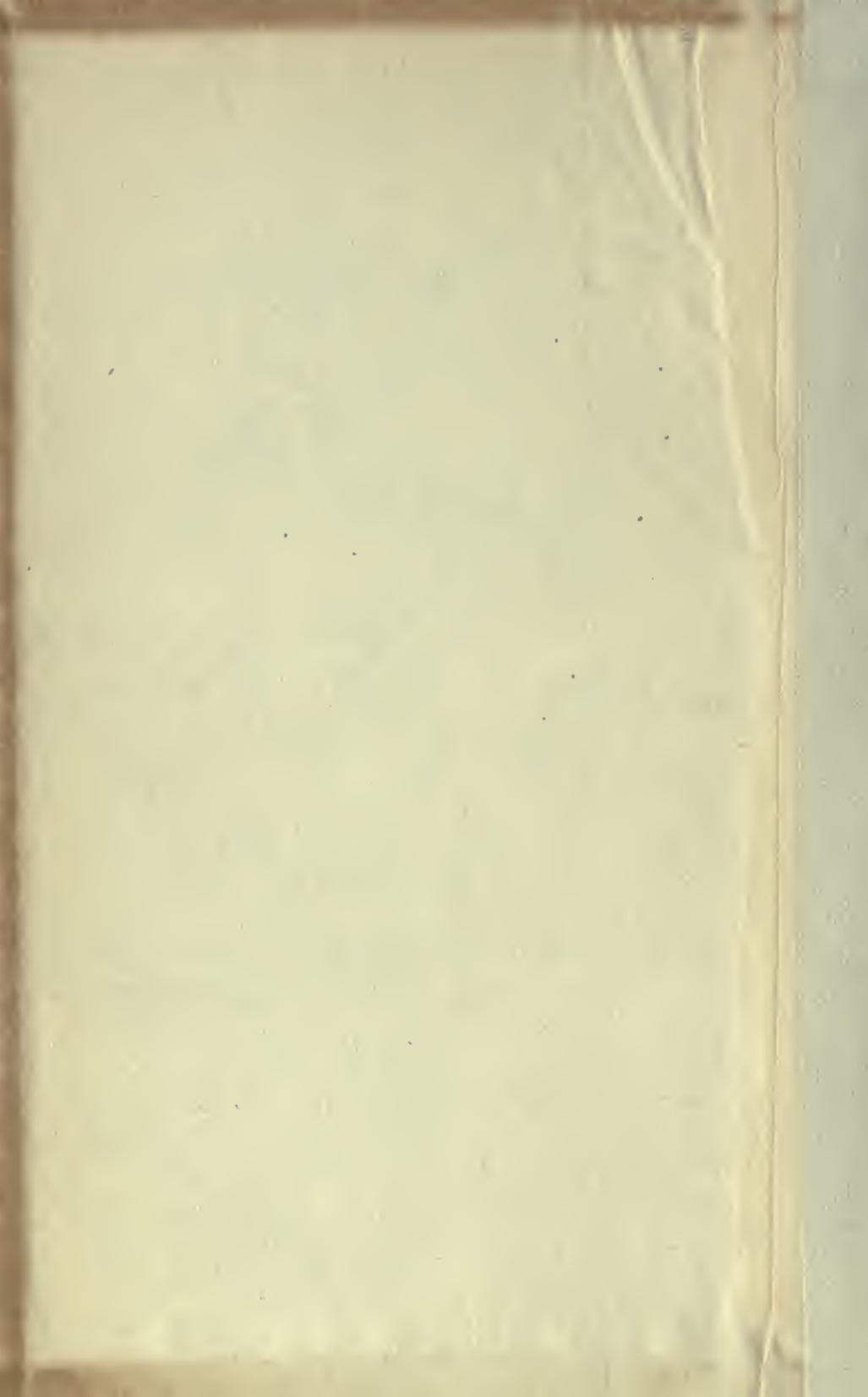


UNIV. OF
TORONTO
LIBRARY



THE [illegible] [illegible]

1

2354

ECONOMIC GEOGRAPHY

21

2205
M.

E C O N O M I C
G E O G R A P H Y

1

BY

JOHN McFARLANE

M.A., M.Com.

LECTURER IN GEOGRAPHY IN THE UNIVERSITY OF
MANCHESTER

135-163
13 | 11 | 14

LONDON

SIR ISAAC PITMAN & SONS, LTD., 1 AMEN CORNER, E.C.
BATH, NEW YORK AND MELBOURNE

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

PREFACE

THE development of the theory of natural regions is an indication of the rapid progress which the study of Geography has made in this country within recent years. The substitution of geographical for political units has not only imparted a new interest to the subject, but has given to it a new value. On the one hand, the gain to the student has been considerable. In the words of Professor Herbertson, to whom the whole theory owes so much, "not merely is time saved, but a more accurate knowledge of the world is gained, the memory is not burdened by such a plethora of place-names, the pupils can tell something of the shape of the lands, and of the circumstances of life in different parts of the Earth." On the other hand, the economist and the statesman may both benefit by a method which enables them to distinguish from one another regions in which the nature of the geographic control is essentially different.

Logically, no doubt, the theory of natural regions implies the treatment of the earth's surface quite independently of the political boundaries which may be traced upon it. But in Economic Geography, at least, there are certain reasons why such a course cannot be adopted. The economic development of a country is affected not only by the nature of the geographic control, but also by the political conditions which prevail. National boundaries cannot be ignored without, to some extent, losing sight of the interaction which takes place between man and his environment. In the following pages, therefore, I have endeavoured to divide the countries of the world into natural regions and to trace the influence of the geographical conditions of each upon the economic life of man within it. In some cases these regions are already well recognised; in others I have essayed a division, more or less tentative, of my own. But I have always been guided by what I conceive to be the necessity of taking all the geographical factors into consideration. The true natural region is a unit—physically, climatically, and biologically; and the ultimate task of the geographer is the recognition, classification, and examination of such units. On the other hand, the individual members of a group of units

are frequently so closely allied to one another by the dominating influence of one or more of the geographical factors, that in a general review of economic conditions they may be treated as together forming one natural region.

I have placed at the end of this book a list of the works to which I am mainly indebted. Mr. Chisholm's *Handbook of Commercial Geography* must be mentioned here. To it I am under a deep sense of obligation, as at every stage of my work it has been of the greatest assistance to me.

I have to express my thanks to the Oxford University Press for permission to reproduce their rainfall maps, which, I believe, will prove of value to students. Professor J. W. Gregory very kindly allowed me to make use of his map showing the geographical divisions of Australia.

Practically the whole of the book was read in proof by Dr. R. N. Rudmose Brown, of Sheffield University. My warmest thanks are due to him for much careful work and many valuable suggestions. In the compilation of statistics, in the correction of proofs, and in a number of other ways, great assistance has been given me by my wife.

J. McF.

CONTENTS

CHAP.	PAGE
PREFACE	V
I. PHYSICAL CONDITIONS OF ECONOMIC ACTIVITY	1
II. CLIMATE	6
III. VEGETATION	15
IV. EUROPE	29
V. THE UNITED KINGDOM	34
VI. SCANDINAVIA	72
VII. FRANCE	77
VIII. BELGIUM	92
IX. HOLLAND	99
X. GERMANY	103
XI. DENMARK	129
XII. SWITZERLAND	132
XIII. AUSTRIA-HUNGARY	136
XIV. ROUMANIA	151
XV. THE BALKAN STATES	154
XVI. ITALY	162
XVII. THE IBERIAN PENINSULA	174
XVIII. RUSSIA	183
XIX. ASIA	195
XX. ASIATIC RUSSIA	200
XXI. ASIATIC TURKEY AND ARABIA	208
XXII. PERSIA AND AFGHANISTAN	214
XXIII. INDIA AND CEYLON	220
XXIV. INDO-CHINA	249
XXV. THE CHINESE EMPIRE	256
XXVI. JAPAN	281
XXVII. THE MALAY ARCHIPELAGO	292
XXVIII. AFRICA	299
XXIX. MEDITERRANEAN STATES	305
XXX. THE BASIN OF THE NILE	311
XXXI. EAST AFRICA	320
XXXII. SOUTH AFRICA	325
XXXIII. WEST AFRICA	341

CHAP.	PAGE
XXXIV. ISLANDS LYING OFF THE COAST OF AFRICA	356
XXXV. NORTH AMERICA	361
XXXVI. CANADA	376
XXXVII. UNITED STATES	400
XXXVIII. MEXICO	436
XXXIX. CENTRAL AMERICA	441
XL. THE WEST INDIES	443
XLI. SOUTH AMERICA	447
XLII. THE CORDILLERAN STATES	454
XLIII. BRAZIL	470
XLIV. PARAGUAY AND URUGUAY	479
XLV. THE ARGENTINE REPUBLIC	482
XLVI. AUSTRALIA	493
XLVII. NEW ZEALAND	516
LIST OF WORKS CONSULTED	527
INDEX	531

LIST OF ILLUSTRATIONS

RAINFALL OF EUROPE	31
" " THE BRITISH ISLES	37
NATURAL REGIONS OF GREAT BRITAIN	41
" " FRANCE	79
" " GERMANY	105
RAINFALL OF ASIA	197
NATURAL REGIONS OF SIBERIA	201
" " INDIA	223
RAINFALL OF AFRICA	301
" " NORTH AMERICA	365
NATURAL REGIONS OF CANADA	379
" " THE UNITED STATES	405
RAINFALL OF SOUTH AMERICA	449
NATURAL REGIONS OF BRAZIL	473
" " THE ARGENTINE	483
RAINFALL OF AUSTRALIA	495
THE MAIN GEOGRAPHICAL DIVISIONS OF AUSTRALIA	497
NATURAL REGIONS OF NEW ZEALAND	517

ECONOMIC GEOGRAPHY

CHAPTER I

PHYSICAL CONDITIONS OF ECONOMIC ACTIVITY

ECONOMIC Geography may be defined as the study of the influence exerted upon the economic activities of man by his physical environment, and more especially by the form and structure of the surface of the land, the climatic conditions which prevail upon it, and the place relations in which its different regions stand to one another. These physical factors, it is true, do not determine absolutely the character of economic life, but they exercise a control over it which is more apparent, no doubt, in the earlier stages of human history, but which is no less real in advanced civilisations when man has learned to respond to his environment and to obtain from it an increased benefit.

In order to pursue a study of the character here indicated, it is necessary to have recourse to much information derived from other sciences. An appeal must be made to the geologist and geomorphologist for many facts regarding the structure and formation of the surface of the earth; from the metallurgist and the mining engineer must be obtained some knowledge of the value of minerals and fuels accessible to man; the general principles determining climate must be accepted from the meteorologist; while the botanist and the agricultural chemist must supply the necessary information regarding plant life. To the economic geographer belongs the task of correlating these different facts and estimating their influence upon human activity. In the first place he has to show, among other things, how the distribution of soil and minerals is affected by the physical structure of the earth; how climate varies with position and configuration; and how vegetation is determined by climatic and edaphic environment. Secondly, he has to consider the extent to which man in his economic aspect is controlled by these various factors, and

how far he is able to free himself from their control and consciously to adapt himself to his environment.

From what has been said it is obvious that some knowledge is necessary, not only of the actual configuration of the surface of the land, but of the rocks of which it is composed, and even of the morphological processes by which its present form has been determined. The minerals which the rocks contain, the soils into which they weather down, and the different types of land form which they constitute, each with its own potentialities for settlement and development, must all be taken into consideration.

Rocks may be classified as igneous, sedimentary, and metamorphic. Igneous rocks have been formed by the cooling and solidification of molten matter, and, while some may have formed part of the original surface of the earth, others belong to more recent times, as is testified by their occurrence among the sedimentary strata. The latter have been formed by the deposition or precipitation of matter derived from pre-existing rocks; they include conglomerates, sandstones, limestones, and shales. Metamorphic rocks are derived from igneous or sedimentary rocks, which, owing to great pressure, heat, or other causes, have entirely lost their original characteristics. Marble, for example, is limestone which has been metamorphosed by heat.

The oldest known rocks are called Archæan, a term which, although it is now being restricted to the earliest formations, has hitherto been applied to all of pre-Cambrian times. These rocks vary in structure, the oldest consisting of schists and granites, while the more recent are of metamorphosed and in places of unaltered sedimentary material. They weather slowly and frequently have but a scanty covering of soil. On the other hand, they sometimes contain great mineral wealth, as in North America, where the richest iron ores of the continent are found within the Archæan area. In some regions, also, and more especially where there are intrusive igneous rocks, valuable deposits of the precious metals occur.

The Palæozoic rocks are of sedimentary origin (though they have also been subject in numerous instances to metamorphic action), and contain great deposits of minerals of economic value. In the Cambrian rocks of North America gold is found, while in the lower Silurian strata of the same continent there are large

quantities of oil and natural gas, both of which are believed to be due to organic matter included in the rocks at the time of their deposition. Where the metamorphosed Devonian rock of Europe is in contact with intrusive igneous rocks, iron, tin, and copper are frequently found. The Carboniferous period saw the deposition of the great coal measures of the world. In the lower Carboniferous rocks of Scotland and of Russia, coal is found ; but it is in the upper Carboniferous formations that the more important coalfields of Europe and eastern North America occur. Iron is also frequently present in the same formations. The Permian beds in many parts of the world contain large deposits of salt ; the upper Permian, for example, contain the thickest layers of that mineral in Europe, Copper and coal are sometimes also found.

The Mesozoic or Secondary strata (Triassic, Jurassic, and Cretaceous) are less valuable on the whole with regard to the economic minerals which they contain, but more valuable in respect of the soils into which they weather. In the Triassic rocks, coal and salt are found in different parts of the world. The metamorphosed Jurassic rocks of California are gold-bearing, while the unaltered Jurassic formations, outside of North America, contain more coal than any other formation except the Carboniferous. In North America, on the other hand, the Cretaceous regions of the west are the most productive in coal, and contain large supplies of a lignitic character. Iron is found in the Jurassic oolites of England and Europe.

The Cainozoic era is divided into the Tertiary and Quaternary periods. During the first of these, important changes took place in the form of the land and the great mountain ranges of the globe were upraised. Volcanic outpourings on a large scale also occurred in different parts of the world at this time. The mineral wealth of the sedimentary rocks formed during the Tertiary period is not very great, but coal is found in those of Washington and Alaska, in parts of Europe, and in Japan. Oil occurs in similar formations in Europe and North America, and amber in North Germany. The Quaternary period is of most importance in relation to the influence upon soil of the ice-sheet which extended over considerable areas of Europe and North America. This will be discussed later.

The above account of the distribution of economic minerals in

rocks of different geological periods must not be considered as exhaustive, and numerous other instances will be referred to in the course of the present work. It is essential, however, that the student should from the beginning realise the importance of the geological factor in economic geography, and it is for this reason that these illustrations have been given.

The physical and chemical properties of the soil vary according to the composition of the rocks from which they are derived, and these variations affect its fertility and suitability for vegetation. On the whole, crystalline rocks such as gneiss do not provide a suitable environment for plant life. The soils derived from them are often thin, as they weather slowly, and they are usually wanting in lime and other constituents of fertility. Granites, also, though rich in phosphates, are often poor in lime, and do not, as a rule, form a fertile soil. On the other hand, some eruptive rocks are very productive, as they may contain both lime and phosphates, and are at the same time retentive of moisture. Basalt, for example, often weathers freely, and responds readily to good cultivation. Of the soils formed from sedimentary rocks those derived from limestone are generally fertile, as potash is in many cases present in addition to lime. That "a limestone country is a rich country" may be illustrated by reference to the blue-grass region of Kentucky; but in some districts, more especially in upland regions, the soil is very thin and cultivation is impossible. Sandstone soils vary greatly in character. Much depends upon the nature of the cementing material which holds the grains of sandstone together. If it happens to be lime, the soil may be fertile, but, if lime is absent and the cementing material is siliceous, the sandstone will disintegrate into a poor and infertile soil. On the Bunter Sandstone of Germany a forest vegetation alone is possible, while some of the richest soils of Great Britain are upon the Old Red Sandstone. The intermixture of the débris of different kinds of rock frequently leads to a soil of great fertility. Thus the alluvial soils deposited by rivers on their flood plains, and at their deltas, are often among the most productive. Many glacial soils are fertile for the same reason, though it must not be assumed that all are so. Much depends upon the source from which the rock waste comes, and the conditions under which it is deposited.

A knowledge of the morphological processes determining the

physical evolution of a region frequently throws much light upon its economic development. The folded mountain ranges of the world are generally higher than its dissected plateaus, their geological structure and river systems are different, and they exercise an influence peculiarly their own upon human progress. Plains of accumulation, again, are not the same as plains of denudation. In the one the strata are generally weak and unconsolidated, and minerals are usually, though not always, wanting; in the other the rocks are hard and consolidated, and great mineral wealth may exist. The plain of Western Siberia is an example of the first type, and that of Central Russia of the second. The value of rivers to man varies with the stage of development at which they have arrived. A river in early youth, descending from a mountain range, is generally useless for navigation, though it may be productive of much water-power. On the other hand, a river which has reached maturity, such as the Lower Mississippi, is navigable, but is without surplus energy. A transverse valley again tends to be narrow and to have steep sides, while a longitudinal valley is broad and suitable for settlement. Changes in the relative level of land and sea have had important economic results. When the land has sunk relatively to the sea, river mouths have often been drowned, and good harbours formed, as was the case along the coast of New England. Further south, along the Atlantic seaboard, the land has risen, and good harbours are few and far between. The processes which led to the formation of the continental shelf, upon which the British Isles stand, account for the fishing industry of these islands, and for the high tides which have played so important a part in the development of their ports.

Many other instances of the importance of a knowledge of morphological structure might be adduced, but these will suffice to show that in order to understand the present it is frequently necessary to appeal to the past.

CHAPTER II

CLIMATE

IN order to understand correctly the geographical conditions which have controlled the economic development of different parts of the world, the factors which determine climate must be carefully studied. For climatic conditions are of the greatest importance in explaining alike the dense population of the monsoon countries and the scattered tribes of the desert, the higher civilisation of temperate lands and the lower development of tropical regions.

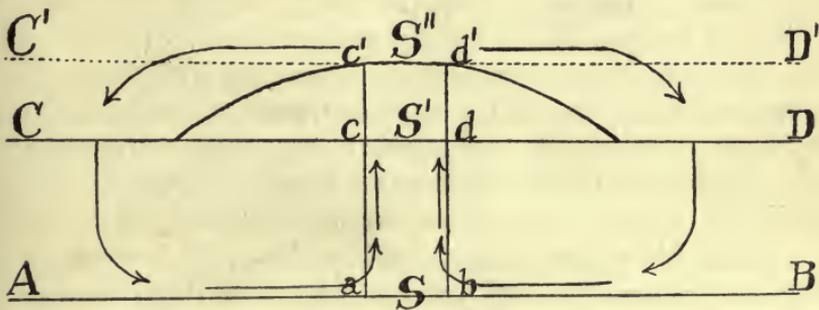
The chief factors which control the climate of any region are its latitude, its altitude, and its position with regard to the various land and water masses of the globe. The effect of each of these may best be observed by beginning with an extremely hypothetical case, and by gradually introducing the various modifications necessary to bring it into accord with actual facts.

If the sun were constantly above the equator, if the surface of the earth consisted entirely of land, and if there were no atmosphere, it is obvious that the temperature of the globe would be greatest at the equator where the sun would be directly overhead each day throughout the year; it would gradually become less in higher latitudes, owing to the greater obliquity of the solar rays; and it would be at a minimum at the poles where the sun would constantly appear on the horizon. In these circumstances the temperature of any place, and therefore its climate, would depend upon its latitude and upon that only. As the sun does not remain constantly above the equator, however, but alternately "moves" each year to about $23\frac{1}{2}^{\circ}$ on either side of it, a disturbing element is introduced, since the increasing length of day caused thereby towards each pole in turn more than compensates, in higher latitudes, for the decreased amount of insolation caused by the sun's rays making an oblique angle with the surface of the earth. To such an extent would this be the case, indeed, that at the summer solstice the north pole would receive in twenty-four hours not only a greater amount of insolation than the equator would receive at

that time, but a greater amount than the equator could receive in twenty-four hours at any season of the year. Under these circumstances the distribution of temperature over the globe would be more complex, but it would still be broadly true to assume that the amount of insolation received by the earth in the course of a year would diminish from a maximum at the equator to a minimum at the poles, though that minimum would no longer be zero as in the previous case.

The introduction of the atmosphere affects the problem in several ways. In the first place the decrease in temperature from the equator towards the poles becomes more marked. Much of the radiant energy of the solar rays is absorbed by the atmosphere and by the water vapour and dust which it contains, and this absorption necessarily increases with latitude on account of the greater obliquity of the sun's rays and the longer path which they have consequently to traverse through the earth's atmosphere.

The circulation of the atmosphere must next be considered. In the accompanying diagram let $A B$ represent a portion of the earth, and $C D$ a horizontal plane some distance above it. The pressure of the atmosphere, as indicated by the barometer at any point in $A B$, is x , and at any point in $C D$, x' and, as pressure decreases with altitude, x' is obviously less than x . Let S be the region of greatest insolation.



The air over S becomes heated to a greater extent than elsewhere, partly by the direct action of the sun's rays, and partly by the radiation from the earth of the heat obtained from the sun, and as a result it expands. For example, the air which formerly occupied the column $a b c d$ now occupies the column $a b c' d'$ and the pressure at S'' now equals the former pressure at S' v.z., x' . But

the pressure towards C' and D' in the horizontal plane $C'D'$ is less than x' , which is the pressure on the horizontal plane CD towards C and D where conditions have not altered. Therefore the pressure at S'' is greater than it is towards C' and D' . But, if in a fluid acted upon by an external force, such as gravity, the pressure is not the same in all parts of the same horizontal plane, a movement takes place from the area of high pressure to that of low pressure and continues until equilibrium is restored. Hence the air flows outwards from the region round S'' towards C' and D' , thus reducing the pressure on the surface of the ground around S where it now becomes less than x , and increasing it towards A and B , where it becomes greater than x . Accordingly, the air moves inward along the surface of the earth from the high-pressure regions around A and B towards the low pressure region about S . Thus a regular system of convection currents is established, as is indicated by the arrows in the diagram.

When the principles in the foregoing paragraph are considered with regard to the general distribution of temperature prevailing over the earth as a whole, it is seen that there is a belt of low pressure at the equator, where the air, being heated, expands and flows outwards towards the poles. The flow is, however, not due north and south as might be expected. On account of the rotation and shape of the earth, every free moving body tends in the northern hemisphere to turn to the right of its direction of motion, and in the southern hemisphere to the left. Thus the air which flows out aloft, from above the equatorial low pressure area, moves towards the north-east in the northern hemisphere and towards the south-east in the southern, and becomes heaped up between latitudes 30° and 35° on either side of the equator. Two belts of high pressure thus tend to be formed round the globe, from which winds blow along the surface of the earth towards the equator on the one hand, and towards, but not to, the poles on the other. The winds which blow from these high pressure belts towards the equatorial low-pressure belt blow from the north-east in the northern hemisphere, and from the south-east in the southern, and on account of their steadiness are known as the trade winds. On the other hand, those winds, which blow from the north and south high-pressure belts to the regions of lower pressure lying to the north and south of them respectively, blow from the

south-west and west in the northern hemisphere, and from the north-west and west in the southern. Into these regions of lower pressure, also, winds appear to blow from the polar ice-caps which are areas of great cold, and therefore of high pressure. Thus, the ideal distribution of pressure and winds over the face of the globe is as follows: at the equator there is a belt of low pressure, where, on account of the ascending air, calm and variable winds prevail. To the north and south of this blow the steady trade winds, beyond which are the high-pressure belts where, as the air is descending from higher altitudes, calm and variable winds are again found. In higher latitudes are the westerly and south-westerly winds of the northern hemisphere, and the westerly and north-westerly of the southern. From the polar areas of high pressure, winds blow from the north-east in the northern hemisphere, and from the south-east in the southern.

That this distribution of pressure and winds prevails over the earth not in its ideal but in a much modified form, is due to the fact that the surface of the globe consists not of land only, but of land and water, unequally distributed. This further modification has now to be introduced into the hypothetical case with which the consideration of climate was begun. For several reasons the temperature of the ocean rises more slowly in warm weather than that of the land. The specific heat of water is greater than that of the land. The sun's rays penetrate it to a greater extent, and therefore warm it less on the surface; much heat is spent in the work of evaporation, and, as will be seen later, much is carried off by the warm currents which flow to colder regions. For somewhat similar reasons the ocean cools more slowly than the land. The water gives up its heat less rapidly, and, as that lying on the surface becomes cold and sinks, warmer water from below rises to take its place. Except in low latitudes, therefore, where the land temperature is high throughout the year, the surface of the ocean is generally colder than the land during the summer and warmer during the winter, and the range of temperature between summer and winter is greater over the land than it is over the sea. These facts have an important bearing upon the distribution of pressure and winds. During the summer months the air over the great land masses becomes heated, expands, and flows outwards over the ocean, thus decreasing the pressure over the land and increasing it over the

sea. To restore equilibrium, winds blow inward over the surface of the earth from the sea to the heated interior of the land mass. These winds being deflected to the right of their direction of motion in the northern hemisphere, in which all the great land masses of the globe are situated, tend to bring about the development of cyclonic movements in which the air circulates in a counter-clockwise direction. During the winter months the conditions are reversed. The air over the land is rapidly cooled, contracts, and sinks to lower altitudes, so that in the upper horizontal layers of the atmosphere pressure is greater over the sea than it is over the land, and there is an inward movement of the air which causes an increase in pressure over the surface of the land and a decrease over the surface of the sea. Accordingly, there is an outward movement of the winds from the land to the sea, and these, being deflected to the right, as in the previous case, have a tendency to circulate round the region of high pressure in a clockwise direction in the northern hemisphere. The actual distribution of pressure and winds over the face of the globe is therefore very different from the ideal distribution as sketched above. In equatorial regions the belt of low pressure moves northwards and southwards with the sun. On either side of it lie the high-pressure belts which change in form and extent during the course of the year, as a result of the unequal heating of land and water. During the northern summer, the north high-pressure belt is broken up over the land and extended over the sea, while in winter it is generally extended over the land and contracted over the sea. To the north of this high-pressure belt there are, in the Atlantic and Pacific, both in summer and winter, but much further south in winter than in summer, areas of low pressure into which winds both from the high-pressure belt and the polar area of high pressure are continually blowing. In the southern hemisphere the normal distribution of the winds is much less affected owing to the much smaller land area which exists there in temperate latitudes. These variations in pressure modify, to a great extent, the planetary distribution of winds already discussed. In some cases the winds are strengthened, in others weakened, and in still others are entirely reversed. For example, the westerly and south-westerly winds which blow at all seasons of the year from the tropic high-pressure belt towards the west coasts of Europe are strengthened during

the winter months by the presence in the North Atlantic of the area of low pressure already mentioned. In corresponding latitudes on the east coast of North America, however, the prevailing winds during the winter months are those which blow from the high-pressure area over the continent towards the low-pressure area over the Atlantic, and, being deflected to the right, appear as northerly and north-westerly winds. During the summer months, again, the low-pressure area over the Asiatic land mass sucks in the air from over the Indian Ocean to such an extent that the north-east trade winds disappear and are replaced by the south-west monsoon.

