Egypt is thus of very great importance to us, and, as we have seen, cotton in Egypt depends upon perennial irrigation, which can only take place under a strong, settled government. This is another reason for British interest in Egyptian affairs.

Health Conditions in Egypt.—All through historical time Egypt has been known for the prevalence of a number of special diseases. Within recent years it has been shown that many of these are due to minute parasites, transmitted by insects or obtained from impure water, and the prevalence of the latter kind of disease in Egypt and the Sudan is to be ascribed to

the dry climate and the consequent difficulty with the water supply. Both in Egypt and the Sudan, the obtaining of a pure water supply and the maintenance of proper sanitary conditions in the towns is a matter of very great difficulty. It is possible that some of the special characteristics of the Egyptian peasant, such as his inertia and unwillingness to make new experiments, are due to the frequent infection with various forms of parasites, and parasitic disease is a great obstacle to stock-rearing in the Sudan.

The People of Egypt and the Sudan.—The inhabitants of Egypt are chiefly of Hamitic and Semitic origin (see Chap. XVIII). The agricultural peasants, who seem to be descendants of the ancient Egyptians, are Hamites; the wandering nomads of the desert are Semites. In marked contrast to these are the negroes of the Sudan. In the southern Sudan the people are pure black negroes, whence the name of Sudan or land of the blacks. Farther north there is a strong infiltration of Semitic or Hamitic blood, and we get mixed races, such as the Nubians.

In a quite general fashion we may think of the population of the Nile valley throughout its extent as follows:—

1. In the south we have pure or nearly pure negroes, with the usual negro characters. Thus little cultivation is carried on, and agriculture is of a very primitive type. In the forest region the banana predominates as the food plant; where the country becomes drier, small amounts of such cereals as millet, with various vegetables, are grown.

2. In the dry regions are wandering Arabs (Bedouins) who become more or less sedentary round fertile oases. These are predominantly pastoral folk, and the date is their chief food plant. Fierce and warlike,

in religion fanatical Mohammedans, these Arabs are a permanent menace to the settled agricultural population of Egypt. They are a tall, fine-looking race, with wavy hair and good features, and are Semites.

3. In the irrigated lands of Egypt, that is, as we have seen, in the strip near the Nile, the predominant people are the Hamitic cultivators, who differ from the negro races not only in appearance and character, but markedly in their methods of agriculture. They use the plough drawn by draught animals instead of the negro hoe. In other words, they are farmers, whereas negroes, except when taught by other races, are never more than gardeners. Like the Arabs of the desert the peasants of Egypt are Mohammedans, but their religion is of a less pure type, remnants of earlier faiths still lingering in their creed. These peasant cultivators have a darker skin than the Arabs, their hair is often frizzy, and their features are less well-cut. As we should expect from the fact that the Nile has always been a highway, there are a very large number of mixed races.

THE ANGLO-EGYPTIAN SUDAN

Area and Population of the Sudan.—This huge area reaches an extent of some 1,000,000 square miles, roughly two and a half times that of Egypt, but it is as yet of little commercial importance, and has been devastated by wars. The population is estimated at about $2\frac{1}{2}$ millions, but the country is capable of carrying a far larger number of persons.

General Characters of the Surface.—It was explained above that the region with some rain extends north beyond Khartum, but long before this the amount has ceased to be large enough to permit of the free

growth of vegetation, except under special conditions, or where water is artificially supplied. El Obeid, the capital of Kordofan, in about 13° N. lat., may be said to mark the northern limit of the region where a considerable amount of vegetation occurs naturally.

Taking the town of El Obeid as a starting-point we may think of the Sudan, outside the Nile valley, as consisting of three belts. North of El Obeid is the dry region. Here the camel is the typical animal, and dates, especially about Dongola, the chief product.

The next belt is formed by Kordofan, of which El Obeid is the capital. Here scattered trees occur, especially acacias, and one kind of acacia yields a valuable gum for export. The slightly damper climate permits the camel to be replaced by cattle, which yield skins and hides for export, and also supply beef for Egypt. The open plains carry ostriches, whose feathers are exported. (Compare the conditions in Somaliland, Chap. XIX).

Still farther south, where the rainfall is abundant, especially in the province of Bahr-el-Ghazal, we find woods dense enough to yield valuable timber, and containing rubber plants, so that rubber is exported. Through the forest elephants wander, and there is in consequence a trade in ivory.

Round the Blue and White Niles cultivation is possible, and is already carried on to some extent. It is believed that the Sudan may become a great cotton-growing country, but cotton has yet scarcely got beyond the experimental stage. Two points of contrast with Egypt may be noticed. In the first place, in parts of the Sudan the rains are sufficient to supply the necessary water, so that we have rainland cotton. Secondly, as the temperature becomes progressively higher as we pass southwards, cotton in the

Sudan can be grown as a "winter" crop on flooded land, instead of only as a summer crop.

Communications and Towns.—The Nile valley railway is continued from Wadi Halfa to Khartum, but it does not follow the course of the river, for south of Wadi Halfa this takes a huge bend, cut off by the railway. From Khartum the line is continued southward to Sennar on the Blue Nile and then westwards to El Obeid. Khartum is the natural centre of the Sudan, standing as it does at the junction of the Blue and White Niles. But the fact that river navigation is interrupted between this town and Assuan, combined with the enormous distance between Khartum and the Mediterranean port of Alexandria, made it extremely difficult to develop the trade of the Sudan. To give an easier access to the sea, no less than to give an alternative route to the Red Sea should the Suez Canal be blocked in war, a railway was built from near Berber to the Red Sea, where a new port was made (Port Sudan). This port, however, is not very safe. On the whole, indeed, the Sudan is at present a country of possibilities only, and it should strictly be included with Somaliland (Chap. XIX), as a region with little native cultivation, but the fact that there is no natural boundary between it and Egypt makes it better to include it here.

CHAPTER XV.

II. THE INDIAN EMPIRE

(A) Natural Regions

General.—India is a great mass of land whose extreme limits in latitude are 8° N. and 37° S., so that, roughly speaking, it is, like Australia, bisected by the tropic—here the northern instead of the southern tropic. In area it reaches a total of 1,770,000 square miles, that is, it is about three-fifths the area of Australia, and less than half that of Europe. Of this great area, however, a very considerable part is included in the native states, and is thus not British territory in the strict sense. France and Portugal have also possessions in India, but these are of small area.

This vast area of land is inhabited by 315 million people (contrast the $4\frac{1}{2}$ millions of Australia), belonging to very varied races, but dependent for the most part upon agriculture. As India, no less than Australia (though to a much less extent), has desert areas, we find that its population is densely clustered on those areas where soil and climate are favourable to the growth of crops. Here, however, the most important crops are tropical or sub-tropical. Population is especially dense round the rice-growing areas, for this cereal is extraordinarily productive, and is well suited to serve as the basal food supply in a hot climate.

Natural Divisions.—India falls into three great natural regions—(1) The Northern Mountains; (2) The Plains of the Indus and the Ganges; (3) The Southern Plateau. Of these the mountain region, which extends into Burma, includes protected or almost independent states, usually not densely peopled and not very fertile.



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FIG. 43.

In the region of the Great Plains we find the most densely peopled areas, and practically the whole of the plains fall into British territory. The plateau region to the south has on its margins, especially on the south-east, plains which are fertile and densely peopled; in its central part, uplands which are not easy of access;

and to the north-west, more or less barren regions of scanty rainfall. Broadly speaking, the most fertile and best peopled regions are British, the less accessible and more barren regions remain as native states.

I. THE NORTHERN MOUNTAINS.—These are of very great importance both historically and geographically. Much of peninsular India is fertile, well-watered and low-lying. It is thus admirably fitted for settlement. On the other hand, Central Asia reaches a high mean elevation and has a very severe climate; the lower lands also suffer greatly from drought. India thus forms an Eldorado for the people of Central Asia, and the nature of the mountain barrier between the two has had an enormous effect on its history.

Again, the presence of the huge mountain barrier has a great influence on the climate of India. It has, broadly speaking, a north-west to east direction, as contrasted with the Rocky Mountains in North America, which have a general north to south direction. The position of the mountains causes India to be warmer and wetter than it would otherwise be, and produces a very marked contrast between its climate and that of the lands to the north. Further, the waste of the mountains has formed the rich alluvial plains of the Indus and the Ganges, and the streams from the mountains water the plain: in other words, the presence of the mountain barrier makes the dense population of Bengal possible.

The central and most important part of the mountain barrier is constituted by the Himalayan Range, which forms a great arc of a circle, advancing upon the plains, and bounded to the east and west by the valleys of the Brahmaputra and Indus respectively.

If we neglect the valley of the Indus, we may say that the Himalaya originate in that great knot of mountains called the Pamirs. From this mountain

knot diverge not only the Himalaya, but also the Karakoram, running roughly parallel to the Himalaya, and the Hindu Kush, which run to the south-west, as the Karakoram run to the south-east. From the Hindu Kush southwards a series of lower ranges continue the mountain barrier of India. These mountains form the Sulaiman and Kirthar Ranges, and are far more easily crossed than the Himalaya.

At the east end of the Himalaya the mountain barrier also turns southward, beyond the Brahmaputra valley, running first south-west as the Patkai Mountains, and then almost due south as the Arakan Yoma Mountains. Behind these seaward-facing ranges, other parallel chains occur, also running north and south, and forming the mountainous land of Burma. This land is traversed by great rivers, such as the Irawadi and the Salwin, running in wide flat valleys well fitted for cultivation and settlement.

Two minor mountain ranges have still to be noted. These thrust themselves forward towards the plains, and form (1) the Khasi Hills, which project, as it were, from Burma into India, seeming to push the Brahmaputra in front of them; and, at the other end of the Himalayan Range, (2) the Salt Range, which extends out into the plain of the Indus.

The mountain ranges are of geologically recent origin, forming, like the Alps, a portion of a great system of wrinkles in the earth's crust, and built up in part of soft rocks, which yield with great rapidity to the denuding forces of frost and rain. Owing to their height they contain many snowfields and the most magnificent glaciers in the world. In consequence their southern slopes give rise to mighty rivers, which are of supreme importance to the plains.

The Himalaya include in Mount Everest (29,000 feet)

the highest mountain in the world, and constitute an almost insuperable barrier to communication with the north. This is not only because of their height and the difficulty of the passes. An even greater obstacle is the fact that behind the mountain barrier which fronts the Great Plains there lies the plateau of Tibet, cold, lofty, almost barren, scantily peopled and of few resources—an obstacle which makes both trade and invasion all but impossible. Owing to the way in which the great earth-folds curve round to the south in Burma, that country is easier to invade from the north than India, and has been so invaded in the past. India lies open to invasion only from the north-west, for here, as we have seen, her mountain barrier is lower, and here access to the hot steamy plains, with their possibilities for agriculture, is relatively easy for the inhabitants of the dry steppe region of Asia to the north-west. Thus India's retaining wall is breached by various passes through a distance of 700 miles from Kabul to Karachi, and through these breaches the land invaders have always come.

The individual passes are too numerous to name—two may serve as samples of the whole. From Kabul to Peshawar a road lies open over the Khyber Pass, and this route brings an invader to Lahore, and so to Delhi and the Ganges Plain. Over part of its course the road lies along the banks of the Kabul River, but where this river plunges through deep and inaccessible gorges it is necessary to leave it, and the actual Khyber Pass lies south of the river and some distance from it.

Another important pass, the Bolan, leads from Quetta to the lower Indus valley, and so to Sind and the west coast.

We must add a word as to the rivers of the mountain

region. The Indus and the Brahmaputra arise, as we have seen, at the back of the Himalayan chain, their sources being near together though they flow in opposite directions. The Ganges and its great tributaries, no less than those of the Indus, seem to arise on the south side of the chain. In point of fact their real origin is often beyond the crest, and it is believed that they are older than the present mountain chain, and were able to eat down their gorges as the land rose. The chief point of interest for us, however, is that the drainage is still in an undetermined state, as is usually the case in recently elevated mountain chains. Thus the Sutlej seems to have beheaded the Indus, and in course of time the tributaries of the Ganges will probably tap the Sutlej and even the Brahmaputra.

2. THE GREAT PLAINS.—Once there rolled at the base of the Himalaya a great sea. This has been filled up by the waste from the mountains, and there now stretches from sea to sea a vast plain, divided by a low watershed, under 1000 feet in height, into the great plain of the Ganges and the lesser plain of the Indus. The Indus receives in its middle course five large tributaries from the Himalaya, the Jhelum, Chenab, Ravi, Beas, and Sutlej, whence the name of Punjab, or region of the five rivers, given to the district. South of the confluence of the Sutlej the Indus receives no left-bank tributaries of any importance, owing to the low rainfall of the region it traverses. On the right bank it receives some short tributaries of minor importance before carrying the waste of the mountains into the Arabian Sea to form a delta.

The Ganges has both left- and right-bank tributaries, but the left-bank streams, which drain the Himalaya, are by far the most important. The chief of these are the Jumna, Gogra, and Gandak, while the important

right-bank streams are the Chambal, which joins the Jumna, and the Son. The river enters the Bay of Bengal by a tremendous delta, which pushes its way out into the ocean as the swampy and unhealthy Sundarbans. The Brahmaputra, which is connected with the lower Ganges, assists in the formation of this great delta.

3. THE SOUTHERN PLATEAU consists for the most part of very old rocks, and shows a certain resemblance to the plateau region of South Africa. As in South Africa, the coasts have not many good harbours, and, as in that country, the seaward escarpment of the plateau presents the appearance of a mountain range. Further, as the plateau faces on the north the depressed area of the plains, it gives rise to the appearance of mountain ranges at this side also. Thus the Aravalli Hills, which face the wastes of Rajputana, form the north-western edge of the plateau. Behind them lies the Malwa plateau whose southern margin forms the Vindhya Mountains, cut off by the deep narrow trench in which the Narbada runs from the Satpura Hills, which are again cut off from the main plateau by the valley of the Tapti River.

South of the Tapti Valley the central plateau is called the Deccan, though this name is sometimes applied to peninsular India generally. In the narrow sense the Deccan is the central plateau, extending from the Tapti to the Nilgiri Hills in the south. Its western margin forms the Western Ghats, which rise step-like from the coastal plain to a height of just under 5000 feet. Their steepness and their narrow valleys make these hills imposing from the sea, and they render the interior difficult of access. South of the Tapti no important stream breaks the line of the Western Ghats, and it is believed that the old plateau of India was once continued seawards over the Indian Ocean to Africa (see

Chap. XVII), and that the present line of the Western Ghats marks the position of the old watershed of the sunken land. South of the Nilgiris a curious gap, called the Palghat Gap, which is of great importance in connection with communications, is thought to mark the site of a great river belonging to the vanished continent.

The Plateau which ends westwards in the great escarpment of the Western Ghats, has a slight tilt to the east, and in consequence the great rivers all flow eastward. The most important are the Mahanadi, the Godavari, and the Kistna. Owing to the tilted position of the plateau its eastern edge forms a far less marked escarpment than the western. This eastern edge is called the Eastern Ghats; but as an obstacle to communication these hills are much less important than the western, in part because of the wide river valleys.

In the south-east the plateau is fringed by a wide belt of lowland, which forms the most fertile and best peopled part of Madras. This belt of lowland is continued northwards up the east coast, narrowing at the point where the coast bends to the north-east. On this belt of lowland, fertile alluvial soils predominate, especially round the valleys of the great rivers. In the tableland the soil is sometimes poor and thin, being often a reddish soil called laterite, which is common in the tropics. Elsewhere great deposits of volcanic rock occur, and this weathers to form a rich soil which accumulates to great depths on the lower grounds, and constitutes the black cotton soil of the Deccan.

(B) Climate, Productions, and People

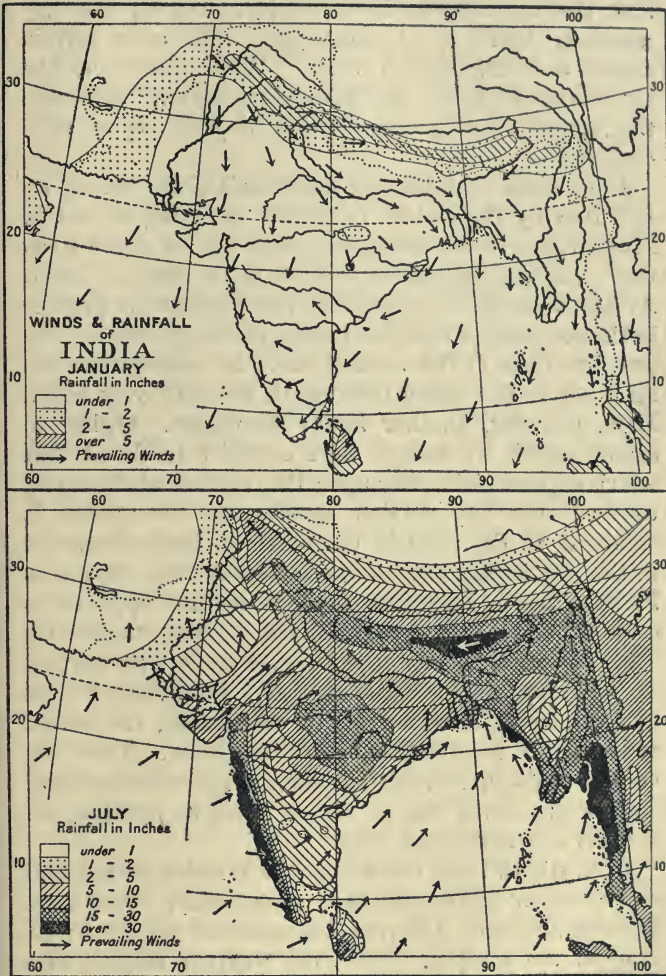
Climate.—Owing to its great area, India has necessarily a variety of climates, a variety which is accentuated by the nature of the surface relief. Certain features

are, however, common to the greater part of the area. Thus India is the typical monsoon country, the winds showing a periodical reversal according as pressure is greater over the land (winter) or over the sea (summer). About 90 per cent. of the total rainfall comes with the wet monsoon of summer, and thus India generally, both the parts within the tropics and those which are extra-tropical, have the tropical feature of heavy summer rainfall and cool season drought.

Another characteristic is the high summer temperature; the temperature at other seasons varies with the latitude. If we take the tropic of Cancer as corresponding in a very rough fashion to the boundary between the plains and the plateau, then the lands lying north of the tropics—*i.e.* the plains, the foothills of the mountains, and the mountain slopes—form Northern India; those lying to the south of it, Southern India. In Northern India, as thus defined, there is a distinct cool season; in Southern India there is little temperature variation throughout the year, so that the “winters” are also hot.

The rainfall varies very greatly in amount in different localities. On the slopes of the Khasi Hills we have the rainiest region in the world, something like 40 feet falling annually, while in some regions in Upper Sind there are years in which no rain falls at all. In the delta region of the Ganges the mean fall is 80 inches per annum, while in the west of the Ganges plain the mean total sinks to 30 inches.