It is obvious that the winds must exercise considerable influence upon the distribution of temperature over the globe. Those which blow from the cold continental interiors during the winter months frequently cause severe weather in comparatively low latitudes; the trade winds which come from the sea tend to reduce the temperature of the warm lands towards which they blow; and on the western coasts of Europe the westerly and south-westerly winds which prevail at all seasons of the year, but more particularly during the winter months, have a modifying effect, reducing the heat of summer and mitigating the cold of winter.

Ocean currents are another factor in the distribution of temperature, and their effects upon climate can most appropriately be considered in connection with the winds through which they make their influence felt. For it must be remembered that the presence of a warm current off the shores of a cold country would have little effect upon its climate, except, perhaps, to keep its ports free from ice, if winds, either warmed or prevented from cooling by the current, did not blow inland. The general circulation of the surface waters of the ocean may best be considered by describing what takes place in the Atlantic. There, the heated surface waters of equatorial regions are blown along by the trade winds and gradually acquire a momentum of their own. Two currents, the North Equatorial and the South Equatorial, are thus formed, and these flow westwards till they strike the coast of South America. Here part of the southern current is forced northward and joins the northern current, which, being likewise deflected by the land, turns to the north. Part of it enters the Caribbean Sea and passes into the Gulf of Mexico, issuing to join the remainder, which has made its way northward to the east of the West Indies.

The reunited current follows the coast of the United States as far as the fortieth parallel where it meets the cold Labrador current from Davis Strait and is more or less dispersed. Some of its waters, no longer as a definite current, but as a surface drift, are carried by the westerly winds across the Atlantic. This drift divides off the coast of Spain, part turning south and rejoining the North Equatorial current, while the other part, still under the influence of the westerly winds, makes its way past the British Isles, along the coast of Norway, and into the Arctic Sea. That part of the South Equatorial current which is deflected southward flows along the coast of South America until it, too, passes under the influence of westerly winds which carry it eastwards until it bifurcates off the coast of Africa, one branch turning north to join the equatorial current, and the other continuing to follow the tract of the westerly winds. In the North Pacific the circulation is, on the whole, similar to that of the North Atlantic, the main differences being accounted for by differences in the configuration of the two basins, while south of the equator the Pacific and Indian Oceans have a circulation like that of the South Atlantic, but modified somewhat by monsoon conditions. On the west coasts of continents, within the trade wind belts, there are cold currents, due in part to the upwelling of cold water to take the place of that blown westwards by the trade winds, and in part to the branches of the easterly drift which turn equatorwards to join the main current. Along the east coasts of North America and Asia there are also cold currents which move southwards until they meet with, and are lost in, the deflected equatorial currents.

Altitude is another important factor in the determination of temperature. With an increase in altitude the atmosphere becomes less dense, and also contains much less water vapour and atmospheric dust. The sun's rays therefore pass through it more easily and are absorbed to a less extent; and this is also the case with the heat rays radiated from the earth. Accordingly the atmosphere becomes cooler at an average rate of about 1° F. for every 300 feet of vertical ascent.

Inversions of temperature, however, are frequent, and are often of economic importance. On still nights, when insolation ceases and radiation begins, the air which is in immediate contact with the earth cools more rapidly than that at higher elevations. Consequently, temperature may slightly increase upwards, even to a

height of 2,000 feet and more. Sometimes, also, colder air is found in valleys than on the neighbouring uplands. Valleys frequently receive less sunlight and are warmed to a less extent, while cold air from the mountain sides may slip down into them and remain there. Certain plants which are liable to damage from frost are therefore often planted on the lower slopes of hills rather than in valleys.

The conditions affecting the distribution of rainfall over the globe have next to be considered. In the lower layers of the atmosphere water exists in a gaseous form as water vapour. This is obtained by evaporation mainly from the sea, but to some extent also from the land, and the lakes, rivers, and vegetation upon its surface. The air, however, is only able to contain a certain amount of moisture at any given time, and that amount depends upon the temperature at which it then is. When the temperature is high it can hold a much greater amount of water as vapour than it can when the temperature is low. Hence, it is of importance to distinguish between the absolute and the relative humidity of the air. The former is the actual amount of water vapour in the air at any given time, while the latter is the ratio of that amount to the amount which the air could hold at the temperature at which it then is. When the temperature continues to fall below that point (called the saturation point), at which the air is just able to retain the vapour it holds at the time, condensation and precipitation follow. This process, however, is much facilitated by the presence of atmospheric dust around the particles of which the vapour more easily condenses.

The necessary cooling to effect condensation may be brought about in one or other of several ways. Within the equatorial belt of calms, warm air, containing much moisture evaporated from the ocean, ascends at all seasons of the year, but, cooling as it ascends, it is no longer able to retain that moisture and heavy rainfall ensues. This process of cooling by the ascent of convection currents also takes place to some extent over the heated interior of continents during the summer months. Winds blowing from the sea are frequently chilled when brought into contact with land, and their moisture is deposited. If the land is much warmer than the sea, however, this result may not follow, and in the absence of mountains there may be comparatively little precipitation. Mountains, indeed, may play an important part in the distribution of rainfall,

by deflecting upwards winds from the sea and causing the moisture which they contain to condense, either by direct cooling or by cooling consequent upon expansion under decreased pressure. In such cases there is usually a wet and a dry side to a mountain range, as the air descending on the leeward side becomes heated, and is able to retain what moisture is left.

CHAPTER III

VEGETATION

THE distribution of vegetation over the surface of the earth is primarily determined by the nature of the climate and the character of the soil. The climatic factors—especially humidity and temperature—are the more important. The amount of water in the soil and in the atmosphere, the periods of the year in which precipitation takes place, and the conditions under which moisture is absorbed by plants, affect their structure in a marked degree. Those which grow in a region where the humidity is high differ in many respects from those which grow where it is low. But an important distinction between physical and physiological humidity must at once be made. Certain conditions may prevent the absorption of moisture by plants even when it is present in abundance. For example, when the temperature is low, water cannot be so easily absorbed by vegetation as when it is high, and for the purposes of plant life, therefore, the colder parts of the world are relatively dry. Again, the presence of humus acids renders the absorption of water by plants difficult, and districts where these acids occur in the soil are physiologically dry. Those plants which flourish in regions physiologically humid are known as hygrophytes, and they are fitted both by their internal structure and their external parts, such as their leaves which are broad and relatively thin, to get rid of excess moisture. Xerophytes, on the other hand, grow in regions which are physiologically dry, and their structure is such as to retain what moisture there is. Their transpiring surface is generally limited, and their leaves are, in some cases, thick and leathery, in others, needle-shaped, and in yet others, so adjusted as to lie parallel to the rays of the sun. Certain plants known as tropophytes are alternately hygrophilous and xerophilous. At the beginning of the physiologically dry season they drop their xerophilous parts, such as their leaves, to assume them later when climatic conditions become more favourable.

If humidity is the most important factor in determining the structure of plants it is heat to which they owe their growth.

Every plant lives between two temperatures, above the upper of which or below the lower, it cannot continue to exist for long. Each function of the plant, moreover, such as germinating, flowering, and seeding, has its own upper and lower zero points, between which that function can alone take place.

The effect of water upon plant life is therefore very different from that of heat. Upon humidity depends the type of vegetation—whether it be woodland or grassland, or whether desert conditions prevail. The amount of moisture necessary for woodland is, as a general rule, greater than that required for grassland and the seasonal distribution is different; while the amount required for either woodland or grassland is greater in tropical than in temperate regions. According to Schimper, the essential characteristics of a good woodland climate are “a warm vegetative season, a continuously moist subsoil, and calm air, especially in winter.” For grassland, on the other hand, the nature of the subsoil is of little importance, but it is absolutely necessary that there should be “frequent, even if weak atmospheric precipitation during the vegetative season, so that the superficial soil is kept in a moist condition”; and further, a moderate degree of heat during the same period. Where the best woodland conditions prevail, the trees are hygrophilous; in a less favourable environment they tend to be xerophilous.

The part played by the soil is generally of secondary importance; but, as its water-holding capacity is affected by its physical structure, that, along with its chemical composition, enables it to incline the balance towards woodland or towards grassland when the other factors are evenly matched.

These two great types of vegetation—woodland and grassland—are each capable of considerable subdivision. In those tropical regions where the rain falls at all seasons of the year the forest is evergreen, and is noted, not only for its luxuriance, but for its great wealth of shrubs, mosses, lianes, and epiphytes. When there is a well-marked dry season, as in the monsoon area, the vegetation, though dense, is tropophilous, the trees shedding the most of their leaves at the beginning of the dry period. Savanna forests, in which the trees are xerophilous and interspersed with grass, occupy considerable areas within the tropics where the rainfall is relatively low; while, under the least favourable conditions for tree growth in

tropical regions, thorn-forests, such as the Caatinga of Brazil, cover the ground. In the warm temperate belts, an evergreen hygrophilous forest of considerable density is found in those regions which have rain at all seasons of the year; when the summers are moist and the winters dry, this passes into savanna forest and thorn forest. On the other hand, when the winters are moist and the summers dry, as round the Mediterranean, a sclerophyllous woodland with thick leathery leaves prevails. In the cool temperate belts there are two great types of woodland, the summer green forest, which is tropophilous, and the evergreen coniferous forest, the structure of which is xerophilous. In tropical regions and in the warm temperature belts, grassland is generally of the savanna type; the grasses are tall and grow in tufts, while the landscape is broken by trees and shrubs. Under unfavourable conditions savanna passes into steppe. In the cool temperate belts grassland varies from meadow to steppe. In meadow the grasses are hygrophilous and grow in close formation; in steppe they are xerophilous and the formation is open.

In all these cases local conditions of soil and climate may cause variations in the prevailing type of vegetation.

It is difficult to correlate the distribution of economic plants with natural types of vegetation because the former have frequently been introduced into, and acclimatised in, regions to which they are not indigenous. Frequently, also, their original character has undergone great change as a result of their new environment and their long cultivation by man. But it will be seen from what follows, that the climate and soil which suit certain natural types of vegetation are likewise adapted to the growth of certain plants of great economic value, though it must not be supposed that their limits are coterminous.

CAOUTCHOUC or RUBBER is the coagulated latex or sap of various trees and other plants which grow mainly within the tropical forests. The most important of these belong to the genus *Hevea*, one species of which, *Hevea brasiliensis*, grows extensively in the Amazonian lowlands. This tree, which reaches a height of 100 feet, thrives best in districts which are regularly inundated, but it will grow elsewhere, provided it has a deep rich soil which is constantly moist. It does not flourish where there is a dry season, nor do sandy soils suit it. It only lives with difficulty in regions

where the thermometer falls below 65° F. and probably finds its most favourable environment where the mean annual temperature is between 80° F. and 90° F. Several other species of *Hevea* produce rubber under somewhat similar conditions. The "manicoba" (*Manihot Glaziovii*) is also rubber-producing. It is a smaller tree than *H. brasiliensis*, and, while demanding a high temperature, thrives best on sloping land with a stony and well-drained soil. A poorer quality of rubber known as "mangabeira" is obtained from *Hancornia speciosa*, a tree which belongs rather to the savanna regions of the tropics, though it will also thrive where there is a heavy rainfall. *Castilloa elastica* grows in Central America where it flourishes best when it does not experience a minimum temperature of less than 60° F., and an annual precipitation of over 60 inches with a dry season of less than four months. It prefers a clay soil or a mixture of sand and clay, but will not grow in a marshy district or where the subsoil is very wet. One of the chief rubber-producing plants of Asia is *Ficus elastica* which frequently begins life as an epiphyte, but after some years strikes into the ground on its own account. It grows best in forested regions on the lower slopes of hills, and requires abundant rains with only a short dry period; it can stand a certain amount of cold, and a slight frost does not injure it seriously. In Africa, rubber is mainly obtained by tapping certain trees and vines, notably *Funtumia elastica*, and various species of the genus *Landolphia*. *Funtumia elastica* grows both in regions which are always wet, and in regions which have a dry season. Of the *Landolphia*, *L. owariensis* grows in the forests of the Congo basin, while *L. Heudelotti* prefers the drier savanna lands of Sudan.

COFFEE.—There are two varieties of coffee in common use, *Coffea arabica* and *Coffea liberica*. The former, which is commercially the more important, is grown in upland regions, while the latter prefers the lowlands. The coffee plant requires a heavy rainfall, and appears to thrive best where the annual precipitation is at least 60 or 70 inches. Its cultivation is seldom carried far beyond the tropics, within which a temperature varying from 60° F. to 80° F. appears most favourable to it. At the same time it seems able to stand occasional low temperatures, and the thermometer may even descend to freezing point without damaging more than the young wood. On the other hand, at a temperature of 95° F.

at most, the plant begins to suffer. Coffee is an exhausting crop and demands a rich soil. Hence it finds its most favourable environment on land from which virgin forest has recently been cleared. The height at which *Coffea arabica* thrives best varies in the different regions in which it is grown, but probably the most favourable situations lie between 1,000 and 5,000 feet.

CACAO.—The cacao tree (*Cacao theobroma*) demands a warmer and more humid climate than coffee and grows best where the temperature falls between 75°F. and 85°F. Its natural habitat is the wet evergreen forest in districts subject to frequent inundations, and unlike coffee it does not thrive in upland regions. It flourishes on the banks of rivers where the alluvium, which they have brought down, is mixed with humus. When the plant is cultivated it requires, for a time, the shelter of shade trees.

RICE.—Of rice, which forms one of the chief foods of the human race, there are many varieties, but they may all be broadly divided into two main groups—upland and swamp. Of these, the latter are the more important. The saying that rice grows best with its feet in the water and its head in the fire, indicates the nature of the climate required. A high temperature is essential, and the plant must also be irrigated to a depth of several inches at certain stages of its growth. The best soils are clays or clay loams, such as are frequently found along the banks, and at the deltas, of rivers. These districts have the additional advantage of being flat and easily cultivated. In tropical regions, moreover, they are often under water at certain seasons of the year, and the rice plant then gets the necessary amount of water, while the land is fertilised by the silt which is deposited at these times. As rice is an exhausting crop, recourse would otherwise have to be had to manure, which is practically unobtainable in many places where rice is grown. The plant can also be cultivated on lands which are unflooded if irrigation is possible. Upland rice which requires much less moisture can be raised at a considerable height above sea-level.

SUGAR CANE grows under somewhat similar conditions to rice. As a rule, lighter soils are more favourable to it, but much depends upon the rainfall. A considerable amount of moisture is necessary at certain seasons of the year, and, if that is not forthcoming, irrigation must be resorted to. On the other hand,

too much rain during the earlier stages of the growth of the plant is as injurious to it as too little during the later stages.

JUTE requires a hot, damp climate, in which there is not too much rain, and it accordingly thrives best when the land on which it grows can be submerged at certain periods of the year. As the crop is, like rice, an exhausting one, the land profits greatly by the silt which is then deposited. Jute will grow on all kinds of soil, but the most productive are loams or light clays mixed with sand, while laterites and gravels are least favourable to it. Large quantities of jute, of coarse quality, are grown in India on mudbanks and islands formed by the rivers.

Among other products of regions which fall within the area of the tropical forests are timber, including mahogany, teak, ebony, and rosewood ; dye-stuffs obtained from logwood and red Brazil wood ; drugs, especially cinchona ; spices and condiments, such as pepper, ginger, and chillies ; and fibres of which Manila hemp is the most important.

THE DATE PALM is the most valuable food plant of the tropical desert, and the chief source of its timber supply. No degree of dryness in the atmosphere and no amount of heat will injure its growth. Atmospheric humidity, indeed, is positively detrimental to it. On the other hand, it requires a continuous supply of moisture about its roots, but it is able to resist large quantities of alkali which is often present both in the soil and water of arid regions. Although the date palm is at certain seasons of the year able to exist with the thermometer below freezing point, it requires a very high temperature for the development of its fruit, and the lower zero point for flowering is believed to be 65.5°F. A mean temperature of 70°F. during the fruiting season (May to October) with one month at least above 80°F. will enable early varieties of dates to ripen ; for later varieties the temperatures must be above 75°F. and 85°F. respectively, and for the best and latest varieties 84°F. and 94°F.

TEA grows in certain favoured localities of the wet evergreen and warm temperate forest regions. Being able to stand a greater range of temperature, it has a wider extension than either coffee or cacao, and in Asia it is grown as far north as the 45th parallel. The conditions most favourable to it are a temperature not falling for long below 54°F., and not rising, except for short periods, above

80°F. A rainfall of at least 60 inches is essential, and the best results are obtained when there are nearly 100 inches, a considerable part of which falls during the vegetative season. At the same time the land must be well-drained, and for this reason it was long thought that the tea plant would only flourish upon the lower slopes of hills; but, within recent years, many gardens have been established in level country where the land is not liable to be water-logged. The plant thrives best on deep, reddish-coloured, sandy loams with a free subsoil. Soils, rich in humus, are beneficial to it, and for this reason it grows well in districts which have been reclaimed from virgin forest, or even from swamps.

COTTON.—This plant belongs to the Malvaceæ or mallow family, the species of it which are most cultivated for commercial purposes being *Gossypium herbaceum*, *Gossypium arboreum*, and *Gossypium barbadense*. The first of these is allied to *Gossypium hirsutum*, which in one or other of its many varieties is largely grown in the United States. From *Gossypium barbadense* Sea-island cotton is obtained. The bulk of the world's cotton supply is at present cultivated on lands which have been cleared of lighter tropical and warm temperate forests, on warm temperate savannas, and even on desert and semi-desert areas, when irrigation is practicable. Conditions of soil and climate restrict the growth of the plant even within these regions. Its lower zero points are relatively high, and six or seven months free from frost are necessary for its development. During the time that the plant is growing an increase in temperature is advantageous, but, after full vegetative growth has been attained, a decrease in temperature and an increasing diurnal range prevent the plant from running to wood, and cause it to devote the food supply which it has accumulated to the nourishment of its seed. The optimum temperatures for the various functions have not yet been carefully studied. According to Heuze, the most favourable daily temperature from germination to flowering is from 60°F. to 68°F., and from flowering to maturity, 68°F. to 78°F.

The moisture required for the development of the plant is supplied, as will be seen later, under conditions which vary so much in different parts of the world, that no absolute statement regarding the amount necessary can be made. In the earlier stages of its growth frequent precipitations, increasing in volume with the

progress of the plant, yield the most satisfactory results. The absence of a sufficient supply of moisture at this period leads to stunted growth and premature ripening, while too great an abundance of it gives rich vegetation with little fruit. Later on a decreasing rainfall is favourable to the seed maturing.

The nature and composition of the soil play an important part in determining whether cotton can be grown upon it in sufficient quantities to make it a profitable crop for commercial purposes. The agricultural chemistry of cotton is yet in its infancy and much has still to be learned on the subject; but it would appear that those soils, which are most favourable, contain nitrogen, phosphoric acid, potash, lime, and magnesia, in sufficient quantities to satisfy the demands of the plant. Nevertheless, some of these may be present in very small quantities on good cotton land, while other lands, seeming to possess all the necessary constituents, fail to yield a crop. The texture of the soil is of importance, chiefly from its influence on the water supply. If the rainfall is considerable, a heavy soil may become waterlogged; on the other hand, a sandy soil, unable to retain moisture, will only yield a poor crop if the rainfall is low. Thus, although no particular soil is typical of the cotton belt, one which is continuously moist, but not wet, is the most suitable.

TOBACCO.—Although the tobacco plant thrives both in tropical and temperate countries, the quality of the tobacco obtained from it varies greatly according to the climatic conditions under which it is cultivated. Within tropical regions, where both heat and moisture are abundant, the very finest tobaccos are produced. A second zone of cultivation lies to the north of this first one, and is bounded by the isotherm of 75° F. for the month of July. This zone includes the greater part of the United States, one of the chief tobacco-producing regions of the world. In the southern hemisphere there is a corresponding belt. The third region, and one which yields a coarse tobacco without aroma, lies in the northern hemisphere only, between the isotherms of 75° F. and 65° F. for the month of July.

Soil is a very important factor in the cultivation of tobacco. In Cuba, for example, differences in the soil between one valley and another are sufficient to cause great differences in the quality of the product. A light and sandy soil grows plants, the leaves of

which are fine in texture and possess a light and delicate aroma, while a clay or other heavy soil produces plants with thicker and coarser leaves. As a general rule, valleys covered with the débris of granitic and gneiss rocks are among the most suitable lands for the cultivation of tobacco, as they are rich in potash. The presence of humus is an advantage.

The cereals, other than rice, have a very wide extension, as they have in many cases been adapted to regions in which they are not indigenous. On the whole, it may be said that they have their greatest development in the lands which have been cleared of deciduous forest, and in the hygrophilous grasslands of the temperate zone, although they spread to a considerable distance on either side of these regions.

MILLET belongs chiefly to tropical regions, where it is frequently found on soils which are too poor, or have too little moisture, to grow wheat or rice. The two most important varieties are Bájra or Spiked Millet (*Pennisetum typhoideum*) and Juar or Great Millet (*Sorghum vulgare*). Millet is extensively grown in India and China as a food grain.

MAIZE OR INDIAN CORN.—According to the Tenth Census Report of the United States, in which country over three-fourths of the world's supply of maize is grown, "the ideal climate is one with a summer from four and a half to seven months long, without frost, the middle portion hot both day and night, sunny skies, sufficient rain to supply the demand of a rapidly growing and luxuriant crop, falling at such intervals as to best provide moisture without ever making the land actually wet." According to the same authority the mean temperature of the warmest month of the year is of great importance, and maize thrives best when that ranges from 70°F., or preferably 75°F. to 80°F. During the growing season, also, there should be a precipitation of from 15 to 30 inches.

WHEAT is grown in many parts of the world, and the methods of cultivation, the yield per acre, and the nature of the product vary greatly. The most suitable soil appears to be a light clay or a heavy loam, but many others are very productive when climatic conditions are favourable. According to the Census Report already referred to, the seed, in order that there may be a good crop, "must germinate and the young plants grow during the cool and moist parts of the year, which season determines the ultimate

density of growth on the ground, and consequently mostly determines the yield. . . . Wheat branches only at the ground and produces no more heads than stalks. It only sends out these branches early in its growth or during cool weather, and unless the growth is comparatively slow the branching of wheat (called 'tillering') must take place before the plant attains any considerable height or it does not occur at all." On the other hand, "wheat ripens in the warmer and drier parts of the year, which season more largely determines the quality, plumpness and colour of the grain. . . . More sun is needed and less rain. Too much rain, particularly if accompanied with heat, induces rust, mildew and other diseases, and too dry winds shrink the grain." Many investigations have been made as to the exact amount of heat required by wheat, but no precise result has as yet been obtained, though it is believed that a temperature of at least 41° F. is necessary before vegetative growth can begin. The temperature, measured by day degrees,¹ which must accumulate before wheat will ripen, appears to vary in different parts of the world according to the length of the day, the amount of precipitation, and the nature of the soil. In England, wheat ripens as a rule when the accumulated temperature amounts to 1,960 day degrees (F.), but in some parts of Alaska, where the days are long, only 1,320 day degrees (F.) are necessary. In sub-tropical countries wheat is a winter crop, the summers frequently being too hot or too dry.

With regard to rainfall a mean annual precipitation of about 15 inches may generally be regarded as a minimum, except under special conditions, as, for example, when all the rain falls during the growing season, or when irrigation or dry farming is practised.

The quality of wheat varies with the conditions under which it is grown. The soft winter wheats, which grow in mild moist districts, such as Western Europe, are relatively rich in starch, while hard wheats—whether winter or spring—which grow in regions where the summers are hot and precipitation is light, are poor in starch, but rich in gluten, and are particularly adapted for milling purposes. In various parts of the world, attempts—all more or less successful—are being made to adapt the grain more closely to its environment and to render it more suitable for the purpose for which it is required.

¹ Day degrees are reckoned by taking the excess of the mean temperature of the day over zero point, in this case 41° F. If the mean temperature of any day is 50° F., nine day degrees are accumulated.

OATS thrive best in districts with cooler summers than are necessary for wheat. It is, therefore, an important crop in many parts of the world where the climate is too moist or too cool for the latter cereal.

BARLEY has a wider range than any other cereal. It ripens easily and can be grown well within the Arctic Circle. On the other hand, it does not require much moisture and will flourish in regions where there is little precipitation during the summer months, as is the case in countries along the Mediterranean seaboard.

Of other cereals, rye thrives on poor soils and under inclement climatic conditions, while buckwheat is often grown where the standard of cultivation is low.

ROOT-CROPS.—BEET grown for sugar has become an important agricultural product in Europe and America within recent years. The regions in which its cultivation is most successful lie within a belt bounded by the isotherms of 65° F. and 75° F. for the three months of June, July, and August. A rainfall of 2 to 4 inches in each of these months gives the best results. It is also grown on irrigated lands, and can even grow in dry regions without irrigation if there is sufficient moisture in the subsoil.

THE POTATO is easily acclimatised and is grown under different climatic conditions in various parts of the world.

FIBRES.—FLAX thrives best on soils which are rich in phosphates, and grows under very diverse climatic conditions in different parts of the world. In warm countries such as India, the seed (used in the manufacture of linseed oil and linseed cake) is abundant, but the fibre is poor, and all attempts to combine the two crops seem to have met, so far, with only moderate success. A moist and mild climate, on the other hand, leads to the development of the fibre, but does not enable the seed to mature.

HEMP, like flax, has a wide extension. It requires a moist and warm climate, but, as its growing season is a short one, it is able to make its way northwards in certain parts of the world as far as the 60th parallel.

PULSES, including peas, beans, and soya beans, all flourish in temperate, and to some extent in tropical countries. Peas find their most congenial environment in cool temperate, and beans in warm temperate regions. Soya beans (*Dolichos soja*), which have within recent years become of considerable importance, can adapt

themselves to varying climatic conditions. " They are very resistant to drought, can endure slight frosts, and are capable of withstanding an excess of moisture. . . . They thrive equally well in regions occasionally subjected to periods of semi-aridity, in regions where the valley soils are flooded for a few weeks during the rainy season, and in northern latitudes having a growing season like that in Minnesota." In the United States soya beans grow best between latitudes 37° and 43°, but in Manchuria, where they are chiefly cultivated at present, they make their way as far north as latitude 47°, and the further north they extend the better they become. " They grow best in soils of medium texture containing fair quantities of potash, lime and phosphoric acid. Good results have sometimes been obtained in comparatively light soils, and an abundant crop is sometimes obtained on land too poor for clover." ("The Soya Bean of Manchuria"—Imperial Maritime Customs, Special Series, No. 31.)

EUROPE

28.

CHAPTER IV

EUROPE

EUROPE forms the western part of the great continental land mass of Eurasia, and on physical grounds alone can hardly be considered a separate continent. But its peninsular character and greatly indented coast line, its climate, and above all the political and economic development of the majority of its inhabitants, mark it off from Asia, and justify the usual custom of according it treatment by itself. In the circumstances, however, it is obvious that the boundary between Europe and Asia must be more or less conventional, and it is generally taken as following the Ural mountains, the Ural river, and the Manych depression to the north of the Caucasus. The area of the continent as thus defined is about 3,850,000 square miles, or about one-fourteenth of the total land surface of the globe.

Several great physical regions may be distinguished. In the north of Ireland and in the north of Scotland, in Scandinavia and in Finland, are the remains of an ancient Archæan land which has been much worn down, and of which, as the result of extensive fracturing, many parts have sunk beneath the level of the sea. This region, which has been glaciated within recent times, is bordered in places by a peripheral zone of low land, built up in part by the débris brought down by the northern glaciers, and in part by the alluvium deposited by Alpine rivers. To this peripheral zone belong the Low Countries and the North German Plain.

Further to the south, there lies a great zone of ancient massifs. These include the Central Plateau of France, the Iberian Meseta, and the Bohemian Block, along with fragments of the Armorican Range, which at one time extended from the south of Ireland, through the south-west of England, and through Brittany to the Central Plateau, and such remnants of the ancient Variscan Range as the Ardennes, the Vosges, and the Rhine massif of Germany. Within the barriers formed by these ancient massifs there are great areas in which Secondary and Tertiary rocks have been deposited. Some of these areas are adjacent to the lowlands

already mentioned, and along with them form the great European Plain, which extends from eastern England, through France, Belgium, Holland, and Germany into Russia.

In the south of Europe lies the most conspicuous feature in its geography—the great system of folded mountains which includes the Pyrenees, the Alps and the Apennines, the Carpathians, the Balkans, and the Caucasus.

East of the regions already mentioned, and in a sense apart from them, is the Russian massif, consisting of older sedimentary rocks, which lie horizontally, and which have been little affected by those great tectonic movements that influenced so profoundly the geography of the remainder of the continent.

Off the north-west coast of Europe the continental shelf has a wide extension, its seaward limit running from the Norwegian coast, by the west of Scotland and Ireland, to the south-east corner of the Bay of Biscay. Within this area the floor of the sea has nowhere a greater depth than one hundred fathoms. In the Mediterranean region, on the other hand, the mountain ranges border a sea whose floor, except in the Adriatic, sinks rapidly to a depth of 1,000 fathoms and more.

CLIMATE.—The climate of Europe is determined mainly by its latitude, and its position on the western side of a great land mass. In winter, the vicinity of the Atlantic coast is warmed by westerly and south-westerly winds from the ocean, and the isotherms run N.N.W. to S.S.E., being turned eastwards in the Mediterranean region, along the northern borders of which they are somewhat closely crowded together. In the interior of the continent the trend is rather N.W. to S.E., but the general rule holds good that temperature decreases from west to east at this season of the year, except in the Mediterranean region, where the more southerly latitude, the shelter from northerly winds afforded by the mountains, and the modifying influence of the sea, together tend to prevent a marked decrease. In summer the conditions are reversed, the coastal districts, under the influence of oceanic winds, remaining cool, while the interior becomes rapidly heated. In July, the isotherms, outside of the Mediterranean region, run W.S.W. to E.N.E., and temperature thus increases from west to east, in which direction also, as is obvious, there is an increase in the range between the temperature of winter and that of summer.



by permission

RAINFALL OF EUROPE

After the Oxford Wall Map.

© Long & Co. Greenwich & Long, E. of Greenwich, S.

The following figures illustrate these variations :—

Place.	January mean.	July mean.	Range.
Cambridge	37·6°F.	61·5°F.	23·9°F.
Utrecht	34·1	62·6	28·5
Hanover	32·7	63·1	30·4
Berlin	31·3	64·5	33·2
Posen	29·3	65·5	36·2
Warsaw	25·9	65·8	39·9

(These places all lie within half a degree of the 52nd parallel, and the altitude in no case exceeds 400 feet.)

The following figures indicate the more equable character of the Mediterranean region :—

Place.	January mean.	July mean.	Range.
Murcia	50·2°F.	78·8°F.	28·6°F.
Catania	51·4	79·5	28·1
Athens	48·7	80·6	31·9
Smyrna	45·6	80·2	34·6

In January, the coldest month of the year, practically the whole continent lies between the isotherms of 50° F. in the south and 0° F. in the north ; in July, the warmest month, the range of the isotherms is from 80° F. in the south to about 50° F. in the north. The summers are therefore warm in the north and centre of Europe and hot in the south-east and in the Mediterranean region, while the winters are cold all over the continent, except in the countries along the central part of the Atlantic seaboard, where they are cool, and on the Mediterranean, where they are, as a rule, somewhat milder.

Three regions may be recognised in respect to the period of the year in which the greatest amount of precipitation takes place. In the interior of the continent the rainfall occurs chiefly during the summer months, when moisture-bearing winds from the ocean are sucked into the low-pressure area, which at that season of the year lies over the Eurasiatic land mass. On the Atlantic coast lands, however, the heaviest precipitation is in autumn when the sea has lost little of its heat and evaporation is proceeding almost as in summer, but when the land is cooling rapidly and causing condensation to take place. The Mediterranean region, again, has its rainfall in the winter half of the year, when it is under the influence of the

westerly winds ; in the summer months the north-east trade wind system gradually extends over it, and the winds, blowing off the land and towards lower, and so warmer, latitudes, are dry.

The regions of heaviest precipitation in Europe are either in the countries which border upon the Atlantic or on the slopes of mountains which face the rain-bearing winds. Over considerable areas in these regions there is a mean annual precipitation of 40 inches and more, which decreases in the less exposed districts to between 30 and 40 inches. The greater part of Central Europe has between 20 and 30 inches, but in the north-east and south-east of the continent there is less than 20 inches.

VEGETATION.—The natural vegetative regions of Europe need only be mentioned here, as they have been so greatly altered by the hand of man. In the extreme north there is tundra which soon passes into the poor coniferous forest of high latitudes. About the 60th parallel this coniferous forest begins to merge into the deciduous summer green forest of Central Europe. In the Mediterranean region evergreen trees of a sclerophyllous type grow on the lowlands, and deciduous trees on the uplands. The south-east of Russia is steppe land.

Of economic plants barley makes its way furthest north and finds its extreme limit along a line running south-eastwards from about the North Cape to the intersection of the 60th parallel with the European frontier. It is closely followed by oats, but wheat cannot grow beyond the 65th parallel in Norway and Sweden, after which its limit bends to the south-east and enters Russia about the 60th parallel. Rye has a somewhat greater extension, and in Sweden can be grown as far north as the Arctic Circle. The northern limit of maize enters France in the south of Brittany and runs in a north-easterly direction as far as the Prussian province of Posen, where it bends to the east, runs through Austria-Hungary by way of Lemberg, and includes Roumania and Southern Russia. The vine has a limit practically the same as that of maize as far as Posen. East of that point the increasing length and severity of winter pushes it to the south of the Carpathians. The area within which the olive is grown is practically co-terminous with the region of Mediterranean rainfall.

CHAPTER V

THE UNITED KINGDOM

THE United Kingdom, comprising the two large islands of Great Britain and Ireland, along with about 5,000 smaller islands lying off their shores, stands upon the continental platform, off the north-west coast of Europe. As indicated in the previous chapter, the geographical and geological characteristics of the region are exceedingly varied and complex. The north and west of Great Britain consist in the main of mountainous land built up of older rocks, while the south and east are generally lowlands, in which the younger formations prevail. As these differences in physical structure have had a great influence upon the economic development of the whole country, a more detailed examination of them is necessary.

Scotland may be divided into three great physical regions—the Northern Highlands, the Central Lowlands, and the Southern Uplands. The Central Lowlands, which separate the first of these regions from the last, consist of a great rift valley, caused by two lines of fracture, one running from Stonehaven in the east to the mouth of the Clyde in the west, and the other from Dunbar in the east to Girvan in the west. The Northern Highlands, which have an average elevation of about 1,500 feet, are in the main a great dissected tableland, probably formed of Cambrian rocks, which have been completely altered by metamorphic action. In the Outer Hebrides and on the west coast, ancient Archæan rocks and pre-Cambrian sandstones appear; in the central part of the Highlands there are considerable areas of intrusive granite, and in the Inner Hebrides extensive volcanic outpourings of Tertiary age. In Caithness in the extreme north, and along the eastern margin of the Highlands as far as the mouth of the Moray Firth, there is a low-lying coastal sill of varying width, formed mainly of Old Red Sandstone. This lowland area broadens out in north-east Scotland, but is there composed in the main of rocks similar to those of the Highlands. The Southern Uplands consist of Silurian rocks, and, like the Northern Highlands, their structure is that of a dissected tableland, but their average height is less, and probably does not

exceed 1,000 feet. The Central Lowlands, which have been let down between these two ancient masses, and folded in the process, are generally covered with Old Red Sandstone and Carboniferous rocks, except in the upland districts, which owe their formation to volcanic matter ejected in Carboniferous times.

England is divided into two very different physical regions by a height of land known as the oolitic escarpment, which extends from Portland Island, by the Cotswolds, to the North Yorkshire Moors. To the north and west of this escarpment lie the great Palæozoic areas of the country, while to the south and east of it are the Secondary and Tertiary formations. The Palæozoic areas—the Pennine Range, the Lake District, the Welsh Upland, and the peninsula of Devon and Cornwall—are united by the Central Plain, which lies between them and the oolitic escarpment. The Pennine range was built up of folded Carboniferous rocks,—Mountain Limestone, Millstone Grit, and Coal Measures,—but denudation has removed the Coal Measures, and in many places the Millstone Grit, from the upper parts of the range. The Coal Measures, however, appear on both flanks, in Lancashire on the west, and in Northumberland and Durham, Yorkshire, Derbyshire, and Nottinghamshire on the east. The Lake District is a dome-shaped uplift, formed of Silurian and igneous rocks, with a band of Coal Measures along the north-west coast. The Welsh Upland is a dissected plateau of Cambrian and Silurian rocks, strengthened in places by intrusive igneous material. In the south, in a synclinal trough in the Silurian rock, there are areas of Old Red Sandstone and Carboniferous rocks within the last of which lies the coal basin of South Wales. The peninsula of Devon and Cornwall consists of a synclinal trough in the Old Red Sandstone, which appears in the north along the Bristol Channel, and in the south along the English Channel where there are also considerable areas of intrusive granitic rocks. The country between these outcrops of Old Red Sandstone is covered with lower Carboniferous rocks, which, however, do not contain coal. The Central Plain, which connects these various upland regions, is composed in the main of Permian, Triassic, and Liassic rocks, though in some parts of the south the Coal Measures come to the surface. From the oolitic escarpment, which bounds the Central Plain, the land slopes gently away eastwards and southwards across the Jurassic belt to the foot of the Cretaceous

escarpment, which runs from the Dorset Downs, by the Marlborough Downs, the Chilterns, the East Anglian Heights, and the Lincolnshire and Yorkshire Wolds, to Flamborough Head. This escarpment bounds the chalk country which extends eastward and southward until it is overlaid by the Tertiary gravels and clays of the London and Hampshire basins.

Ireland may be described as basin-shaped, since it consists of a central plain, more or less surrounded by a rim of mountains. In the north and south these mountains cover wide areas, but in the east and west they are more restricted and less continuous. In the north-west, where they follow the fold lines of the Scottish Highlands, they consist of crystalline and granitic rocks, while in the south-east of Ulster, where they were once continuous with the Southern Uplands, and in Leinster, where they formed part of the same mountain area as Wales, they are of Cambrian and Silurian rocks which have been pierced, however, by the large granitic masses that now give them their most characteristic features. The Antrim Plateau, in the north-east, is built up of layers of basalt. In the south and south-west, where the mountains have been folded along the same lines as those of south-western England, the ridges consist of Old Red Sandstone, while in the intervening valleys Carboniferous rocks appear. The low-lying Central Plain, formed by the denudation of the upper layers of the Carboniferous rocks which once covered the greater part of Ireland, is underlain by a floor of Carboniferous Limestone which, in fact, only comes to the surface in a few places, as it is generally concealed beneath a covering of glacial drift. Over the whole of Ireland, indeed, the drift is widespread, and, by obstructing the watercourses, has done much to aid in the formation of the bogs which are so characteristic a feature of Irish scenery.

CLIMATE.—The British Isles fall within the climatic area of North-Western Europe, and lie in the belt of westerly and south-westerly winds, which modify alike the heat of summer and the cold of winter. In summer, the land is heated by the direct insolation of the sun, which is then north of the equator, and temperature decreases in a northerly direction. Owing to the cooling influence of the westerly winds blowing from the ocean, however, Ireland has at this season of the year a temperature about 2°F. lower than that part of Great Britain which lies within the same parallels of



After the Oxford Wall Maps,

by permission

RAINFALL OF THE BRITISH ISLES

latitude ; while places on the west coast of Great Britain have a somewhat lower temperature than corresponding places on the east coast. In July, the warmest month of the year, the isotherms range from 63° F. in south-eastern England to 55° F. in the north of Scotland. In winter, on the other hand, when the sun is south of the equator, the British Isles receive the greater part of their warmth not from it directly, but from the westerly and south-westerly winds, which reach them from the Atlantic. Accordingly, the western coasts, which are most exposed to these winds, receive the greatest benefit from them, and temperature decreases, not from south to north, but from west to east. At this season of the year, therefore, Ireland has a mean temperature several degrees higher than that of corresponding parts of Great Britain, and the west coasts of both islands are warmer than the east coasts. In January, the coldest month of the year, the mean sea-level temperature ranges from 44° F. in the south-west of Ireland to 38° F. in the south-east of England, while the isotherm of 40° F. runs from Cape Wrath to the Isle of Wight. The upland regions are, of course, colder at all seasons of the year than the sea-level temperatures indicate. On the whole, however, it may be said that in the British Isles the summers are warm and the winters cool.

The western parts of the British Isles have generally a heavier precipitation than the eastern parts. This is due in the first place to their more exposed position in relation to the winds blowing from the Atlantic, which is the great source of moisture ; and in the second place to the presence of mountain masses, which force the winds upwards, so that they are cooled, and the moisture, which they carry, condensed. The eastern parts of the country, on the other hand, lie in the rain shadow cast by the mountains, and have, therefore, a much lower rainfall. Generally speaking, it may be said that on the mountainous districts of Ireland and of the west of Great Britain there is a mean annual rainfall of at least 40 inches, while on the lowlands, in both countries, there is less than that amount. But parts of the Western Highlands, of the Lake District, and of Wales, have as much as 60, 80, and even 100 inches. The greater part of the Irish plain, and the Scottish Lowlands, have between 30 and 40 inches ; the Central Plain of England, and much of the east coast of Great Britain, have

between 25 and 30 inches, while the eastern counties of England have less than 25 inches.

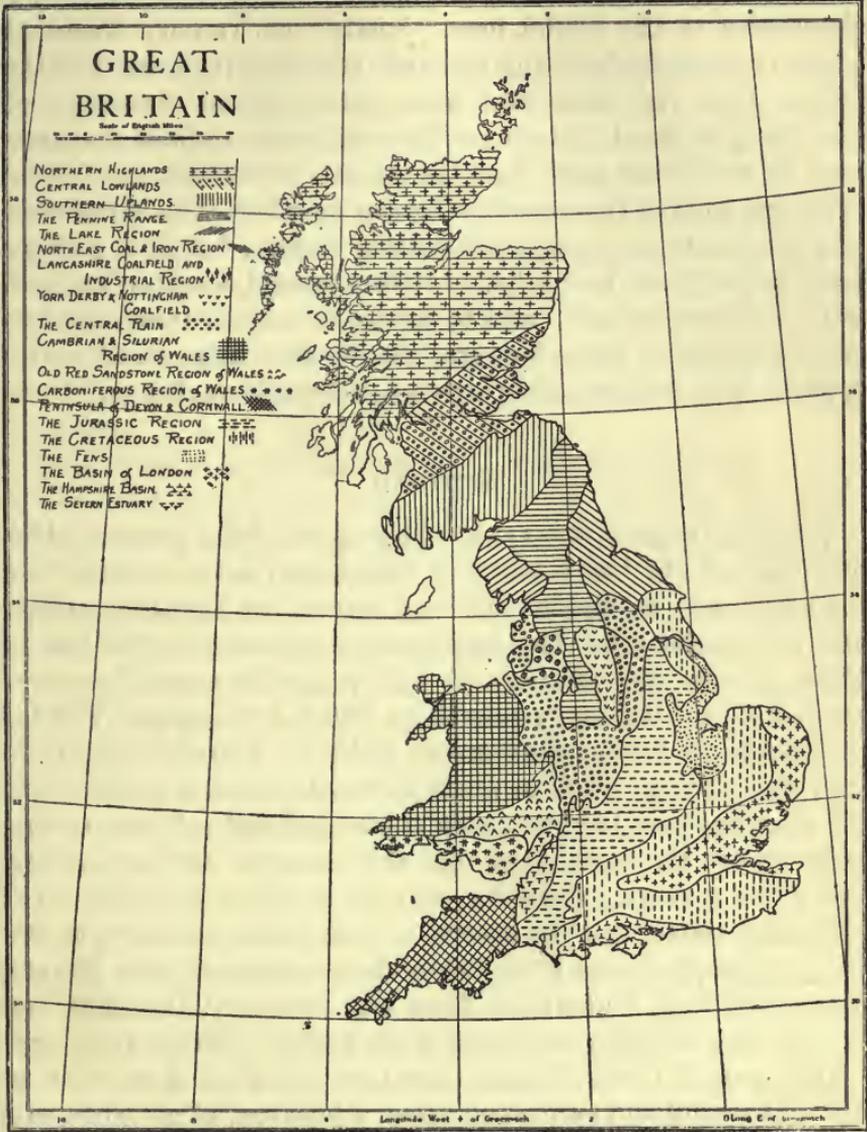
GENERAL CONSIDERATIONS.—In order to realise the extent to which geographical conditions have contributed to establish the British Isles in the pre-eminent position which they occupy in the economic world of the present day, certain considerations of a general nature must be taken into account. In the first place, the position of the British Isles upon the continental platform has been of importance in several ways. The islands were, at one time, connected with the Continent, and even after land connection ceased they were easily accessible from it. European flora and fauna entered during the earlier period, and European civilisation during the latter. But along with accessibility there was detachment, and even a certain amount of isolation, which allowed the island people to develop along lines of their own, free to a greater extent than most continental countries from the danger of foreign invasion. Again, the insular and indented character of Britain would, in any case, have made communication by sea relatively easy, but the high water in nearly every river estuary around the coast, caused by the heaping up of the tidal wave upon the continental platform, rendered many comparatively inland places, seaports of some importance in early times. With the increased size of ships, a number of these inland ports have decayed as such. On the other hand, some of the principal seaports of the country, which have grown up near the mouths of rivers, are only accessible to the larger vessels of the present day at times of high water.

In the second place, although the British Isles cover but a small area, geological structure and land form are exceedingly varied and climatic contrasts are well marked. The number of natural regions is, therefore, large, and as many of them are well endowed with regard to soil and climate, or mineral wealth, the geographical conditions for a wide range of economic activities are present. Moreover, the actual distribution of natural regions has proved favourable to economic development. Those regions which are most suitable for agriculture, and, therefore, best fitted for man in the earlier stages of civilisation, lie nearest to the Continent, and are most accessible from it. Those, on the other hand, whose economic resources could only be utilised by a fairly advanced people, and whose topography would in some cases

have actually retarded progress in its earlier stages, lie distant from the Continent, and were for long but scantily populated.

Lastly, account must be taken of the international position of Great Britain. Before the geographical renaissance of the fifteenth century the country practically lay upon the outer circumference of the known world. But, after the discovery of the Cape route to India, and of America, its position became central rather than peripheral. By taking advantage of this relative change in position, especially during the critical period of the eighteenth century, Britain became a trading and colonial power. This not only gave it the profits of a great entrepôt trade, but aided the development of manufactures by facilitating the importation of raw material from, and the exportation of manufactured goods to, all parts of the globe.

NATURAL REGIONS.—Geological structure, land form, and climatic conditions all serve to mark off fairly well the major natural regions of the British Isles. The areas of ancient rocks are generally uplands, and being uplands have a higher rainfall and a lower temperature than the neighbouring lowlands, with the result that their vegetation and, to a certain extent, their economic development, are different. But each upland region may be considered separately, as no two of them are exactly alike. The Northern Highlands are of older rock than the Southern Uplands, their elevation is greater, and their climate more inclement. The Central Lowlands may be distinguished from both, not only by their physical character and climatic conditions, but by their mineral wealth and economic potentialities. The Pennine Chain differs entirely in structure from the other Palæozoic areas of Great Britain, while each of the great coalfields, which lie upon its flanks, has, as a result of differences in geological environment, climate, or place relations, a well-marked individuality of its own. The Lake District, the Welsh Upland, and the peninsula of Devon and Cornwall present contrasts to one another in respect to structure, mineral wealth, and climate. The Central Plain, which unites these upland regions, is itself a lowland which must be subdivided in order that due attention may be given to the Carboniferous districts within it. The south and east of England, though generally lowland, do not form one natural region. The soils of the Jurassic area differ from those of the Cretaceous area, and the economic development of the two regions



NATURAL REGIONS OF GREAT BRITAIN

differs likewise. In the Cretaceous area, moreover, the agricultural conditions of different districts are profoundly modified by the distribution of the glacial drift. Lastly, the Tertiary basins of London and Hampshire, and the lands adjoining the estuary of the Severn, have had their past history and present conditions so profoundly modified by their position and place relations that each must be considered apart from the others. In Ireland, the Central Plain and each of the mountain masses by which it is surrounded may be considered as separate natural regions, but it is perhaps better to recognise three belts, a northern upland, a central lowland, and a southern upland; and to subdivide each of these into two parts, an eastern and a western, the division being based partly upon physical structure and partly upon climatic conditions.

SCOTLAND

THE NORTHERN HIGHLANDS.—The whole of the country which lies north of the line connecting Stonehaven with the mouth of the Clyde may be divided into two parts: the highlands proper, and the coastal sill. The mountainous character of the first of these regions, the infertile soil into which its crystalline rocks weather down, the heavy rainfall to which it is exposed, and the comparatively low temperature to which its altitude subjects it, combine to render it one in which little cultivation is possible. In the more favoured localities, such as the sheltered valleys, oats and potatoes are the main crops, but the yield per acre is generally below the average. Even for pastoral purposes the land is not altogether suited, and the density of both cattle and sheep is, and has apparently always been, below the average for Great Britain. The counties of Sutherland, Ross and Cromarty, Inverness, and Argyll, may be taken as typical of the region. With 14 per cent. of the area of Great Britain, they have less than 2 per cent. of the arable land and permanent grass, 2 per cent. of its cattle, and 7 per cent. of its sheep. During the last thirty years the arable land has decreased from 288,000 acres to 270,000 acres, which is less than the average rate of decrease for the whole of Great Britain; while permanent grass has increased from 126,000 acres to 183,000 acres, which is above the average rate of increase for the same area. On the other hand, cattle have decreased by 5 per cent.

and sheep by 17 per cent. during the same period—a result of the conversion of considerable areas of mountain grazing land into deer forests.

On the coastal sill, with its lower elevation, better soil, higher temperature in summer, and moderate rainfall, the conditions are much more favourable to agriculture. Oats are extensively grown, barley is cultivated in places, and large numbers of cattle are raised for the English market. Along the coast there are a number of towns which serve partly as centres for the agricultural districts, and partly as bases for the fleets which frequent the fishing grounds of the Moray Firth and the North Sea. Of these the most important is Aberdeen which is second to Grimsby alone among the trawling ports of the British Isles. It is also engaged in the export of granite.

The Highland region, as a whole, is obviously unsuitable for the development of manufacturing activity. There is no coal, and, although there is in the aggregate a considerable amount of water-power at present running waste, there are few places where 1,000 horse-power could be continuously maintained throughout the year. Works for the extraction of aluminium by electrical processes have, however, been established within recent years at Foyers and Ballochulish in Glenmore, the electricity being generated by a natural waterfall in the first case, and by an artificial one in the second. Scattered over the Highlands there are numerous distilleries, which are, to some extent, dependent for their raw material upon the oats grown in the vicinity, and owe at least part of their success to the flavour imparted to the whisky by the peat.

THE CENTRAL LOWLANDS are economically the most important part of Scotland, and contain about 75 per cent. of the population of the whole country. The soil varies in fertility, but is generally very productive when of alluvial or glacial origin, or when derived from Old Red Sandstone or volcanic ash. The rainfall decreases from over 40 inches in the west of the region to less than 30 inches in the east. Hence, from the agricultural point of view, a distinction may be drawn between the western and eastern counties. In the former, over two-thirds of the land is pastoral, and less than one-tenth is devoted to cereals; while in the latter just over one-half is pastoral and nearly one-fifth is under cereals, Fife and Haddington, the two driest counties in the Lowlands, together

contributing one-third of the wheat crop of Scotland. Cattle-raising and dairying are characteristic of the west, while sheep farming is more important in the east. Fruit is cultivated in many localities where the environment is favourable, but especially in Clydesdale and Strathmore. Roots are grown chiefly in the east.

On account of its more favourable climatic conditions, the eastern part of the Lowlands was the first to be settled; and it remained the more densely populated until the development of the great mineral districts in the west led to the growth of large industrial communities there.

The coalfields of Scotland are practically confined to the Central Lowlands, which produce about 15 per cent. of the total output of the United Kingdom. The Carboniferous strata were deposited over the greater part of the rift valley, but subsequent folding in different directions led to the formation of a number of basins in which the coal was preserved at a time when it was being removed by denudation from the surrounding uplands. Of these basins the most important are the Ayrshire, the Lanarkshire (which includes the coalfields of Linlithgow and Stirling) and the Fifeshire and Lothian. The importance of the Scottish coalfields is due in part to the fact that they contain two groups of coal-seams, the lower one lying in the Carboniferous Limestone, and the upper one lying in the same geological horizon as the true Coal Measures of England. The Ayrshire basin, with an output of about 10 per cent. of the whole output of Scotland (which is just over 40,000,000 tons), stretches along the Firth of Clyde from Ardrossan to Ayr, and extends inland for a distance of twelve or fifteen miles. Much of the coal produced on this field is shipped from the ports of Ardrossan, Irvine, Troon, and Ayr, to the Belfast district of Ireland. The Lanarkshire coalfields, along with which may be included those of Renfrew and Dumbarton, are at present the most important in Scotland, and account for nearly 45 per cent. of the total output. The bulk of the coal is obtained from the upper Coal Measures, which extend from Glasgow eastwards to the borders of Linlithgow, and southwards as far as Stonehouse and Carluke. The coal, which does not lie far below the surface, is easily worked, and is of great value for smelting and steam purposes, while some of it is especially valuable for the manufacture of gas. The coal seams of the lower

Carboniferous strata have not been extensively worked in Lanarkshire; and in Dumbarton and Renfrew, where the greater part of the output is obtained from them, they do not appear to be nearly as rich as those of the upper Coal Measures. The Linlithgow and Stirling fields, which belong to the same basin as those of Lanarkshire, have an output of about 5 per cent. and 7 per cent. respectively of the whole of Scotland. Up to the present time the bulk of the coal has been obtained from the upper Coal Measures, but recent developments have been chiefly directed to the exploitation of the seams in the Carboniferous Limestone. In the east of the Lowlands, the coal seams of Fife dip under the Firth of Forth and reappear along the coasts of Edinburgh and Haddington, and it is believed that the field is continuous under the Forth. The Fifeshire coalfield has recently assumed considerable importance, and the output of coal, which is obtained from both geological horizons, now amounts to over 20 per cent. of the total output of the country. Much of it is exported from Methil and Burntisland to Scandinavia and the Baltic countries. The Edinburgh and Haddington field has hitherto played a less important part than the Fifeshire field, and accounts for rather less than 10 per cent. of the total production of Scotland; but within the last few years a number of new pits have been sunk, and considerable quantities of coal are now exported to the Continent from Leith. In 1904 it was estimated that the net available quantity of coal remaining in Scotland amounted to 15,700,000,000 tons. Of this, about 8,700,000,000 tons lie in Fifeshire, under the Firth of Forth, and in Midlothian and Haddington. In Lanarkshire itself the net available quantity was 2,600,000,000 tons, which, at the rate of consumption now prevailing, will be exhausted within a century and a half. It is very probable, therefore, that, within a comparatively short time, the chief coal-producing districts will be found in the east of the Central Lowlands, and not improbable that, within a somewhat longer period, there will be a gradual transference of manufacturing industry from the west to the east, so that the latter region will once again regain at least something of its ancient pre-eminence.