The Monsoon Winds (see maps forming Fig. 44).—The prevailing wind currents of India are the north-east or dry monsoon, which prevails from the middle of December to the end of May, and the wet or south-west monsoon, which blows for the rest of the year. During the wet monsoon the air is damp, heavy rain is frequent,



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FIG. 44.

and the atmosphere is oppressive. During the dry monsoon there is at most light rain over certain areas, and the sky is clear. While, however, the air currents have the general direction indicated, the actual wind in any locality depends upon local conditions.

If we begin with the dry monsoon and its causes, we find that by the end of December the land, so hot in summer, has cooled down, and chills the air above it, so that an area of high pressure forms in the north of India. At the same time an area of low pressure is present in the southern part of the Indian Ocean, because of the presence there of the vertical sun. In consequence the air tends to flow down from north to south over India. Here, however, another factor intervenes. Owing to causes which we cannot here consider in detail, but which depend ultimately upon the rotation of the earth, we find that any particle moving on the surface is deflected to the right in the northern hemisphere and to the left in the southern, a generalisation known as Ferrel's Law. Therefore the air current appears to come from the north-east instead of from the north. Thus the dry monsoon appears over India as a current of generally north-east direction. But though this is the general direction of air movement, the actual wind varies in different parts of India. Thus the current finds in Northern India the open Ganges plain and sweeps down this as a west wind, reappearing off Madras as a north-east wind.

In Northern India this is the *Cold Weather Season*, and storms occur in the northern plains which bring rain, in small amounts, it is true, but sufficient for the wheat crop of the Punjab. This cold weather rainfall also makes cultivation possible in parts of Sind and Rajputana, regions which do not get the ordinary monsoon

rainfall. In Southern India there is practically no rain during this period.

These conditions prevail till about March. Then the land begins to heat up, this being especially true of the dry area of Sind, Rajputana, and part of the Punjab. By May the hottest part of India lies in the region of Sind, and here, therefore, a low pressure area develops. At the same time, owing to the advance of the sun northward, the equatorial low pressure belt changes in position. The result is that the wind circulation is reversed. Instead of air streaming from India seawards, it is drawn across the equator, from the sea towards the land, and being deflected to the west (that is to the left, see above) by the earth's rotation, appears in India as the south-west monsoon. During the months from March to May there is conflict between the two currents, and these months constitute the *Hot Weather Season* of India, the period when the atmosphere is most oppressive. During this season there are dust storms in the dry interior, but in Assam the numerous thunderstorms bring heavy rain, which is of great importance for the tea crop. Bengal also receives the benefit of these thunderstorms, which promote an early crop of rice, and thunderstorm rains occur on the Malabar coast. In the interior the storms only bring little rain, which occurs in heavy bursts, and is of little use for agriculture.

By June the south-west monsoon is thoroughly established, and "bursts"—that is, brings torrential rain, which refreshes the parched land, and leads to a rapid growth of vegetation. The coming of the rain is usually heralded by storms, and the date of its beginning shows great constancy in the different parts of India. The months from June to October form the *Rainy Season*.

The actual course of the south-west air current is interesting. One great stream of air rushes up the Bay of Bengal, and brings copious rain to Tenasserim and Burma as it rises over the coastal mountains. At the head of the Bay this current meets the Khasi Hills and brings tremendous downpours here—the rainfall which permits of the growth of the tea plant in Assam. The current is now bent to the west, and, meeting the Himalayas, is forced to rise, and throws down heavy rain over the Ganges plain.

Another current of air travels up the Arabian Sea, and is confronted with the line of the Western Ghats. As it rises to overtop this obstacle it is cooled, and much of the contained moisture is thrown down on the seaward side of the Ghats, so that the Deccan behind gets less. This air current then crosses the plateau to the Bay of Bengal, giving rise to squalls where it meets the Bengal air current.

The northern part of the west coast current gives but little rain to the low and sandy Kathiawar, Cutch, and Sind coasts, and is deflected from the hot region of Sind, so that this region lies on the margin of the rain-bearing current and gets practically no rain. Not till it reaches the Eastern Punjab does this branch deposit any heavy rain, and thus Sind and Western Rajputana form permanently dry areas.

With intervening dry periods, of varying length, the rainy season lasts till September or October, when the area of heavy rainfall begins to contract and the monsoon retreats, as it is called—that is, gives place gradually, from north to south, to the north-east wind. During this period of retreat, which lasts till December, the Madras coast gets a certain amount of rain. By December the north-east wind has completely established itself, and the cool dry season begins.

The Seasons of India may thus be given as follows :—
1. From June to October is the Rainy Season for most of India. 2. November to February is the Cool Season for Northern India. During this period there are occasional storms in the north-west of India, which bring cold weather rainfall. Further, during November and December, the period of retreating south-west monsoon, the Coromandel Coast gets some rain, for at this time the wind blows from the south-east or east—that is, towards the land—before the north-east wind establishes itself. 3. The Hot Weather period lasts from March to May, and is generally dry. In Assam and Lower Bengal, however, as well as elsewhere, thunderstorms bring heavy rain.

As will be seen from the above description, parts of India are permanently dry. Thus the Indian desert, which includes Western Rajputana and parts of Sind and the Punjab, is too dry for cultivation, and the lower Indus valley generally can only be cultivated where irrigation is possible. Much of the Deccan also, except where the water-holding black cotton soil occurs, is too dry for cultivation without irrigation. Generally speaking, regions under irrigation are not so liable to famine as those which depend upon a rainfall just sufficient in normal seasons. In the interior of the plateau region, and in Northern India, the wet monsoon rainfall is that upon which agriculture depends. It follows a period of great heat and drought, and thus a delay in the appearance of the rains, or a diminution of the normal amount, has very serious effects upon agriculture. A very considerable part of India, especially those areas remote from the seaboard, is liable to famine owing to variation in the rainfall, and this liability has as yet been only partially overcome by irrigation works on the large scale.

Natural Vegetation and Cultivated Crops.—From what has just been said in regard to the climate, we may deduce the nature of the vegetation. Those parts of India which have abundant rainfall and no long dry season, such as the seaward slope of the hills of Burma, the Assam Hills, the southern part of the Western Ghats, bear evergreen tropical forest, like that which occurs in all hot regions with a heavy rainfall. This forest is, however, of limited distribution, and, wherever the dry season becomes marked, is replaced by the deciduous forest, the most widely distributed kind of woodland in India. This type includes trees with various methods of protecting themselves against recurrent drought, the most marked being the periodical shedding of the leaves. The most valuable tree is teak, which yields a high-priced timber; other commercially valuable trees are sal, ironwood, sandalwood, and so forth. A kind of acacia is important, because it yields a useful resin called cutch, and the bamboos, really gigantic grasses and not trees, are exceedingly abundant and useful in many ways. Palms are also frequent. This deciduous type of forest was once widespread in India, but the lower lands have been cleared for purposes of agriculture, and forest now mostly occur in the upland regions.

Where the rainfall is small and precarious, as in the Deccan, and in the north-west, the deciduous forest gives place to scrub, in which acacias and tamarisks are important plants. As the rainfall diminishes further, or the conditions in other ways become unfavourable, the scrub forest thins out into grassland or desert. Thus grassland occurs in various parts of the Deccan and in South-eastern Rajputana. North-western Rajputana and part of Sind are desert (forming the Indian desert or Thar).

The lower slopes of the northern mountains are clothed with deciduous forest, or, where the rainfall is adequate, as in the north-east, with evergreen forest. The higher slopes, above an elevation of about 3000 feet, carry woods of mountain type. Here are found oaks and many other trees familiar in Europe; pines, spruces, the beautiful deodar cedar, cypresses, and so forth, mingled with huge rhododendrons. The upper limit of these forests lies at about 12,000 feet; above is a zone of Alpine plants, as in the Alps.

In regard to the cultivated plants we must note first that even in Northern India the cold season is warm enough for temperate crops, which can be readily grown where the rainfall is sufficient, or irrigation is possible. In the south the temperature never falls low enough to check vegetative growth, and plants can grow continuously where water is supplied. Thus the Indian cultivator normally obtains two crops per annum.

Agriculture suffers, as we have seen, from the uncertainty of the rainfall. It is also unfavourably affected by the fact that large numbers of domestic animals cannot be kept in the cultivated areas, and thus only small quantities of manure are available, which means that the land runs the risk of becoming exhausted. Further, as in many parts wood for fuel is scarce, and coal not obtainable, dried cow dung forms a usual fuel (as it does, for example, also in the deforested areas of Savoy, in South-eastern France), and this again diminishes the supply of manure. Handicapped as he is, however, by these difficulties the Indian peasant is a skilful cultivator, incomparably superior to the African negro, and better than the Egyptian peasant. His superiority is especially shown in the great variety of crops grown, and in the habitual use of a rotation of crops.

In Northern India the crops fall into two classes.

Wheat, millet, pulse, oil-seeds, opium poppy, tobacco, etc., can be grown during the cooler season, and demand but little water. They are sown in autumn (October to November), and ripen in our spring (March to April). Sometimes, as in parts of the Punjab, the natural rainfall of the cool season suffices, elsewhere irrigation is used. These are the spring crops.

Crops which demand much water are rice, jute, indigo, sugar, cotton, tea, etc., and these are grown as wet season crops. The short-lived forms, like rice, jute, and indigo are sown in June to July and reaped in September to December; the other plants named are long lived.

In Madras and the south generally, where there is no cool season, there is no difference in character between the crops of the two seasons, and where abundant water is available owing to irrigation, as *e.g.* in parts of Madras, three crops of rice can be obtained in the year.

As the above account shows the great need of Indian agriculture is water. Only areas in which the total fall reaches 70 inches per annum can dispense with irrigation, and apart from Ceylon, of which we shall speak separately, such areas only occur in Burma, Assam, Lower and Eastern Bengal, and along a strip between the Western Ghats and the sea. Elsewhere productivity depends upon artificial supplies of water.

Irrigation water is supplied in three main ways: by wells; from tanks or reservoirs; by canals. Wells can be sunk with relatively little labour, and the water is then obtained by hand or by simple forms of mechanism; in consequence, wells are very abundant wherever water occurs near the surface, and especially in the alluvial plains of the Central Provinces and the Punjab.

Tanks or reservoirs, in which the excess water of the rainy season can be stored, are also numerous, and vary

greatly in size, some ancient ones having formed huge lakes. They are to be found in Madras, Mysore, Bombay, Hyderabad, and elsewhere. Irrigation canals, on the other hand, are for the most part costly to construct, and are often undertaken by government. The irrigation canals leading from the Indus Valley make cultivation possible in parts of Sind, and the prosperity of Madras is largely due to the canals which carry water from the great rivers. In the Punjab, the United Provinces, and Bengal also, canals are numerous.

As regards the chief crops grown the largest area of land is given to rice, but this is not, as is sometimes supposed, the chief food plant of the majority of the people of India. In Lower Burma, Assam, Lower and Eastern Bengal, and the western coastal strip, rice can be grown without irrigation. In these regions, as also in Ceylon, it is the natural food of the people. In Burma the population is thin in proportion to the area capable of growing rice, and therefore this cereal is largely exported, the world's supply coming chiefly from Burma. India proper consumes most of its own rice, and in famine years imports supplies from Burma. Rice, though highly productive, is a difficult crop to grow, and even in the rice-growing regions the grain is sometimes sold to pay taxes, the grower eating the cheaper millets and pulses instead. In addition to the districts named, Madras and the Central Provinces grow much rice by the aid of irrigation.

Wheat is grown on a very considerable scale as a cool season crop in the Punjab, the United Provinces, and the Central Provinces, but it is chiefly a money crop, and is eaten by the richer classes only. There is a large export of wheat from India to the United Kingdom.

The grains which feed the majority of the people of India are millets, of which several varieties are grown.

They are widely distributed crops, which can be grown with a relatively small rainfall, and are thus both cool season crops in the north, and rainy season crops in regions where the total rainfall is small. Mingled with pulses and vegetables, they form the chief food of the peasants.

A considerable variety of pulses are grown, especially chick peas (*gram*), both as food crops, and as rotation crops to improve the condition of the land. Oil-seeds, especially linseed, sesamum, ground nuts, castor-oil plants, rape, etc., are also widely and extensively grown.

Other important crops are jute, especially in Bengal ; tea, in Assam, round Darjeeling and in the Nilgiris ; cotton, over a wide area, but especially in the Deccan ; coffee, chiefly in the Nilgiris, and to a diminishing extent ; indigo, especially in Bengal, Madras, and the United Provinces, but now diminishing on account of the increasing use of artificial dyes ; opium poppy, chiefly in Bengal and the United Provinces ; the cinchona tree for quinine, at Darjeeling and in the Nilgiri Hills, usually grown in conjunction with tea or coffee ; tobacco, chiefly in Bengal ; with many kinds of fruit and vegetables. Of the fruit trees the mango, whose fruit is very extensively eaten in Northern India, is the most important. India also has always been celebrated for its spices and flavouring matters, extensively used by the natives to make the tasteless rice appetising. The Malabar coast still produces pepper and other spices.

Wild and Domesticated Animals.—India with Further India, etc., constitutes a special zoological region, and is remarkable for the great wealth and variety of its native mammals. Among the large cats the tiger is still a serious foe to man in the more remote

districts, and monkeys are almost everywhere abundant. Of the hoofed animals mention may be made of the elephants, which have been tamed but not domesticated, for they do not breed in captivity. They are used both for riding, especially in the native states, and for heavy hauling work, especially in the forests. Various kinds of oxen occur, such as the small yak of Tibet, found both wild and domesticated, the buffalo, also domesticated and used as a draught animal, together with other wild cattle. There are also wild deer, antelopes, and pigs. The birds are numerous and beautiful, and India is famous for its abundance of poisonous snakes, among which the cobra is included. The mongoose, often kept as a pet, is a small carnivore of great agility, which feeds upon snakes, and is thus a highly useful animal.

As regards domesticated animals, cattle and horses are not abundant, for there are considerable difficulties in feeding them. Also, owing to religious scruples, cattle are but little bred for food. Buffaloes and the Indian humped cattle are the chief kinds of cattle kept. The female buffaloes yield milk, the males are used in ploughing and as draught animals in the regions of heavy rainfall, where the humped cattle will not thrive. The humped cattle are chiefly used in agriculture and for draught. The chief cattle-breeding areas of India are in Rajputana and the Rann of Cutch where natural grass land occurs, and in parts of the Punjab.

The People of India.—The people of India belong to a great number of different races, speaking a variety of languages, and having few common ties. It is thus as impossible to speak of an Indian people as it would be to speak of a European people.

We may, however, recognise three main strains. It seems probable that India was originally inhabited

by dark people, with broad noses, and hair inclined to be curly, to whom the name of Dravidian is given. According to some authorities this race is related to the aboriginal Australians. In any case they seem to be a very primitive type of Caucasians. Though probably once distributed over India generally this race is now confined, in the pure form, to the upland and relatively infertile regions within an area extending from the Vindhya to Cape Comorin, to the east of the Western Ghats. It is thus the predominant race of Madras, Hyderabad, and the Central Provinces.

The next race includes tall, fair-skinned, bearded men, with prominent narrow noses, who seem to have entered India from the north-west, and called themselves Aryans. In a more or less pure form this race exists in Rajputana, the Punjab, and Kashmir, but it also spreads down the Ganges plain, and mingles with the native Dravidians.

Finally, on the north-eastern frontier there is a strong admixture of Mongolian races—that is, of people of short stature, with flat, nearly hairless faces, slanting eyes, and dark or yellowish skin. These are almost pure in the hill regions, where they form *e.g.* the Gurkhas of Nepal, and the people of Burma; but in Lower Bengal they have mingled with Dravidians to form the unwarlike Bengalis. The races called Scythians, which in historic times overran the basin of the Indus, and have mingled with Dravidians in the west coast belt of peninsular India, were apparently also of Mongolian type.

The vast majority of the people of India profess the religion known as Hinduism, but in Burma, of a total population of twelve million, more than ten millions are Buddhists. After Hinduism, the most important religion is Mohammedanism. Mohammedans are especially

numerous in Eastern Bengal and Assam, and in the Punjab and Baluchistan.

(C) Economic Geography

Minerals and Manufactures.—The minerals of India are not of very great importance. Coal and iron both occur in various parts, iron especially being widespread, but those special advantages which make the coal and iron beds of Great Britain so important are here absent. Thus the coal beds lie at some distance from the ports, and the best fields are in somewhat remote and inaccessible situations. Iron is not near coal, and limestone for flux is not easily obtained. Further, the native coal is not suitable for smelting.

Coal is chiefly worked in the Hugli basin, the chief centre being Raniganj, about 120 miles north-west from Calcutta. Petroleum is obtained chiefly in Assam and Burma, the oil-wells of Burma being of great importance. Iron used to be smelted by the natives with charcoal as a fuel in various parts of India, and this iron was the basis of a small native iron industry. But with the development of the railways, European iron, produced much more cheaply, has driven the native iron almost out of the market. Attempts have been made to smelt Indian iron on a large scale with the aid of coal, and the works at Barakar near Raniganj have been fairly successful.

Among other minerals are gold, mined especially in Mysore; copper, found in Southern India, Rajputana, and parts of the Himalayas; salt, obtained by mining in the Salt Hills, as well as by means of evaporation along the coast, and from salt lakes in the arid district; and gems. The last are produced in small amount only, in spite of the reputation of India as a gem-pro-

ducing country. Rubies from Burma are specially important.

The original manufactures of India were all based upon hand-power. Practically all the villages contained handicraftsmen carrying on minor trades, that is, potters, weavers, dyers, blacksmiths, and so. Where conditions were especially favourable, skilled and highly artistic crafts arose, the workers in this case tending to cluster in cities, which were the natural centres to which the raw material upon which their crafts depended tended to gravitate.

With the opening up of India to European products, the old arts and crafts have suffered considerably. Factory-made products are much cheaper than hand-made ones, and Manchester cottons and Birmingham goods have largely replaced the older and more attractive wares. But India has coal and cheap labour, so that a third stage in its manufactures is now beginning with the opening up of factories.

The three stages in India's relation to manufactures are well illustrated by the history of the cotton industry. Long before cotton was known in the West, India brought the art of weaving and dyeing to a high state of perfection, and the beautiful muslins of Dacca were known even to the Greeks. When the cotton industry of Manchester developed, India constituted (and still constitutes) a very important part of the available market, owing to the fact that cotton is there the almost universal wear. The last stage is the setting up of cotton factories in Bombay, Madras and Calcutta, so that India can supply a small part of her own demand for cotton goods, and exports a little to neighbouring regions.

Sacking (gunny bags) made from jute forms another interesting Indian manufacture. Jute fibre was used,

perhaps not earlier than the beginning of the nineteenth century, in Assam and Bengal, to make bags for the conveyance of various agricultural products, and also for cloth-making. In 1834 a Dundee manufacturer began to experiment with the substance, and laid the foundation of the extensive jute manufacture of that town. This led to a large export of raw jute from Calcutta, while at the same time a small hand manufacture continued to be carried on in Bengal. By the middle of the century, however, jute factories began to be established in Calcutta, and now there is a thriving industry there, which is affecting the Dundee trade unfavourably.

Other Indian manufactures carried on in factories are silk goods, manufactured in Bengal from home-grown silk, and in Bombay from raw material imported from China.

Among the goods still manufactured by hand are certain specially rich silk goods (Multan, Agra, Benares, etc.); carpets and rugs (Poona, Amritsar, Lahore, Multan); lacquered goods and brass goods (Agra, Lucknow, Benares, etc.); carvings in ivory and wood, and so forth.