Bituminous oil shales occur in the Calciferous Sandstones underlying the Carboniferous Limestone series. These shales are worked at the present time mainly in Linlithgowshire, and oil, wax, and

ammonia are obtained by distillation. Broxburn and West Calder are important centres of this industry.

Ironstone occurs with coal in many places, and for long was worked to supply the iron industries of the Central Lowlands. The most valuable seams, such as the Blackband ironstone, which could be cheaply smelted because of the large amount of carbonaceous matter which it contained, are practically exhausted, and many of the clayband ironstones have been abandoned on account of the expense of working them. The native production of iron ore is, therefore, no longer able to meet the demands of the iron industry.

The great coalfields of the Central Lowlands, the large supplies of good iron-ore which formerly existed, the proximity of coal and iron to one another, and the accessibility of the whole region by means of the Forth and Clyde estuaries, the one facing Europe and the other America, are conducive to the great industrial development of this part of Scotland. The first iron works to be established were at Falkirk, where ironstone, wood for fuel, and water-power from the Carron, were all obtainable, and for a time these works were the most important in Europe. Iron-smelting has since moved westwards, but the momentum given to Falkirk by that industry has made it at the present day the centre of a district noted for its production of all kinds of iron goods.

With the development of the use of coal for smelting iron, Lanarkshire naturally became the centre of this industry, and among the towns which owe their importance to it are Coatbridge, Motherwell, Wishaw, and Airdrie. On the Ayrshire coalfield, where ironstone could also at one time be obtained, Muirkirk and Dalry are the centres of the iron-manufacturing industry. These two counties, and especially the first, are among the most important in the United Kingdom for the manufacture of steel. Since the rapid decline in the production of native ore, the accessibility of the Central Lowlands has rendered easy the importation of foreign ore.

In early times, Glasgow owed its importance to its situation on the fertile soils of the Clyde valley, and to the fact that it was at the meeting place of routes from the north, the south, and the east. Later on, its position with regard to the New World brought it much trade, which eventually rendered necessary the deepening of the river. Thus it became a great trading port, while the abundance

of coal and iron in the neighbourhood facilitated the growth of shipbuilding lower down the river. The Clyde is now the chief shipbuilding area in the world ; it produces over 30 per cent. of the total tonnage of the United Kingdom, and its ships are to be seen on every sea. The principal yards are at Clydebank, Dalmuir, Dumbarton, and Greenock.

The textile industries of Scotland were originally scattered over the whole country. Linen was manufactured where flax could be grown, and where water was abundant. The introduction of machinery and the necessity of importing raw material from the Baltic countries have, however, drawn the industry to the east coast, where it is established at Dundee, Dunfermline, and elsewhere. Dundee suffered greatly during the Crimean war by the suspension of the supply of flax from Russia, and began to import jute from India, the manufacture of which has now become its leading industry, although it has suffered somewhat in recent years from the competition of the Calcutta mills. Various branches of the woollen industry are carried on in and around Alloa, Paisley, Glasgow, and other towns ; while the manufacture of thread, which is extensively followed in Paisley, is the chief branch of the cotton industry established in the Central Lowlands.

Among other industries are engineering and the manufacture of machinery, both of which are important pursuits at Glasgow, Greenock, Paisley, Dundee, Edinburgh, and elsewhere. There are chemical works on several of the coalfields ; some raw sugar is still refined at Greenock, where it is imported from the West Indies ; printing is an important industry at Edinburgh, and paper is made in the neighbourhood, where clear water is abundant ; oil-cloth and linoleum are manufactured at Kirkcaldy ; Dundee obtains from the Carse of Gowrie much of the fruit required for the preserves for which it is noted.

To sum up, the Central Lowlands, on account of their moderate elevation and easy accessibility, their not unfavourable climate, and their fertile soils, the stores of coal which they still contain, and the supplies of iron which they once possessed, have become the great agricultural and industrial region of Scotland. As they contain the capital of the country, and its great commercial centres, they represent a "pole of convergence," drawing people from all directions, even as the Northern Highlands, and, to a less extent,

the Southern Uplands, sending people in all directions, represent "poles of divergence."

THE SOUTHERN UPLANDS.—The rocks of this region are in the main Silurian, but in the east a belt of Old Red Sandstone runs southwards from Dunbar to the border, and much of Berwickshire is upon the Calciferous Sandstone. In the west there are granitic areas and isolated basins of Triassic rocks. The lower elevation and less rigorous climate of the Uplands cause them to compare favourably with the Highlands. The hills are generally covered with grass to their summits, and the percentage of land used for grazing purposes is high. In Peebles, Selkirk, Dumfries, and Kirkcudbright, for example, over 80 per cent. of the land is in pasture or permanent grass, and the whole region constitutes one of the great sheep-raising districts of the United Kingdom, containing nearly one-tenth of the total number of sheep therein. Over the greater part of the Southern Uplands, indeed, there is, on an average, one sheep to each acre of pasture land. Cattle are not raised except in Wigtown and Kirkcudbright, where the lower elevation of the land and the heavier rainfall lead to the growth of pasture more suitable for cattle than for sheep. Arable farming is generally restricted; oats, the chief cereal grown, is cultivated mainly in the river valleys and in the Triassic basins, both of which are frequently covered with alluvium, and on the lower lands of the Old Red Sandstone and Calciferous Sandstone of Roxburgh and Berwick.

The woollen industry is more centralised in the Southern Uplands than in any other part of Scotland. This is due in part to the large supplies of wool at hand, and in part to the abundance of water, both for power and for cleansing purposes. The chief towns engaged are Hawick, Galashiels, Jedburgh, Selkirk, Peebles, and Innerleithen. The manufacture of tweeds of various kinds is the principal branch of the industry pursued in this region.

ENGLAND

THE PENNINE CHAIN has played an important part in the economic development of Northern England. By its influence upon the climates of Lancashire and of Yorkshire respectively, and by acting as a barrier, though not an impassable one, between the two counties, it has differentiated the occupations of the people

living upon either side of it. On its moors have fed the sheep whose wool has helped to found the cotton industry on its western flank no less than the woollen industry on its eastern. The rivers which flow down its slopes have provided power for both industries in the earlier stages of their growth, and determined the sites of many of the more important towns engaged in each of them; while from reservoirs upon it is obtained no inconsiderable part of the daily water supply of several millions of people. It is, therefore, in its influence upon neighbouring regions that the importance of the Pennine Chain consists. The limestone districts, which cover considerable areas both in the north and in the south, are in general suited for pastoral pursuits alone, though along the river valleys and in the lowlands they frequently provide good agricultural land. In the neighbourhood of intrusive volcanic rocks there are numerous lead veins, which are worked in different parts of the range. The Millstone Grit generally leads to the development of moorlands, which provide a somewhat scanty pasturage for sheep.

THE NORTH-EAST INDUSTRIAL REGION.—The mineral resources of this region constitute the basis of its economic activities. Its coalfields fall into two distinct groups. The Coal Measures occur within an area defined by lines drawn from the mouth of the Coquet to Middleton in Teesdale, and from Middleton to a point on the coast a little to the north of Hartlepool. In the south-east part of this area they are overlain by Magnesian Limestone, but, though the coalfield is here concealed, it has been proved and is worked at the present time. It has been estimated that the coal seams may be followed under the sea for a distance of three miles from the coast. Coal also occurs in the Mountain Limestone series in the north-east and the north-west of Northumberland, but so far not much has been produced in these districts. The total available contents of the whole region have been estimated at 10,780,000,000 tons, while the yearly output at present averages 54,000,000 tons. Much of the coal is shipped to London and other seaports on the coast, but, of course, much is also consumed by the varied industries of the region itself.

The iron industry owes its origin to the fact that ironstone is found in the Coal Measures along with the coal. The greater part of the native ore used at the present time comes, however, from the

Cleveland Hills, which produce about 40 per cent. of the output of Great Britain. In the valley of the Esk, near Whitby, there are two seams of ore which increase in thickness towards the north, and unite to form the main Cleveland seam, from which the bulk of the ore is at present obtained. This ore contains phosphorus, and could not be used in the manufacture of steel until the discovery of the basic process, by which lime is added to the lining of the Bessemer converter or to the Siemens hearth to form a base with which the phosphorus may combine. Even at the present time phosphoric ores cannot be used in the manufacture of acid steel, and this is suggested as one reason why the output of the Cleveland mines does not increase more rapidly. Middlesbrough is the centre of the iron-smelting industry, which is also carried on at Stockton, Hartlepool, and other places, where coal, ore, and flux can all be easily brought together.

Shipbuilding is an important branch of the iron and steel industry of the region. The principal yards are situated below Newcastle on the Tyne, which has been deepened to permit of its navigation by large vessels, on the Wear at Sunderland, at Hartlepool on the coast, and at Stockton on the Tees. These districts have made rapid progress within recent years, and the tonnage of the ships built there now averages over 45 per cent. of the total tonnage built in the United Kingdom. Other industries of the region are also associated, to a large extent, with the manufacture of iron and steel. There are great engineering works at Newcastle, Stockton, and Darlington; and railway stock is manufactured at the last named town. Salt is obtained from the Keuper marls at Middlesbrough, and there are great chemical works on the Tyne which derive part of their raw material from the Magnesian Limestone in the vicinity.

THE YORKSHIRE, DERBYSHIRE, AND NOTTINGHAMSHIRE COAL-FIELD.—This coalfield occupies a great basin of which the western part alone is exposed, the eastern part lying concealed under an accumulation of Permian and later rocks. The exposed portion is bounded on the west by the Millstone Grit of the Pennines, and on the east by the outcrop of the Magnesian Limestone. Within these limits it extends from Leeds and Bradford in the north to Nottingham in the south. The coal varies in character, different seams having different qualities, but it includes varieties well

adapted for locomotives and steamships, household purposes, and the manufacture of gas. The limits of the eastern or concealed portion of the field are only gradually being determined. On the east it has now been found to extend as far as a line running from Selby, by Thorne and Haxey, to Owthorpe, that is, nearly as far east as the Trent. In 1904 it was estimated that the unconcealed and the proved parts of the concealed coalfield (the latter not so extensively known then as now) contained in all 26,000,000,000 tons, while calculations of the contents of the unproved parts of the concealed area varied from 23,000,000,000 tons to 35,000,000,000 tons. An accurate estimate is impossible, however, until further investigations have been made. The present rate of production is 65,000,000 tons per year.

Upon the visible part of the coalfield numerous important industries have grown up. Partly as a result of geographical conditions, the woollen manufactures of England are established mainly in Yorkshire. The Pennine Chain was a great sheep-raising region in early times, and, as the manufacture of cotton made its way in Lancashire, that of wool was pushed over the mountains into Yorkshire, where it took firm hold. With the development of steam power the industry began to grow rapidly, and, as a result of the momentum which it thus acquired, drew to itself various branches of the woollen industry which had hitherto been settled in other parts of the country. It is mainly concentrated at the present time in the Yorkshire dales, on the eastern slope of the Pennines, between the Wharfe and the Calder. Considerable specialisation prevails. Wools vary greatly in length according to the breed of sheep from which they are obtained, and the geographical environment in which the sheep are reared. Short wools are carded, long wools are carded and combed, or combed only. Carded wools are made into woollen goods "the fibres of which, in the finished article, cross and recross one another"; combed wools are made into worsteds, "the fibres of which lie parallel to one another." The former include coarse cloths, flannels, blankets, and tweeds, while the latter are generally lighter and of finer quality, and include the better kinds of dress material used by both sexes. The Bradford district, Huddersfield, and Halifax are chiefly engaged in the manufacture of worsted goods. Leeds and Morley make woollens; Batley and Dewsbury among other articles produce large quantities

of shoddy (re-made woollen goods); Keighley and Dewsbury are engaged in spinning; carpets are made at Heckmondwike and Halifax; and so on. In addition to wool, it may be noted, both cotton and silk are used in the manufacture of certain fabrics. The wool is partly of domestic, but mainly of foreign origin. Of the latter, Australia and New Zealand are the chief sources of supply, though some comes from the Argentine, either directly, or by France or Belgium, in which two countries special methods have been devised for dealing with the very dirty wool that is produced by South America. Mohair is imported from Turkey and the Cape, and alpaca from South America. It may be noted here in passing that Leeds is the chief seat of the leather industry in Britain.

To the south of the wool-manufacturing region lies that in which iron and steel goods are produced. Sheffield is its centre, though the advantages of that town are shared to some extent by a number of others. The iron industry settled in this part of the country in early times, because iron ore, and wood for fuel, were within easy reach of one another. Coal has taken the place of wood, and, though some clay ironstone is still found in the locality, the chief supplies of native ore now come from Northampton, Lincoln, and Leicester. These ores are phosphoric, and can be made into basic steel, the Magnesian Limestone to the east being used for lining the converter or making the hearth. For the special kinds of steel in which Sheffield excels, however, hæmatite pig-iron has to be imported from Lancashire, Cumberland, and Spain, while, for the finest descriptions of steel goods, Swedish iron is used. Excellent ganister for the furnaces is found in the Coal Measure sandstone, some of which consists of almost pure quartz. Derbyshire limestone provides the flux, while the gangue left by the lead miners in the same county is now worked over for the fluor spar which it contains. This fluor spar is of great value in desulphurising the metal used in the manufacture of basic steel, and small quantities of it are sent to the United States for similar purposes. In addition, moulding sands with an admixture of clay are found in the upper Permian beds, fireclays are abundant, and excellent grindstones can be obtained from the sandstones of the Coal Measures. With all these advantages Sheffield has developed a great iron and steel industry, manufacturing engineering plant and machinery, armour plate and ordnance, cutlery, tools, and a great variety of other articles.

THE LANCASHIRE INDUSTRIAL REGION lies mainly, though not entirely, upon the Coal Measures which occupy a considerable part of the south of Lancashire, and a small area in the east of Cheshire. The country is generally hilly, but seldom rises to more than 1,300 or 1,400 feet above sea level. The geographical factors which have most influenced the economic development of the region are the abundance of its coal, its large supplies of water, its climate, and its position. The coal is obtained chiefly round the lower slope of the Coal Measures, the principal mines being found in a stretch of country enclosed within lines joining St. Helens, Wigan, Bolton, Bury, Manchester, and Leigh; along a line drawn from Darwen by Blackburn to Burnley; along another line drawn from Burnley by way of Bacup, Rochdale, and Oldham to Manchester; and in the east of Cheshire. The total contents of the whole area has been estimated at 4,530,000,000 tons, and there is an annual output of about 24,000,000 tons. Along with coal, iron was formerly found, but the supplies of it are now almost entirely exhausted.

Other geographical factors may best be discussed in connection with the development of the cotton industry, which is the basis of practically all the economic activity of the region. In early times the pursuits of the people in this part of England were mainly pastoral, and the wool of the sheep raised on the Pennines was exported to the Continent. Later on, a woollen industry grew up within the region itself, and by the end of the fifteenth century a number of towns were engaged in it. As land became more valuable for agricultural purposes in the south of England, the Pennine slope became the chief sheep-raising district, and there the woollen industry was encouraged not only by the abundance of raw wool, but by the plentiful supply of water for washing it. When cotton goods came into more general use, partly, no doubt, as a result of the discovery of the Cape route to India, it was not unnatural that Lancashire already interested in the manufacture of textiles, in which her workmen had become expert, should turn, towards the end of the sixteenth century and in the early part of the seventeenth, to the spinning and weaving of cotton. The raw material at first came from the Levant to London, and had to be sent to Lancashire at great expense. Towards the end of the eighteenth century, the inventions of Arkwright, Hargreaves, and others, which rendered possible the use

of water power, led to a great extension of the industry. The Levant was no longer able to supply the raw material required, but the development of the cotton fields of North America fortunately placed the industry beyond the danger zone. At the same time, Liverpool, which is much nearer the manufacturing districts than London, became the chief receiving port for raw cotton, and this change undoubtedly gave a greater stability to the Lancashire industry. The process of localisation was completed by the introduction of steam power in the first quarter of the nineteenth century. During the whole period of its growth, moreover, the cotton industry has been aided by the favourable climatic conditions of the region. The prevailing winds blowing from the west and south-west are heavily charged with moisture, and on approaching the Pennines are forced upwards and cooled. The relative humidity of the atmosphere is therefore high, and this is of great advantage in cotton-spinning, as it prevents the cotton, and especially the finer qualities, from snapping, as would be the case with vegetable fibres, if the air were dry. These climatic conditions probably contributed also to the differentiation of processes which gradually took place in the cotton industry. The spinning towns—Oldham, Bolton, Bury, Stalybridge, and others—lie in valleys up which the winds from the ocean may easily blow. Of the weaving towns, on the other hand, Blackburn, Darwen, Accrington, Nelson, Colne, and others, lie sheltered to some extent, while Preston and Chorley have the rainfall of the Lancashire plain, which is lower than that of the Pennine slopes. Thus, the towns situated most favourably for spinning developed that branch of the industry, while others without these advantages took more naturally to weaving. The political events of the eighteenth century, which led to the growth of the United Kingdom as a great colonial and maritime power, have also had an important influence upon the development of the cotton trade. The fact that British ships were constantly finding their way into every port on the globe facilitated the export of cotton goods, and gave Lancashire the additional advantages of cheap transportation.

To estimate correctly the exact position of the Lancashire industry is a task of some complexity, which need not be attempted here; but a few figures will give some idea of its general character. On an average of the three years 1908-10, Great Britain

had 40 per cent. of the cotton-spinning spindles of the world, and of these over nine-tenths were in the region under consideration. On the other hand, only about 20 per cent. of the raw cotton consumed in the world's mills is consumed in Great Britain. This indicates that the finer qualities of cotton goods are more extensively manufactured in this country than in any other. In 1912 the average consumption of cotton per spindle in Great Britain was estimated at 35.2 lbs., in Germany at 82.4 lbs., and in the United States at 88.8 lbs.

The progress of the Lancashire cotton industry has been so great that there is a tendency to overlook the dangers which lie ahead. The coalfields from which the mills obtain their power are not inexhaustible, and even at the present rate of production will probably be worked out within the next two centuries. Long before this takes place, however, the greater cost of obtaining the coal will certainly have checked its output. Humidifiers, again, as they become more perfect, may reduce the value of the climatic advantage possessed by Lancashire. The world's supply of raw cotton, moreover, is not keeping pace with the increased demand of the chief manufacturing countries, and it is questionable whether this tendency may not become more marked in the future. Lastly, the progress of manufacturing industry in other parts of the world will ultimately reduce the demand for goods from this country. It is not intended, by what has been said, to convey the impression that Lancashire is about to lose its pre-eminence, but it is necessary to indicate that changes in the relativity of geographical advantage will ultimately prevent the present rate of progress being maintained, and may even bring about a retrograde movement.

Around the cotton industry various others have grown up. Bleaching and calico-printing are naturally important. Engineering and the manufacture of textile machinery, favoured by the presence of coal, the facilities for obtaining iron, and the large market at hand, are carried on in many towns of the region. Wigan, which produces some iron ore and imports more, is the centre of the iron-smelting industry and coal export trade. The manufacture of glass and chemicals is carried on at St. Helens, Runcorn, Widnes, and other towns where coal can be obtained from Lancashire and salt from Cheshire. Warrington has large soap works. Liverpool is the great port of the whole region, though Manchester, connected

with the Mersey by the Ship Canal, has a large and growing trade.

THE LAKE DISTRICT is a dome-shaped mass formed in the main of ancient rocks. On the central uplands the cultivation of the land is impossible, but, in the valleys and on the surrounding lowlands, pastoral farming is an important pursuit. The mineral wealth of the region is considerable. The Cumberland coalfield extends along the coast from Whitehaven to Maryport, a distance of fourteen miles, and then runs inland in a north-easterly direction for another fifteen miles. In addition, large deposits of coal lie concealed beneath more recent formations, and under the sea where indeed they have been worked for a distance of over four miles from the coast. The total content of the field is estimated at 1,500,000,000 tons, while the annual output is over 2000,000, a large part of it being shipped to Ireland from Whitehaven and Maryport. Haematite iron is obtained in various districts, but more especially to the north-east and south-east of Whitehaven, round Millom, and in Eskdale and Weardale. The annual output, which is about one-tenth the output of iron-ore in Great Britain, is steadily decreasing, and it is necessary to import foreign ore for the iron industries of Barrow and Workington. In 1846 Barrow was a village with 300 inhabitants, but it began to grow when the iron mines were connected with the coast, and it is now actively engaged in shipbuilding and the manufacture of armaments. The discovery of salt deposits in Walney Island has at the same time favoured the development of chemical industries.

THE CENTRAL PLAIN, which lies between the areas of Palaeozoic rocks and the oolitic escarpment, is generally a flat or gently undulating country. Over the greater part of the region Triassic and Liassic rocks prevail, but in places Carboniferous strata come to the surface. The lower Trias, or Bunter sandstone, generally forms light, sandy soils which, as in Cannock Chase in Staffordshire, are poor and infertile, and suitable only for sheep runs. The upper Trias, or Keuper sandstones and marls, on the other hand, weather down into a stiff clay which provides some of the best soils of the Central Plain. Being heavy and difficult to work, these soils are generally kept under grass, and this is also true of the Lias clays, which are better adapted for pastoral than for arable pursuits, though in places, as in the Vale of Evesham, they are

well suited for market gardening and fruit-growing. Considerable areas are also covered with Boulder Clay and alluvium, and are generally fertile. But, taking the Central Plain as a whole, it is not surprising to find that nearly three-fifths of its area is in permanent pasture, and that only about one-eighth is under cereals, oats being the principal crop. On the other hand, cattle-raising and dairy farming are extensively carried on, and the best cheese-making districts in England are those which are situated upon the Keuper marl.

Owing mainly to the presence of various minerals in different parts of the Central Plain, a number of industrial regions have grown up within it and require to be treated separately.

THE CHESHIRE SALT DISTRICT centres round the towns of Northwich and Middlewich, the salt itself lying in the red marls of the upper Trias. In some cases it is mined, and in others evaporated from natural springs, but the bulk is obtained by pumping up and evaporating water which has been allowed to enter the mines and dissolve the salt.

THE NORTH STAFFORDSHIRE COALFIELD is a valuable one, and the total content has been estimated at 4,368,000,000 tons. The coals vary in quality, but they are chiefly used for domestic, steam, and manufacturing purposes, though in some cases good coking and gas coals are found. Mining and the manufacture of pottery are the chief occupations of the region. The latter industry, which is carried on in and around the "Five Towns," owed its origin to the presence of large deposits of suitable clay in the neighbourhood. The finer clays are now exhausted, and it is necessary to import kaolin from Devonshire for the manufacture of porcelain and china, but local clays are still used for the coarser kinds of earthenware, and for making the "seggars" in which the finer kinds are baked.

THE BLACK COUNTRY.—The coalfields of this region extend from Rugeley in South Staffordshire as far as the Clent Hills. The coals are of much the same character as in the previous region, except that gas and coking coals are generally absent. The total available content of this coalfield is estimated at 1,415,000,000 tons. The annual output of the whole of Staffordshire is about 14,000,000 tons. The region is one of great industrial activity. The iron ore which occurs in the Coal Measures was for long worked

with charcoal from the Forest of Arden, which lies to the south, and, when coal replaced charcoal as the fuel required, the industry naturally remained where it was. But a certain amount of readjustment took place. Birmingham, for example, which is not on the coalfield, but is several miles distant from it, is now engaged in the manufacture of a great variety of miscellaneous articles, all of which are in great demand, but none of which is of great bulk in proportion to its value. Guns and ammunition, jewellery and electro-plated goods, clocks and watches, scientific instruments, railway carriages and wagons, glass, chemicals, brass bedsteads, and nails, are all manufactured and exported. Wolverhampton, Walsall, Dudley, and several other towns actually on the coalfield, have blast furnaces, and are engaged in the manufacture of heavy goods; but their distance from the sea, which renders difficult the importation of foreign ore, and the gradual exhaustion of their local supplies, have led to a great decline in the production of iron. On the other hand, important industries have become established in each of them. Dudley manufactures chains and cables, fenders and fire-irons. Nails and chains are made at Cradley, Lye, and elsewhere. Redditch is noted for needles, Walsall for locks, and West Bromwich for small arms.

Several other industries which obtain their fuel partly from the South Staffordshire coalfield, and partly from the much less important coalfields of Shropshire, may be mentioned here, although, strictly speaking, they do not belong to the Black Country. Droitwich is the centre of a large glass-making industry. It is not far from coal, and receives salt from the Keuper marls upon which it stands, while the fireclay, which is found in the valley of the Lye, near Stourbridge, is of great value for moulding the pots in which the glass is melted. Kidderminster is noted for the manufacture of carpets, and is said to owe its success to a popular belief in the peculiar properties of the waters of the River Stour for fixing dyes. Worcester, without any special advantages, took up the manufacture of china after the decline of its woollen industry.

THE WARWICKSHIRE COALFIELD lies in the north-east part of the county of Warwick, between the towns of Nuneaton, Coventry, and Tamworth, and extends under Permian and Triassic rocks to the south and south-east. The coal is of the ordinary bituminous character, and, besides satisfying local needs, is exported in

considerable quantities to other parts of the country. The content of the field is estimated at 1,126,000,000 tons, and the annual output is about 4,500,000 tons. Coventry, a few miles south of this coalfield, has had a varied history, but it is now chiefly engaged in the manufacture of cycles and motor-cars.

THE LEICESTER COALFIELD lies in the north of the county of that name, and extends into south Derbyshire. The coals are bituminous, and are used for manufacturing and domestic purposes. Burton has a great brewing industry, due partly to the fact that its water has, dissolved in it, a considerable quantity of gypsum from the Keuper marls. Leicester, which is some distance from the coalfield, is engaged in the manufacture of boots, shoes, and hosiery.

WALES as a physical region includes all the country to the west of the Central Plain. But within it three distinct natural regions may be recognised, geological structure being taken as the basis of division.

THE CAMBRIAN AND SILURIAN AREA, which lies in the west and north-west, is a dissected tableland, the uplands of which are generally grass-covered except in their highest parts, while the lowlands are broad valleys capable of cultivation. The arable area is small, and stock-raising is more important than arable farming. Sheep are well distributed throughout the region, but cattle are most numerous on the lowlands of Anglesey, Pembroke, and Carmarthen, which contain one-third of all the cattle in Wales.

Mineral wealth is of some importance. Slates are extensively quarried near Bangor, in the north-west, while along the eastern rim are the coalfields of Flint, Denbigh, and Shropshire, the total contents of which have been estimated at 2,000,000,000 tons.

THE OLD RED SANDSTONE AREA includes the counties of Brecon, Hereford, and Monmouth, and parts of Shropshire and Worcester. The particular formation of the Old Red Sandstone, on which the greater part of this area is situated, is known as corn-stones, and the land is of exceptional fertility. It is well suited both for orchards and hop-gardens, and the apples grown upon it have given Hereford a famous cider industry. Much of the region forms rich pasture land, and the number of cattle and sheep is relatively high.