Trade and Means of Communication.—The trade of India was for long greatly hampered by difficulties of external communication. As we have seen, the land routes are only possible in the north-west, and these are so difficult that only very valuable goods will bear the high cost of transport. Before the opening of the Suez Canal the long and dangerous voyage to Europe, the chief market for Indian produce, had an unfavourable effect upon the foreign trade.

Further, not only is communication between India and the outside world difficult, but within the country it is not, in most places, easy. The Ganges and its tributaries, it is true, running as they do over broad

plains, are admirably adapted for inland navigation, and they lead down to the fine port of Calcutta. The lower part of the Brahmaputra also is an excellent waterway. But the Indus is dangerous owing to the shifting sandbanks, and the rivers of the plateau, generally speaking, are unnavigable, owing to the rapids where they drop over the plateau edge, and the frequent presence of gorges. Thus, except in Bengal, the rivers of India are not of great importance as means of communication.

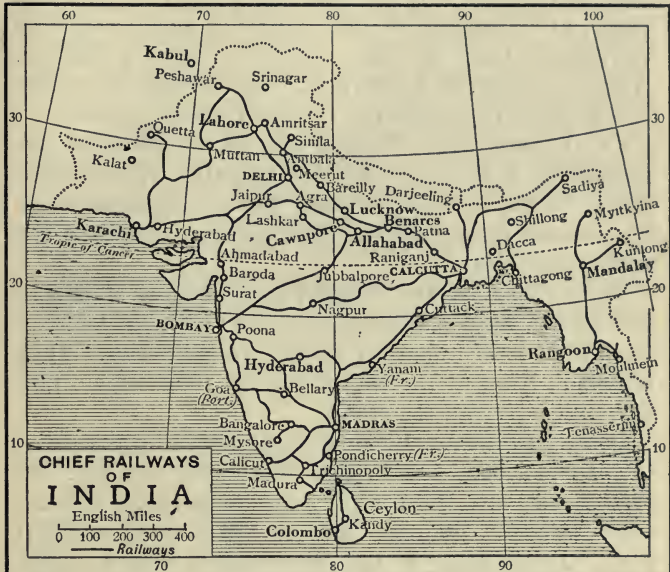
Before the British occupation, roads were few. Land communication generally was carried on by paths and tracks, goods being chiefly carried on pack animals, especially bullocks and buffaloes, or, less frequently, by rough native carts. In the Great Plains road-making is difficult and costly, because those vast alluvial stretches contain no stone, hardly even a pebble. Thus roads have to be made with broken brick, which is costly and not very satisfactory.

In the plateau region communications are difficult owing to the steepness of the margin, especially on the west; thus Bombay never flourished until the difficulties of road and railway construction were surmounted, and it was connected with the region lying behind it.

The railway system of India is now well developed, and we can only note the position of a few of the more important routes.

In the valley of the Ganges the network of lines is dense, for here construction is easy. This system is continued right up to Peshawar in the north-west, but as yet no transcontinental route links India to Europe as China is linked. South-west, this system is connected with a main line down the Indus valley, which sends a branch to Quetta.

In the Deccan the network is much looser, and routes across the peninsula are few. From Bombay two lines diverge and cross the Western Ghats by difficult passes. One of these, which traverses the Thal Ghat (1900 feet), runs to Allahabad, the other, after crossing the Bhor



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FIG. 45.

Ghat (2000 feet), runs to Madras. The Portuguese port of Goa is also connected to Madras.

Farther south an interesting line connects Calicut to Madras, this line passing through the Palghat Gap, of which mention has already been made (p. 233), at a height of 1000 feet.

By far the greater part of India's trade is sea-borne, and

it is therefore unfortunate that ports are few. The west coast, during the south-west monsoon, suffers severely from the blasts of this wind, which greatly impedes navigation. Bombay harbour has now been so improved that it affords safe anchorage even during violent storms. Next to Calcutta it is the most important port of India. Surat, at the mouth of the Tapti, has easier access to the interior than Bombay, but its harbour is shallow. Karachi, the great wheat port, is a thriving town, but is not perfectly safe during the south-west monsoon.

On the east coast Madras, despite all efforts at improvement, is not a safe port, but Calcutta, with splendid access to the interior, is good, though constant effort is necessary to prevent the port silting up owing to the advancing delta.

Burma has a number of good ports, such as Rangoon, Chittagong, Akyab, Moulmein, and so forth, but many of them are cut off from easy access to the interior. Thus Rangoon, lying at the end of a great river valley, predominates over all the rest.

In the year 1912-13 the total exports of India amounted to £178,000,000, the largest total ever reached. In this total raw jute and jute manufactures bulk most largely, the raw and manufactured material being to each other in the proportion of 6 to 5. Raw and manufactured cotton come next, the raw material being more than twice the value of the manufactured goods. Rice, chiefly from Burma, follows, then oil-seeds, wheat, hides and skins, tea and opium in order of importance. The total imports reached £159,000,000, a considerable discrepancy between exports and imports being characteristic of Indian trade. Part of the explanation is that British administration has to be paid for—that is, India pays the salaries and pensions of its British officials by surplus exports.

In the imports (apart from gold and silver) the most important item is manufactured goods, showing that India is very far from being self-supporting so far as manufactures go. Among the manufactured goods the chief items are textiles (including cotton goods to the value of £40,000,000), metal goods, and railway plant. Among the foods imported sugar ranks most largely, India not producing nearly enough sugar for its own use. Most of the sugar imported is cane sugar, coming from Java and Mauritius, but Austria-Hungary sends a considerable amount of beet sugar. A very large amount of gold and silver (bullion and specie) is also imported.

(D) Government and Divisions

The King of Great Britain and Ireland is also Emperor of India. Indian affairs in England are managed by the Secretary of State for India, assisted by a Council. In India the executive power is entrusted to a Governor-General or Viceroy, assisted by a Council.

There are ten great provinces in India, in addition to some minor ones. The great provinces are Madras, Bombay, Bengal, the Punjab, Bihar and Orissa, Assam, the United Provinces of Agra and Oudh, the Central Provinces, the North-West Frontier Province, and Burma. Of the native states the most important are Mysore, Hyderabad, Rajputana, the Central Indian States, and Kashmir. In regard to the frontier states Baluchistan is partly British and partly independent, while Nepal and Bhutan are virtually independent states.

The provinces and states do not exactly fall into the three divisions of India described on p. 227, but we may classify them roughly as follows :—

- (1) MOUNTAIN STATES AND PROVINCES.—Baluchistan, Nepal, Bhutan, Kashmir, North-West Province, Assam.

- (2) STATES AND PROVINCES OF THE GREAT PLAINS.—Bengal, Bihar and Orissa (but Orissa should go under 3), the United Provinces, the Punjab, Rajputana.
- (3) STATES AND PROVINCES OF THE PLATEAU.—Bombay (including Sind, which really belongs to 2), Madras, the Central Provinces, Hyderabad, Mysore.

Burma must be considered separately.

1. THE MOUNTAIN STATES.—Nepal and Bhutan are really outside India. Both are mountainous and forested, and yield timber. Nepal rears cattle. Baluchistan is a mountainous region with an extreme climate and low rainfall. Much of it is desert. Quetta is an important military station commanding the Bolan Pass. Kashmir has fertile valleys, in one of which the capital, Srinagar, lies. West of Kashmir and the Punjab is the North-West Frontier Province, created for military reasons. The capital, Peshawar, commands, as we have seen, the route to Kabul by the Khyber Pass. Assam was separated from Eastern Bengal in 1912, when various changes were made. It grows rice and tea, and the capital is Shillong, in the hills.

2. STATES OF THE GREAT PLAINS.—These include in the east well-watered, fertile and densely populated regions, and in the west barren wastes, like parts of Rajputana and the Punjab.

The Punjab includes the plain watered by the tributaries of the Indus and also part of the Ganges basin. The land near the Himalayas, where irrigation is easy, is fertile. Much wheat is produced and is exported from Karachi; the drier regions rear cattle, buffaloes, sheep and goats, and the Salt Range produces salt. The Punjab contains many important towns. Multan is placed where the tributary streams converge upon

the Indus, and where the fertile zone meets the desert. Lahore, the capital, and Amritsar lie near the foothills of the Himalayas; Delhi, now the capital of India, is placed on the Jumna.

Agra and Oudh, Bengal and what used to be Eastern Bengal, include the most densely populated part of India, and here towns are numerous and ancient. Most of the land is fertile, and rice, jute, opium poppy, indigo, oil-seeds are important crops, with wheat towards the west. Most of the famous towns of India are in this region. Among the more important are Cawnpore, Allahabad (at the junction of the Ganges and the Jumna), Benares, the sacred city, Patna, the rice centre, all on the Ganges. Lucknow is the ancient capital of Oudh. Meerut is an important railway centre. Calcutta, the great port and commercial capital, is a modern town. Dacca, to the north-east, collects agricultural produce for export from Chittagong.

Rajputana is fertile in the south and east, but desert in the west.

3. STATES OF THE PLATEAU.—Madras, like Bengal, is densely peopled, especially along the coastal strip, where most of the towns lie. Madras city and Calicut are important ports. In Bombay cotton is extensively produced and its manufacture is increasing (see p. 248). Poona, on the plateau, is a railway junction.

The Central Provinces and the native states of the plateau are not densely peopled, and are liable to famine owing to the scanty rainfall. Mysore has important forests in which wild elephants occur.

BURMA.—This interesting country is divided into Upper and Lower regions. In Lower Burma rice is the chief crop, and the rainfall is abundant. Sugar and tobacco are grown, and the petroleum wells are im-

portant. Off the coast of Tenasserim lie the Mergui Islands, where fishing for pearls is carried on.

Upper Burma is very mountainous, and the valley tracts are drier. In consequence millets, wheat, oil-seeds, etc., replace rice to a large extent. The forests produce teak and cutch (p. 240). In addition to the ports already mentioned, Burma has an important inland town in Mandalay, on the Upper Irawadi.

SUMMARY

India is a vast territory, about three-fifths the size of Australia, but densely peopled. The total population numbers 315 millions, mostly engaged in agriculture. India is the typical monsoon country, and, owing to the protection afforded by the Himalayas and the latitude, it is hot. The rainfall varies greatly; where it is abundant, as in Lower Bengal, the population is very dense, and the chief food is rice. Manufactures on the factory system are just beginning to develop, and jute fabrics are now important.

The export trade in 1912-13 amounted to £178,000,000 and the import to £159,000,000.

HONG-KONG.—The Crown Colony of Hong-Kong lies off the mouth of the Canton River, about one degree south of the Tropic of Cancer, and consists of the island of Hong-Kong (area comparable to that of Guernsey, *i.e.* about twenty-nine miles), the small peninsula of Kowloon, on the mainland opposite, and a considerable stretch (some 396 square miles) of leased land round this peninsula.

The climate, like that of India, is a monsoon one, the south-west monsoon blowing during the hotter months, and bringing abundant summer rain, and the north-east wind blowing as a dry wind during the rest of the year. There is a considerable temperature range, and Victoria, the only important town on Hong-

Kong island, is sheltered from the cooling breeze, a fact which, though good for shipping, makes the climate additionally trying for Europeans.

The total population of the colony is half a million, so that it is densely peopled. On the mainland the population is agricultural and Chinese; on the island there is a considerable European element, and, in addition to the naval and military establishments, there is a large shipping community.

The island is of very irregular form and is hilly, the highest point, Victoria Peak, rising to 1800 feet, and forming a favourite place of residence for the Europeans during the hot season. Victoria lies on the northern shore of the island, and has a large and excellent harbour. It is thus not only a naval station of great importance, but also serves as an outlet for the produce of Southern China, and distributes imports to the same region. Thus the silk and tea trade of China is largely in the hands of Hong-Kong firms, and the colony imports the opium of India, cotton goods from Great Britain, and so on. There are some minor industries, mostly dependent upon the activity of the port, such as rope-making, shipbuilding, etc., also some cotton-spinning. The total trade is estimated at about six millions. The leased area is mountainous, rising to 3000 feet, but the fertile valleys produce rice, sugar-cane, and many kinds of vegetables.

QUESTIONS AND EXERCISES

1. Describe the course of the Nile from its source in Lake Victoria to the sea, and illustrate by a sketch-map.
2. What are the causes which lead to the annual flooding of the Nile? Explain as carefully as you can, and describe the changes which the river undergoes during the year.
3. If you were a peasant in Egypt what would be the

course of your year's work, (1) if your land could be perennially irrigated, or (2) was under basin irrigation? Distinguish between the crops which would be wanted for your own household and those which you would hope to sell to pay your taxes.

4. Give some account of the railways of Egypt. Is the Nile a good means of communication or not?

5. Contrast India and Australia as regards position, size, and the number and composition of the population.

6. Give a brief description of the structure of India, and explain why it is believed that Southern India once extended much farther to the west.

7. Give an account of the climates of India, with special reference to the amount and seasons of rainfall.

8. Both India and Burma produce rice, but while India sometimes imports additional rice, Burma always exports rice. Explain these facts.

9. Name some plants which we grow in our gardens or in greenhouses which are native to India, Australia, and the Cape of Good Hope respectively. Show, as far as you can, how the plants are suited to the climates of their respective homes.

10. Describe the forests of India and name some specially useful trees. Can you explain why the Indian Government devotes so much attention to forestry?

11. We think of India as a very hot country, and yet plants like wheat, tea, and rhododendrons grow there. Can you explain this?

12. The railway system of a country is always closely related to its relief. Illustrate this by a reference to Indian railways.

13. Name four great Indian ports and discuss their probable trade, basing your conclusions upon the nature of the country which lies around and behind them.

SECTION IV

HOT REGIONS WITH LITTLE NATIVE CULTIVATION

CHAPTER XVI

I. ASIATIC POSSESSIONS : CEYLON ; THE STRAITS SETTLEMENTS AND FEDERATED MALAY STATES ; BRITISH BORNEO

CEYLON.—The island of Ceylon forms a Crown Colony and lies to the south-east of India, with which it is all but connected by two small islands and a coral reef called Adam's Bridge. The total area is 25,500 square miles, or almost precisely half that of England, and the population numbers 4 millions. Ceylon has thus a density of population almost the same as that of Scotland.

The island is pear-shaped, and is mountainous in the centre with plains all round, especially to the north. It extends from lat. 6° N. to lat. 10° N., and is thus far within the tropics. As it is apt to be supposed that Ceylon lies due south of India, it is well to note that long. 80° E., which passes close to Madras, forms nearly the western boundary of Ceylon.

Like India, Ceylon has a uniform coast-line, and therefore few good harbours. The best natural harbour is Trincomali on the north-east, but this is out of the

way of steamship traffic, and the artificial harbour of Colombo, in the south-east, is the one chiefly used. The highest mountain of the island is Pidrutalagala (8000 feet), but the sacred mountain called Adam's Peak (7000 feet) is more familiar.

Ceylon has a tropical monsoon climate, the alternating winds being, as in India, north-east and south-west, but, owing to the elevation of the central mountains, the climate varies considerably, and the mountain slopes afford the type of climate best suited to tea (cf. the mountain slopes of Assam and the hills at Darjeeling). In the low grounds Ceylon is hot, with but little annual variation in temperature. The rainfall is generally good, and is heavy in the south-west, which is exposed to the full force of the south-west monsoon. The retreating monsoon of autumn (or period of changing winds) brings rain to the north-east coast, just as it does to the coast of Madras, so that Ceylon generally has two seasons of heavy fall. Colombo has rain at all seasons, the heaviest falls coming in May and October. The ordinary tropical rainfall is thus markedly altered by the monsoon conditions. The coasts not fully exposed to the monsoons, *i.e.* the south-east and north-west coasts, have less rain, and the rainfall is not everywhere sufficient for the rice crop. In earlier days Ceylon had a marvellous system of canals and reservoirs, but these were later allowed to go to ruin, and are only now being gradually restored by the British Government.

The people of Ceylon are interesting. A relatively small number of them belong to a race known as the Veddas, who are very short and dark. Some of the Veddas practise agriculture, but others dwell in the forest, live chiefly by hunting, and preserve many primitive customs. It is believed that these Veddas

are the remnants of a race which inhabited India and Ceylon before the Dravidians, and have been largely driven out of their original lands by later races. The next race is a tall dark one called Tamil, from their language. These are Dravidians; some are native to Ceylon, others come over from India to work in the plantations. Finally, the majority of the inhabitants are Sinhalese, apparently people of mixed Aryan and Dravidian stock, of small stature and fair complexion. The Europeans only number about 5000, but include a number of planters engaged in growing tea, rubber, cocoa, etc.

The natives of Ceylon live chiefly upon rice and coconuts, which occupy a very large acreage of land. Much of the island was originally forested, with evergreen forest in the damper regions and deciduous in the drier. This forest has now been largely cleared by Europeans and natives to permit of the extension of plantations. Until about thirty years ago the European planters grew coffee almost exclusively, but the plants were then attacked by a fungoid disease which ruined the plantations. The place of coffee has been therefore taken by tea, and Ceylon tea has become exceedingly popular in Great Britain. In 1912 the total exports reached a value of £13,000,000, and of this total tea was responsible for 5½ millions. Rubber has been extensively planted and the export is steadily rising. Coco-nut palms, which do not require a very fertile soil and are easily grown, cover a very large area in the island, and the produce bulks largely in the list of exports. Thus we find there copra, desiccated coco-nut, coco-nut oil, coir fibre (made from the husk of the nut) and goods manufactured from it, and the nuts themselves. Less important are areca- (or betel-) nuts, much used for chewing in the East, cinnamon, cocoa, and cardamoms

(a kind of spice); the export of coffee is now insignificant.

The imports in 1912 had a value of about £12,000,000. They include a very large amount of rice, necessary to feed the coolies on the plantations, manures, coal and coke, manufactured cotton goods, and so forth.

The large import of rice indicates one of the differences between Ceylon and India and Burma. In India the farmers grow first food for themselves, and second, special crops for export, or else export the surplus of their crops, as in Burma. In Ceylon the chief crops grown are export crops, and the people engaged in working in the plantations require to be fed with imported food. This is a common condition where the plantation system is in existence.

Colombo is a very important port, being a calling point for ships going to Australia, India, China, etc., and this increases the importance of the island. The planting industry has made Ceylon prosperous, but its soil is not very fertile, and, like most of India, it suffers from the lack of internal waterways. The railway system is now fairly well developed.

THE STRAITS SETTLEMENTS AND FEDERATED MALAY STATES.—The part of Burma called Tenasserim is continued to the south-east in the long narrow Malay Peninsula, which reaches nearly to the Equator. Off the southern end of the peninsula lies the island of Singapore, and the peninsula is separated from the great island of Sumatra by the Malacca Strait. Down this strait go the ships passing from India to China or Eastern Australia, and Singapore, the town on the island of the same name, commands the southern end of the strait, while Penang, another island farther north, commands the northern entrance. These two islands, with parts of the adjacent mainland, comprise the Straits Settle-

ments, to which are attached the island of Labuan, off Borneo, and Christmas and Cocos Islands. The Straits Settlements proper have, as suggested above, much strategic importance, and Singapore is also a great trading centre.