THE CARBONIFEROUS AREA lies in the south of Wales, and covers part of the counties of Pembroke and Carmarthen, nearly the whole of Glamorgan and Monmouth, and part of Brecon. The Coal Measures come to the surface over the greater part of this region, while the productive coalfield has an area of about 1,000 square miles. The land, which has a plateau-like formation, and slopes from north to south, is cut up by a number of deep transverse valleys, including those of the Nedd, Afon, Rhymney, Taff, and Ebbw. These valleys, by exposing many of the coal seams, facilitated in the past the economical working of the coal, which could be obtained by driving adits and galleries from the outcrops along the hillsides; and, as a result, deep mining was rare in this region until within comparatively recent years. At the same time, the eastern part of the coalfield is traversed for many miles by an important anticlinal fold, which converts it into two troughs, and in this way brings within reach of the miner much coal which would otherwise have lain at too great a depth to be worked. The character of the coal varies from bituminous in the east, to pure anthracite in the west, the steam coal used in the Navy and on all fast boats occurring chiefly in the central part of the field between Llanelly and Neath. The whole coalfield is estimated to have a net available content of 26,470,000,000 tons, of which about 14 per cent. is classed as first-class steam, 22 per cent. as anthracite, 30 per cent. as bituminous, and 33 per cent. as second-class steam. The annual output of the field is now about 50,000,000 tons, of which more than one-half, consisting largely of steam coal, is sent abroad. The export of coal from South Wales, like the mining of it, is greatly aided by the transverse valleys, which open up easy railway routes across the field, and which have at their mouths the chief exporting towns: Llanelly, Swansea, Cardiff, and Newport. Barry Dock, situated a few miles west of Cardiff, though not at a river mouth, is also engaged in the coal trade.

In addition to the mining and exportation of coal, metallurgical industries of considerable importance are established on the coalfield. These industries, although they owe their origin to the proximity of raw materials, are now mainly dependent on ores imported from abroad. Iron is brought from Spain for the iron and steel works at Dowlais, Merthyr-Tydfil, Cardiff, Port Talbot, and Swansea. For the tin-plate industry which has grown up in the

west of Glamorgan, raw material was formerly obtained from Cornwall, but is now imported from the Malay Peninsula. In and around Swansea, also, there are smelting works for the treatment of copper, lead, and zinc. Pembroke on Milford Haven is a naval dockyard.

THE PENINSULA OF DEVON AND CORNWALL forms a synclinal trough. Old Red Sandstone appears in the upland districts in the north and south, while Carboniferous rocks occupy the hollow between. In the south, also, there are considerable upland areas of granitic formation. Much of the country consists of moorland and grassland; and cattle-raising is an important industry in this region, which contains one-tenth of all the cattle in England. Arable farming is in the main confined to the river valleys, and oats is the chief cereal grown. The northern part of the Old Red Sandstone is, in the east, suitable for apple-growing, while the mildness of the climate along the south coast favours the cultivation of early flowers and vegetables. In those districts where granitic masses have come into contact with the Palæozoic rocks there are mineral veins, the output of which, however, is not now of great value. Tin is still worked in Cornwall, and some copper is produced, but the amount of each is insignificant when compared with that which is imported from abroad. Kaolin is obtained from districts in which the granitic rocks are decomposing, and is sent not only to the Potteries but to the United States and other countries. Fishing for pilchards, mackerel, and flat fish is carried on from various points along the coast. Devonport is a naval station, and Plymouth a port and place of call for mail steamers.

THE SCARPLANDS AND TERTIARY FORMATIONS.—The economic development of England to the south and east of the oolitic escarpment is in striking contrast with that of the regions which have already been discussed. The Scarplands and Tertiary formations cover less than two-fifths of the total area of England and Wales, but they include over three-fifths of the arable land. On the other hand, with the exception of London and one or two ports, there are no great manufacturing towns, as in the north. Agriculture is the chief occupation of the inhabitants, but its character varies from one place to another with changes in the geographical environment. Differences in soil and climate over the whole region would permit of its division into a considerable number of

sub-regions, but in what follows only the more general characteristics are considered.

THE JURASSIC AREA.—On the higher parts of the oolitic escarpment the land is suitable only for pastoral purposes, and sheep are raised in the Cotswolds and elsewhere. In various places, also, iron is obtained from the Jurassic limestone. Apart from the Cleveland Hills, which have been included in the North-East Industrial Region, the chief deposits are in Lincoln and Northampton. The greater part of the ore produced by these two counties, which have an annual output of about 4,500,000 tons, is sent to Sheffield and other iron-manufacturing areas, but some of it is smelted in the vicinity of the mines, at Kettering, Wellingborough, and elsewhere. The industry in these districts is, however, not highly organised, and the products of the furnaces, forge and foundry iron, are utilised in the workshops of Sheffield and the Black Country.

From the oolitic escarpment the land slopes gently down towards the foot of the chalk escarpment. In the lowlands are the Oxford and Kimmeridge clays, which, though productive, are heavy and difficult to work. Consequently, they have in many places been converted into grassland within recent years, and over the whole of the Jurassic belt the area under permanent grass is considerably greater than that under crops. Cattle and sheep, wheat, barley, and roots are the chief agricultural products of the region.

Manufactures are of secondary importance. The West of England woollen industry is situated mainly, but not entirely, upon the western part of the Jurassic area, where the proximity of sheep-runs and the abundance of water favoured its early growth. Frome, Stroud, and Bradford-on-Avon are the centres of this industry, and some of their woollen cloths are held in high repute. Witney, in Oxfordshire, is famous for its blankets. Northamptonshire, where nearly two-thirds of the land is under grass, has for long been a great cattle-grazing country. The presence of oak-woods encouraged the tanning industry, which in turn led to the manufacture of boots and shoes. This industry is now extensively carried on in Northampton itself, and in the towns and villages of the central and southern districts of the county. Agricultural machinery is made at Lincoln and Grantham.

THE CRETACEOUS REGION must be divided. The eastern section is overlain by the Boulder Clay, and along with it may be considered those parts of the London Basin which are also covered with the deposits of the glacial ice-sheet, and even the Fens, where both Jurassic and Cretaceous rocks lie under a covering of alluvium. The fertile soil, the low rainfall, and the warm summers of the whole of this area render it well suited for the cultivation of wheat, and the East Riding of York, the eastern part of Lincoln, and Norfolk, Suffolk, Essex, Cambridge, and Hertford contain over two-fifths of the total area under wheat in Great Britain. In these counties, also, the area under arable land is more than twice that which is in permanent grass, and barley and roots are extensively grown.

Over the greater part of the Cretaceous area in the south and west of the country, the chalk comes to the surface. As there is little soil on the uplands, and the rainfall is quickly absorbed, these districts are mainly devoted to sheep, which thrive on the good, if somewhat thin, grass with which the chalk is covered. In the valleys, where the soil has accumulated, arable farming is possible.

In the Weald economic conditions are more varied. To the north and the south lie the chalk downs, but, in the country between, the lower members of the Cretaceous system are exposed. Of these the most fertile are the Hythe beds and the Upper Greensand. The former constitute the typical soil of Kent, on which some of its best hop gardens and fruit orchards are to be found, while the latter, which is one of the best light soils in the country, grows both hops and wheat.

Over the whole Cretaceous area there are few manufactures. The most important industries include straw-plaiting at Luton, originally established there on account of the white wheat straw grown on the chalk, but now carried on with raw material imported from China and Japan; chair-making at High Wycombe, where the beech woods, also on the chalk, originally provided the necessary timber; and agricultural machinery at Norwich, in the arable area. Norwich also retains the manufacture of silk and wool, and makes boots and shoes. In the north-east, Goole, Hull, Immingham, and Grimsby, all on the Humber, carry on the trade of Lancashire and Yorkshire with the Baltic and North Sea ports. Grimsby is also a great fishing centre; and Dover, Folkestone, and Newhaven, in the south-east, are important packet stations.

THE LONDON AND HAMPSHIRE BASINS lie in depressions in the chalk occupied by various Tertiary formations, the most important of which are the London Clay and the Bagshot Sands. The latter are dry and pebbly, and are chiefly covered with heath; while the former constitutes a stiff clay, which, although difficult to work, is of considerable fertility. Much of it is now in grass, though, when the price of wheat was higher than at present, that cereal was extensively grown. But the economic importance of the London Basin lies in the great city of London. Situated near the head of the estuary of the Thames, which offers an easy means of access into the country, and at a convenient crossing point of that river, whence good routes diverge to all parts of the British Isles, London also lies opposite the mouths of several large rivers, which drain some of the most productive regions of the Continent. To these conditions are due its rise and early importance, but its later development is the result of that change in geographical values which led to the colonial and imperial pre-eminence of the United Kingdom. It was then that London became not only a great port, but the international market and financial centre for the most important part of the economic world. With the progress of other nations it has lost some of its earlier advantages; many of its markets have moved away from it; its port is affected by the competition of rivals both at home and abroad; its manufactures are carried on with increasing difficulty. Nevertheless it remains the greatest port of the Kingdom, the centre of its entrepôt trade, the point upon which all its most important railways converge, and the seat of an extensive and varied industrial activity. Southampton, in the Hampshire Basin, trades mainly with the Atlantic ports of Europe, with Africa and the East, and with South America.

THE SEVERN ESTUARY.—The lands on either side of the lower Severn, south of the Old Red Sandstone area of Wales, and west of the Jurassic escarpment, may be considered apart. Their geological structure is varied, but they contain two coalfields—the Forest of Dean, and the Bristol and Somerset. Their position, also, with regard to the south-east of England, on the one hand, and the New World on the other, has given to their trade and industry certain distinctive features. The Forest of Dean coalfield, with an estimated net contents of 258,000,000 tons, and an

annual output of less than 1,000,000 tons, produces good house and gas coal. A small iron-smelting industry, which formerly obtained the necessary fuel from the forests in the locality, is still carried on upon this coalfield. The Bristol and Somerset coalfield is more important, and it is estimated that it contains 4,000,000,000 tons. The output, which averages 2,500,000 tons annually, consists of house, gas, and good steam coal. Bristol, the chief town of the region and the nearest western port to London, has always been interested in the American trade, and was, formerly, one of the principal ports engaged in it; but it is handicapped, both by the unsuitability of the Avon for navigation by large ships, and by the great rise and fall of the river. With a view to overcoming these obstacles, docks have been constructed at Avonmouth. The chief imports include cereals and colonial produce generally of a tropical or sub-tropical nature. A great drawback to the growth of the port has hitherto been the want of a return cargo, but recently attempts, not wholly unsuccessful, have been made to tap the Birmingham area. Bristol itself is engaged in the manufacture of tobacco and cocoa. The surrounding country is fertile, and much fruit is grown.

IRELAND

THE NORTHERN REGION includes practically the whole of Ulster, but it may be divided into two parts—an eastern and a western. In the former, the débris from the basaltic rocks, which constitute the Antrim Plateau, furnishes considerable areas with a fertile soil, and the plains around Lough Neagh and in the valley of the Bann are among the most productive in the country. The Old Red Sandstone, which occurs in parts of Tyrone, has also weathered down into good arable land, but in the Silurian districts of the south-east of Ulster the soil is generally poorer, and much of it is devoted to pastoral pursuits. In the west, on the crystalline and granitic rocks of Donegal, conditions are much less favourable to agriculture, and the more mountainous districts are almost entirely barren.

The north-east of Ulster is the most prosperous district in the whole of Ireland, a result which must in part be attributed to the strong infusion of Scots and English settlers which took place in the sixteenth and seventeenth centuries. Over 20 per cent. of

the total area is under cereals and green crops, while less than 60 per cent. is under hay and grass. In the western division, on the other hand, only about 12 per cent. of the land is under crops. Ulster produces nearly one-half of all the oats grown in the country, and practically all the flax. For the cultivation of the latter crop, the moist soil and temperate climate are peculiarly favourable. Unfortunately, in the after treatment of the plant the Ulster farmer appears to be careless and unscientific, and Irish flax does not hold its own with that imported from abroad. Dairy farming and pig-raising are also important pursuits of the agricultural population.

The industrial life of Ireland is concentrated, to a great extent, in the east of Ulster, which, although practically without mineral wealth of its own, is easily able to obtain coal from Ayrshire and south Lancashire, and iron and steel from Cumberland and other parts of Great Britain, for the shipbuilding yards at Belfast. There, it is true, a certain amount of compensation for the want of raw material is found in the relative cheapness of land and labour and the excellent facilities for launching vessels. Belfast builds some of the largest ships in the world, and, according to tonnage, has an output of about 10 per cent. that of the United Kingdom. Londonderry is also engaged in shipbuilding, but on a much less extensive scale.

The manufacture of linen in Ireland was a natural result of the cultivation of flax in that country, but at the present time much of the raw material is imported from abroad, especially from Russia. The facilities for bleaching afforded by climatic conditions and the nature of the water supply, as well as the large reserve of female labour, have done much to concentrate the industry in Belfast, though it is also carried on to a greater or less extent in many of the surrounding towns and villages. Shirt-making, which gives employment to a large number of people in the west of Ulster, probably owes its origin to the presence of the linen industry. The cutting and finishing processes are performed in large workshops in Londonderry, but the actual sewing of the shirts is a domestic industry throughout Londonderry, Tyrone, and part of Donegal. Other industries in Belfast and Londonderry include rope-making, engineering, brewing, and tanning. In the west of Ulster, especially in Donegal, where geographical conditions

are adverse to economic development, and where much of the land is under the control of the Congested Districts Board, there are few manufactures. The most noteworthy is handloom weaving in wool, which, partly as a result of the Board's fostering care, has attained some importance in south Donegal.

THE CENTRAL PLAIN covers about one-third of the whole of Ireland. The soil, derived mainly from the underlying limestone mixed to some extent with the débris of other rocks, is often fertile, but the drainage is defective and in places there are great bogs. The proportion of land under crops is much lower than in the previous region, and does not exceed 9 per cent. of the whole area, while over 60 per cent. is under hay and grass. The rainfall increases from east to west, and, as a result, the cropped area decreases. Moreover, while the acreage under cereals exceeds that under green crops in the east, the reverse is the case in the west. Oats is the chief cereal grown, but in the south-east barley is an important crop, while in the west potatoes are extensively cultivated. On the grasslands large numbers of store cattle are raised.

Dublin, which is situated where a break in the mountain rim and a deep bay permit of easy access from England to all parts of Ireland, is the chief industrial town of the region. Brewing and distilling, the manufacture of poplin (a fabric consisting of a mixture of wool and silk, noted for its soft texture, delicate colouring, and extreme durability), and biscuit-making are all carried on.

In the west the Central Plain extends as far as the coast at Galway, but elsewhere it is cut off from it by the mountains of Mayo, Galway, and Clare. The whole of this mountain area is very infertile, and much of it falls within the Congested Districts.

THE SOUTHERN REGION is, on the whole, mountainous, but contains considerable lowland areas along the coasts and in the valleys of the larger rivers. The soil varies greatly from one place to another. On the Old Red Sandstone of the south-west it is well adapted to dairying, while in the Silurian districts in the south-east much of it produces good herbage. In the Golden Valley, between the Slievefelim and the Galty Mountains, an intermixture of the débris of limestone and Old Red Sandstone

produces a soil of great fertility; and elsewhere, also, the limestone soils are generally fertile. With regard to cultivation, this region occupies a position intermediate to those already described. Over 10 per cent. of the area is under crops, and the grasslands are more extensive than in any other part of Ireland. Barley is grown, mainly in the east, and has given rise to brewing at Waterford, Kilkenny, Limerick, and elsewhere. Dairying is an important pursuit, especially in the three counties of Limerick, Kerry, and Cork, which contain about one-fourth of all the milch cows in Ireland. Cork is the commercial centre of the industry, and from it large quantities of butter are sent to Great Britain. The proportion of pigs is also high in the south, especially around Cork and Waterford, both of which are actively engaged in curing and exporting bacon.

With the exception of those already mentioned, there are few industries in the south. Lace is made in a number of convent schools, and there is a certain amount of handloom weaving in Kerry and elsewhere.

A little coal is found at Castlecomer, near Kilkenny, and in north Kerry and Clare. The output, however, is small, and the quality inferior.

In conclusion, it may be noted that the economic development of Ireland is affected by a variety of circumstances. Her comparative poverty in mineral wealth has retarded the growth of manufactures; topographic and climatic conditions limit the possibilities of agriculture; the proximity of Great Britain prevents her growth as a trading nation. She has suffered alike by the protectionist policy of her more powerful neighbour in the eighteenth century, and by the free-trade policy of the nineteenth: in the former period by the suppression of her woollen industry, and in the latter by the loss of special privileges for the sale of her agricultural produce.

FOREIGN TRADE.—The main factors in British trade have already been indicated, but it is necessary to note its extent and character somewhat more closely. The imports consist partly of goods intended for consumption within the country itself, and partly of commodities which are imported in order to be exported again. The relative importance of each of these classes is shown in the following tables which give the average figures for the years 1906–10

(both inclusive) compiled from the "Annual Statement of the Trade of the United Kingdom."

	General Imports (in £ million).	Re-exports (in £ million).	Retained for use in the United Kingdom (in £ million).
I. Food, Drink and Tobacco ..	248·31	11·99	236·31
II. Raw materials and articles mainly unmanufactured	227·42	52·50	174·92
III. Articles wholly or mainly manu- factured	151·73	25·64	126·09
IV. Miscellaneous	2·44	·22	2·21
Totals	629·90	90·35	539·53

Further particulars regarding the more important items in each of these four classes with an indication of the countries from which they are imported are given below (in £ million).

- I. Wheat, £39·54 : Argentine £8·65, United States £7·72, Russia £6·48, Canada £6·08, British India £5·43.
 Wheat Flour, £6·49 : United States £4·43, Canada £1·00.
 Meat, £42·07 : Beef—Argentine £5·90, United States £3·35.
 Mutton—New Zealand £3·72, Argentine £2·33,
 Australia £1·61.
 Bacon—United States £6·33, Denmark £5·50.
 Canada £1·87.
 Ham—United States £2·93,
 Butter, £23·37 : Denmark £10·11, Russia £3·12, Australia £2·77.
 Sugar, £20·53 : Germany £8·89, Austria-Hungary £3·48.
 Netherlands £1·88, France £1·36.
 Tea, £10·87 : British India £5·95, Ceylon £3·60.
 Eggs, £7·18 : Russia £2·72, Denmark £1·70.
 Cheese, £6·96 : Canada £4·79, New Zealand £·83.
- II. Cotton, £62·80 : United States £43·00, Egypt £15·70, British
 India £1·89.
 Wool, £30·70 : Australia £13·51, New Zealand £7·20, South
 Africa £2·63, Argentine £1·47.
 Wood, £25·74 : Russia £8·61, Scandinavia £5·69, Canada £3·73.
 Ores, £15·15 : Iron, Spain £4·34, Tin, South America £1·34.
 Rubber, £13·88 : Brazil £8·49, Straits Settlements £1·18.

Oil, £13·74 : Palm-oil, S. Nigeria £1·46, Petroleum, United States £3·43 ; Motor spirit, Dutch possessions £·66.

III. Metals and manufactures thereof (other than iron and steel), £26·17 : Tin, Straits Settlements £5·83 ; Copper, United States £2·95, Spain £1·07, Australia £1·19 ; Lead, Spain £1·49. Silk, £13·22 : France £5·51, Switzerland £3·22, Italy £1·18. Iron and Steel and manufactures thereof, £8·06. Germany £3·36. Cotton Goods, £9·95 : Lace, France £1·64, Germany £1·34 ; Hosiery, Germany £1·20.

Woollen Goods, £10·33 : France £5·28.

Leather, £9·37 : Undressed, British India £2·44 ; United States £1·26 ; Dressed, United States £2·49.

The exports of the United Kingdom consist in the first place of the produce and manufactures of the country itself, and in the second place of the produce and manufactures of foreign countries and colonial possessions which are re-exported.

The exports, under the first head, are as follows :—

	In £ million (averages for same five years as before).
I. Food, Drink and Tobacco	22·80
II. Raw materials and articles mainly unmanufactured	51·33
III. Articles wholly or mainly manufactured	316·52
IV. Miscellaneous	6·80
Total	£397·45

The following table indicates some of the principal items included in the above figures and the countries to which they are sent. It frequently happens, however, owing to the widespread nature of British trade, that some article, of which there is a considerable export, is distributed over the whole surface of the globe, and that no one country receives a large amount of it.

- I. Fish, £4·84 : Herrings, cured, Germany £2·06, Russia £1·05. Spirits, £3·13 : Australia £·60, United States £·48, ³/₁ Canada £·37, British India £·28, New Zealand £·23.
- II. Coal, £36·24 : France £5·60, Italy £5·20, Germany £4·62, Sweden £2·16, Russia £1·88, Argentine £1·84.
- III. Iron and Steel goods, £40·99 : British India £5·33, Australia £3·90, Argentine £3·76, United States £3·06, Canada £2·03, Germany £1·98, Japan £1·85.

Cotton manufactures, £100·91 : Yarn, Germany £3·76, British India £1·96 ; Piece goods, British India £22·52, China £8·02, Egypt £3·17, Asiatic Turkey £3·12.

Woollen Manufactures, £29·33 : Yarn, Germany £3·31 ; Woollens, Germany £1·17, France £1·02, Canada £·91 ; Worsteds, Canada £1·20, United States £·95.

Machinery £29·4 : India £4·5, Russia £2·3, Argentine £2·2.

The entrepôt trade of the United Kingdom which during the last five years averaged £90,350,000 consists in the main of a great variety of miscellaneous articles which find their way to British ports for re-distribution. The following table indicates the more important of these, the total exports of each, and the countries to which each is consigned.

Wool (sheep's), £13·52 : Germany £3·83, France £3·49, United States £3·21, Belgium £2·39.

Rubber, £8·41 : United States £2·52, Germany £2·05, Russia £1·53.

Cotton, £8·37 : United States £3·08, Russia £3·08.

Tin, £4·75 : United States £3·86.

The following table indicates the relative position of the chief ports engaged in the foreign trade of the United Kingdom (1906-10).

Port.	Imports (in £ million).	Exports of produce of the United Kingdom (in £ million).	Exports of foreign and Colonial produce (in £ million).
London	207·7	72·5	47·0
Liverpool	153·3	132·2	23·4
Hull	38·9	22·7	5·4
Manchester	28·3	14·9	·6
Glasgow	14·7	27·7	·4
Southampton	19·8	14·5	5·5
Grimsby	11·4	15·5	·1
Harwich	19·7	3·9	1·8
Newcastle	9·6	10·7	·1
Leith	13·5	6·1	·1
Cardiff	5·8	12·9	·0
Goole	7·8	10·2	·1
Bristol	13·9	3·3	·1
Newhaven	11·8	3·2	1·6
Folkestone	10·3	1·4	·8

CHAPTER VI

SCANDINAVIA

THE Scandinavian peninsula consists of a plateau with a gentle slope to the east and an abrupt slope to the west. This plateau which has an average elevation of about 3,000 feet, and to which the names Kjolen and Fjeld have been applied, is not continuous from north to south, but is broken up by transverse valleys along which communication between the east and west coasts is possible, while isolated summits rise to a height of several thousand feet above its general level. The rocks of which it is composed belong mainly to the Cambrian and Silurian periods, though Archæan rocks are characteristic of the remainder of the peninsula. Those on the west coast have been much glaciated, and great fjords have been formed, while on the east coast a strip of land, which broadens out in the south of Sweden, was covered with the deposits of glacial rivers at a time when it lay below the level of the sea. The gradual upheaval of the land which brought it above the waters is also apparent in the raised beaches on the west coast and along the fjords. Only in the south of Sweden, in Scania, do rocks of Triassic and Cretaceous age appear, and these are covered with deposits of the glacial period.

Three of the climatic regions of Europe are represented in Scandinavia. In January, the isotherm of 32° F. runs along the southern half of the Norwegian coast, and even as far north as the North Cape the temperature on the coast does not fall more than 7° or 8° below freezing-point. In Sweden, on the other hand, the range of temperature is much greater, varying from 32° F. in the extreme south to 4° F. in the north. In July, the west coast lies between the isotherms of 53° F. and 57° F., but in Sweden the range is from about 62° F. in the south to about 57° F. in the same northern districts as before. The rainfall varies from over 60 inches in south-western Norway to less than 20 inches in north-eastern Sweden.

The flora of Scandinavia reflects the physical and climatic environment. In Scania the forest vegetation of Central Europe

is found, but over the remainder of southern Sweden and south-eastern Norway deciduous and coniferous trees are intermingled. Elsewhere, except in the north and on the plateau, where an Arctic vegetation prevails, the forests are coniferous, Scots pine, spruce, and birch being the dominant species. Both below and above the upper limits of tree growth, there are many regions suitable for pasturage during the summer months.

NORWAY

The greater part of the Norwegian population is found in the agricultural region, that is, on the raised beaches along the coast, on the delta lands of the fjords and lakes, in the valleys of the rivers which penetrate the plateau, and in the Christiania region where the soils, derived from Cambro-Silurian limestone, possess considerable fertility. These districts only amount to about three per cent. of the whole area, but, lying between the forest region on the one hand and the sea on the other, the whole industrial activity of the country is centred upon them. Cereals such as barley and rye can be grown as far north as the 70th parallel, but oats is the chief crop. The production of grain is not sufficient to meet the home demand, and large quantities have to be imported. Dairying is becoming an important industry, and there are 1,000,000 cattle in the country. During the summer months these are fed on the upland pastures. As the farms are small, co-operative dairies have been established and have proved very successful. Butter and condensed milk are exported.

The products of the Forest region—timber, wooden goods (such as doors and window-frames), and wood pulp—constitute over 30 per cent. of the country's exports. The manufacture of wood-pulp is greatly facilitated by the presence of enormous supplies of water-power, obtained from the rivers which rush down from the highlands. The population of the Forest zone is largely migratory, the various processes in preparing the timber for export being carried on chiefly in the small towns of the previous region.

Norwegian fisheries are of first-class importance. The greatly indented coast, with its long line of protecting islands (the Skjaergaard), provides numberless harbours for the fisherman, and good spawning grounds for the fish. The proximity of the Arctic leads to the predominance of northern species, and these find their

home on the ocean banks, more especially in the vicinity of the Lofoten Islands, which are the centre of the cod-fishing industry. Herring are obtained all along the coast from Bergen northwards, but the relative productivity of different districts varies greatly from year to year. The cod, when salted and dried, are exported to the Catholic countries of Europe (chiefly to Spain), while the herring are sent to Germany, Sweden, and Russia. Whale-fishing is carried on from various ports, the oil being used for purposes of illumination.

Of the manufactures and industries, other than those already mentioned, shipbuilding, the manufacture of paper and matches, and the preparation of calcium carbide are the most important. Within the last few years the production of calcium carbide for the manufacture of nitrogenous manures has become an established industry of Norway, which is specially favoured by its large supplies of water-power. Large works have been built at Notodden and Rjukanfos in North Telemarken, and considerable quantities of the product are now exported.

The mineral resources of the country include extensive supplies of low-grade iron ore in the northern districts, which it has not hitherto paid to work on a large scale because of the want of fuel. The development of electrical methods of treating the ore is causing more attention to be paid to these deposits, as the districts in which they are found are rich in their possession of water-power. Among other minerals, copper is worked at Røros in the valley of the Glommen, and silver at Kongsberg.

The geographical position of Norway, its numerous good harbours, the facilities for building wooden ships, the ease by water and the difficulty by land with which communication is carried on, the exportation of timber and fish, and the importation of coal, cereals, and manufactured goods, have all contributed to the growth of Norwegian shipping, which has about 5 per cent. of the world's tonnage, and ranks in importance after Great Britain, the United States, and Germany. Christiania, Bergen, and Trondhjem are the chief ports.