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FIG. 46.

A great part of the remainder of the peninsula forms the Federated Malay States, which are under British protection, and are interesting not only because they supply the usual tropical produce, but also for their tin mines, which are of great value. Tin is produced in all the Federated Malay States to a very large extent, and the produce of the mines is chiefly exported through

Singapore, largely to Great Britain, where it supplies, for example, the tinplate industry of Cardiff. In 1911, four-fifths of the British supply of tin came from the Straits Settlements. Singapore is what is called an entrepôt, that is a great clearing-house which collects and exports the goods of the surrounding district, and receives and distributes imports to the same region. It also smelts tin ore preparatory to exporting it, and cans pine-apples, for the necessary tin and the fruit are both at hand. Generally, however, we may say that the Straits Settlements are busy with buying and selling, while it is the native States which are the producers and purchasers—producers of tin and tropical products, purchasers of manufactured goods and machinery, as well as food for the miners.

The above statements are well illustrated by the nature of the trade of the Straits Settlements. Their export trade reached in 1912 a total value of about £44,000,000, and of this tin amounted to more than one-quarter. Other important items, in order of value, were rice, rubber, copra, opium, dried and salted fish, areca-nuts, sugar, sago, etc. But all these reappear in the list of imports (tin chiefly in the form of ore), that is, they are for the most part collected from the Federated States; in other words, the trade of the Straits Settlements is largely transit trade. In addition to the produce named above, the imports, which amounted to £53,000,000 in 1912, included cotton goods and clothes, coal, hardware, machinery, and so forth; these were imported from a distance.

If we turn for a moment to the Malay Peninsula as a whole, we find that there is a central chain of mountains which, like the peninsula in general, has a north-west to south-east direction. The mountains rise to a height of 8000 feet and are densely wooded.

From them short rapid streams flow to the sea. It is in this mountain range, which consists partly of old rocks, that the tin deposits chiefly occur. The forest regions are inhabited by some very primitive races of mankind, and produce various useful substances, such as gutta-percha, rattans, gums, areca-nuts, bamboos, and so forth, while nearer the coast the coco-nut palm thrives. In the valleys and near the coast are many plantations, yielding rubber, copra, areca-nuts, coffee, sago, sugar, etc., and also spices. Rice is also much grown. Cultivation is carried on to a small extent by the native Malays, also by immigrant Chinese, and by European planters with Tamil coolies from India. The climate is hot and damp, but owing to the narrowness of the peninsula the land is generally freely exposed to the winds, which make the heat somewhat less oppressive.

The Straits Settlements, including the small Cocos and Christmas Islands, have an area of 1600 square miles, and a dense population of 700,000, including people of many races—Chinese, Malays, natives of India, and so on, with some 7000 Europeans. The chief towns are Singapore, a fortified port, George Town in Penang, and Malacca, once important but now with a silted-up harbour.

The Federated States have an area of 28,000 square miles and a population of 1,000,000. The land is fertile and capable of growing many crops (see above), and the States have the advantage over Ceylon that the numerous rivers are navigable for some distance. Meantime, however, attention is chiefly given to the tin mines, and not enough rice is produced to feed the miners. The most important town is Kwala Lumpur, in the State of Selangor, connected by railway with the excellent harbour of Port Swettenham. In this State

rubber cultivation is being carried on to an increasing extent.

BRITISH BORNEO.—The great island of Borneo, which is bisected by the Equator and has a hot, damp climate, contains a considerable stretch of territory under British rule or protection. These territories consist of (1) the small island of Labuan, now attached to the Straits Settlements; (2) British North Borneo, under the jurisdiction of the British North Borneo Company; (3) Brunei, nominally ruled by a Sultan, but really by a British Resident; and (4) Sarawak, governed by a rajah, Sir Charles Brooke, nephew of Sir James Brooke, who obtained the supreme power from the chiefs after putting down an insurrection and establishing a firm government.

Labuan is an island off the north-west coast, somewhat larger than Guernsey. It has important coal mines, and was believed at the time of its acquisition to have a great future before it. But it has proved impossible to work the coal at a profit, partly because of the damp climate, and partly because the adjacent coast of Borneo is very unsettled and inhabited by largely uncivilised tribes. There is a good harbour, and rice is grown to a small extent. The chief occupation of the small population, apart from the coal mines, is manufacturing sago from raw material imported from North Borneo.

British North Borneo, Brunei and Sarawak lie along the north and north-west coasts of Borneo. In all the surface is clad with dense forest, which yields much valuable produce, and the rivers are numerous and sometimes large. The total area is about that of Great Britain, but the population is only three-quarters of a million. The inhabitants are chiefly Malays and a race of uncertain origin, called Dyaks. Like all equatorial

regions Borneo is difficult to develop, but its natural wealth is considerable. The forests yield fine timber, camphor, gutta-percha, rubber, rattans, etc., the coasts bêche-de-mer and edible birds' nests (found in caves); coal and gold are also produced. In the plantations all tropical products can be grown, and rubber, tobacco, sago, pepper, coco-nuts, gambier (a kind of dye), coffee, and so forth are cultivated, but the trade is not of great importance. All three trade chiefly with Singapore and Hong-Kong, and in British North Borneo there are a considerable number of Chinese coolies who work in the plantations; the European planters are not meantime numerous.

CHAPTER XVII

II. AUSTRALASIAN AND OCEANIC POSSESSIONS : PAPUA OR BRITISH NEW GUINEA ; ISLANDS OF THE SOUTH PACIFIC ; SOUTHERN IS- LANDS OF THE INDIAN OCEAN ; NORTHERN ISLANDS OF THE INDIAN OCEAN ; ISLANDS OF THE SOUTH ATLANTIC

PAPUA.—New Guinea is, next to Australia, the largest island in the world. It lies near the Equator and has the characteristic equatorial climate, with, especially to the north, almost continuous drenching rain, high temperature, and little variation in temperature throughout the year. In consequence it is clothed with equatorial forest and contains many large rivers. The inhabitants are Papuans, that is, are of the negro type, with woolly or frizzly hair, dark skins, thick lips, and so forth, but they have the negro characters somewhat less pronounced than the negroes of Africa. Inland pigmy tribes have been discovered recently. Like all inhabitants of equatorial forest regions, the Papuans are relatively few in number, and live in scattered groups, carrying on a small amount of cultivation, the plants selected being those which demand the minimum of care and attention, such as yams, bananas, sweet potatoes, etc. Indeed, one very important food plant, the sago palm, grows wild abundantly in the lower parts of the island.

As in the equatorial forest generally, mammals are few in New Guinea, a fact which is believed to account for the cannibalism practised at least at times by the natives, for it is difficult to get meat. In the forest animals of Australian type, including tree kangaroos, occur, and there are many birds, among them cassowaries and the beautiful birds of paradise. Generally the animals are of Australian type, that is, the higher mammals are absent, but an exception to this statement is found in the presence of a wild pig, which forms an important part of the food supply of the natives. It is probable, however, that this pig was originally introduced by man. The final important item in the food supply of the natives is fish.

In regard to the configuration of the island the most important feature is the presence of an axis of lofty mountains, snow-clad in Dutch New Guinea, from whose slopes the mighty rivers stream. In consequence much mud and silt are brought down to the low ground, forming, for instance, a great delta at the mouth of the Fly River. Much of the low ground is very swampy, and owing to the thick forest communication is everywhere difficult.

This description enables us to realise the general features of the island of New Guinea. The island as a whole is divided among the three powers of Britain, Holland, and Germany. British New Guinea is now attached to the Commonwealth of Australia as the territory of Papua. It comprises the most southerly part of the island, British territory lying between 5° and $11\frac{1}{2}^{\circ}$ S. lat. In consequence the equatorial character of the climate is slightly less marked than in the north of the island. The rainfall is rather less, Port Moresby, the chief settlement, being even dry at certain seasons. During the cooler season, that is,

from June to October, the south-east trades blow steadily. During the rest of the year the north-west monsoon generally prevails. The heat also, even on the coast, is somewhat less intense than in Dutch New Guinea, and the forest is not quite so thick. Further, the highest mountains only reach about 13,200 feet, that is, do not rise to the snow-line. Owing to the existence of these mountains the climate varies greatly with elevation, the higher parts of the territory being quite cool.

The territory of Papua, which includes certain islands adjacent to the mainland, has a total area which is comparable to that of Great Britain, but the population is only about 380,000, that is, less than that of Edinburgh and Leith combined. The population seems to be diminishing rather than increasing, a statement which is true of many of the islands of the Pacific. For Europeans the climate is quite unsuited, and there is a very high death-rate among European children. Only about one thousand Europeans live in the territory.

Papua trades chiefly with the adjacent parts of Australia, and its most important export is gold. Next to gold comes copra, or dried coco-nut, used for soap-making, etc. Coco-nuts are extensively planted and form a favourite crop among the inhabitants of the Pacific islands generally. The trees require the minimum of care, grow very easily, and though they take some years to come into bearing, form afterwards a very profitable crop. The "fisheries" are of considerable importance, the chief products being pearls and bêche-de-mer (p. 159). A certain amount of land is now under cultivation, rubber especially having been planted, but the European planters find it difficult to obtain native labour. In addition to gold, copper has been found, and petroleum deposits have been discovered.

The forests yield valuable timber, which is exported to a small extent. Sandal-wood is the most valuable tree found.

THE TROPICAL ISLANDS OF THE SOUTH PACIFIC

General Characters.—The Pacific is a very deep ocean, the greatest known depths occurring within it, and the mean depth being greater than that of the Atlantic. It contains, however, areas of shallower water, forming what are called rises, and these rises bear islands, arranged in more or less definite lines. Very many of these islands consist of volcanic rocks, suggesting that submarine eruptions took place, and material was piled up on the sea-floor till it appeared at the surface as an island. Another island-making agent is, however, also at work. The waters of the Pacific in low latitudes are warm and clear, and in them a great number of organisms exist which possess the power of taking lime from sea-water. Most important among these are animals related to sea-anemones, which sometimes live singly like our common British sea-anemones, but more frequently in groups or colonies. Both kinds take lime out of sea-water and form what are known as corals, the individuals of the colonies being called coral polypes. These corals, together with lime-containing seaweeds and many other kinds of organisms, build up a kind of compact limestone which is widespread in the warmer seas. When ground down by the waves the coral rock forms dazzling white coral sand.

Corals only live in warm and relatively shallow water. Thus, while we can suppose that a volcanic island may be gradually built up from great depths, a coral island can only arise in shallow water. Further, the corals cannot grow out of water, so that the actual appearance

of coral rock at the surface must either be due to earth movements or to the great breakers tearing off pieces of rock in shallow water, and piling these up elsewhere above water-level. Very often coral rock is found round the margin of volcanic islands, forming what is known as a fringing reef. The corals tend to grow at the seaward but not at the landward side, and the wash of the waves, combined perhaps with earth movements, leads to the production of a navigable channel between the seaward edge of the reef and the land. The reef is then called a barrier reef; the Great Barrier Reef of Australia (p. 125) is a typical example. Finally, if we have a volcanic island which is sinking gradually below the sea, and was originally surrounded by a fringing reef, the reef will pass through a series of changes. It will first become a barrier reef, and then, when the original island completely disappears, there will be left a rim of coral surrounding a shallow lagoon where once the island stood. Such a reef is called an atoll (Fig. 47), and atolls are circular or oblong, and usually have their surface broken by one or more passages by which it is possible to reach the calm waters of the lagoon.

From this description we may realise that there are two main types of islands in the Southern Pacific. In the one type we have a mountainous island of volcanic rock, whose coast shows fringing or barrier reefs. In the other type no rock but coral rock is visible, and the island is low and usually more or less atoll-shaped. Traders in the southern seas call the islands "high" and "low" respectively. The Fiji Archipelago forms an admirable example of a group containing high islands, while the Gilbert Islands are all low islands. The high islands are generally forested and fertile; they produce abundant vegetable food

with but little trouble, and the inhabitants tend to be lazy, while, because animal food is scarce, cannibalism is frequent. In the low islands the coco-nut palm and screw-pines are sometimes the only trees, water is difficult to obtain, and the inhabitants have to work harder because their land is much less fertile and food is not easy to get.

The Chief Groups of Islands

The islands of the Pacific may be grouped according to the particular "rise" along which they lie, and as we have only to consider here those in which Britain is directly interested we need only recognise three groups.

1. From New Zealand there runs north-westward to New Guinea a rise which carries the New Hebrides and the Solomon Islands, together with several others which are not British. These form the **MELANESIAN ISLANDS**.

2. Another great rise runs at first north-eastward from New Zealand and then curves round to become nearly parallel with the first. The British islands borne by this rise are the Friendly (or Tonga), Fiji, Ellice, and Gilbert Islands, which, with others, form the **MICRONESIAN ISLANDS**.

3. Farther out in the ocean another rise bears the lonely Pitcairn Island and the small Cook Islands; these form with others the **SOUTH PACIFIC CHAIN**.

Position.—The meridian of 180° runs approximately through the Gilbert Islands and Fiji, a fact which it is useful to remember. When it is 12 o'clock noon at Greenwich it is midnight along the meridian of 180° . This line is here part of the international date line. Sailors crossing this line on a journey west have to tear

off a leaf from their calendars, for to-day becomes to-morrow; those crossing it on a journey eastwards have to turn back a page, for to-day becomes yesterday.

The Gilbert Islands lie on the Equator; the Friendly Islands lie near 20° S. lat. Pitcairn Island is a little farther south, but, broadly speaking, the British tropical islands in the South Pacific lie between 0° and 20° S. lat., and the more important are in about 180° long.

Climate.—The climate of the islands is very interesting, for throughout a considerable range in latitude there is no very striking difference in temperature or rainfall. This is partly because of the great ocean mass around, and partly because the more southerly islands do not, as we might suppose, lie entirely in a trade-wind belt. In the Atlantic, St. Helena and Ascension have almost constant south-east trade winds, but in the Western Pacific islands in similar latitudes the south-east trade blows only in winter with any steadiness, and in summer the winds are variable and damp. In other words, at this season the islands enter the region of equatorial climate. The Solomon Islands are even reached in summer by the north-west monsoon of northern Queensland.

In the Gilbert Islands the mean annual temperature is well over 80° , and the range is very small indeed. Though the islands are so low, the rainfall is over 100 inches per annum, and is distributed throughout the year, though it is least in August and September. In Fiji, some 20° to the south, the temperature is lower, but still reaches a mean of about 80° . The range is greater than in the Gilbert Islands. There are heavy summer rains, with a period of drought in the southern winter, but the actual amount of rain varies greatly with the height and the degree of exposure to the rain-bearing winds.

Generally, the islands of the South Pacific may be said to have a warm, equable, and moist climate. In consequence plants grow with great rapidity and ease, but the climate is less healthy for man than in such islands as Ascension, where there is a steady, dry trade wind.

Population.—The people present several points of great interest. In those eastern islands which we have called Melanesian the predominating people are curly-haired Melanesians, that is, people of negro stock. On the other hand, in the Micronesian islands the brown-skinned, straight-nosed, and wavy-haired Polynesians predominate. In Fiji, however, we have a western outpost of Melanesians, with an intermixture of Polynesians, while some Polynesians occur in the Solomon Islands and in the New Hebrides to the east. In the islands of the South Pacific Chain the people are Polynesians.

Plants and Animals.—Generally these Pacific islands are characterised by the absence of non-flying mammals, though the Solomon Islands, which possess a native marsupial and some mice, form an exception. One kind of rat, perhaps not native, does, however, occur, and pigs and cattle have been introduced and have sometimes, as in Fiji, become wild. On the other hand, the seas round the coral reefs are nearly always rich in fish, which form an important part of the food of the natives. The word fish must be taken here in a wide sense to include *bêche-de-mer*, shellfish, and a curious worm (*palolo*) which at certain seasons of the year is found swimming in countless myriads at the surface of the water in the Friendly Islands and Fiji.

In the islands generally the coco-nut palm is the commonest and most useful tree. Its fruit floats in sea-water and can be carried long distances in this way.

Coco-nuts form a very important part of the food of many Pacific islanders, and now that the islands are opened up to trade copra is an important article of export.

As regards cultivated plants it is important to notice that cereals are (or were) entirely absent, and in many places, *e.g.* in Fiji, the natives are slow in acquiring the habit of eating rice, when this becomes available by means of trade. The usual food plants are taro, yams, bananas, breadfruit, coco-nuts, etc. Most of these contain much starch, but relatively little nitrogenous matter (proteid), and in consequence the natives have to eat very large quantities of food. This kind of food is not suitable for young children, and the islands have rarely any milk-yielding animals. There is a very heavy death-rate among the children, and it seems probable that this is partly due to the nature of the food. In most of the islands the native population seems to be either stationary or decreasing.

We may add to this general account of the Pacific islands a short note on the Gilbert and Fiji groups as types of the two main kinds.

THE GILBERT ISLANDS.—These consist of low atolls, nowhere more than half a mile across and not rising more than 20 feet above sea-level. The chief plants are screw-pines (*Pandanus*), plants related to palms yielding an edible fruit, and coco-nuts. In the old days the inhabitants lived upon coco-nuts, pandanus fruits, and fish, and though rice and other kinds of food are now available they still consume seven coco-nuts per head per day. The surplus coco-nuts are dried to form copra, the chief export of the islands. Formerly the inhabitants were skilful navigators, but the islands are washed by the powerful equatorial current and navigation is full of risks for native boats. Harbours

are few, and the great waves which dash upon the low coral beaches make communication difficult. There are about 25,000 natives in the islands, but their numbers are steadily diminishing.

THE FIJI ISLANDS.—This archipelago consists of two large islands, Viti Levu and Vanua Levu, and a number of small islands, the total area being almost exactly the size of Wales. But whereas Wales, despite its mountainous surface, has a population of over two millions, there are only 140,000 people in the fertile islands of Fiji, and their numbers are not increasing to any extent. The islands are mountainous, rising to an elevation of over 4000 feet, and have a rich flora, the mountain slopes being covered with forests. The mountains feed numerous streams whose waters can be used for the plantations in regions where rain is scanty. The natives cultivate with some care, growing taro, yams, coco-nuts, bananas, breadfruit, etc., for their own use, and much sugar for export. A certain though not very large amount of land is cultivated by planters of European descent with the aid of native labour, and the chief exports are, in order of importance, sugar, copra, and fruit (including especially bananas and pine-apples). The islands trade chiefly with Australia and New Zealand. There are good harbours.

Of the other islands we need only say that the New Hebrides are protected by England and France in combination, and that many of the islands are of very little commercial importance, but serve as harbours, and are, or may become, cable or wireless telegraphy stations.

SOUTHERN ISLANDS OF THE INDIAN OCEAN

The Indian Ocean south of the Equator contains a number of islands included in the British Empire which

show much general resemblance to the islands of the South Pacific. The most important of these are Mauritius, with its dependencies Rodriguez, the Cargados Islands, the Chagos Archipelago, etc.; the Seychelles, with some less important groups.

The resemblances to the Pacific islands are shown in the general characters, for the islands consist of volcanic rock, or of coral rock, or of both; in position, for Mauritius lies in about 20° S. lat., and the Seychelles in about 5° S. lat.; in products, for the minor islands produce coco-nuts, fish, turtle, guano, and so forth, and the larger sugar-cane, fruit, etc.; in climate, for in most of the islands the south-east trades prevail during the cooler months of the year, and the hotter months have variable winds with much rain.

With the resemblances certain differences are noticeable, especially the fact that Madagascar is connected by a belt of shallow water to the islands of the Indian Ocean, which suggests that long, long ago there was a land connection from Africa through Madagascar to India, across what is now the Indian Ocean, the islands marking the position of the vanished continent. This suggestion is confirmed by the presence in the islands of large tortoises (now practically extinct) and flightless birds such as the dodo of Mauritius and the solitaire of Rodriguez. As we have already seen, it is characteristic of islands in the middle of the ocean that land animals of all kinds are few, and those that are present are of such a nature that we may suppose them to have reached the island by water, or through the air, or to have been accidentally introduced by man. The fact that tortoises and flightless birds are found in the islands of the Indian Ocean therefore leads us to believe that these islands were once connected to continents, and the absence of mammals suggests that this con-

nection must have been so long ago that mammals had not then appeared on the earth.

MAURITIUS is the most important of the islands. It is about the size of Surrey, and has a population of about 400,000. The inhabitants are partly persons of French descent, for the island once belonged to France, partly descendants of negro slaves, and partly East Indians. The last came over as coolies to work in the sugar plantations, but are now to an increasing extent taking up land on their own account, and growing sugar on a small scale. These Indians are steadily increasing in number, and now predominate in the population.

Mauritius is a volcanic island with coral reefs round its margin, and has a very diversified surface, the mountainous interior rising to 2700 feet. It was formerly densely covered with wood, the forests including the valuable ebony tree, but much of the land has now been cleared. The result is that the tropical rainfall runs off with great rapidity, the streams being foaming torrents in the wet season and becoming nearly dry in the cooler months. A great obstacle to agriculture is the frequency of hurricanes, which cause fearful havoc in the plantations. The island is not very healthy, human beings being very liable to malaria and plague, while cattle and horses are attacked by diseases due to the presence of minute parasites called trypanosomes in the blood. Sugar is the main product, and unrefined sugar the chief export. Port Louis, on the north-west coast, and therefore sheltered from the south-east trade, is the chief harbour. Before the opening of the Suez Canal Mauritius was on the road to India. With the opening of the canal and the consequent diversion of traffic it, like St. Helena (p. 282), lost much of its former importance.

RODRIGUEZ is a small island lying east of Mauritius and growing small amounts of many kinds of tropical produce. It is a cable station.

The SEYCHELLES are chiefly interesting because here, and here alone, is found the curious double coco-nut, called *coco de mer*, which owes its name to the fact that the fruit, but not the tree, was found by the Portuguese in the Maldives, where it had been carried by currents. Vanilla is grown and rubber is being planted. The largest island is called Mahé and is rather larger than Jersey.

NORTHERN ISLANDS OF THE INDIAN OCEAN

The Indian Seas north of the Equator contain several groups of British islands, some of coral formation, attached to India or Ceylon. Thus the MALDIVES consist of a large group of coral atolls, lying between the Equator and 7° N. lat. Like so many coral islands, they have difficulties with the water supply, springs being absent, and as usual fish from the reefs and coco-nut palms are the chief products. The surplus fish is dried and sent to Ceylon, within whose jurisdiction the islands are placed, and the products of the coco-nut palms, including fibre, are also exported. In return the inhabitants, who are civilised and are great traders and navigators, obtain rice, cotton goods, and so forth. There are some 50,000 inhabitants, who are Mohammedans.

The LACCADIVES, lying farther north, are attached to the province of Madras, and are also of coral formation. They have a much smaller population, about 10,000, and chiefly export coco-nut fibre.

In the southern part of the Bay of Bengal lie the ANDAMAN and NICOBAR Islands, which are attached to

India. The Andamans are wooded and hilly, the forests yielding a valuable timber called redwood. The popu-



FIG. 47.—The Southern Group of the Cocos or Keeling Islands, an example of a coral atoll. The outer dotted line shows the edge of the reef, the black the islands, that is the part permanently above sea-level. On the seaward side of the reef the sea-floor slopes steeply down to great depths. Within the lagoon there is shallow water, nowhere more than a few fathoms deep; the dotted regions are partially dry at low tide. Note the small size of the islands, which are only a few feet above sea-level, and the large area of the lagoon.

lation is about 26,000, and includes convicts sent thither by the Government of India. Port Blair has an excellent anchorage. The climate is very wet and the islands are

unhealthy. Only a small amount of cultivation is carried on, the plants including tea, agave for fibre, and coconuts. The aborigines of the islands are dwarf blacks of the race called Negrito.

The Nicobars are somewhat similar in type, but are much smaller. The chief product is coconuts.

To the above we may add the COCOS ISLANDS and CHRISTMAS ISLAND, though both lie south of the Equator and are attached to the Straits Settlements.

The Cocos Islands lie on the route between Ceylon and Australia, more than 700 miles south-west of Java. They are low islands, forming a horseshoe-shaped atoll (Fig. 47), and are typical coral islands. Coco-nut palms are abundant and copra is exported.

Christmas Island lies 190 miles due south of Java, and is chiefly interesting for its great deposits of phosphate of lime, a valuable manure. The deposits are worked by Chinese coolies. The island is wooded and furnishes a kind of teak in addition to the phosphate.

TROPICAL ISLANDS OF THE SOUTH ATLANTIC

(a) ST. HELENA.—This island, which is of volcanic origin and lies in lat. 16° S., about 800 miles south-east of Ascension, shows a modified tropical climate. It lies in the region of the south-east trades, and this wind blows practically all the year round. As the air so brought has blown over the cold ocean current which cools Walfish Bay (p. 195), we find that St. Helena has a cooler climate than we should expect from its latitude. Thus it is considerably cooler at all seasons than the Fiji Islands, which yet lie farther from the Equator, and owing to the cloudiness, especially of the higher parts of the island, fruits ripen slowly. The

rainfall is irregular alike in amount and in season of fall; small near the coast, it increases with elevation, the highest parts of the island (about 2700 feet) being only free from cloud for short periods. On the other hand, the temperature is remarkably uniform, both throughout the year and during the twenty-four hours. The warm moist climate of the upper slopes encourages abundant vegetation, and cattle and goats thrive well. The latter indeed have thriven so well that they have largely destroyed the original vegetation, and the deforested slopes have been washed bare by rain, so that much of the island is now barren. The goats further make it impossible to afforest the island.

St. Helena has an area of 47 square miles, and now contains about 3500 inhabitants. It was formerly of great importance as an intermediate station for ships going round the Cape, and its people found an easy livelihood by supplying water, meat, and so forth to the ships. With the opening of the Suez Canal the importance of the island as a station on the route to India very greatly diminished, and a garrison is therefore now no longer maintained there. With the increase in the speed of ships also, such intermediate stations as St. Helena have lost importance, and the inhabitants have now no outlet for their produce. An attempt to grow early potatoes for the Cape market was stopped by a prohibitive duty there, and though further attempts have been made to supply the English market, the distance and the difficulty of furnishing a steady supply combine to make the trade of little importance. Various attempts have been made to improve the condition of the islanders. Thus New Zealand flax (*Phormium*, p. 37) has been introduced, and supplies a local flax mill in the island. The women have been taught lace-making, but the industry is scarcely self-supporting. It is said

that the fisheries are capable of development ; meantime, however, the poverty is extreme.

(b) ASCENSION.—Like St. Helena, this island is of volcanic origin. It is smaller in area (34 sq. miles), but shows somewhat similar climatic conditions. The temperature is warm and uniform. On the coast there is practically no rain, but the higher slopes (about 2800 feet) are cooler and cloudy. As in St. Helena the climate is very healthy, and Ascension is chiefly used as a sanatorium for the crews of men-of-war. A small amount of cultivation is carried on, the crops being grown for the use of the garrison. The population numbers about 400. The island is visited by turtle and also by sea-birds for breeding purposes, the turtle forming a valued food supply.

Owing to the fact that it lies much nearer the Equator (in about lat. 8° S.) Ascension is throughout the year warmer than St. Helena, but like the latter it is permanently within the régime of the south-east trade wind. The prevalence of this wind throughout the year makes both islands healthy, but as compared with many other tropical islands both are remarkable for the fact that but little tropical produce is grown.

CHAPTER XVIII

III. TROPICAL AFRICAN POSSESSIONS: (A) THE PLATEAU REGION—RHODESIA; THE NYASALAND PROTECTORATE; BRITISH EAST AFRICA

WE have spoken already (p. 174) of the fact that the east of Africa, no less than the south, contains much elevated land. Along this eastern side of Africa there stretches an interrupted belt of land under British control or protection, and it is a peculiarity of the three countries named above that each contains some land of such an elevation that the climate is greatly modified, and European settlement is possible. To what extent it is possible has yet to be determined, but in that European planters occur, and can in some cases at least bring up their children in the country, Rhodesia, the Nyasaland Protectorate, and British East Africa (including the East Africa Protectorate and Uganda) differ notably from the West African possessions, and must be considered separately.

RHODESIA

The river Limpopo forms the northern boundary of the Transvaal (p. 197), but it does not constitute a natural frontier. Beyond it there stretches a plateau country, richly mineralised, with a somewhat pre-

carious summer rainfall and long winter drought, with undulating, high-lying, grassy plains suited for cattle—that is, generally, an area resembling the Transvaal. This area lies wholly within the tropics (extending from lat. 22° to lat. 8°), but the higher parts of the plateau are cooled by the elevation and are therefore suitable for European settlement, which, as in the Transvaal, has been hastened by the presence of rich mineral deposits.

Farther north the plateau is intersected by the great valley of the Zambezi and those of its large tributaries, the Kafue and Luangwa, which are hot, damp, and unhealthy; the rainfall is greater; malaria is more prevalent; the mineral deposits seem to be somewhat less rich; generally the country as yet has not hitherto attracted many European settlers.

These two regions constitute together the vast territory of Rhodesia, which has an area nearly three-quarters the size of the whole Union of South Africa, and is under the administration of the British South Africa Company.

SOUTHERN RHODESIA.—The southern region forms Southern Rhodesia, whose resemblances to the Transvaal are perhaps sufficient to justify in the future its inclusion in the South African Union. The northern region, on the other hand, which now forms Northern Rhodesia, shows more resemblance in climate and products to Nyasaland, the belt of country to the west and south of Lake Nyasa, which is definitely tropical in character.

Rhodesia, like the Transvaal, suffers from the fact that it is cut off from its natural outlet to the sea by Portuguese territory. An arrangement has now been made, however, whereby Beira, in Portuguese East Africa, is declared the official port. Through it the

greater part of the trade of Rhodesia passes, though the railway system is connected up with that of South Africa.

Through Rhodesia indeed there extends a section of a main trunk line, the so-called Cape to Cairo route, which it is hoped may some day form a continuous line through Africa. At present it is far from doing this, for there is a huge gap in Central Africa.

From Vryburg and Mafeking the main line runs to Bulawayo in Southern Rhodesia, and from this town a railway goes to Salisbury and so to the coast at Beira. North-west from Bulawayo the main line continues to the coalfields of Wankie and then to the magnificent Victoria Falls on the Zambezi. From here it passes through Northern Rhodesia and across the frontier of the Congo Free State to the copper mines of Katanga, whose presence is meantime the chief justification of the existence of the northern section. Branch lines are as yet few and short. (Fig. 52, p. 304.)

Southern Rhodesia has an area of nearly 150,000 square miles, or one and a quarter times that of the United Kingdom. It is estimated that of this total an area equal to about half England (without Wales) lies above 4000 feet, and is suitable for European settlement, that is, European children can be brought up there. At present about 23,000 Europeans are living in Rhodesia, but the men greatly outnumber the women, showing that there is not much family life. There are three-quarters of a million natives, whose wealth consists chiefly in their cattle.

The highest part of Southern Rhodesia is a ridge which forms the watershed between the Zambezi and the Limpopo, and runs from south-west to north-east through the region. The Matopo Hills, where Cecil Rhodes is buried, are a part of this ridge, and along it

the chief towns, *e.g.* Bulawayo, Salisbury, Gwelo, etc., are placed. This is the region best suited to Europeans, and it is watered by permanent streams. The lower grounds, especially the slopes to the Zambezi valley, are much hotter, are malarious, and become burnt and desolate in the dry season.

Of the minerals gold is the most important. It has been worked for long ages, remains of ancient workings, together with temples and other ruins, being found in various parts of the country. Some investigators believe that these workings belong to a period long before the Christian era. In recent years gold valued at about $2\frac{1}{2}$ millions has been produced every year. Other minerals are silver, coal, diamonds, chrome iron, etc.

Southern Rhodesia is divided into two provinces—Mashonaland in the north and Matabeleland in the south. Salisbury, the capital, stands at a height of nearly 5000 feet; in the vicinity are goldfields, and the land is also suitable both for the pastoral and agricultural industries.

In regard to agriculture in Rhodesia we may note that with its summer rain it is well fitted for maize, which is the staple crop. It is hoped that this crop may come to be used very extensively for stock, especially pigs (*cf.* Chicago, which owes its bacon industry to the maize-growing area in its vicinity). Other cereals, especially wheat, suffer from the summer rains, which tend to produce rust, but can be grown in the dry season with irrigation. In the higher parts all the temperate vegetables can be grown, but next to stock-raising and maize-growing tobacco forms one of the most important crops. In favourable localities the more valuable fruits such as oranges and lemons as well as bananas will grow, and cotton is also possible, with rubber in the hottest parts.

NORTHERN RHODESIA is meantime far less developed than Southern. With a total extent of about 290,000 square miles it had in 1911 a white population of only 1400, while the native population slightly exceeded that of Southern Rhodesia. The capital is Livingstone on the Zambezi. On the plateau cattle seem to do well, the heavier rainfall producing a better growth of grass than farther south. The heavier fall also leads to a much better development of forest, so that Northern Rhodesia produces some timber. Agriculture has not as yet made much progress, but the products are definitely tropical. Thus coffee and rubber are being tried, and the oil-palm grows in some districts. Cotton, tobacco, fibre plants, maize, manioc, ground nuts, and so forth can be grown, with many kinds of fruit.

THE NYASALAND PROTECTORATE (Fig. 52)

Lake Nyasa is one of a series of narrow, steep-sided, deep lakes which occur at the east side of tropical Africa, and are believed to mark the position of what is called a rift valley, that is, a region where a block of the earth's crust has sunk, at whose sides steep walls rise. Lake Nyasa drains to the Indian Ocean by means of the Shiré River, a tributary of the Zambezi, and its waters are perfectly fresh. A tract of land along its western bank, together with a belt on either side of the Shiré River, and a small area at the southern end of the eastern shore of the lake, constitute the Protectorate of Nyasaland (lat. 17° to 10° S.).

Nyasaland is about $1\frac{1}{2}$ times the size of Ireland, and consists of a combination of plateau and valley land. The most important low-lying regions lie on the western shore of Lake Nyasa and round the Shiré valley, while the most important part of the plateau is the region

lying to the east of the Shiré, forming the Shiré Highlands. Here the chief settlements, *e.g.* Blantyre and Zomba, are placed, and here also the elevation diminishes the excessive heat. Everywhere the summer rainfall is heavy, but the "winter" is dry, with mists, but no rain. Nyasaland is only moderately suited for Europeans, as is shown by the fact that there are less than 1000 in the country, though there have been British settlements there for more than fifty years.

Many of the Europeans are planters carrying on agriculture with native labour. A few years ago coffee was the most important product, but owing to drought, pests, and the fluctuation of price, it has gone out of favour. Tobacco and cotton are now the staples, cotton being grown also by the natives on their own account. Among the minor crops chillies are important, and rubber plantations have also been started. Various fibre plants do well, as well as a number of other tropical plants.

Owing to the heavy rainfall Nyasaland has much forest land, but the individual trees are mostly small, and there is not much valuable timber. Among the wild products a plant called *Strophanthus* is of some importance. It yields an important drug and is exported to a considerable extent. The elephants which roam in the forest yield ivory, and as wild bees are very numerous there is a considerable export of beeswax. Cattle can be reared on the higher land, but in the valleys tsetse flies are abundant and distribute fly disease (due to trypanosomes in the blood).

Nyasaland has one notable advantage over Rhodesia in that natural means of communication exist. The great lake has a length of 360 miles, and though its harbours are not very good, navigation is everywhere practicable. The course of the Shiré is unfortunately, even in the wet season, interrupted by rapids in its

middle stretch, but long reaches both in its upper and lower courses are navigable. From the Lower Shiré steamers can pass into the Zambezi, and so out into the Indian Ocean at Chinde. A short railway now runs from Port Herald, on the Lower Shiré, to Blantyre. Port Herald is the highest point to which steamers can ascend in the dry season, so that the railway makes direct communication between the coast and Blantyre possible at all seasons. Blantyre is the most important settlement, though Zomba is the seat of the administration.

Outside of the region where communication by water is possible, transport must generally be carried on by human porters, as it is impossible to use oxen or horses, owing to the existence of tsetse flies in the wooded regions. In this respect Nyasaland resembles equatorial Africa. The presence of tsetse flies in the wooded valleys has also an unfavourable effect upon the cattle industry of the plateau region, for if the surplus cattle are exported there is always the risk that they may be infected by fly disease on their journey from the plateau.

Human transport in the shape of porters is the slowest and most costly of all methods, and the fact that it is the only form available has been one of the factors in checking the development of tropical Africa. As civilisation advances there is a tendency to replace it by motor-drawn vehicles, where roads can be made, and especially by the bicycle, which can of course be used on a very narrow track.

BRITISH EAST AFRICA (Fig. 52)

The East Africa Protectorate, with which the Protectorate of Zanzibar is now associated, and the adjacent Uganda Protectorate constitute a vast area of tropical

—indeed, largely equatorial—land (extending from lat. 3° S., to 6° N.), a considerable part of which is a high plateau. In parts of the area, therefore, even under the Equator, European settlement is possible. The whole area is roughly comparable in size to South Africa, but the white population is meantime not large.

THE RIFT VALLEY AND THE GREAT LAKES (Fig. 48).—Eastern Africa generally is especially characterised by its great lakes. We have already seen (p. 289) that Lake Nyasa lies along the line of a rift valley, but it is in German and British East Africa that this rift reaches its most notable development. The Red Sea lies in a narrow, steep-sided trough, and from it there runs a narrow trench, partly occupied by water and partly dry, which seems to end in Lake Nyasa. Another trench, of similar shape, holds Lake Albert and runs through Tanganyika to join the first at the north end of Nyasa. In the eastern half of this great fissure lie the lakes Rudolf, Sugota, Baringo, Manyara, and others; in the western, Lakes Albert, Edward, Tanganyika, and others. Between the two branches lies Lake Victoria, which is quite unlike the other lakes in shape. They are long, narrow, deep, and have high, steep sides; it is broad, shallow, with low, often marshy, shores. The lake is not, however, low lying, for its surface is about 4000 feet above sea-level.