SWEDEN

In Sweden, as in Norway, agriculture is the most important pursuit of the people, probably rather more than half of the working

population being engaged in it. The districts in which it is carried on are all situated within the region which has been covered by débris left by the retreating ice-sheet or washed down by glacial streams. In the north of this region, where climatic conditions are unfavourable, less than 10 per cent. of the land is cultivated, but south of the 60th parallel the percentage of cultivated land increases in many places to between 20 and 50 per cent., while in the south of Scania it is over 80 per cent. Of the whole country about one-twelfth is under crops, oats, rye, barley, and fodder plants being the most important. The production of cereals does not meet the home demand and importation is necessary.

The large natural meadows, covering over 3 per cent. of the total area of the country, and the extensive forest pastures have encouraged the development of dairy farming. There are over 2,500,000 cattle in the country and large quantities of butter are exported, chiefly to Great Britain.

The forests which occur in all parts of Sweden, except on the plateau, cover half its area, and provide 45 per cent. of its exports; but timber and wood-pulp are chiefly obtained from what is known as the Forest region, that is, the eastern slope of the Scandinavian plateau between the primary rocks of the plateau proper and the glacial periphery. Here, climate and soil render the land unsuitable for agriculture, the snows of winter facilitate the removal of the timber from the forests, and the spring freshets float it down to the coast, along which stands a line of small towns, all engaged in the preparation and export of forest produce. As in Norway, water-power is extensively used to drive machinery in saw mills and pulp factories. Great Britain is Sweden's chief customer both for timber and pulp, but other European countries take a large share.

The most important factor in the mineral wealth of Sweden is iron ore, which occurs in the central parts of the country and in the Norrland. In the first of these regions, the chief producing districts are within an area which stretches from the southernmost parts of the Gulf of Bothnia to a point north of Lake Venern in the west. In this area are the Dannemora, the Grängesberg, and the Norberg ore fields, the first being famous for the purity of its iron. The most important fields in the Norrland are those of Gellivara and Kirunavara, both of which lie within the Arctic

circle. These mines, which have only been opened up within recent years, now produce between 55 and 60 per cent. of the Swedish output. They are connected by rail with Luleå near the head of the Gulf of Bothnia, and with the Norwegian ice-free port of Narvik, which ships more than half of the total output. The production of iron ore in Sweden in 1909-10-11 averaged 4,250,000 metric tons, or 3·7 per cent. of the world's production. The greater part of it is exported to Germany—chiefly to the Rhine manufacturing district—but a considerable amount is also sent to England and some goes to the United States.

The manufacture of iron has long been carried on in the southern region where the population is large, the ore good, and wood for fuel and the manufacture of charcoal, abundant. The product is of excellent quality, but, with the use of coal for smelting iron, Sweden has had to take a relatively lower position among the iron-producing countries, though it is possible that the development of electrical processes may enable her to regain something of her former importance.

Among other manufactures not already mentioned are woollen goods at Norrköping, where water-power is obtained from the River Motala; cotton goods at Gothenburg and Norrköping; matches at Jönköping, where there is also water-power; paper in the vicinity of Lake Venern; and explosives near Stockholm. The chief imports include coal from the United Kingdom—large quantities are imported from Scotland—iron and machinery from the United Kingdom and Germany, textiles from the same countries, wheat from various sources, and coffee from Brazil. In the five years 1906-10 the value of the imports averaged £35,000,000, and that of the exports £28,000,000.

The development of railways in Scandinavia has naturally been impeded by the topography of the country. Stockholm and Christiania are connected, and there are also lines from the former city to Gothenburg and Malmö, two of the chief ports of Sweden. Another line runs north from Stockholm to Luleå, with a branch to Trondhjem, which is also connected with Christiania by a railway that follows the valley of the Glommen. From Luleå there is communication with Narvik in Norway.

CHAPTER VII

FRANCE

THE economic development of France has at all times been greatly influenced by the fact that it lies between the Atlantic and the Mediterranean, with easy access to both, and with good routes connecting the one with the other. The physical features of the country are comparatively simple. The Central Massif, around which the remainder of France has grown up, consists of a plateau of Archæan rock, overlain in places by Carboniferous deposits and volcanic outpourings; it rises gently towards the south and east where the Cevennes form a steep escarpment. There are, besides, the three peripheral masses of Brittany, known as the Armorican, the Ardennes, and the Vosges, all of which consist in the main of primary rocks. The Alps in the east and the Pyrenees in the south are mountains folded during Tertiary times. Lastly, the lowland regions of Aquitaine, the basin of Paris, and the Rhone depression are areas of sedimentation filled up in part by rocks of Secondary age, and in part by débris from the surrounding uplands brought down during the Tertiary period.

The physical character of these different parts of France, and their relative position to one another and to the Atlantic and the Mediterranean, give to the country a somewhat varied climate, each region having its own peculiarities. In the Central Massif, which rises from a height of 1,500 to 2,000 feet in the north-west to over 5,500 feet in Mont Lozère in the Cevennes, the winter is long and cold with northerly winds, while the average temperature in summer does not exceed 65° F. The rainfall is heavy, and in the more exposed districts the mean annual precipitation is over 60 inches. The Armorican region has, as a result of its proximity to the ocean, a temperate climate, and its summers are cool, while its winters are mild. The rainfall, which is greatest in autumn and winter, is not so heavy as on the Central Massif, but the atmosphere generally contains a considerable amount of moisture. In the Gironde these conditions are modified by a more southerly position, and at Bordeaux the July mean is nearly 70° F. In the sub-Pyrenean

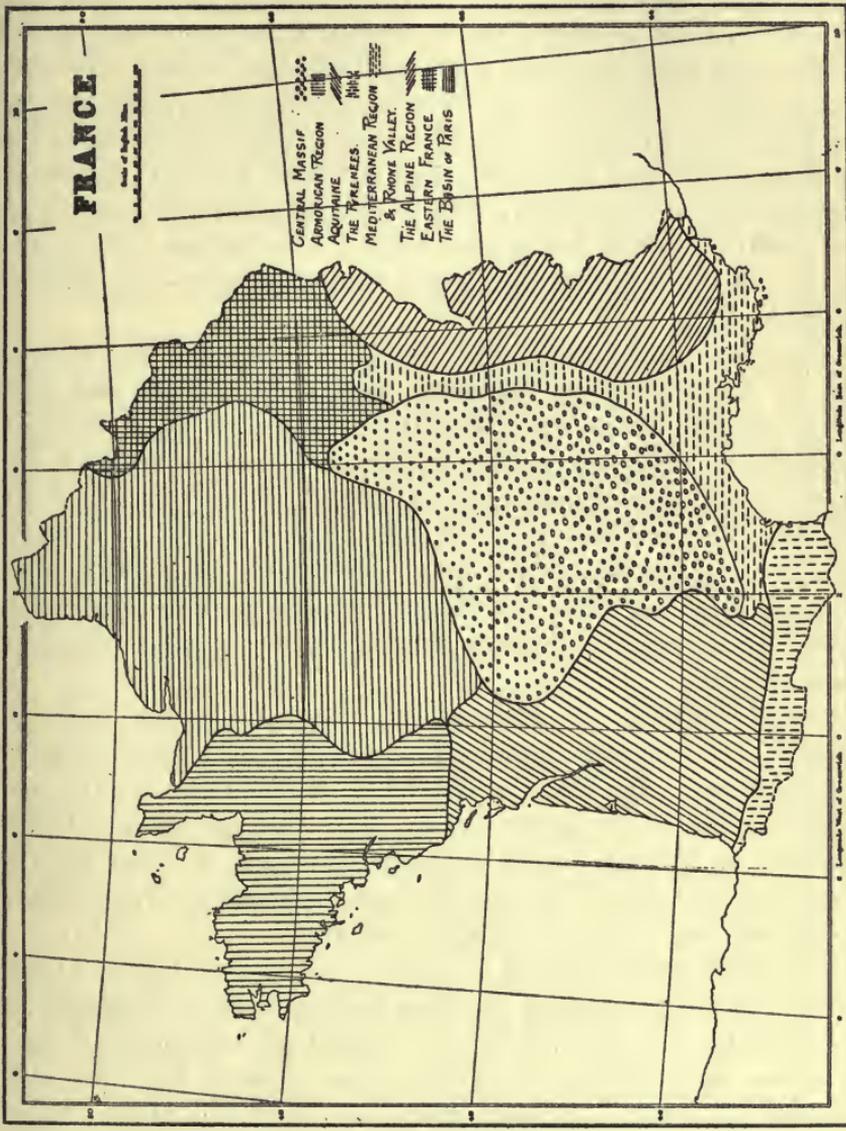
region there is a heavy rainfall and a temperature gradually decreasing with altitude.

The climate of the Mediterranean coast is very different from that of other parts of France. As a result of its southerly position and exposure, and the proximity of the sea from which the winds then blow, the winters are warm ; on the other hand the summers are hot, as the prevailing winds blow from the land during that part of the year. At Nice the range of temperature is from 46° F. in January to 75° F. in July. The summers are dry and the rain falls during the autumn and winter months. In the Rhone valley the temperature is much reduced by the cold wind, known as the mistral, caused by the dense air which lies over the Central Massif slipping down into the warm lowlands of the Rhone and the Mediterranean. The rainfall is heavier than along the coast, and amounts to between 30 and 40 inches. The Jura and the French Alps have, like the Central Massif, a greater precipitation than the Rhone valley, and, of course, a lower temperature.

Eastern France, from the Ardennes to the Vosges, lies furthest from the influence of the sea, and the range between summer and winter temperature is considerable. Owing to the presence of the mountains the rainfall is high, being between 35 and 40 inches. In the Paris basin the climate is somewhat more extreme than in Brittany. January isotherms range from 35° F. in the east to 39° F. in the west, and July isotherms from 64° F. in the north to nearly 70° F. in the south. The low rainfall, less than 30 inches over nearly the whole region, is partly due to the absence of mountains.

As each of the various upland and lowland regions of France has its distinctive physical and climatic characteristics, they form the best basis for the division of the country into natural regions.

THE CENTRAL MASSIF.—The sterility of the soil derived from the Archæan rocks of which the Massif is mainly composed, along with the rigour of the climate, renders this region unsuitable for agriculture, and arable farming is more restricted than in any other part of France, except the Alpine zone. Wheat and oats are grown in some favoured localities, such as the valley of the Allier, but the characteristic crop is rye, and nearly one-half of the rye fields of France are found on the Central Massif. Pastoral farming is also extensively carried on in the same region, which contains one-fifth of the cattle and sheep of the whole country.



NATURAL REGIONS OF FRANCE

The development of the mineral wealth of the Central Massif has given it a much greater importance than hitherto in the economic life of France. Around it and within it lie a number of coal basins which produce over one-fourth of the total output of the country, the most important fields being situated round St. Etienne in the basin of the Loire, at Creusot, Blanzay, and Épinac, around Morvan, at Commentry in the basin of the Allier, and at Alais in the south-east. The coal from these fields is utilised mainly in the neighbouring parts of the country. Much of it is produced at considerable cost, and the rates for transport are high. It is cheaper at Marseilles to buy sea-borne coal from England than land-borne coal from St. Etienne.

Iron ore is also found in this region, especially around Morvan and in Aveyron, but it frequently occurs apart from coal, and the production is less than one-fiftieth that of the whole country. Nevertheless, its existence has facilitated upon the coalfields the development of an important metallurgical industry, much of the ore for which has now to be brought from a distance. Creusot, St. Etienne, and other towns are all engaged in the production of iron and steel, and the best French steel comes from the region under consideration. Creusot is the centre of large ordnance manufactures.

Textile industries are situated in a few more or less scattered localities. St. Etienne manufactures silk goods, mainly ribbons; and Roanne, in the basin of the Allier, manufactures cotton and woollen goods. Commentry and Montluçon are among other towns carrying on a small textile industry. Limoges is noted for the manufacture of china, Clermont-Ferrand for pneumatic tyres, Thiers for cutlery, and Vichy for mineral waters.

THE ARMORICAN MASSIF is in its general character a region of primary rocks, its most striking feature being its tendency to rise towards the ocean as the two ranges of Archæan and pre-Cambrian age, which run through the country from the east towards the west, converge upon one another. These ranges separate three lowland districts, one of which lies along the north coast, one in the centre, and one along the south coast. The uplands are generally infertile and unproductive, while in the lowlands good and bad lands alternate. The coastal plains are carefully cultivated, and, in the northern one, much attention is

paid to market-gardening. The basin of Rennes and some districts around the Lower Loire are devoted to arable farming, and considerable quantities of wheat are grown. In the north, in the "bocage normand" of north-west Normandy, and in the south, in the "bocage vendéen" of north-west Poitou, softer schists provide good grazing grounds intermingled with woodlands. The humidity of these districts makes them especially suitable for cattle, and it is instructive to note that the Armorican region has one-fifth of the cattle, but only one-twenty-fifth of the sheep, of the whole of France.

The conditions favourable to the growth of towns and industrial development are generally wanting, and there are few manufactures. Laval and Nantes are engaged in textile pursuits, and Nantes in the tanning of leather. On the other hand, the sea, which has always been an attractive force, has drawn many people to fishing and seafaring, and Breton fishermen still go to the Banks of Newfoundland. Some of the principal naval stations of France, Cherbourg, Brest, and Lorient, are situated on the coast; but, owing to their remoteness from the industrial parts of the country, the ports of the Armorican region do but a small trade, with the exception of Nantes and St. Nazaire, which owe their importance to being at the outlet of the basin of the Loire. Cherbourg is now a port of call for many foreign liners.

AQUITAINE is the lowland region surrounded by the Central Massif, the Armorican Massif, and the Pyrenees. It is composed partly of Secondary and partly of later formations, but the character of the soil is very variable. In the sub-Pyrenean districts, covered to a large extent with glacial débris, in the Landes where Quaternary sands stretch over wide areas, and on some of the limestone rocks of the north and east, it is infertile; in other places, and more especially in the Tertiary lands of the valley of the Garonne, it is well adapted to cultivation. Agricultural pursuits predominate, wheat is the chief cereal grown, while the French maize crop is almost exclusively obtained here, as temperature and humidity are alike favourable to it. Cattle are reared on the richer pasture lands, and sheep are fed on the Landes, in the sub-Pyrenean districts, and elsewhere.

Nearly one-third of the French vineyards are situated in this region, the most important being in the country round Bordeaux,

from which come such well-known wines as Médoc, St. Julien, and Sauterne. Further north, in the basin of the Charente, are grown the vines from which brandy is made, and Cognac, situated on that river, is the centre of the brandy-distilling industry. Plums and walnuts are also important products of Aquitaine.

The industries of Aquitaine are chiefly concerned with the preparation for the markets of its various agricultural products, and it is only at the ports, where coal can easily be obtained from Great Britain, and raw material from other parts of the world, that manufactures assume a more varied character. At Bordeaux there are chemical works and sugar and petroleum refineries; at Pauillac, the outport of Bordeaux, and at Bayonne, iron-works. In order to prevent damage being done by moving sand dunes, the Landes have in many places been planted with forests of pine, and these have given rise to various pursuits, such as the preparation of pit-props and the extraction of resinous products.

THE MEDITERRANEAN REGION AND THE RHONE VALLEY.—The Mediterranean region differs in several respects from the rest of France. Along the coast much of the soil is infertile, but further inland it improves and is capable of producing valuable crops. The climate, hot and dry in summer, mild and moist in winter, gives the region its characteristic vegetation, the vine, the olive, and the mulberry being its typical products. Of the area under vines in France over one-third is included within the Mediterranean region, which also contains practically all the olive-yards and over one-half of the mulberry trees of the country. Arable farming is not of much account, but sheep are reared on the upper slopes of the hills and on some parts of the lowlands.

With the Mediterranean region may be also considered the Rhone valley, where the soil is generally more favourable even if the climate is less beneficent. The olive does not make its way north beyond the region of Mediterranean rainfall, but the vine and the mulberry flourish, nearly one-half of the mulberry trees and one-ninth of the vineyards of France being found in this part of the country.

French viticulture is but slowly recovering from the severe blow dealt it by the ravages of the phylloxera, which, like so many previous invaders of France, entered by the Rhone valley. The practice of grafting French vines on American stumps has, in the

case of the Rhone and Mediterranean regions, at least, proved an effectual means of restoring prosperity to the industry.

The olive grows well in many parts of the Mediterranean coast where the soil is too dry or stony for other crops. Elsewhere, however, it is not in exclusive possession of the land it occupies, but is cultivated along with cereals or vegetables.

The industrial development of the Mediterranean coast and the Rhone valley is based partly on the cultivation of the above-mentioned plants, partly on the position of the Rhone valley in relation to Africa and the East, and partly on proximity to the coal resources of the Central Massif. The manufacture of silk settled naturally in a region favourable to the growth of the mulberry tree, but the domestic supply of raw material is now far short of the demand, and large quantities are annually imported from Italy, China, and Japan, with all of which there is easy communication. Spinning is widely distributed, but weaving is centred at Lyons. Within recent years considerable changes have taken place both in the nature of the product and the methods by which it is manufactured. Rich and valuable figured silks have given place to lighter and cheaper goods, and the manufacture of muslins is now the staple product of the town. The hand-loom weaver has left the urban districts and settled in the country, while the development of electrical energy has rendered possible the use of mechanical power even in the domestic workshops. One of the great inconveniences of the silk industry is its entire dependence upon the fashion of the hour, and the adaptability of the Lyons weavers has been a potent factor in their success.

The cultivation of olives has played an important part in the trade and industry of Marseilles. The manufacture of olive oil encouraged the growth of pursuits of a similar character, and the facilities with which such articles as linseed, gingelly, sesamum, ground nuts, and copra could be imported from the East contributed to the establishment of oil, candle, and soap factories on an extensive scale.

The presence of coal in the Central Massif and the demand for silk-weaving machinery have favoured the development of a large engineering industry at Lyons, which is also noted for the construction of automobiles, a result partly of the fact that early experiments in this mode of locomotion were made there. The

position of Marseilles as a great port, and its facilities for the importation of coal and iron, have naturally made it a centre of smelting works, engineering establishments, and shipbuilding yards. Toulon, further east, is an important naval dockyard.

THE ALPINE ZONE plays but a relatively small part in the economic life of France. The soil is generally poor and difficult to cultivate outside of the valleys, where it is rich, and with increasing altitude the climate becomes unfit for the growth of cereals. Much of the region consists of poor pasturage on which cattle, sheep, and goats are fed, while in the sheltered valleys the vine is grown. Anthracite and iron occur in places, and there are numerous hot springs. The manufactures are chiefly such as can be carried on in the homes of the people, and include glove-making in the country around Grenoble, wood-turning, and employments of a similar nature.

THE EASTERN BORDER consists of the ancient massifs of the Ardennes and the Vosges, and the connecting stretch of Jurassic uplands in the basins of the Meuse and Moselle may also be included within it. This region is the chief producer of iron ore in France, more than seven-eighths of the entire French output coming from the single department of Meurthe-et-Moselle, the districts round Nancy, Longwy, and Pont-à-Mousson being the most important. The proximity of the German coalfield of the Saar, and the easy communication by water with the coalfields of the north of France, have favoured the growth of a great metallurgical industry in this region, which now produces over two-thirds of the pig-iron and over one-third of the steel manufactured in the country. Nancy and the towns around it are chiefly engaged in the production of pig-iron, while Longwy manufactures a large amount of steel.

In the southern part of this region, in the Vosges, there is situated one of the three chief cotton manufacturing districts of the country. This industry grew up in Alsace as a result of the plentiful supplies of water-power, but much of it was lost to France after the war of 1870. On the French side of the border the principal centres are Belfort, Épinal, Saint-Die, Remiremont, and Senones. The specialities of this region, which contains 33 per cent. of the total number of French spindles, are calico and thread.

THE BASIN OF PARIS is the name given to that great area of

sedimentary deposits which lies between the Central Massif, the Ardennes, and the Armorican region. The outer rim of the basin consists of rocks of Jurassic age; within that there is a belt, not fully developed in places, of Cretaceous rocks, while the centre of the basin is covered over with deposits of Tertiary times. Although the soil of this region is generally fertile, its character varies considerably from one place to another. In the Tertiary lands the greater part of it is suitable for cultivation, but on the Cretaceous area it is less certain. Champagne, for example, consists in part of a great plain where the chalk comes to the surface and is suitable only for grazing purposes, and in part of a region of wet clays naturally opposed to cultivation. In the Jurassic lands the valleys are generally fertile, while the limestone uplands are more suitable for pastoral pursuits.

Taking the Basin of Paris as a whole, however, it is the most important agricultural region of France. It produces nearly one-half of the wheat and three-fifths of the oats grown in the country, and it also contains the best grasslands. In many places, and more especially in the vicinity of the great towns, market-gardening is an important pursuit; and in the north-east there is grown practically the whole of the French beet-root crop. Cattle are raised mainly in the moister regions of the west and north-west, and sheep in the drier districts of the east. There are two separate and important wine-growing areas—that of the Middle Loire, which produces light wines, and that of the eastern part of the Seine basin, more especially on the chalk and limestone slopes in the valleys of the Aisne and the Marne, where are grown the vines from which champagne is made.

Industrially, this region is also the most noteworthy in France. It contains part of the great coalfield which extends from Western Germany through Belgium into the departments of the Nord and the Pas-de-Calais. Unfortunately, in the French portion of the field the coals lie at a greater depth than in Belgium, and are worked at greater cost. The centre of production is at Anzin, and the total output is nearly three-fourths that of the whole country. In 1911 it amounted to 28,000,000 tons out of 38,000,000 tons.

An important iron industry is situated upon this coalfield. A certain amount of pig-iron is made on the spot, but large quantities

are bought from Lorraine for the manufacture of steel to be used in the various engineering and textile machinery works which have grown up, more especially around Lille and Valenciennes.

Within the Basin of Paris there are two cotton-manufacturing districts. That of Normandy owed its origin to the fact that raw cotton was first imported into France through Rouen, and, though it is handicapped by the absence of coal, the momentum it acquired by its early start, the ease with which raw material can still be imported, and the traditional skill of its workmen, have all contributed to enable it to retain its position. It has 1,646,000, out of the 7,130,000 spindles in the country. Rouen is the centre of this district, and among other towns belonging to it are Darnétal, Maromme, Sotteville and Oissel, all in the vicinity of Rouen, Evreux and Gisors, Le Havre, and Yvetot. Upon the coalfield of the north is situated the other cotton district of this region, which contains 36 per cent. of the French spindles. Among the towns engaged in the industry are Lille and its suburbs, which do much spinning but little weaving, and St. Quentin and Amiens, where weaving is chiefly carried on.

The woollen industry also finds its principal home on the coalfield where it has the further advantage of being able to import raw wool from abroad through Dunkirk, and where the chief manufacturing towns are Roubaix, Tourcoing, and Fourmies. The industry is also followed at Reims, where wool is obtained from the sheep of Champagne, in the middle Loire at Orleans, Amboise, and elsewhere, and in Normandy at Elbeuf and Louviers. The manufacture of woollen goods in France has been carried to a high state of perfection, and the country is specially noted for its output of fine dress materials, large quantities of which are exported.

Another industry which may be noted is the manufacture of sugar, carried on in the beet-growing districts, where coal is easily obtainable.

GENERAL RÉSUMÉ.—From this survey of the natural regions of France certain deductions may be drawn. It is obvious that the country is greatly favoured not only by the abundance of fertile land which it contains, but by the variety of crops which its climate and soil enable it to produce. The importance of France as an agricultural country is best illustrated by the fact that its wheat area is only exceeded by Russia, the United States, and

India, and its crop by Russia and the United States. Unfortunately the yield per acre is low, averaging only 20 bushels as against 32 in the United Kingdom and 29 in Germany. Many of the plants grown in France have given rise to industries in which a considerable amount of labour, frequently highly skilled, is required ; and, although in many cases the industry has grown to such an extent that the home supply of raw material is no longer able to meet the demand, the importance of that home supply in establishing the industry must be recognised. On the other hand, France is handicapped by its comparative poverty in minerals. The coal produced is only one-seventh of the amount mined in the United Kingdom, and although iron is plentiful in places it generally occurs far from coal. Hence it follows that a large proportion of the people of the country are engaged in the cultivation of the soil, and agriculture gives employment to 42 per cent. of the population, as against 8 per cent. in the United Kingdom. It also follows that the inhabitants of France are not congregated in large towns to the same extent as they are in Great Britain.

COMMUNICATIONS.—The distribution of ways of communication in France is determined to a considerable extent by the physical features of the country, and the same geographical conditions which have made Paris the capital have made it the centre of the railway system. There are six important French railways, and the lines of five of these radiate from Paris. Each serves a separate sector of France, and, consequently, there is little competition for local traffic, though for long-distance traffic there is considerable rivalry.

The Northern Railway serves the busiest and most industrial part of France. The main lines, which have few physical difficulties to overcome, are those which connect Paris by way of Amiens with Calais, Dunkirk, and Lille, and those which follow the valley of the Oise for Maubeuge and Hirson on the Belgian frontier. The Northern Railway, therefore, performs three important functions ; it connects Paris with the ports for Britain ; it serves the industrial region on the coalfield of the North ; and it connects France with the plain of Northern Europe.

The main lines of the Western Railway, which now belongs to the State, run from Paris to Dieppe and Havre, following the valley of the Seine to Rouen ; from Paris to Caen and Cherbourg ; and

from Paris by Laval to Rennes and along the northern coastal plain of Brittany to Brest. The most important part of this system is that between Paris and Havre, a great port of France.

The Paris-Orleans Railway connects these two towns. The main line then follows the Loire as far as Tours, where it divides, one branch continuing along the river to Nantes and St. Nazaire, and the other striking south by Poitiers to Bordeaux. Other lines over difficult country connect Orleans with Toulouse, and Bordeaux with Lyons. The Paris-Orleans railway brings the basin of Paris into communication with the Atlantic ports, and by means of the Southern railway offers a choice of routes to Spain. The Southern railway begins at Bordeaux. One line runs by Bayonne to the Spanish frontier, while another goes by Toulouse and the depression of Naurouse to Narbonne, whence there are lines to Cette and to Perpignan.

The Paris-Lyons-Mediterranean Railway has the greatest mileage of any of the French systems. Its most important line runs from Paris by Lyons to Marseilles, following the valleys of the Seine, the Yonne, the Saône, and the Rhone. From this line there breaks off at Dijon a branch which strikes across the Jura to Pontarlier and connects with the Swiss railways. At Mâcon another important line diverges, and after following the valleys of the Isère and the Arc passes through the Mont Cenis tunnel into Italy. From Marseilles there is a line along the coast into Italy. The traffic on the main line of the P.L.M. is very important, for not only does it bring the Paris basin into communication with the Mediterranean, but along it there also passes much of the traffic with Switzerland and Italy. Another branch of this railway runs from Paris to Nîmes and Cette by the valleys of the Loire and the Allier, but the route is a difficult one, and there are many obstacles to overcome.

Lastly, there is the Eastern Railway, one line of which follows the Marne to Vitry and then goes by Nancy and through the Gap of Saverne to Strassburg; a second breaks off at Épernay, crosses by Reims to the valley of the Meuse, and follows it to Namur; and a third, going from Paris by Troyes and Chaumont, turns the southern extremity of the Vosges by the Gap of Belfort and arrives at Mülhausen. The Eastern Railway, therefore, serves the mineral region of France and has important communications with Germany.

In addition to these railways a small state-owned system has

lines which run from Paris to Bordeaux by Chartres, Saumur, Niort, and Saintes ; and from Nantes to Bordeaux by La Rochelle and Rochefort.