There is a low-lying coastal belt in the East Africa Protectorate, but the western part of this Protectorate and Uganda generally are plateau regions, with the special feature that the two narrow trenches already described intersect the plateau, the trenches running on through German East Africa to converge at the head of Lake Nyasa. The eastern rift of the Great Rift Valley contains less water than the western, and is some

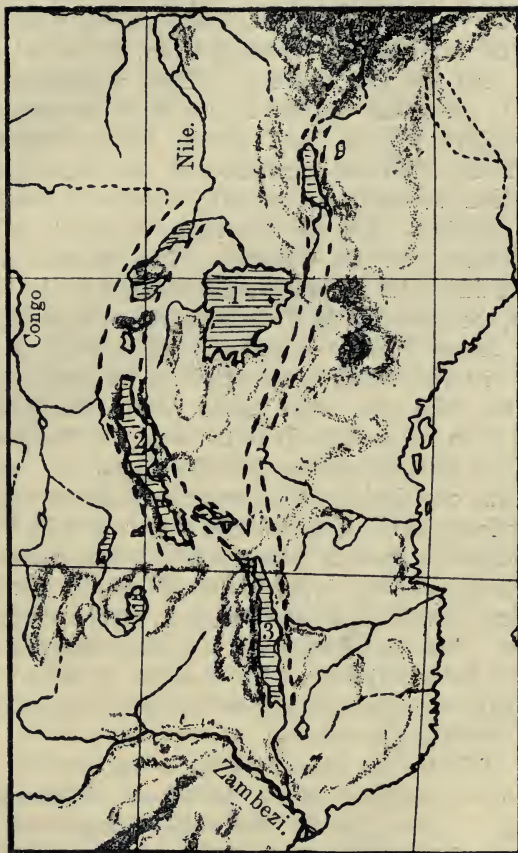


FIG. 48.—A PART OF EQUATORIAL AFRICA, TO SHOW THE POSITION OF THE RIFT VALLEY.

(1) *Lake Victoria*. (2) *Lake Tanganyika*. (3) *Lake Nyasa*.
The Rift Valley is marked by dotted lines. (See also Fig. 52.)

forty to sixty miles wide. It is probable that the two rifts have arisen in geologically recent time, and, when the earth sank to produce them, active volcanoes broke out in the vicinity. These volcanoes, now extinct, form the beautiful and lofty mountains of Kilimanjaro (19,316 feet), Kenia, Elgon, Ruwenzori, and others. Of those mentioned all, save Mount Elgon, have their summits permanently snow-clad, and give rise to glaciers. The two fissures have greatly affected the drainage of the country. The plateau at the eastern side of the main rift sends streams to the Indian Ocean, the Athi and the Tana being the most important. From the western lip of this rift the streams drain to Lake Victoria, which is the origin of the mighty Nile. Into the Nile also drain Lakes Albert and Edward, which lie in the branch rift to the west, but Tanganyika drains, at least sometimes, into the Congo.

In this description we have omitted all reference to the drainage of the lakes lying in the Great Rift Valley. The largest of these is Lake Rudolf, which has no exit and whose waters are impregnated with soda. Similarly the other, smaller, lakes have no exit, and have brackish waters. The most interesting of them is Magadi Lake, not far from Nairobi, which consists of almost solid carbonate of soda, and is now connected by a branch line to the Uganda railway.

The Nile leaves Lake Victoria at its northern end, forming the Ripon Falls near its origin. It then passes through a great marshy lake called Kioga, and after leaving this is joined by the Kafu, after which it runs through a very narrow cleft forming the Murchison Falls. Entering Lake Albert as the Victoria Nile, the river leaves it almost at once, swollen by the discharge of this lake, and runs northward to enter, beyond the boundary of the Uganda Protectorate, the Anglo-

Egyptian Sudan, from which point we have already described it (p. 208).

Into Lake Albert there flows the Semliki, bringing the discharge of Lake Edward, while that lake in its turn receives the discharge of Lake George.

Characters of the Surface.—Let us now look at the surface as a whole. The islands of Zanzibar and Pemba, together with the coastal strip of the mainland, are low-lying, hot, steamy, and covered with a jungle containing many palms, of which the coco-nut is the most important. On passing inland on the mainland the land gradually rises, and a well-marked dry season appears. This belt is clothed mostly with a thorny scrub, is inhabited by many game animals, and is generally unhealthy. Gradually there is a further rise, and as we ascend above 4500 feet the country becomes of the savanna type, with rolling downs, thin wood, increasing to forest on the heights, and an almost uniformly warm but not hot climate, with seasonal rainfall. Parts of this plateau are well-fitted for European settlement. It is intersected by the deep gash of the Great Rift. Beyond the western wall of the Great Rift the land sinks slightly, and round Lake Victoria and the Nile Valley to the north of it we have a great area below 4000 feet in elevation, uniformly hot, and almost uniformly moist, unsuited to European settlement, often clothed with equatorial forest, and devastated by sleeping sickness. Farther west again the land rises, but, broadly speaking, Uganda, that is the western part of British East Africa, unlike the plateau region of the East Africa Protectorate, is not suitable for the white man.

Climate.—In regard to this, the two most interesting points are the temperature range and the distribution of the rainfall.

The essential points in regard to the temperature may be gathered from Fig. 49. The three stations selected are at very different levels, but we see that at all there is very little variation throughout the year, this being especially true at Entebbe, which is placed

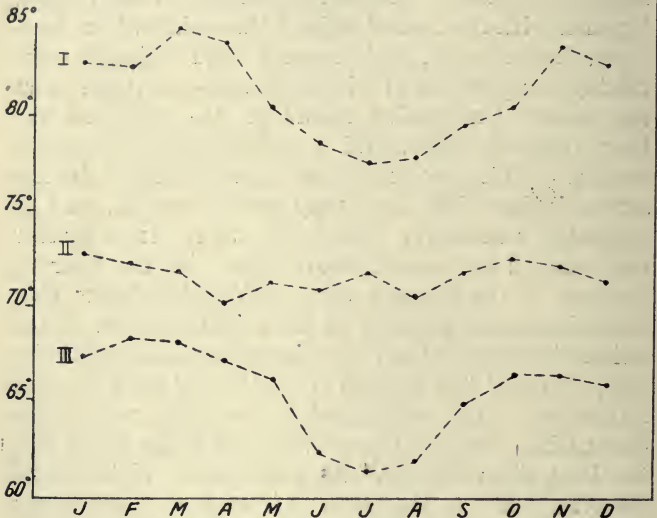


FIG. 49.—TEMPERATURE CURVE FOR BRITISH EAST AFRICA.

- (1) *Mombasa*.—Height above sea-level, 60 feet. Lat. $4^{\circ} 4' S$.
- (2) *Entebbe*.—Height, 3906 feet. Lat. $0^{\circ} 3' S$.
- (3) *Machakos*.—Height, 5400 feet. Lat. $1^{\circ} 31' S$.

on the shore of the great mass of water formed by Lake Victoria. Though always cooler than Mombasa on the coast, it shows less range of temperature. At Machakos, within the highland region, the air is distinctly cooler than on the lower ground, and this is true throughout the year. But so far as temperature

goes, there is nothing to prevent plant growth being continuous throughout the year at all three stations.

Turn next to Fig. 50. Here Entebbe, almost on

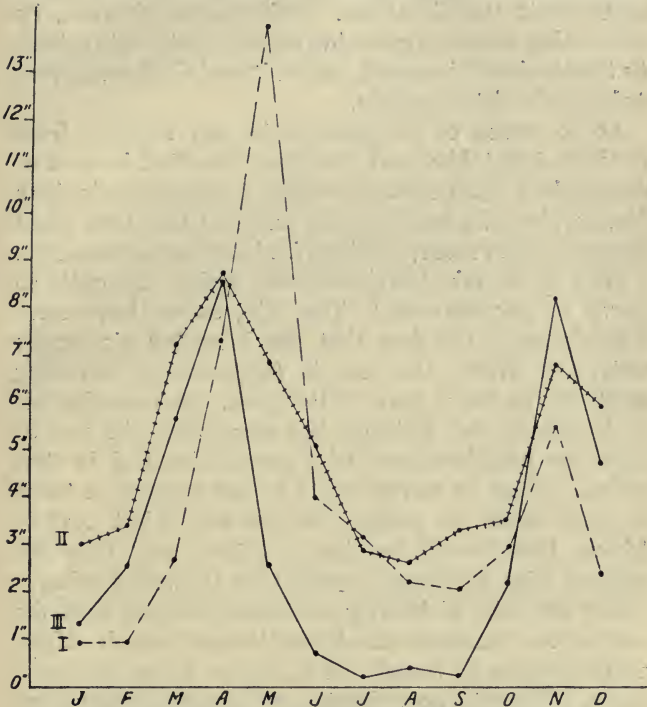


FIG. 50.—RAINFALL CURVES FOR BRITISH EAST AFRICA, TO ILLUSTRATE EQUATORIAL CONDITIONS.

(1) Mombasa. (2) Entebbe. (3) Machakos.

the Equator, and on the shore of Lake Victoria, has a characteristic equatorial rainfall. There is no dry season, but the rains are heaviest in our spring and autumn, heavier in our spring than in autumn. Why is

this? At the time of the spring and autumn equinoxes the sun is vertical over Entebbe, and the fierce rays, blazing down upon the surface, heat the earth which again heats the air above. This heated air rises, its place being taken by incoming air from adjacent regions. As the air rises it is cooled, and as it cools it throws down its load of moisture as rain.

At no season of the year is the sun very far from vertical at Entebbe, and therefore this effect is more or less marked at all seasons, so that at no season is there drought, but the heaviest rain comes at the times when the sun is most nearly vertical, *i.e.* in spring and autumn.

Why is the rain heaviest in our spring, not quite so heavy in our autumn? The rain, as we have seen, depends upon the fact that the incoming air carries moisture. When the sun is (apparently) travelling north in the early part of the year, the incoming air at Mombasa and Entebbe has come from the sea, or from the neighbourhood of a great lake, and is thus moist. When he travels south in our autumn it tends to come from the widest, hottest and driest part of Africa, therefore it has less moisture, and thus the autumn rains are less in amount than the spring rains.

For the sake of brevity we sometimes say that the vertical sun carries a cloud mantle with him, in Africa heaviest when he travels north, lighter when he travels south. There is no objection to our using this form if we understand what it means, realising that the apparent movement of the sun back and forward across the Equator is but an appearance, not a reality.

How then do we explain the rainfall of Entebbe? The vertical sun is, as we say, never far away, therefore there is rain at all seasons. Twice a year he passes Entebbe—once in our spring bearing his heavy cloud mantle, once in our autumn bearing a lighter mantle.

Now look at Mombasa, a little south of the Equator. The conditions are nearly the same, but before the heavy rains of April and May there is a season of

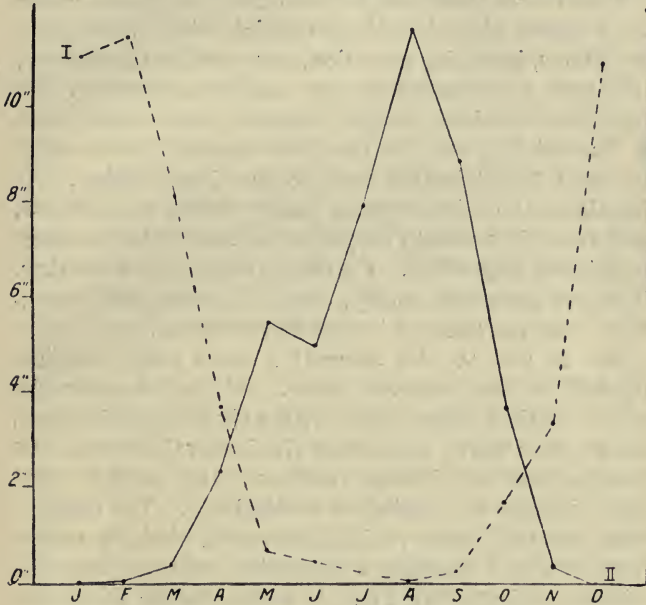


FIG. 51.—TROPICAL RAINFALL.

The diagram shows that in the tropics there is a season of drought at the time when the sun's rays slant most, and a season of heavy rainfall at the time when they are vertical.

(1) *Zomba*, in lat. $15^{\circ} 4' S$. The rainy season is in the Southern summer.

(2) *Gambaga*, in the Northern Territories of the Gold Coast, West Africa; lat. $10^{\circ} 32' N$. The rainy season here falls in the Northern summer.

relative drought—a season when the thin cloud mantle of autumn has virtually disappeared.

Machakos, on the plateau, has equinoctial rains as

before, but with no great difference in amount. Between these rains, however, there is a very distinct dry season, when scarcely any rain falls.

Thus we see that though theoretically all places under the Equator should have equatorial rainfall, yet local conditions, including elevation, may modify the climate, and lead to well-marked dry seasons appearing. Of the three stations named, Entebbe has some forest in its vicinity, but for the true equatorial rain-forest we must travel farther west to the Congo region. At Mombasa the climate suits jungle rather than forest, and there is a wealth of palms, of which the coco-nut is the most important. On the plateau, as at Machakos, trees are generally scanty, except under special conditions, and the country is typically savanna.

Let us add to this account a word about tropical rainfall in the narrower sense. At the Equator the sun is vertical twice a year with a six months' interval. As we pass north and south the interval between the two periods diminishes, until on the actual tropic there is only one period of vertical sun. The result is that the two rainy periods approach, the dry season lengthens and becomes accentuated, and we have the climate indicated by Fig. 51, where Zomba shows the conditions south of the Equator and Gambaga those to the north.

Inhabitants.—In connection with South Africa we saw that the native population there now consists predominantly of negro races belonging to the Bantu division, but formerly there were pigmy Bushmen, and also Hottentots, who are probably the result of a mingling of Bantu and Bushman stocks. The northern part of Africa is inhabited by men whose skin colour varies, but who have straight faces and aquiline noses, instead of the protruding jaws and flat noses of the

negro stocks. These races belong to the same division as ourselves—that is, are Caucasians. They are divided into two groups, the Semites, including Moors and Abyssinians, and the darker Hamites, including the Egyptians, the Somali, and others. The Semites and Hamites live mostly in arid or semi-arid regions, and are predominantly pastoral; where cultivation is possible it is carried on by the men and with the aid of the plough. The negroes, who live mostly in the moister parts of Africa, sometimes depend largely upon wild produce and hunting, but, where possible, they keep some cattle or other domestic animals; generally agriculture is carried on on a small scale, but this is almost always done by the women, and with the help of the hoe only. In other words, negro cultivation is only a simple form of gardening.

Just as, however, in the south the primitive Bushmen have apparently mingled with negroes to give rise to the Hottentots, so in Central Africa the Caucasians, coming from the north, have mingled with the negroes to give rise to various mixed races. In British East Africa the most interesting of these mixed races is the Masai, who are purely cattle rearers (and raiders), and do not cultivate at all. They live on the plateau region in the East Africa Protectorate and in German East Africa. The other races are mostly pure negroes. Examples are the Baganda in Uganda, and the Kikuyu in the East Africa Protectorate. One of the great difficulties in European settlement in East Africa is that the planters find it very difficult to obtain labour to work their land. The Masai despise agriculture, the pure negro stocks regard it as women's work; to the mind of the negro the natural work of a man is war, or guarding the cattle against Masai raiders. Now that intertribal war has been put down, and it is no

longer necessary to guard the cattle, these negroes have degenerated greatly, and drink and disease have played havoc among them.

The climate of East Africa is well suited to Asiatics, and many British Indians have emigrated there. These are, however, almost all engaged in trade, and so do not affect the labour problem greatly. But Indian coolies are employed on public works.

Flora and Fauna.—The fauna of British East Africa is excessively rich, most of the large game animals of Africa being found there. Large tracts of land have now been set aside as game reserves. Elephants are abundant and produce much ivory. On the other hand, lions constitute a real danger. In Uganda there is much equatorial forest, while the high lands of the East Africa Protectorate are also clothed with valuable timber. Rubber and coffee both grow wild.

Land Utilisation.—We have already mentioned the Masai as a native race rearing cattle. In earlier times the natural increase of their herds was largely checked by disease, and the quality of the animals was not good. Now strenuous efforts are being made by the administration to keep down disease, and not only are the cattle belonging to the natives increasing in number, but the settlers are also rearing cattle on a considerable scale. Already skins and hides form a very important item in the trade both of Uganda and of the East Africa Protectorate, and it is possible that in the future the healthier parts of the plateau will form an important cattle-rearing country. In Uganda generally tropical products are produced in the fertile, relatively low-lying regions. In the East Africa Protectorate, owing to the variety of the surface, both temperate and tropical products are produced.

Means of Communication.—British East Africa has an

excellent port in Mombasa, which is placed upon a small island and has two harbours. It is the chief outlet not only for the East Africa Protectorate, but also for parts of German East Africa and for Uganda. From Mombasa a railway (the Uganda railway) runs inland to Port Florence on Lake Victoria. Steamboat services on this lake maintain communication with Uganda, notably with Entebbe, its capital, situated on the lake. No direct route at present exists between the northern end of Lake Victoria and the navigable part of the Nile, but from Gondokoro, the most northerly station in Uganda, steamers run to Khartum. Wherever possible, roads are being constructed in East Africa, and the motor-car is becoming important as a means of transport. Where roads are not present, human porters are used, and they were universally employed in earlier days.

THE EAST AFRICA PROTECTORATE

The total area is about 250,000 square miles, and the population numbers about 3,000,000. There are some 25,000 Asiatics and about 2000 whites. Nairobi, the capital, is situated on the plateau. Minerals do not seem to be abundant. The most suitable region for Europeans seems to be that lying to the north-west of Nairobi. The largest single item in the export list is furnished by "grain," but this includes as well as maize, sesamum, a seed grown for its oil, ground nuts, peas and beans, etc. Hides, skins and live stock are all exported, also rubber, copra, ivory, some cotton, coffee, chillies, wattle bark, and so forth.

UGANDA

With a somewhat smaller area, and fewer whites than its neighbour, this Protectorate has a similar



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FIG. 52.

native population (about 3,000,000), and its exports are more valuable. As, however, these exports must be sent out through the East Africa Protectorate, they swell the export list of the latter. By far the most important product is cotton, grown on a large scale in the fertile belts. Hides and skins are also extensively produced, with much ivory. Attempts are being made to cultivate coffee and rubber. Uganda is hotter, damper, and generally more fertile than the East Africa Protectorate, part of which is infertile and suffers from drought. It has, however, been devastated by sleeping sickness, which is believed to have killed off nearly one million natives, and has rendered fertile and productive lands uninhabitable. Active measures have been taken against the disease, and its virulence seems to be abating, but it is uncertain when the cleared lands can again be safely occupied.

THE ZANZIBAR PROTECTORATE

This includes the two islands of Zanzibar and Pemba. The total area is only about 1000 square miles, but the Protectorate is important from two points of view. In the first place, the island of Zanzibar has a well-protected harbour, which serves as an important calling station for the coastal trade. Second, the two islands (Pemba predominating) yield 90 per cent. of the world's produce of cloves, of which they have thus a virtual monopoly. Copra is also produced on the large scale, and many other tropical plants can be cultivated. The islands are densely peopled by a very mixed population. The governing class and landowners are Arabs, but the actual work of cultivation is mostly done by negroes, largely the descendants of slaves.

SUMMARY

As already noted, the important point about these East African possessions is the extent to which they can be settled by Europeans. As yet there are most Europeans in Southern Rhodesia (23,000), which generally resembles the Transvaal in character. The East Africa Protectorate has 2000 Europeans, engaged in cultivating a variety of crops and in stock-raising. In Nyasaland there are few, and even the Shiré Highlands do not seem well suited for European settlement. Uganda is quite unsuitable.

The progress of Rhodesia is fairly well assured by its mineral wealth. In the possessions generally stock-rearing can be carried on in the higher areas, but various diseases still offer great obstacles. The uplands also often suffer from a lack of fuel, which in the East Africa Protectorate is partly due to the way the natives have destroyed the always thin forests. In the uplands various temperate products can be grown. In the low grounds all the usual tropical crops can be cultivated; cotton and rubber are especially being pushed, but nowhere yet are there plantations on a very large scale. The natives cultivate little.

CHAPTER XIX

III. TROPICAL AFRICAN POSSESSIONS: (B) DESERT REGIONS; THE SOMALILAND PRO- TECTORATE. APPENDIX — ADEN, PERIM, SOKOTRA, AND MINOR ISLANDS

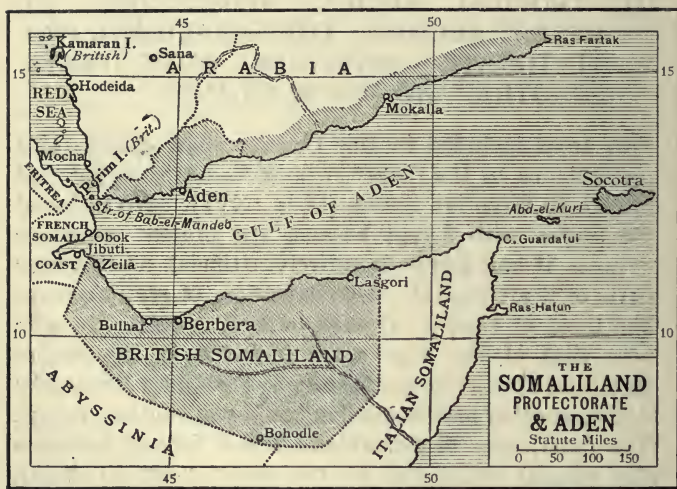
THE areas included in this chapter show considerable resemblance to the desert regions found in Egypt and the Anglo-Egyptian Sudan (Chap. XIV). We included the Sudan with Egypt because the present boundary between it and Egypt is entirely artificial, and because parts of it are capable, with irrigation, of growing crops like those of Egypt. It may be well, however, to note here that of the huge tract included in the Anglo-Egyptian Sudan one part generally resembles Equatorial Africa, another part Somaliland, and still another, Egypt. The description of Somaliland which follows indicates the general characters of the desert lands of North Africa.

THE SOMALILAND PROTECTORATE

The Somaliland Protectorate, a tract of land on the shore of the Gulf of Aden, in the Horn of Africa, has little commercial importance. In theory it occupies an area exceeding twice that of Ireland (about 68,000 square miles), but British occupation is now confined to the coastal belt. Three zones can be recognised: (1) The coastal plain, with scarcely any rain, and there-

fore very dry and unproductive ; behind this lie (2) the coastal hills with some rain, with streams in the wet season ; finally we have (3) the high plateau, rising to 7000 feet towards the Harar Highlands, with seasonal rain.

The coastal plain has few plants, including one or two thorny bushes. In the valleys of the coastal hills



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FIG. 53.

trees occur, especially acacias, and generally there is more vegetation. In the plateau region woods are found on the crests, but most of the area forms rolling plains where grass grows freely after the rains. In the dry season the country presents a very arid appearance, and parts of it are waterless.

The great feature of the climate is the alternation of

the dry north-east trade wind of winter with the south-west monsoon of summer. This latter wind brings heavy rain to the highlands of Abyssinia, but all the coastal belt of Somaliland is too low to precipitate moisture from this wind, hence the great aridity. During the time of the south-west monsoon the climate is very hot.

The products are characteristic. Water is difficult to procure, wells having to be sunk in the dry water-courses; in consequence the camel, with its catholic taste in food and its capacity for enduring thirst, is the most important domestic animal. Cattle can only be kept in parts of the interior, but sheep and goats are abundant. Owing to the arid climate the bushes and trees, as in the Mediterranean region but to a greater extent, produce aromatic gums and resins. The gums exude as "tears" on the plant, or drop from them to the ground, and are collected for export, forming "frankincense and myrrh." Again, ostrich feathers are exported, chiefly from wild birds which thrive in this arid region.

The population numbers about 350,000, and consists of Somalis, who belong to the Hamitic race. They are nomadic herdsmen, their wealth consisting in their flocks of camels, goats, and sheep, the two latter being largely exported to Aden. Small horses are used for riding, and the Somali are excellent horsemen; in their raiding and fighting propensities they resemble the nomadic tribes of North Africa generally.

The most important towns are Zeila and Berbera on the coast.

APPENDIX: ADEN, PERIM, AND SOKOTRA

ADEN, which is subject to the Bombay Government, but is most conveniently considered here, is a volcanic peninsula on the coast of Arabia, strongly fortified,

for it commands the southern entrance to the Red Sea, and thus the road to India. There is practically no rain, and the region is intensely arid, very hot in summer, but cooler during the north-east monsoon of winter. Aden has a good harbour, and is used as a coaling station by vessels going to or coming from the east and from Australia. As it has a desert region at its back, supplies have practically all to be brought from Somaliland opposite (p. 309). Water is difficult to obtain. There are elaborate cisterns used for storing the occasional rainfall, also wells, but much of the supply is obtained by condensing sea-water.

PERIM is a small island at the entrance of the Red Sea, having a lighthouse, and serving as a coaling station.

Some seven hundred miles farther east, near the entrance to the Gulf of Aden, lies the hilly island of SOKOTRA, whose inhabitants keep cattle, sheep, and goats, and cultivate dates, the chief food supply. As in Somaliland and Arabia, gums are exported, but the climate is damper and the soil more fertile than on the adjacent lands.

The Kuria Muria Islands, off the coast of Arabia, are attached to Aden. Their chief importance is that they afford a landing-place for the Red Sea cable. On the other hand the Bahrein Islands, in the Persian Gulf, are attached to the Government of India. They produce dates and donkeys, but their chief importance is due to the pearl fishing in the surrounding waters, the export of pearls and pearl shell amounting to about £1,000,000 per annum. There is also much trade with the adjacent mainland.

CHAPTER XX

III. TROPICAL AFRICAN POSSESSIONS: (C) WEST AFRICA; NIGERIA; GOLD COAST; SIERRA LEONE; GAMBIA

General.—The West African colonies and protectorates offer a number of contrasts to those on the east. In the first place we must note that they are of comparatively small area, and are isolated from one another—the eastern possessions, as we have seen, are not only of very large area, but form an almost continuous belt from south to north, separated only by German East Africa.

Again, there is a great difference in elevation. A belt of relatively high ground runs nearly parallel to the north coast of the Gulf of Guinea, some little distance back from the coast, thus separating a coastal forested belt from an inland relatively dry belt, but there is nothing comparable to the high plateaux of Eastern Africa.

Partly because of the low mean elevation, partly for reasons which we shall consider directly, the climate, especially on the coastal belt, is hot, moist, and unhealthy. Sanitation, and especially measures to prevent the increase of mosquitoes, have done something to diminish the reputation of the west coast as the "white man's grave," but a number of tropical diseases, including malarial fever, are still woefully prevalent. Not

only is it impossible to bring up European children, but Europeans can apparently only tolerate the climate

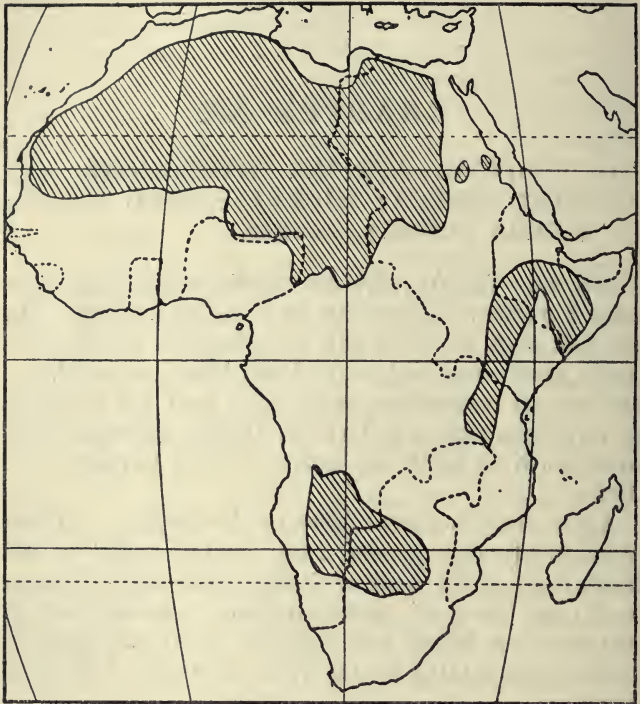


FIG. 54.—SKETCH-MAP OF AFRICA, TO SHOW BASINS OF INLAND DRAINAGE—THAT IS, THE AREAS WHICH SEND NO WATER TO THE SEA. THESE AREAS ARE SHADED.

The dotted lines enclose the regions in which Britain is interested.

for short periods, and require long leave of absence in the unhealthy season.

We have suggested above that the West African

colonies consist, broadly speaking, of three belts: the coastal belt, very hot and swampy, with high rainfall, and clothed in dense forest; the upland region, with less wood and a lower rainfall; the hinterland, a savanna region, passing gradually, *e.g.* in Northern Nigeria, into the desert (Fig. 54). Now the desert is the home of pastoral tribes of Semitic or Hamitic descent, and these nomad herdsman are continually tending to overrun the damper lands to the south. A natural barrier to their progress southward seems to be the climate and vegetation of the coastal belt, for here their cattle cannot live, both because of the tsetse fly, and because of the absence of pasturage in the dense forest. In consequence, in West Africa generally we have full-blooded negroes near the coast, and more or less mixed races farther inland.

The influence of the northern races is obvious in various ways:—for instance, in religion, for many of the West African negroes are Mohammedans; in agriculture, for some of the West African tribes, especially those living outside the damp forest region, cultivate more extensively and employ better methods than negroes generally, and also learn new methods with some rapidity; also in a capacity for trade which some tribes show to a marked degree. In consequence, West Africa is undergoing considerable development as the result of the activity of the natives, rather than of Europeans. Their trading instincts lead the negroes to collect wild produce, often, it is true, by very wasteful methods; their interest in agriculture is leading them to take up the cultivation of new products, though it is remarkable that they show great reluctance to use the plough, and cling tenaciously to the negro implement—the hoe. Among the wild products which they collect are especially the fruit of the oil-palm and rubber;

among new products which they are beginning to grow are cocoa, rubber, kola-nuts, and so forth.

West Africa was once the centre of the slave trade, and supplied the Americans with negro slaves.

Climate.—To what has been already said on tropical climates in general on p. 300, we must add a few words on the special climate of West Africa. The most important point is to note first that at the eastern boundary of Southern Nigeria the coast-line turns round almost at a right angle, and then trends roughly east and west to form the great western extension of Africa. Thus Nigeria, the Gold Coast Colony, and Sierra Leone have ocean to the south of them (Fig. 55, p. 316). The coast-line of all these colonies lies in summer just within the area of the south-east trades; all, further, have the great desert area of the Sahara in their hinterland. In summer the Sahara becomes intensely heated, and the air over it rises so that a low pressure area is produced into which air is sucked. The result is that the south-east trades lose their normal direction, are turned to the south-west, and appear on the coastal belt of West Africa as the summer "monsoon," which brings heavy rain to the coast, the amount diminishing as we pass inland.

In the "winter" months, that is, when the sun is vertical over the tropic of Capricorn, the Guinea coast lies in the belt of calms, for the trades have "followed the sun" and travelled south. Then light and variable winds occur, with local thunderstorms which bring rain to the coast, while the interior has a dry season. Thus the coast is more or less wet at all seasons, and shows the equatorial type of rainfall (see p. 299). Inland we have tropical rainfall, *i.e.* heavy summer rains, and a severe drought in the cooler season.

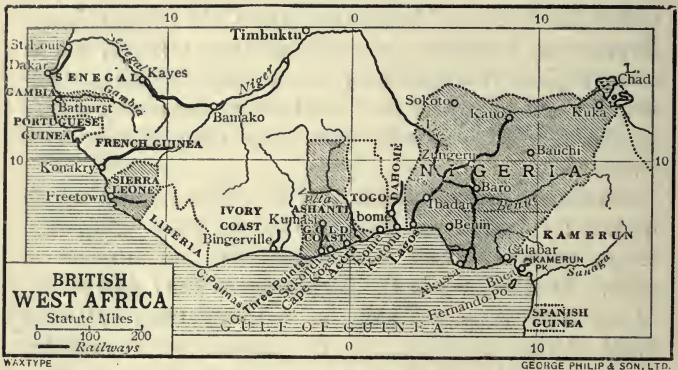
One other feature of the climate must be mentioned.

The Sahara heats up rapidly in summer, but owing to the absence of vegetation it cools quickly in winter. While in summer, therefore, it forms a low pressure area, sucking in air from the surrounding regions, in winter it forms a high pressure area, from which winds blow out to the surrounding lands. This type of wind is always dry, and it appears in the lands of West Africa as the *Harmattan*. Owing to its dryness the Harmattan is welcomed in the damp regions, and is, for example, called the "doctor" in parts of the Gold Coast Colony. Dryness is, however, its only constant quality, for in some regions it appears as a hot wind bringing sandstorms, and in others as a cold wind, dreaded because of the risk of sudden chills, very dangerous in hot climates.

Products.—In the absence of the high ground which makes it possible in East Africa to grow temperate crops, those of West Africa generally are tropical in type. Further, while the highlands of East Africa are, as we have seen, suitable for cattle-rearing, cattle in West Africa only appear far inland where acacias flourish and there is no dense wood to lodge the tsetse. Again, in the West African colonies, as already stated, the collection of wild produce is very important; the gold of the Gold Coast and the tin of Nigeria are also valuable mineral products, the latter paying for railway construction in Nigeria.

Though there is a general similarity of products in the different colonies, yet Nigeria and the Gold Coast differ to some extent from Sierra Leone and the Gambia. In the last ground-nuts are the most important crop. They grow also in the other colonies, but are there less important and fetch a lower price in the market. In the Gambia also gum from the acacia indicates that we are getting near the desert. Only in Sierra Leone

and to the east of it does the oil-palm flourish and its fruit become really important. Everywhere millet, maize, and manioc are important native food-stuffs. Wheat can rarely be grown, except in the north of Northern Nigeria. Cocoa is most important in the Gold Coast, kola-nuts and ginger thrive in Sierra Leone, rubber, palm-oil nuts and kernels, cocoa, cotton, and so on in Nigeria.



London: G. Bell & Sons, Ltd.

FIG. 55.

THE SEPARATE COLONIES AND PROTECTORATES

These are four in number—Nigeria, Northern Nigeria and Southern Nigeria being now united with each other and with the former colony and protectorate of Lagos; the Gold Coast; Sierra Leone; and the Gambia.

NIGERIA includes, first, Southern Nigeria, which extends south to about lat. 4° N. and has a total area of about 80,000 sq. miles, that is, is about the size of England (without Wales) and Scotland put

together. The population is fairly dense—about eight millions—but whites are few. The region, which is also the outlet of Northern Nigeria, is not well provided with safe ports; Lagos (once the centre of the slave trade), Akassa, and Calabar are all much exposed. The chief exports are palm-oil and palm kernels, both obtained from the fruit of the oil-palm, which grows wild abundantly in the forest region. Palm-oil is largely used in soap-making, and much of it is sent to Liverpool; it is also used in the tinsplate industry of Cardiff. Then come tin, rubber, cocoa, cotton, etc. The coastal region is very unhealthy, especially round the delta of the Niger, where there are innumerable creeks and mangrove swamps.

The former Northern Nigeria Protectorate (northern limit about 14° N.) has an area more than twice that of the whole United Kingdom (total area, 256,000 square miles), and a population of about 9,000,000. Kano and Sokoto are busy trading centres in the north. Tin is an important product; cotton and tobacco are grown and live stock reared.

THE GOLD COAST COLONY (lat. 5° N. to about 11° N.) equals Southern Nigeria in area (about 80,000 square miles), but has a population of only about $1\frac{1}{2}$ millions. In addition to cocoa, gold, rubber, palm-oil, and palm kernels there is a considerable export of timber. Sekondi, Cape Coast Castle, and Accra are ports. Attached to the colony are Ashanti and the Northern Territories, the latter said to contain much gold.

SIERRA LEONE (about lat. 7° to 10° N.) is a colony and protectorate with a total area of about half that of England (about 25,000 square miles) and a population of $1\frac{1}{2}$ millions. Freetown, the capital, is the best port in West Africa; from it a railway runs

inland. Palm-oil, palm kernels, kola-nuts, and ginger are the most important products.

THE COLONY OF GAMBIA (about lat. 13° N.) comprises a very small area, under 4000 square miles, round the river Gambia, with a good port at Bathurst. In addition to ground-nuts, beeswax, hides, and millet are exported.

CHAPTER XXI

IV. TROPICAL AMERICAN POSSESSIONS: THE BRITISH WEST INDIES; BRITISH HON- DURAS; BRITISH GUIANA

THE BRITISH WEST INDIES

FROM the peninsula of Yucatan there stretches a great chain of islands, running first in a south-easterly direction and then curving to the south to approach the coast of Venezuela not far from the mouth of the Orinoco. To the north of the western part of the chain there lies a great submarine bank, connected to the coast of Florida, from whose surface rise a number of mostly barren coral islets, forming the Bahamas. To the south of Cuba, the first island of the chain, lies the large island of Jamaica. The whole chain, with the two outlying portions mentioned, forms the West Indies, which separate the Gulf of Mexico from the Caribbean Sea and the Caribbean Sea in its turn from the Atlantic Ocean, communication between these different bodies of water being effected by the wide Yucatan Channel and the narrower passages between the islands.

Of these islands a number, though not the largest, belong to Britain. In earlier days the islands produced sugar for the civilised world, and were of such enormous importance that they were much sought after by the great powers. With the cultivation of

beet sugar in Europe, they have lost much of their importance, though they may regain part of it with the opening of the Panama Canal.

The British islands fall into six groups, which are—



FIG. 56.

1. JAMAICA, the largest and most populous.
2. The BAHAMAS.
3. The small LEEWARD ISLANDS, including ANTIGUA, DOMINICA, MONTSERRAT, etc.
4. The WINDWARD ISLANDS, including ST. LUCIA, ST. VINCENT, etc.

5. The outlying island of BARBADOS ; and
6. TRINIDAD, which lies close to the mainland of South America. With it TOBAGO is included.

Structure.—We have already mentioned the Bahamas and noted that they consist of coral. They show the usual characters of coral islands. Thus they are low and often barren, with salt-water lagoons covering large areas. Where the soil is fertile it owes its fertility to the fact that sea-birds nest and leave a deposit of guano behind, a deposit which is rich in plant food. We may add that because the current of warm water called the Gulf Stream, sweeps north past the coast of Florida, coral reefs extend farther north here than anywhere else, so that coral rock occurs in the Bermudas in lat. 32° N.