NAVIGABLE WATERWAYS play an important part in the movement of goods from one part of France to another, and carry about one-fifth of the total tonnage. They belong to three classes—free rivers, canalised rivers, and canals—and they are connected with one another so as to form an extensive and fairly complete system.

The Seine stands by itself. As far as Rouen it is navigable by ocean-going steamers of small size, and even to Paris it is ascended by vessels from abroad. Of waterways navigated by specially constructed boats, the most important are those which connect the north and east of France with one another and with Paris. A network of canals and canalised rivers extends from Calais and Dunkirk over the coal-producing and industrial area, connected on the one hand with the Belgian waterways of the Lys and the Scheldt, and, on the other, by the Canal de St. Quentin with the Oise, which is in turn connected by canal with the Sambre. The Oise with its canal extensions is the most important inland waterway in France and carries large quantities of coal to Paris. It is connected by canals with the lateral canals of the Aisne and the Marne, which extend eastwards into the mineral-producing regions. The Canal de l'Est, which runs from north to south, brings into touch with one another the Meuse, the Aisne, the Marne, the Moselle, and the Saône. These different waterways enable coal and even cotton to be imported into Eastern France, and iron and iron ore to be exported.

The Seine is connected with the lateral canal of the Loire, which extends from Briare to Roanne, by the Canals du Loing and de Briare, while the Canal du Centre joins the Loire with the Saône near Châlons. The Seine is also connected with the Saône by its tributary the Yonne and the Burgundy canal. The Rhine-Rhone canal connects these two rivers by the Gap of Belfort.

On the Rhone and the Saône, traffic is much impeded by the character of the river, and the movement of goods is largely downstream. A canal from Arles joins the Rhone to the Mediterranean. The Canal du Midi, which carries only a small amount of traffic, places the Mediterranean in communication with the lateral canal of the Garonne and so with the Atlantic.

Bulky materials constitute the greater part of the traffic on all these canals. In 1906, for example, nearly 80 per cent. of water-borne goods consisted of coal and coke, building materials, and agricultural produce. But, notwithstanding the fact that water transport is on an average nearly 20 per cent. cheaper than transport by rail, the amount even of bulky goods carried by rail is much greater than that carried by water. It is interesting to note that over 4,000,000 tons of cargo go between Lyons and Arles by the former method, but only 800,000 tons by the latter, and that even Paris, which has exceptional facilities for river and canal traffic, transacts about 54 per cent. of its trade by land. Among the disadvantages with which French waterways have to contend are the slowness of transit, the greater length of the journey (60 per cent. on the average), the want of good inland ports, and the inadequate facilities on some of the canals for the transference of goods to or from the railways.

COMMERCE.—France, facing alike the North Sea and the Channel, the Atlantic and the Mediterranean, with good internal communications, and with easy access to Central Europe, occupies a position very favourable to commerce. Her position, her varied agricultural resources, her comparative poverty in minerals, and the skill and aptitude of her people, determine the nature of her trade, the general features of which are indicated by the following figures :—

Average for five years, 1906-10 (in £ million).

	Imports.	Exports.
Food-stuffs	42·22	31·09
Raw material	157·99	63·58
Manufactured goods	47·05	128·23
Total	£247·26	£222·90

The principal food-stuffs imported are wheat from Algeria, maize from Roumania and the Argentine, wines from Spain, coffee from Brazil, and cocoa from Ceylon and Venezuela. Of raw materials, cotton comes from the United States, Egypt, and India, wool from the Argentine and Australia, and silk from Italy, China, and Japan, coal from Britain, Germany, and Belgium, oils and oilseeds from Italy, India, and the West Coast of Africa, and rubber from the Congo and South America. Manufactured goods consist largely of machinery and textiles from Great Britain and Germany.

The food-stuffs exported include wine, sugar, and dairy produce ; the raw materials are chiefly silk and wool ; while the manufactured goods consist of textile materials, furniture, clothing, leather, chemical products, and automobiles. Great Britain is the chief customer, but many of the articles sent there in the first instance are for transmission abroad. Among other large purchasers of French commodities are Germany, Belgium, Holland, Switzerland, Italy, the French colonies, the United States, and the Argentine.

The chief ports of France in order of their importance are Marseilles, through which the bulk of the trade with the Mediterranean and the East passes ; Rouen, which receives very large supplies of coal from Great Britain, partly for Paris ; Havre, which has an extensive trade with North and South America and imports cotton, wool, and copper ; Dunkirk, which is growing rapidly as the port of the industrial region of North France and imports wool from South America ; and Bordeaux which trades with the West Coast of Africa and with South America, and is the chief town in France for the exportation of wine.

CHAPTER VIII

BELGIUM

BELGIUM, with an area of 11,373 square miles, is one of the smallest countries in Europe. In 1910 it had a population of over 7,500,000. The south-eastern region, which varies in height from 500 to over 2,000 feet, belongs to the plateau of the Ardennes, and consists in the main of Devonian slates, though Cambrian rocks appear in some of the more elevated districts. Along its northern border, partly within the Devonian area, but partly without it, lies a belt of Carboniferous rock which is traversed by the valleys of the Sambre and the Meuse. Beyond this are the Tertiary sands and loams which cover practically the whole of Central Belgium, and of which the most fertile is the loess-like formation known as the "loam of Hesbaye"; it extends over the greater part of Hesbaye, Brabant, and Hainaut, but its agricultural value varies considerably from one place to another. The remainder of the country is almost entirely covered with Quaternary formations; in the north-east, in Antwerp and Limburg, there is a great sandy tract known as the Campine; and in Flanders, in the north-west, between the loam-lands and the sea, there is first a belt of country covered with sand but underlain in the south by clay, then a stretch of low-lying land which has been drained and formed into polders, and lastly a line of sand-dunes which, along with artificial walls, prevent the encroachment of the sea.

The climate is warm in summer, and, owing to the influence of westerly winds, mild in winter. The mean temperature for July is about 65°F. and for January about 35°F., except in the Ardennes, where the summers are cooler and the winters more severe. The rainfall, which occurs chiefly in the summer and autumn months, ranges from 20 to 40 inches.

THE ARDENNES PLATEAU, with its bleak climate and infertile soil, is of little economic importance. Oats and rye are grown, and cattle, and more especially sheep, are raised. Attempts are being made to reforest considerable areas. In the deep valleys, which are entrenched in the plateau, climatic conditions are more favourable, and various fruits, including the vine in the valley of

the Meuse, are cultivated. The population is scattered, and in the province of Luxemburg averages only 135 per square mile as against 652 per square mile for the whole of Belgium.

THE CARBONIFEROUS AREA is one of great importance. The chief coal deposits lie in a long narrow trough, which extends from Liège through Namur into Hainaut, and which is separated from the Ardennes by a great fault. In the west the Belgian coalfields are continuous with those of the north of France, while in the east they are connected with the German coalfield of Aachen. The principal mines are situated around Liège, Namur, Charleroi, and Mons, the most productive being those around Charleroi, which produce over one-third of the Belgian output of 24,000,000 tons per year. Many of the coal seams lie at a great depth, and, owing to folding, faulting, and overthrust, they are frequently worked only with considerable difficulty. The total available resources of this region have been estimated at between 15,000 and 16,000 million tons.

Many important industries have grown up in this region where coal is so abundant, and among these the manufacture of iron and steel holds a foremost place. Iron ore was formerly obtained from the Ardennes, but the amount produced there is rapidly decreasing, and France and Luxemburg now supply the bulk of the raw material. Charleroi and Mons have blast furnaces and make all kinds of iron and steel goods, locomotives and machinery. Liège has long been noted for the manufacture of ordnance and firearms, and is also engaged in various metallurgical pursuits. Belgium is able to export large quantities of cheap iron and steel goods partly on account of the relatively low cost of labour, and partly because transport to the coast is rendered easy by the magnificent system of waterways which the country possesses.

Glass is manufactured in the vicinity of the coal mines, Charleroi being the chief centre of production. In addition to coal, which is at hand, large quantities of excellent sand are found in the Campine, and limestone appears along the northern border of the Ardennes; but the industry, which is an old-established one, undoubtedly owes much at the present time to the inherited skill of those who are engaged in it. Chemical products and ceramic wares are also extensively, but not exclusively, produced upon the coalfields. Sulphuric acid is manufactured near Liège, in the vicinity of the

zinc works, which formerly obtained their raw material from the *Vielle Montagne* in the neutral territory of *Moresnet*, but which are now compelled to import the most of it from abroad. Superphosphates are manufactured in the same locality, while sulphate of soda is largely produced in the neighbourhood of the glass-works, where it is in great demand. The earthenware- and brick-works situated in this region obtain the coarser material which they require from the clays underlying the loam of *Hesbaye*, while finer clays are found near *Mons*, to the south of *Charleroi*, and elsewhere. *Verviers*, situated on the dividing line between the *Ardennes* and the *Carboniferous* region, is the great centre of the woollen industry in Belgium, and owes much of its prosperity to the excellent facilities for washing wool provided by the pure waters of the *Vesdre* and the *Gileppe* dam. Large quantities of foreign wool imported by way of *Antwerp* are washed at *Verviers* before being despatched for manufacture in *Germany* and *Austria*.

CENTRAL BELGIUM AND FLANDERS.—For the sake of convenience the Tertiary and Quaternary soils of Central Belgium and Flanders may be considered together, although from the agricultural, if not from the industrial, point of view several distinct regions may be recognised.

The loam lands of Central Belgium constitute the most fertile part of the whole country. Wheat is the principal cereal crop, and the yield per acre is high; sugar beet is also cultivated on an extensive scale, and flax is grown on the poorer soils. In Flanders the districts covered by sand have been greatly improved by the cultivators raising the underlying clay, which is at no great depth, and mixing it with the sand. In this and other ways a region, which would have been, if left to itself, as barren as the greater part of the *Campine*, has been rendered most productive. Rye and potatoes are the principal crops, but flax, tobacco, and colza are also cultivated. In the polders, barley is grown and large numbers of cattle are raised, while dairying is an important pursuit of the inhabitants.

The industrial activity of the whole of this region is of considerable antiquity. In the Middle Ages the towns situated within it were able, largely on account of their central position on the plain of Northern Europe, to engage both in commerce and manufactures; and in the thirteenth and fourteenth centuries they were

noted especially for their production of woollen goods. As a result of various political and economic changes they fell for a time into a state of decadence, but have succeeded during the nineteenth century in regaining something of their old importance. The manufacture of linen is carried on chiefly at Ghent, Courtrai, and Tournai, all in or near the flax-growing districts, but the supply of home-grown flax is unable to meet the demands of the industry, and large quantities are imported from Russia. Much of the flax which is grown in Belgium itself is retted at Courtrai, where the waters of the Lys are particularly adapted to giving the fibre a soft and silky appearance and great tenacity; and large quantities of it are exported to the United Kingdom where it is much in demand. On the other hand, Belgium imports from Ireland a considerable amount of the finer kinds of yarn which the climatic conditions of the latter country enable it to produce. The cotton industry of Belgium, which in 1910 had over 1,300,000 spindles in operation, has its chief centres in Ghent, in Brabant especially in the district round Nivelles, and in Hainaut. The first of these is the most important, and contains over one-half of the factories and spindles in the country, and, though it is somewhat more remote from coal than the districts in the south, it is able to import its raw cotton more easily by means of the Terneuzen canal. Other textile pursuits include the manufacture of jute and hemp.

Other industries include shipbuilding at Antwerp, the production of chemicals in the neighbourhood of the textile centres, and the manufacture of bricks, earthenware, and porcelain in the large towns with clay obtained partly from the valley of the Rupel, especially in the vicinity of Boom, and partly from abroad. At the ports a great variety of articles are made for which the raw material has to be imported.

THE CAMPINE is of little value from the agricultural point of view, though some attempts have been made to improve the soil by the methods which have proved so successful in Flanders. A scanty pasturage is afforded to cattle, and buckwheat is grown in the more favoured localities. The Campine may, indeed, be the seat of considerable economic activity in the future. A few years ago coal was discovered under the more recent formations in Antwerp and Limburg, and the various soundings which have since been taken encourage the belief that the resources of the region are very

considerable. But it is feared that there are great difficulties in the way of exploiting the coal, and some time must elapse before these can be successfully overcome.

COMMUNICATIONS.—Over the greater part of Belgium geographical conditions favour the free movement of railways, and it is only in the south that their distribution is affected, except in a minor degree, by the physical features of the land. Brussels, upon which many of the most important lines converge, may be regarded as the centre of the whole system. It is connected with the French Northern Railway by two lines, one of which goes to Calais by Tournai and Lille, and the other to Paris by Mons and Maubeuge. From Maubeuge another line, connecting Paris and Berlin, runs by the Sambre and the Meuse past Charleroi and Namur to Liège, whence it goes by Verviers to Aachen, and then on to Cologne. Namur, which has direct communication with Brussels, is connected with Paris by a line which follows the Meuse and its tributary the Virouin, and joins the Northern Railway at Hirson. From this railway there breaks off a branch, which, after running along the valley of the Lesse, joins a line which has come by the valley of the Ourthe from Liège (like Namur in direct communication with Brussels) and then continues its course southwards by Luxemburg to Metz. North of Brussels the most important railway is that which runs by Mechlin and Antwerp towards Amsterdam. From Mechlin one line going by Ghent joins the railway from Brussels to that town, and proceeds by Bruges to Ostend, a packet station for the United Kingdom; while another meets the Brussels-Liège line at Louvain.

There are over 1,000 miles of good waterway in Belgium, 900 miles of which are owned by the State. The Lower Scheldt and the Rupel are tidal rivers, but it has been necessary to canalise the Lys, the Upper Scheldt and the Dendre, the Sambre and the Meuse, in order to render them navigable. The Lys and the Scheldt are connected with the canal system of north-eastern France, while the Sambre has been linked up with the Oise, and the Meuse with the Aisne and the Marne. The Meuse and the Scheldt also connect the waterways of Belgium with those of Germany and Holland. Of the canals the most important are the Canal de Jonction, which connects the Meuse and the Scheldt; the Charleroi-Brussels canal and its continuation from Brussels to the Rupel; the Ghent-Bruges

canal, which connects these two towns and is continued to Ostend; and the Terneuzen canal which, by opening up a route from Ghent to the Scheldt, has converted that town into a seaport. The waterways in the west and south-west of Belgium connect that country with the coalfields of the north of France, and the iron ore deposits of Lorraine; while those in the centre and east bring the coal-producing areas and other industrial districts into communication with one another and with the coast.

FOREIGN TRADE.—In dealing with the foreign trade of Belgium a careful distinction must be drawn between the special and general exports and imports of the country. In this paragraph only the special trade is discussed. The imports consist largely of food-stuffs and raw materials, while goods, wholly or partly manufactured, make up the bulk of the exports. Belgium's chief commercial relations are with the neighbouring countries of France, Germany, the Netherlands, and the United Kingdom, though large quantities of wheat are imported from the United States, Russia, and Roumania, wool from the Argentine and Australia, and flax from Russia. Coal and iron ore come from France and Germany, and coal from Great Britain. Among the semi-manufactured articles imported are linen and cotton yarns and coal-tar from the United Kingdom, and iron and steel from Germany. Wholly manufactured products include chemicals, locomotives, and machinery from Germany, cotton and woollen goods from France, and cotton goods and machinery from the United Kingdom. Among the raw materials exported by Belgium are coal and building stone to France and Holland, and flax to Great Britain and Ireland. Semi-manufactured goods exported consist largely of zinc and wool to the United Kingdom, artificial silk, vegetable oils, and "Thomas Slag" to Germany, and coke briquettes and zinc to France. Among the wholly manufactured goods exported are cotton and linen fabrics, glass, and ceramic wares to Great Britain, chemicals, machinery, and ceramic wares to Germany, and machinery, locomotives, and chemicals to France.

The important transit trade of Belgium is conducted mainly through the port of Antwerp, which is connected by navigable waterways with France, Germany, and Holland. Among the goods imported for distribution in Europe are grain, wool, copper and other minerals, and rubber. The wool, however, by being washed

at Verviers, undergoes a process preliminary to manufacture and is now entered under special trade in the Belgian statistics. The exports from Europe by Antwerp and other ports consist largely of manufactured goods, much of which comes from Germany.

The following figures indicate the magnitude of the special trade :—

	Average imports for the years 1906-10 (in- clusive)(in £ million)	Average exports for the years 1906-10 (in- clusive)(in £ million)
Live animals	£ 2·18	£ 1·48
Articles of food and drink	36·40	14·10
Raw materials and partly manufactured articles	78·74	51·46
Manufactured articles	25·96	45·52
Bullion and Specie	4·91	2·36
	<hr/>	<hr/>
	£148·19	£114·92
	<hr/>	<hr/>

CHAPTER IX

HOLLAND

HOLLAND has an area of 12,648 square miles and a population which, in 1911, numbered 6,000,000. Although all the great geological formations are represented in the country nearly 99 per cent. of the whole area is of Quaternary age. About two-fifths of it consists of diluvial lands formed by an intermixture of material carried down from the north by the Scandinavian ice-sheet, and brought from the south—especially from the Rhine massif and the Ardennes—by the Meuse and the Rhine. This region, which includes the east of Friesland and Groningen, practically the whole of Drenthe and Overijssel, the most of Gelderland, the east of Utrecht, and the greater part of North Brabant and Limburg, is a dry, sandy or stony country in which water and bog alternate with stretches of land on which no vegetation can grow. The elevation varies from a few feet above sea-level to over 300 feet in the Veluwe. In the detached part of Limburg in the south-east, older rocks, including the Coal Measures, appear, and in places the land rises to a height of over 1,000 feet.

The remainder of the country is of alluvial origin; much of it lies below sea-level, and, with the exception of the sand dunes along the coast, very little rises more than a few feet above sea-level. Hence, this region, which includes about three-fifths of the total area of Holland, is practically the creation of man, and, if it were not for the dikes which have been built by him, much of it would be liable to submergence by rivers or by the sea. In many places, lakes, lagoons, and marshes have been drained and formed into polders, and, along the coast, land is also being reclaimed at the expense of the sea. The west of Groningen and Friesland, North and South Holland, Zeeland, and parts of Gelderland, Utrecht, and North Brabant, all fall within this alluvial region.

CLIMATE.—The most important factors controlling the climate of Holland are the proximity of the sea, and the prevalence of the winds which blow from it. The winters, though somewhat colder than in the south-east of England, do not attain the severity of the continental type, and the mean temperature for January is about

35°F. For similar reasons the heat of summer is not very great, and the mean temperature of July is about 66°F. The rainfall is not excessive, owing to the absence of hills, and only in the neighbourhood of the coast does it exceed 30 inches. On the other hand, the humidity of the atmosphere is high, especially in the west, where the proximity of the sea and the want of natural drainage contribute to this result.

NATURAL REGIONS.—The great difference in fertility which exists between the alluvial soils and the diluvial justifies the division of the country into two main natural regions, the alluvial and the diluvial.

THE ALLUVIAL REGION is the most important from both the agricultural and the industrial point of view. It contains the greater part both of the arable land and of the grassland of Holland, which cover respectively 25 and 50 per cent. of the total area of the country. The fertility of the soil and the humidity of the climate combine to make the region an ideal one for dairying purposes, and Dutch cattle, especially those of the Frisian breed which are well adapted to the clay soils of the polders, are noted for their milk. The manufacture of butter and cheese, frequently carried on in creameries conducted on the co-operative plan, is an important industry, and large quantities of both are exported. Among the principal crops grown, are wheat and beetroot in the south of the region, and oats and rye in the north. Flax, tobacco, chicory, and colza are all cultivated. In North and South Holland, and more especially at places like Haarlem, on the margin of the alluvial soils where clay and sand can both be obtained, many people are engaged in horticultural occupations, and large quantities of fruits, flowers, and bulbs are exported.

The chief manufacturing districts are also situated within this region which contains most of the large towns, and nearly 60 per cent. of the total population of the country. Amsterdam and Rotterdam, on account of their position as ports, are engaged in shipbuilding and in employments subsidiary thereto. The sugar industry is twofold. At the ports, more especially at Amsterdam, there are refineries in which is prepared for consumption cane-sugar imported from Java and other Dutch possessions in the East Indies, while in Zeeland and Brabant there are numerous factories for the extraction of sugar from beet. Brewing and distilling are both

extensively carried on, and Schiedam is noted for its gin, the excellence of which is said to be due in part to the quality of the water obtained in the vicinity. Bricks and tiles are made in many places where suitable clay can be obtained, and Delft and The Hague manufacture all kinds of pottery. Several towns, including Amsterdam and Utrecht, are engaged to some extent in the production of cotton and woollen goods.

THE DILUVIAL REGION contains much land which is altogether unfit for cultivation, and much which can only be rendered fit by heavy expenditure both of labour and capital, though, with the establishment of fen colonies in various places, considerable areas have been reclaimed. Rye, buckwheat, oats, and potatoes are the principal crops of the arable districts, while in the pastoral areas cattle and sheep are raised, the former being of the Gelderland breed which thrives well on poor soils. The south of Limburg, which is much more fertile and rather resembles the neighbouring part of Belgium, produces large crops of wheat and sugar-beet, and the population is denser than in other parts of the diluvial region. Various manufactures which have been established are aided by the coal from the only productive coalfield of Holland, that of Kerkrade, which now has an annual output of over 1,000,000 tons. Maastricht is engaged in the woollen industry, and manufactures glass and ceramic wares. In the Twenthe district of Overijssel several small towns, including Enschede, Hengelo, Almelo, and Oldenzaal, are occupied in spinning and weaving cotton. The district has few natural advantages, and probably owed much, in the earlier stages of its development, to the special privileges it then enjoyed for the sale of its products in the Dutch colonial possessions.

COMMUNICATIONS.—The principal railways are those which place the Dutch ports in communication with Germany and Belgium. From Wesel on the Rhine one route leads by Emmerich and Arnheim to Amsterdam, another by Cleve and Dordrecht to Rotterdam and the Hook of Holland, and a third by Breda to Flushing. Amsterdam and Rotterdam are connected with Berlin by a line running eastwards by Deventer and Oldenzaal to Osnabrück, and with Brussels and Paris by one which goes southwards by Dordrecht and Antwerp.

The chief waterway of the country is the Rhine, which takes in

succession the names of Waal, Merwede, and Maas. Below Rotterdam it is connected with the ocean by an artificial waterway known as the "Nieuwe Waterweg." Ships going to Amsterdam avoid the voyage through the Zuider Zee by availing themselves of the North Sea Canal, which has its outlet at Ymuiden. The Merwede Canal connects Amsterdam with Utrecht and the Rhine, by way of the Lek and the Merwede; and the South William's Canal replaces the Maas below Maastricht, where it becomes unsuitable for navigation. In addition there are, in the alluvial district especially, a great number of minor canals which are of much value for the conveyance of agricultural produce.

CHAPTER X

GERMANY

THE German Empire has an area of 210,248 square miles. Broadly speaking, three great physical areas may be distinguished: the Alpine Foreland, the Central Highlands, and the Northern Lowlands. The first of these regions, which slopes down towards the north, has an average elevation above sea level of about 1,600 feet, and extends from the Noric Alps in the south to the Danube in the north, and from the Lake of Constance in the west to the Inn in the east, while a slight extension lies to the north of the Danube between the Bavarian Forest and the Franconian Jura. The Central Highlands have a more varied topography. In the west, the rift valley of the Rhine, which has a length of about 200 miles, and a breadth of about 20, has been let down between the Black Forest and the Odenwald on the east, and the Vosges, Lower Vosges, and Haardt on the west. The southern parts of the Vosges and the Black Forest are both formed of ancient rocks, mainly granite and gneiss, but further north Bunter sandstone prevails, except in the west of the Odenwald, where crystalline rocks again come to the surface. After leaving the rift valley, the Rhine makes its way in a deep gorge through the Rhine massif, which consists mainly of Devonian schists and forms an undulating plateau with an average height of about 1,600 feet. The Taunus and the Westerwald lie on the right of the river, the Hunsrück and Eifel on the left. In the north, the Westerwald passes into the Sauerland, along the northern border of which is the Ruhr coal basin. The Eifel, which connects the Rhine massif with the Ardennes, shows many traces of recent volcanic activity. The Swabian Jura, which lies to the north of the Danube, and forms an acute angle with the Black Forest, consists of a broad undulating tableland of Jurassic limestone, which slopes down steeply to the Neckar, but gently to the Danube. Its average height is about 2,500 feet, and its rugged character has given to it the name of Rauhe Alp. Towards the east, the tableland formation is continued northwards under the name of the Franconian Jura which is hilly rather than mountainous. The whole area surrounded by the

uplands just described, that is, the greater part of the basins of the Neckar and the Main, is covered by Triassic rocks, which form a scarped or terraced land. In the west, Bunter sandstone is the prevailing formation; the centre is occupied by shell limestone or "muschelkalk," while in the east and south the red marls of the Keuper extend to the foot of the Jurassic escarpment. In the same way, it may be noted, the Vosges slopes westward to the plateau of the Faucilles. To the north of the scarp lands, the Triassic formation extends over the uplands of Hesse, though the Vogelsgebirge, the Rhöngebirge, and other heights, are of volcanic origin; it also covers the Thuringian basin, which lies between the Thuringian Forest and the Harz Mountains, both fragments of the ancient Variscan Chain. Along the course of the Weser, and following the same direction as the Harz, are the sub-Hercynian Hills, which include the Teutoburger, the Deister, and the Süntel, all of Secondary formation.

East of the Triassic lands lies the Bohemian massif, to be more fully described later. Belonging to it are the Bavarian Forest, the Erzgebirge, and the Sudetes, all of which form part of the borderland of the Empire. To the north of the Central Highlands is the North German Lowland, which stretches across the country from west to east, and lies within the plains of northern Europe. It is undulating rather than flat, but its elevation seldom exceeds 600 feet.

THE ALPS AND THE ALPINE FORELAND.—The German Alps, which attain their highest point in the Zugspitze (9,710 feet), belong to the outer limestone ranges of the Alps. The Foreland, which stretches northward from their foothills to the Danube and beyond, is of Tertiary formation, but is covered to a great extent with the *débris* distributed by the great glaciers which descended from the mountain zone. Morainal material is widespread over a considerable area immediately to the north of the foothills. The land is consequently of poor fertility, and was formerly occupied by numerous lakes, many of which have been drained. Beyond the belt of morainal country there are great deposits of glacial gravels. In the south these gravels are of considerable depth, and absorb water easily, so that the surface is left dry; but in the north, where they thin out, the water collects upon the underlying impermeable stratum, and the land

becomes marshy, as in the neighbourhood of Munich. West of the Lech and north of the Amper the Tertiary land reappears, and is often of considerable fertility, while some of the alluvial soils in the valley of the Danube are among the most productive in the Empire.

Climatic conditions are also unfavourable to agriculture over the greater part of the Foreland. Increase of altitude counteracts the advantages of decrease of latitude, and the summer temperatures are low. The rainfall is heavy, the mean annual precipitation varying from 30 to 60 inches. The lower slopes of the foothills are generally forest-covered, while the grassland districts above the limit of tree growth, and the morainal districts of the Foreland, are largely devoted to dairy-farming. Over the whole region nearly one-third of the land is pastoral, and in the southern districts more than one-half is under grass. On the other hand, on the alluvial soils of the Danube, especially between Ratisbon and the Isar, where wheat is extensively grown, less than one-tenth of the surface is reserved for live stock. Hops, which form the basis of the great brewing industry of Munich, are an important crop in many places, particularly in the Danubian valley, on the Tertiary lands, and in the country between the Danube and Lake Constance.