The remaining islands are of two main types. Some of the smaller islands, such as St. Vincent and St. Lucia, show nothing but volcanic rock, St. Vincent having an active volcano. On the other hand, the larger islands, such as Jamaica, contain rocks of the kind called sedimentary, that is, rocks which were laid down in shallow water, a fact which leads us to believe that such islands once formed part of a continent. These islands contain native non-flying mammals, especially gnawing animals (rodents), though these are relatively few in number, suggesting that the breaking up of the old continent into separate islands took place a long time ago. In contrast to these islands, which stand well away from the present land, we have Trinidad, which lies close to South America and has plants and animals similar to those of South America.

Position.—The Bahamas, which are scarcely tropical islands, extend well within lat. 25° N. ; Trinidad just touches 10° N. ; Jamaica is crossed by the parallel of

18° N. lat. ; so that in a very general fashion we may think of these islands as lying between 10° and 20° N. lat., and thus corresponding in position to the islands of the Indian Ocean.

Climate.—Their climate shows considerable similarity to that of those islands, but as the West Indian islands lie north of the Equator their seasons are reversed as compared with Mauritius and the Seychelles. As in the case of the latter, the trade wind blows steadily during the cooler months, but it is here the north-east trade. Again, as the sun travels northwards in the northern summer he brings with him the equatorial belt of calms, with the result that during the hotter months of the year the winds are variable, and there is copious rainfall. As in other tropical islands the eastern side is healthier than the west, because it is more exposed to the trades. On the other hand, ports tend to be placed on the western side, because only here is there shelter from the strong wind.

The temperature is high and remarkably even throughout the year, but the fact that the highest temperatures come in the rainy season makes this period trying. Most of the West Indian islands are liable to hurricanes of disastrous strength, which tend to occur in the months of August, September, and October.

The health conditions vary considerably. Barbados, an outpost fully exposed to the trade wind, is healthy, and in all the islands the healthiest period is the season from January to March, when there is least rain and strongest wind. The usual tropical diseases, especially malaria and, in some parts, yellow fever, tend to occur, except where special measures are taken to keep down the mosquitoes which carry these diseases from one human being to another.

Products.—The islands are generally very fertile, this

being especially due to the volcanic soil. Progress is, however, checked not only by the hurricanes, but also by the frequent and destructive earthquakes, and in some islands by volcanic eruptions. Owing to the moisture and warmth almost all tropical crops can be grown, but, as already indicated, the tendency in the old days was to concentrate upon sugar. Now tropical fruit is extensively grown, especially for the use of the dense industrial population of the United States. The United States form the nearest market for the produce of the islands, and since products which can be grown in the warmer parts of that country, *e.g.* oranges, are shut out by tariff, the tendency is for the islands to concentrate upon crops which demand great heat. Thus the banana trade of Jamaica far surpasses its orange trade, for Jamaica oranges are shut out of the United States market, and in the British market have to compete with oranges from many other parts of the world. The demand for bananas, on the other hand, in the United States is almost unlimited, and they cannot be grown within the States. Cocoa, another crop which demands great heat, is also extensively grown in the islands.

People.—At the time of their discovery the West Indian islands were inhabited by American Indians called Caribs, but these are now virtually extinct. To work in the sugar plantations negro slaves were introduced from West Africa, and the descendants of these now form the bulk of the population. In Jamaica especially much intermingling of the black and white races has taken place, so that there are great numbers of persons of mixed blood. Pure whites are relatively few in number. In some of the islands British Indians have been introduced as coolies.

I. JAMAICA has an area about equal to twice that

of Lancashire, and is inhabited by about three-quarters of a million people. The scenery is picturesque, for there is a central axis of mountains rising to 7400 feet (Blue Mountains) from which numerous streams flow. The soil is fertile, and the island is beginning to recover from the depression caused by the abolition of slavery and the fall in price of cane sugar. At the present time bananas are the most important export of Jamaica, and the trade in this fruit is in the hands of an American Company, and is well organised. Logwood and logwood extract are also extensively produced; sugar, though still second or third in the list of exports, has greatly diminished in amount. Other crops are coffee, of very excellent quality, cocoa, coco-nuts, and pimento, also called allspice or Jamaica pepper, which is obtained from a tree native to Jamaica, and of which Jamaica forms the chief source.

Oranges and other fruits are also extensively produced, and attempts are being made to develop the island as a tourist resort. In 1911 the total exports of the island had a value of nearly three millions, and of this total bananas accounted for one-half, and sugar for only about one-twelfth. Broadly speaking, therefore, Jamaica, once a sugar-producing island, has become a banana-producing one. The capital is Kingston on the south coast.

2. THE BAHAMAS are not of very great importance. Of the numerous islands only twenty are inhabited, and the most important is New Providence, with Nassau, the capital. The natural resources consist of the fisheries, especially the sponge fisheries; turtles, pearls, and pearl shell are also obtained. The low islands are interpenetrated by shallow lagoons where the sea-water evaporates and leaves deposits of salt, which are collected by raking, so that salt forms an article of export.

Further, agaves, plants like aloes in appearance, grow like weeds, and from them a fibre called sisal hemp is obtained, which is manufactured into rope. The plant is also cultivated. Pine-apples, oranges, and tomatoes are grown, and, as in the case of so many coral islands, guano is obtained from the islets where sea-birds nest in numbers.

3. THE LEEWARD ISLANDS consist of a number of islands, many of them small. The largest is Dominica, which is twice the size of the Isle of Wight, but it has a smaller population and is not so prosperous as Antigua, an island less than half its size. Antigua has a somewhat varied surface, owing to the fact that volcanic, sedimentary, and coral rocks all occur. It has no rivers, and the water supply presents difficulties, the island being subject to drought. The chief product used to be sugar, but the valuable kind of cotton known as Sea Island cotton is now grown, as well as pine-apples. St. Kitts, a much smaller island, is mountainous, but contains fertile plains, and produces sugar and Sea Island cotton. Dominica used to be very backward, but is now making progress, owing to the fact that the planters are devoting more attention to cocoa and limes. Oranges and coffee are also produced. The island, which is mountainous, is well-watered. The small island of Montserrat is noted for its limes, which give rise to the lime juice so familiar in shops. Sea Island cotton and sugar are also produced.

4. THE WINDWARD ISLANDS are volcanic and mountainous, with heavy tropical rainfall and picturesque scenery. The seat of government is in Grenada, whose chief product is cocoa. St. Vincent yields arrowroot and Sea Island cotton. Arrowroot is obtained from a plant related to the Canna of gardens, native to tropical America. The plant is grown in several of the islands,

and the arrowroot is obtained from the rootstocks. St. Lucia, which is damp and not very healthy, is not meantime much developed, but produces sugar, cocoa, rum, coffee, etc.

5. BARBADOS is larger than the Isle of Wight, and consists for the most part of coral rock, but has also some interesting sedimentary beds. The island is, for the most part, flat, the greatest elevation being a little over 1100 feet in height. Owing to the porous nature of the rock there are no streams, and the soil, which is fertile, is shallow, and is believed to have been fertilised by ashes from the Soufrière in St. Vincent, an active volcano. Sugar, Sea Island cotton, and bananas are the chief products.

6. TRINIDAD is less than half the size of Jamaica, and has a population of 330,000. It is mountainous and has many rivers. The east coast is very much exposed to the trade winds, and the breakers here reach a great height, so that ships cannot approach this coast, which is low and flat and fringed with coco-nut trees. The capital, Port of Spain, lies on the western side of the island. The most important product of Trinidad is cocoa, for which the hot, damp climate is well suited. Next comes sugar and asphalt. In 1911 the value of the exports of Trinidad, with Tobago, was nearly five millions, of which cocoa accounted for more than one quarter.

The most interesting feature of Trinidad is the so-called pitch lake, from which the asphalt is obtained. This lake is 114 acres in extent, and consists of solid pitch whose surface is sufficiently firm to be walked upon, and even to bear a cable tramway. The pitch is dug out, and the holes then fill up owing to pressure from the sides.

Tobago, which lies twenty miles to the north-east

of Trinidad, produces sugar, cocoa, etc., and has now a considerable area of rubber plantations, rubber being a valuable article of export. Cattle and horses are also raised.

THE BERMUDAS may be regarded as an appendix to the West Indies, for, although they lie in lat. 32° N., they consist of coral rock, and have an unusually warm climate for their latitude. Those accustomed to the climate of the West Indies declare that in summer the damp heat of the Bermudas is more trying than that of the former islands, for the winds are here less strong, and the air is saturated with moisture. The summer temperature exceeds 80° F., and though rain occurs at all seasons, it is heaviest in autumn. The winter temperature exceeds 60° , and at this time, and especially in the relatively dry period of spring, the islands are frequented as a health resort by persons seeking to escape the severe cold of the eastern United States.

The islands are not very fertile, and there are no streams, so that the water supply presents difficulties. Owing to the high mean temperature, a certain number of tropical plants have established themselves, but the main products are temperate, especially early potatoes, onions, and lily bulbs for the United States market. Arrowroot is also grown. The inhabitants are chiefly negroes or persons of mixed blood, so that in this respect also the islands resemble the West Indies. The chief importance of the Bermudas is that they form a naval station. The islands are fortified, and there is a garrison.

BRITISH HONDURAS

British Honduras is interesting from the fact that although it lies practically in the latitude of Jamaica, yet it shows the general characters of an equatorial

country; that is, its hot, damp climate promotes the growth of dense tropical forest, and the chief exports are forest products, cultivation playing a small part in its activities.

The colony, which is placed on the eastern coast of Central America, south of Yucatan, consists of a northern region which is flat and swampy, and a southern region rising to 4000 feet in the Cockscomb Mountains. As in similar regions elsewhere, streams are numerous, and serve as the chief means of communication through the dense forest. So much is this the case that the exports of the colony vary with the rainfall, for in dry seasons it is impossible to float the valuable timbers down the shrunken streams to the coast.

Though the colony is considerably larger than Wales (total area, 8600 square miles), the population is only 40,500, chiefly negroes, or persons of mixed descent, with some Caribs from the West Indian Islands, and a small percentage of Europeans. Practically the only town is Belize, the capital, on the river of the same name, with a poor harbour. Access to the coast generally is rendered difficult by the presence of coral reefs.

A few years ago the chief products were mahogany, used in cabinet-making, cedar (cabinet-making and pencils), and logwood (for dye). Mahogany and cedar are still important, but the export of logwood has been steadily diminishing owing to the increasing use of artificial dyes. Further, the first place in the list of exports, at one time held by logwood, was in 1911 occupied by a substance called chicle, used in the manufacture of American chewing-gum. Chicle is a substance which shows certain resemblances to indiarubber, and is obtained in a similar fashion by making incisions in the bark of certain trees, and collecting the sap which exudes. The trees are natives of Guatemala, Yucatan, and

Honduras, but occur only in the depths of the forests. The exports from British Honduras are swollen by the fact that some of the product of the forests of Guatemala and Yucatan reaches the sea through Belize. Only in the last few years has the use of chewing-gum in the United States reached great proportions, and this has coincided with the great increase in its export from British Honduras. The trade is in the hands of an American trust.

In addition to forest products, British Honduras exports small amounts of tropical fruits, especially coco-nuts and bananas, also sugar, rubber, etc., in a very much smaller degree. The total exports, which reach about three-quarters of a million, are insignificant compared with those of Jamaica, which is just half the size. Densely forested countries which depend chiefly upon the collection of wild produce are never thickly populated, and never rich.

BRITISH GUIANA

This colony shows certain resemblances to British Honduras, but also some well-marked differences.

The British portion of Guiana forms a somewhat narrow belt of land, running southwards from the coast, and having a total area comparable to that of Great Britain (area, 90,500 square miles). The latitude limits are about from 1° to 9° N., and the country is divided into well-defined zones.

Before describing these we may note first that coral reefs are here absent, because the rivers, fed by the abundant equatorial rainfall, carry down to the sea an enormous amount of fine mud. This mud is entangled in the roots of the shore plants, with the result that swampy alluvial flats are formed, comparable to the

swampy, sudd-covered areas which we have described on the course of the Nile (p. 209). As this process has been going on through long ages, we find that the coast is fringed by a wide belt of swampy land, covered with deep alluvial soil, but in its natural state useless for man's purposes.

Of the plants which grow upon this coastal belt, two are of special importance. One is the courida, sometimes called white mangrove, because it has the habit of a mangrove, and the under surface of its leaves is silky white. This plant acts something like the marram grass on the sand dunes of our own shores, binding together the shifting soil, and forming a breakwater against the waves. The second plant is the true mangrove, which fringes the innumerable creeks and streams of the swampy flats.

Behind the coastal belt is the original coast-line, which forms the margin of an undulating region, densely covered with tropical forest. Westwards the forest region passes into a mountainous district, with fewer trees, which rises in the curious mountain called Roraima to a height of 8740 feet. This hill, which is formed of sandstone, is extraordinarily steep and precipitous. Over its steep sides many streams leap in waterfalls, streams which find their way ultimately into the Orinoco, or the Amazon, or the Essequibo, for Roraima lies on a watershed.

Finally, to the south there lies a savanna region, where trees are thin owing to the presence of a dry season in the cooler part of the year, and the natural vegetation consists of grasses, sedges, and herbaceous plants generally.

We have thus four distinct zones in British New Guiana—a coastal swamp, a forest region, a hilly region, with fewer trees and natural clearings, a savanna belt

to the south. The savanna region is probably suited for the rearing of cattle and horses, but meantime the fact that it has practically no convenient access to the sea makes its development impossible. We should expect, therefore, that the products of British Guiana would be those of the forest, and that the hilly region and the swamp would be alike useless. In point of fact, however, it is the swampy coastal belt which is the most important part. The first planters were the Dutch, who noticed the resemblance between the wet alluvial lands and those to which they were accustomed in Holland, and began an elaborate system of empoldering, which was carried further by British colonists. Empoldering consists in laborious dyking and draining, with the object of preventing the land from being flooded by sea-water at high tide, or by the fresh-water brought by the streams. The reclaimed land was at first impregnated by salt, and was used for cotton growing. Later, however, the salt was gradually washed out by the rain, and cotton gave place to sugar-cane plantations. To work in the plantations negro slaves were introduced, and, till beet sugar became abundant, Demerara sugar was a much sought-after product, and the colony was prosperous. The abolition of slavery, and the general depression of the cane-sugar trade, affected the prosperity of British Guiana seriously, and its troubles were increased by difficulties with the labour supply.

Very many experiments were tried to increase the number and quality of the labourers, including the import of Portuguese from Madeira. Ultimately, as in Mauritius, East Indians were introduced as coolies, and they now form more than one-third of the total population.

In addition to sugar, many tropical crops are grown,

mostly in small amounts, but rice cultivation is increasing.

The forest region yields cabinet woods, but only to a small extent. Much more important is a kind of gutta-percha called Balata gum, which is obtained by tapping from a tree related to the chicle tree of British Honduras. Small amounts of true rubber, various resins, etc., are also obtained, but none in great quantity.

Gold occurs in the gravels of the river-beds throughout the forest region generally, but the amount produced is steadily diminishing.

The climate of British Guiana is hot and damp, as one would expect from the situation. On the coast there is no true dry season, but autumn is relatively dry, and there are very heavy rains in "winter." In a tropical country this is somewhat remarkable. It is believed to be due to the fact that the coast is washed by the warm equatorial current, and thus the sea in winter is warmer than the land. Hence the warm, moist air coming from the sea to the cooler land throws down its load of moisture. Though Guiana has a bad name, the coastal climate in itself is stated to be not unhealthy, where sanitation is strictly attended to, and the necessity for full exposure to the cool sea breezes in the case of settlements is realised.

The population numbers about 300,000, of which, as already stated, more than one-third are East Indians, and rather over one-third negroes. There are some aborigines (American Indians), and the presence of Portuguese from Madeira increases the percentage of whites, which is nevertheless not large.

The value of the exports is about £2,000,000 per annum, and the chief item is sugar, which forms more than one half the total, and now goes to Canada for the most part, and not, as formerly, to the United

Kingdom. Gold and Balata gum are the other most important items.

The capital is Georgetown on the river Demerara. Population is practically limited to the coastal belt.

QUESTIONS AND EXERCISES

1. Suppose you wanted to start planting in Ceylon what crops would you try to grow ? Why ? Where would you get your labour from ? What would you feed your coolies on ?

2. Discuss the trade of Singapore and explain the curious fact that it imports largely the same articles that it exports.

3. In his book called *In the South Seas* Robert Louis Stevenson says: "No distinction is so continually dwelt upon in South Sea talk as that between the 'low' and the 'high' island, and there is none more broadly marked in nature. The Himalayas are not more different from the Sahara." Give examples of the two kinds of islands and describe the differences between them. Do you think the second sentence quoted is strictly true ?

4. Describe a coco-nut palm. Where do coco-nuts grow ? What useful products does the tree yield ?

5. If it is midnight at the Fiji Islands (180° long.) when it is midday at Greenwich, and the earth moves from west to east, what time will it be at Colombo (80° E.) when it is noon at Greenwich ? Explain how you get your result.

6. What lands do the tropics of Cancer and Capricorn respectively cross ?

7. Try to get from a library an old-fashioned book called Mariner's *Tonga Islands*, and read the description of catching palolo. Why do you think the islanders rejoice so greatly when this worm appears ?

8. What kind of food do the islanders of the Pacific generally live upon ? Why ?

9. The Government in Fiji recommends planters not to give their coolies rice as food. Comment upon this commendation.

10. Compare Mauritius and the Cocos Islands as regards structure and products.

11. Most of the inhabitants of St. Helena are very poor. Can you give any geographical reasons for their poverty?

12. What are the chief crops of Rhodesia? Why?

13. Describe the Rift Valley of Eastern Africa. The east branch of the Rift is continued into the Red Sea, follow this branch northward on a map and try to find a lake without an outlet to the north of that sea which also lies in the Rift. Note how this lake is fed.

14. Write a description of the Uganda railway.

15. Who are the Masai? Give some notes on their occupations.

16. Name places where the following are largely produced: cloves, chillies, copra, areca-nuts.

17. What is meant by tropical rainfall? Describe fully, giving an example. What kind of vegetation would you expect in a country with such rainfall?

18. Describe Somaliland as a typical desert region, and mention some other hot deserts.

19. What is the Harmattan wind, and where does it blow?

20. What kind of crops do the natives of West Africa grow? What forest produce do they collect?

21. What time of year would you recommend a tourist to choose to visit the West Indian Islands? and the Bermudas? Why?

22. Jamaica used to produce a great deal of rum and of sugar, now it produces a vast quantity of bananas. Can you explain this?

23. Do the exports of a country necessarily tell us much of the nature of that country? Illustrate by reference to British Honduras.

24. British Honduras exports an amount of timber which varies very much from year to year. State the reason of this fact.

25. How do you explain the fact that it was the Dutch who first showed how the coastal belt in Guiana could be

reclaimed ? What kind of crops does the reclaimed land yield ?

26. Write notes on Demerara sugar, Montserrat lime juice, Bahama salt and guano, Trinidad asphalt, West Indian arrowroot, allspice.

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