The Alpine Foreland is comparatively poor in other sources of economic wealth. Coal is not found, though some lignite is obtained. Water-power, which is fairly abundant, is being utilised for the production of electrical energy, and the Bavarian State has reserved to itself the waters of the Isar, the Inn, and several other rivers for the electrification of the railways. The cotton industry is carried on at various places, more especially at Ulm and Augsburg. Munich, which has grown up where the ancient salt route from Salzburg to the west crossed the Isar, has, in addition to breweries, machine shops, furniture works, and manufactories of scientific instruments. The clays and iron-free sands of the Bavarian Forest have led to the growth of porcelain and glass works at Nymphenburg and Ratisbon.

THE RIFT VALLEY AND THE ADJACENT HIGHLANDS.—The rift valley of the Rhine, and the lower slopes of the adjoining hills are covered to a considerable depth with a finely comminuted soil, deposited by the waters which at one time flowed from the melting glaciers of the Alps and the Jura. This loess, which is

derived from a variety of rocks, is of great fertility, and has contributed much to the fruitfulness of the region. The climate is also favourable, as the valley is sheltered from cold winds, and in comparison with other parts of Germany the spring season comes early and is warm. Agriculture accordingly assumes considerable importance. The vine flourishes both on the plain and on the lower slopes of the hills, while tobacco and hops are widely cultivated, and sugar beet is grown. As a result, wine, cigars, beer, and sugar are all manufactured throughout this area.

Situated mainly upon the plain, but owing part of their prosperity to the water-power derived from the rivers which flow from the Vosges, are the towns engaged in textile pursuits, of which cotton-spinning is the most important. Mülhausen is the centre of this industry, and Colmar, Thann, and Gebweiler are among the other towns mainly dependent upon it. This region has not the same advantages as many others in respect to atmospheric conditions and facilities for obtaining raw material and fuel, but nevertheless it is making progress, and Alsace has about 15 per cent. of all the spindles in Germany at the present time. Woollen, linen, and silk goods are also manufactured in the above-mentioned towns. The cotton industry has also been established in various parts of Baden which has about 5 per cent. of the spindles in the Empire.

The principal towns of the plain are the river ports of Frankfurt-on-Main, Mannheim, Ludwigshafen, and Strassburg. Frankfurt has, in addition, large chemical works, breweries, and machine-shops, and is one of the most important banking centres in Germany, while Ludwigshafen is one of the chief seats of chemical industry in the country.

The Vosges, with the Lower Vosges and the Haardt, and the Black Forest, with the Odenwald and the Spessart, may be considered together. The crystalline rocks of the Black Forest and the Vosges, and the Bunter sandstone elsewhere, are covered to a great extent with forests of pine. The lumber industry of the Black Forest is still of considerable importance, and the abundance of wood has led to an extensive manufacture of clocks, toys, brooms, musical instruments, etc. Over the greater part of the Odenwald similar industries are pursued, but not to the same extent, while on its western slopes, where crystalline rocks again appear, there

are many fertile districts suitable for orchards and vineyards. Great efforts have been made within recent years to improve the economic conditions of the Spessart, and Aschaffenburg, its chief town, now has numerous paper mills, breweries, iron-works, and factories for ready-made clothing. The industries of the mountain districts on the west of the rift valley resemble those on the east, although the forests of the Vosges have been recklessly destroyed and have lost much of their value.

THE SWABIAN AND FRANCONIAN JURA are not capable of great economic development. The limestone, which covers the whole region, provides but a scanty soil, and agriculture is confined in the main to pastoral farming, as it is only in favoured places, such as the valley of the Ries, where irrigation is possible, that cereals can be extensively cultivated. At Solnhofen, about forty-five miles south of Nuremberg, lithographic stones are obtained from a species of compact limestone which is found there, and, although the industry is relatively a small one, it is able to meet the demands of the whole world. Iron ore is found in the Franconian Jura, and has given rise to the metal industries of Amberg, where rails and carriages are made, and where there is an important gun factory. To the east of Bamberg large deposits of iron ore have been located within recent years, and mining operations are now in progress.

THE SOUTH-CENTRAL SCARPLANDS.—In this region, which corresponds somewhat roughly to the basins of the Neckar and the Main, the different members of the Triassic rocks appear in succession. The Bunter sandstone of the Spessart, of the eastern slopes of the Odenwald, and of the north and east of the Black Forest, is replaced over a great part of Lower Franconia, north-east Baden, and northern Würtemberg by the muschelkalk, which in turn disappears before the Keuper marls of Upper and Middle Franconia and central Würtemberg. A belt of Lias separates these marls from the limestone of the Swabian and Franconian Jura.

As in other parts of Germany, the Bunter sandstone is generally forest-covered. Except in the valleys the muschelkalk does not, as a rule, weather down into a very productive soil, though its uplands provide good pasture land, and on the slopes of many of the deep valleys by which it is cut up the vine is extensively grown, as is the case around Würzburg. But the best soils are found

upon the Keuper marls, which have given rise to the agriculture for which Franconia is famous. Nuremberg is the centre of the hop-growing industry, and Middle Franconia and Würtemberg together produce one-third of the hops grown in Germany. Cereals are also extensively cultivated on the Keuper marls, while, on the alluvial soils around Bamberg and Stuttgart, vegetables are raised in large quantities. The Liassic belt on the south and east is generally fertile.

There are few minerals in the region. Salt, which is the most important, is found in the muschelkalk, and is worked at Heilbronn, Kochendorf, Hall, and elsewhere. Some lignite is also obtained.

Notwithstanding the comparative poverty of its natural resources, the industrial development of this region has been considerable, and is to be explained mainly by the supply of labour provided by the growth of the population. Brewing is, as might be expected, an important pursuit in Würtemberg and Middle Franconia, where hops form so abundant a crop. The toy industry of Nuremberg was originally based upon the large supplies of wood which could be obtained in the vicinity, but toys of all kinds, and not merely of wood, are now made there. The manufacture of porcelain and glass is largely localised in Upper Franconia, and in the Upper Palatinate where wood, kaolin, and quartz sand can all be easily obtained from the Bavarian Forest. The Upper Palatinate, indeed, is the chief glass-producing region in Germany. The textile industry is of growing importance, and there are cotton factories at Stuttgart, Cannstatt, Reutlingen, and Bamberg. Esslingen and Stuttgart are noted for printing, and especially for pictorial printing. Fine metal work is characteristic of Würtemberg, where it is carried on at Esslingen, Geislingen, and elsewhere. Pforzheim is noted for jewellery; Hanau for gold and silver ware; Würzburg for machinery and furniture; Nuremberg, which is the typical town of the whole region, has breweries, glass works, machine shops, and various establishments for the production of fine metal ware and optical instruments.

The population of this region is concentrated mainly in two districts, which are separated from one another by the Franconian Heights—an area of comparatively poor land, where the Keuper marls are wanting in lime and are consequently infertile. But the valley of the Main and the valley of the Neckar, cut off as they

are from other fertile regions by the Bunter sandstone and the Jurassic limestone, which surround them, draw to themselves the surplus people of these less favoured lands, and are, therefore, areas where the density of population is high.

LORRAINE.—To the west of the Lower Vosges various rocks of Triassic and Jurassic age appear in succession in the imperial territory of Lorraine. The Bunter sandstone in the east is covered with forests, which formerly provided fuel for numerous glassworks, although these are now partly dependent upon the Saar coalfield. Further west, salt is obtained in large quantities from the Keuper marls, Château Salins and Dieuze being the centres of the industry. On the fertile Lias soils in the basin of the Moselle the vine is grown, although climatic conditions are not entirely favourable. Lastly, in the lower Jurassic rocks, which occur not only in the extreme west of Lorraine but extend into France and the Duchy of Luxemburg, there are great deposits of iron ore. These ores—known as “minette”—contain a high proportion of phosphorus, and until recent times could not be used in the manufacture of steel. Owing to the presence of limestone they have the advantage of being self-fluxing. Lorraine and Luxemburg (which belongs to the German Zollverein) now produce over 75 per cent. of the German output of iron ore. The greater part is smelted on the spot; some goes to France and Belgium, though with the development of the French mines the amount exported to these countries is decreasing; and the remainder is sent in almost equal quantities to the Saar and the Ruhr coalfields, the trucks which bring coal carrying ore away. The production of pig-iron in Lorraine and Luxemburg amounts to about 30 per cent. of that of the whole Empire.

THE RHINE MASSIF.—The economic activity of this region varies greatly from place to place. The Taunus and the Hunsrück are well wooded, and on their southern slopes vines and fruit are grown. Along the foot of the Taunus, also, are mineral springs, which have brought prosperity to Wiesbaden and Homburg. The Eifel and the more elevated parts of the Westerwald and the Sauerland are, in the main, covered with dreary moors, while lower down, in the two latter regions, woods and meadows are common. The valleys are often fertile, and on the slopes of some of them, more especially on those of the Rhine, the Moselle, and the Aar, the vine is extensively cultivated. Mineral wealth

is widely distributed. Lignite, which is of special value for the manufacture of briquettes, occurs under the Tertiary layers which occupy part of the Westerwald, and in greater quantity in the hills around Cologne. Manganese ore is obtained in the Siegerland, on the north-west slope of the Westerwald, and red hæmatite in the districts drained by the Lahn and the Dill. Smelting is carried on in both places, some of the raw iron being sent to the basin of the Ruhr. But it is upon the coalfields on the margin of the massif that economic progress has been most marked. The Saarbrücken field, which lies to the south of the Hunsrück, has at present an annual production of over 10,000,000 tons, or nearly 7 per cent. of the total German output, while its available content, to a depth of 1,000 metres, has been estimated at 12,000,000,000 tons. The coal, though not so useful for heating purposes as that from the Ruhr field, makes good coke. Much of it is exported to the south-west of Germany, Switzerland, and the north-east of France, partly by the river Saar and the Main-Rhine and Rhine-Rhone canals, but mainly by rail. A considerable amount is also used by the blast furnaces, machine shops, and glass and porcelain works, which have grown up on the coalfield. Saarbrücken-St. Johann is the centre of a group of towns engaged in these pursuits.

The Ruhr coalfield, which lies to the north of the Sauerland, and extends from the Rhine at its confluence with the Ruhr along the valley of the latter river for a distance of forty-six miles, is at present the most important in Germany ; it has an area of over 1,000 square miles, and an estimated available content of 45,000,000,000 tons. The coals from it are the best in Germany for heating purposes, and they are also very suitable for the manufacture of gas and coke. The annual output now averages over 83,000,000 tons, or about 55 per cent. of the entire German production. The greater part of the coal mined on the Ruhr field is consumed in the neighbourhood, but large quantities go up the Rhine to Mannheim, down it to the Netherlands, by the Dortmund canal to the coast, and by rail to Belgium. For the production of coke, Gelsenkirchen on this coalfield is the chief town in Germany.

The iron ore which is obtained along with the coal is limited in amount, but was in earlier times of some importance in helping to build up the great iron smelting industry of the Ruhr district,

which now produces over 40 per cent. of the total German output of pig-iron. The chief sources from which the raw material is at present obtained are Lorraine, Luxemburg, and Sweden; while the greater number of the blast furnaces and iron and steel works are situated in the vicinity of the Ruhr and its tributary the Ennepe at Essen, Mülheim, Hagen, and elsewhere; in the valley of the Rhine at Düsseldorf and Duisburg-Ruhrort; and in the basin of the Emscher at Dortmund, Bochum, and Gelsenkirchen. Industries connected with the manufacture of iron and steel goods are also carried on at these and other towns. Solingen is noted for cutlery, Essen and Düsseldorf for armour plate and cannon, Duisburg-Ruhrort for shipbuilding and machinery, and Remscheid for tools.

Upon, and in the vicinity of, the Ruhr coalfield there has also grown up an important textile industry. For cotton-spinning this region occupies the first place in Germany, and has nearly 30 per cent. of all the spindles in the Empire. The adjoining towns of Elberfeld and Barmen in the Wupperthal, and München-Gladbach and Rheydt to the west of the Rhine, are chiefly engaged in the manufacture of cotton and woollen goods. Crefeld is the principal place in Germany for the production of silks and velvets, and occupies, in this respect, a position in Europe second only to that of Lyons. Linen and plush goods are also made there. Cologne has spinning and weaving establishments. Round Solingen there are many handloom weavers of woollen goods. Elberfeld and Barmen are both noted for their ribbons, laces, braids, and cord.

Among the other and varied industries of this region, the manufacture of chemicals is carried on, especially at Elberfeld, brewing at Dortmund, glassmaking at Düsseldorf, the preparation of cocoa and chocolate at Cologne, and fine metal work at Iserlohn and Altena.

To the north of the Eifel lies the coalfield of Aachen, the eastern extension of that which runs through France and Belgium. Upon it have grown up iron and textile industries.

The Rhine massif, with the coalfields upon its borders, has now become the most important industrial region in Germany. The abundance of coal, the facilities for obtaining iron ore from Lorraine, Luxemburg, and Sweden, the progress of science which has rendered these ores of value in the manufacture of steel, the

great waterway of the Rhine, which permits the import of raw material and the export of manufactured goods, and the development of the canal system, which has brought the industrial districts into communication with the German seaboard, have all contributed to the economic progress of this region, which now contains about one-fifth of the total population of the Empire.

THE NORTH-CENTRAL UPLANDS AND THE ADJOINING LANDS.—For the sake of convenience this region may be considered to include the country between the South-Central Scarplands and the North German Lowland. As usual, the Bunter sandstone provides a soil but poorly adapted to agriculture, and much of the Hessian Uplands is forested; though to the west of the Vogelsberg, in the valley of the Wetter (the Wetterau), where volcanic débris has accumulated, the land is of exceptional fertility. On the lower slopes of the Vogelsberg, again, and to a less extent on those of the Rhöngebirge, the soil derived from the volcanic rocks is very productive, and these districts are noted for their fruit gardens. The poverty of the Hessian Uplands in good agricultural land is not compensated for by their mineral wealth. Some iron ore is found in the Vogelsberg and is sent to the iron-smelting districts of the Rhine massif; lignite, which has been converted by volcanic activity into coke, is worked on the Meissner; and in the Habichts Wald there are some layers of brown coal. All things considered the region is of comparatively slight economic importance, the population is small, and the industries of little account. To the north of the Hessian Uplands lie the Weser Uplands. In the south these are formed of Triassic rocks, but in the north the sub-Hercynian hills are of Jurassic and Cretaceous formation. The uplands are generally wooded, while the lowlands are devoted to arable and pastoral farming. The mineral wealth of the region is of some value. Coal of Carboniferous and Cretaceous age is found in the Deister and the Osterwald, while iron occurs in the Teutoburger range and in the Wiehen Gebirge. The proximity of these two minerals accounts for the iron industries of Osnabrück, Minden, and Bielefeld. Osnabrück has also textile and tobacco factories, while Bielefeld is extensively engaged in the manufacture of linen. The latter industry received its early impetus from the cultivation of flax in the vicinity, but the bulk of the raw material now comes from Russia.

Further east, in the country round Stassfurt, occur those great deposits of potash salts which have played so important a part in the development of German agriculture within recent years. Their origin is accounted for by the fact, that, after the pure rock salts which underlie them had been deposited, a solution remained which contained certain chlorides and sulphates of potassium. Under the conditions prevailing at that time this solution was not drained off, as has been the case in most parts of the world, but evaporated, so that the potash salts were precipitated. "Kainit," which is obtained from the chlorides, is of especial value to the German farmer, but the sulphates are better adapted for use in arid regions.

The Thuringian Basin, which extends from the Harz to the Thuringian Forest, is of varied fertility. The alluvial soils of the Golden Vale, to the south of the Harz Mountains, are very productive, and so also is the alluvial country round Erfurt, which is noted for its market gardens and seed farms. On the Keuper marls, which cover a considerable area, cereals are extensively raised. The muschelkalk is less fertile, but in the valley of the Saale the vine is grown, though in a latitude too far north to attain full perfection. Industry is varied. There are large deposits of salt in the Wupperthal and in the valley of the Upper Unstrut, and a number of manufactures are associated therewith; while lignite occurs in patches of Tertiary rock, especially round Zeitz and Weissenfels.

THE NORTH GERMAN LOWLAND is underlain by Tertiary rocks which have been covered in Quaternary times by material deposited in part by the glacial ice sheet from the north, and in part by the rivers from the south. Only in a few places do the Tertiary rocks come to the surface. The country to the east of the Elbe may first be considered. From the shores of the Baltic Sea the land rises to the heights of the Baltic ridge, which runs from Courland to Schleswig. Upon this line of heights, due in part to a movement of Tertiary times, the edge of the ice-sheet remained for a prolonged period during its retreat from the south. The heights themselves are therefore covered with morainal débris and numberless lakes, as in East Prussia, Mecklenburg, and Schleswig, while the land intervening between the lakes is generally well-wooded. On the northern slopes of the ridges there are considerable areas of fertile land,

due in part, it is believed, to the débris brought down from the limestone rocks in the south of Scandinavia. On the southern slopes of the ridges, on the other hand, the waters of the melting ice-sheet left large deposits of sand and gravel, which have rendered considerable areas poor and infertile. Beyond the Baltic ridge lies the zone of Great Valleys, each of which in turn marks the channel by which the water escaped at each successive stage in the retreat of the ice-sheet. The valley from Thorn to Eberswalde is now occupied by the Vistula, the Netze, and part of the Oder; further south, in the Warsaw-Berlin valley, are the Bzura, Ner, Warthe, Obra, and the Spree; while still further south lies a third valley, in which the Bartsch and the Baruth flow for part of their way. Over all this zone the character of the soil varies greatly from one place to another. In some districts there are considerable areas of good boulder clay, which are fertile; in others the land had to be reclaimed from bog and swamp before it could be made productive; while elsewhere, as in Brandenburg, there are wide stretches of sand on which little cultivation is possible.

To the south of the Great Valleys lies another ridge of land, beyond which the ice-sheet did not advance. This ridge is marked by heights, rather than by hills, in the south-east of Posen, in the north of Silesia, in the Fläming, and in the Lüneburg Heath. The first of these upland regions contains great stretches of sand; in the second there is much fertile soil; the Fläming consists of sandy wastes, marshes, and moorland; while in the Lüneburg Heath vast expanses of sand and gravel are covered with heather. In parts of Saxony and Silesia there are widespread deposits of loess, and in the country south of Magdeburg this is also the case. Some of these deposits lie in the valley beyond the Southern Ridge, which is now occupied by the Black Elster and the Drömling.

To the west of the Elbe the country consists in the main of dreary alternations of high moors and marsh lands. The former frequently occur in sandy districts which are underlain by an impermeable subsoil, while the latter are low-lying lands which were at one time covered by water, but are now occupied by the vegetation typical of bogs and marshes.

The great inlet of the North German Plain, which lies between the Ruhr coalfield and the Teutoburger Range, and of which Münster is the centre, consists largely of sandstones and marls

of Secondary times, frequently overlaid by alluvial soils, which are generally fertile and produce good crops of cereals. There are in places forests of oak, upon the acorns of which feed the pigs that produce the well-known Westphalian hams. Horses and cattle are also reared.

The general character of the North German Lowland as fashioned by nature has been improved in many places by the hand of man. The valleys and deltas of the Memel and the Vistula, for example, have been embanked, and considerable areas of arable and meadow land thus brought under cultivation. To the south of the Baltic Ridge, again, much of the country has been drained, as in the Oder Swamp and in the valleys of the Warthe and the Netze. A great part of the heaths has also been improved in various ways. Formerly, the practice was to burn the dry heath and to sow buckwheat in the ashes until the soil formed by them had been exhausted. The present method, the results of which are lasting, is to open up the moor, to drain it, to expose it to the air, and to manure it heavily. On the low moors the peat is first removed, and the subsoil is then mixed with sand and manured with kainit.

Notwithstanding the comparative poverty of much of the soil of the North German Lowland, the area from which a return of some kind or other cannot be obtained is relatively small. The total extent of the region is over 100,000 square miles, and of that about 50 per cent. is under crops, 15 per cent. under grass, and over 20 per cent. under woods, while, of the remainder, parts can be used for grazing purposes. Rye is the cereal best adapted to the infertile conditions which exist, and about two-thirds of the German crop is grown in this region, Brandenburg and Posen, in the zone of Great Valleys having the greatest output, although East and West Prussia, Pomerania, and Mecklenburg also produce large quantities on the Baltic ridge and its northern slopes. Oats comes next to rye as the cereal of the North German Lowland, which accounts for nearly two-thirds of the oats grown in the Empire. Wheat occupies some fertile districts in the north of the plain, but it finds its most favourable environment on the loess soils of Saxony and Silesia, which together produce nearly one-fourth of the wheat grown in Germany. About three-fourths of the potato land of the Empire is also found in the Lowland, where the sandy soils of Brandenburg and Posen, and the less fertile

districts of Silesia produce a large part of the total crop, which forms the basis of an important alcohol distilling industry. The cultivation of beetroot in the loess districts around Magdeburg and in Central Silesia finds employment for a considerable amount of labour in a region which, on the whole, is far from fertile. It also renders the land more suitable for the growth of cereals, and the pulp which remains after the sugar has been extracted forms a valuable food for cattle. The discovery of the fertilising powers of Stassfurt salts has increased the area under beet, and at the same time improved the yield per acre, while the proximity of coal has facilitated the manufacture of sugar, in which Germany now leads the world. There is no doubt that the development of this industry was greatly aided by the bounties granted by the Government on foreign exports, and for some time after the Brussels Convention there was a decided decrease in the amount of sugar produced in Germany.

The mineral wealth of the region is not of great importance. Bog ores are found at Grabow in the valley of a tributary of the Warthe, and elsewhere, and sent to Silesia. Cement lime is obtained at Buxtehude, near Stettin, and supplies the large cement works of the latter town. Amber, a fossilised resinous product derived from a former coniferous vegetation, occurs mainly along the coast of Samland. At Sprenberg, south of Berlin, there are salt beds of exceptional thickness belonging to the younger Primary rocks. Manufactures are in the main confined to the larger towns and seaports, which in the east are chiefly concerned with the preparation for market of raw materials, and with supplying the more immediate demands of an agricultural population. In Brandenburg, Berlin with its suburbs is of greater importance, and manufactures of chemicals, textiles, electrical apparatus, machinery, and scientific instruments are all extensively carried on, while clothing and furniture are made in large quantities. Leipzig, which owes much of its importance to its situation on a southern inlet of the North German Lowland offering special facilities for trade, is engaged in the manufacture of textiles of all kinds, machinery, musical instruments, and scientific apparatus. Into the Münster "Bay," also, industries are beginning to press forward, favoured by the proximity of the Ruhr coalfield, and Münster itself is becoming a manufacturing town of some importance. Of

the seaports on the Baltic, Stettin is engaged in shipbuilding, and launches some of the largest German vessels ; Danzig is an imperial naval station and dockyard ; and Lübeck is engaged in chemical and other manufactures. Of the North Sea ports, Hamburg has shipbuilding yards, jute mills, chemical works, and various factories engaged in working up raw material imported from abroad. Bremen is employed, but to a less extent, in similar occupations.

THE VOGTLAND AND THE SAXON ERZGEBIRGE.—These two regions may be considered together. The first is a low highland connecting the Erzgebirge, the Fichtelgebirge, and the Franconian and Thuringian Forests, while the second, which is a fragment of an ancient peneplain, forms the north-west slope of the Bohemian massif. Both regions are somewhat unfavourable to agriculture. In the Vogtland, rye and potatoes are grown, but except in the valleys, where there are orchards, the land, on account of its elevation, is unsuited for other crops, and much of it is devoted to pastoral pursuits. The slopes of the Erzgebirge are well wooded, but are even less adapted to arable farming. The Vogtland is without minerals, but in the Erzgebirge there are mines of iron, tin, silver, and zinc, which have all been worked, although their product is now of decreasing importance. On the other hand, the prosperity of both regions is mainly dependent upon two coalfields, the larger of which extends from Zwickau to Chemnitz, while the smaller is near Dresden. The coal from the first of these fields is suitable for the manufacture of gas and coke, and some of it can be used for smelting purposes. The annual output of the two combined is about 5,000,000 tons.

Textile industries on a small scale have long been established in the Vogtland, where they were carried on mainly in the homes of the people to satisfy local requirements, and in the Erzgebirge, where they were introduced to meet the want of employment, caused by the decreasing productivity of the mines. The present position of the cotton and woollen industries, and their concentration in large towns is, however, mainly due to the proximity of the coalfields. The cotton industry of the region has about 15 per cent. of the total number of spindles in the Empire. Its centre is at Chemnitz, but a number of other towns, including Zwickau, Werdau, Crimmitschau, Glauchau, Meerane, Ölsnitz, and Lugau are also extensively engaged in it. The woollen industry, which

owes part of its prosperity to the excellent wool obtained from the merino sheep of Saxony, is also carried on in most of these towns; though weaving is still to some extent a domestic pursuit, and around Glauchau and Meerane large numbers of handloom weavers are settled. The manufacture of lace and embroidery is likewise a cottage pursuit, and in many villages in the mountainous districts provides the inhabitants with their chief means of livelihood. Zwickau is the centre of an important iron and steel industry, and both there and at Chemnitz textile and other machinery is made. Porcelain works, obtaining their kaolin from numerous granitic areas in the mountains, are established in various places, but especially at Meissen, where there is an imperial factory. The manufacture of paper depends upon the abundance of water and water-power, and clock-making owes its origin, as in other mountainous districts of Germany, to the presence of timber and the absence of more important factors of economic activity.

THE SUDETES, which form the north-east flank of the Bohemian massif, consist in the main of ancient rock, although the Coal Measures appear in the Waldenburg Hills of Lower Silesia and extend into Bohemia. The mountain slopes are forested, but a certain amount of farming, mainly pastoral, is carried on. The abundance of timber and water-power favoured the growth of various forms of industry in early times, but, until the development of the Waldenburg coalfield, little was done on an extensive scale. This coalfield extends in a semicircle from Bober and Schatzlar at the foot of the Riesengebirge, by Landeshut and Waldenburg, to Eckersdorf, near the banks of the Neisse. Its average annual output is about 5,000,000 tons.

The use of coal has effectively stimulated all the industries of the region, and, although there are no large towns, modern factories are growing up in many places. The linen industry, which is of considerable importance, formerly depended mainly upon the presence of water-power and the large supplies of flax grown in the mountains as well as on the Silesian plain. Now it receives at least part of its power from the neighbouring coalfield, while for its raw material it relies upon Russia for the coarser, and upon Holland and Belgium for the finer kinds. Langenbielau, with its weaving factories, is the centre of the industry, which is also carried on round Reichenbach, Landeshut, and Waldenburg, and in many

villages along the valleys of the Riesengebirge. Other textile pursuits include the manufacture of cotton at Langenbielau, Peilau, and Peterswaldau, and of wool at Schweidnitz, Reichenbach, and Peterswaldau. The abundance of timber for fuel, and of fine sand, has induced the glass industry to spread from Bohemia, while deposits of kaolin in the granitic areas have led to the manufacture of porcelain.

THE TABLELAND AND COAL BASIN OF UPPER SILESIA.—In Upper Silesia the remnants of a Trias plateau extend eastward from the Oder into Poland, while further south lies a great coal basin which is exposed in some places, but in others is concealed by later deposits. Over the whole of this region there has been rapid economic development within recent years. The coalfield, which also underlies parts of Austrian Silesia and Russian Poland, is one of the most important, if not the most important, in Europe; and, although the German part of it at present produces less than one-fourth of the coal mined in the Empire, its available content is believed to be two or three times as great as that of the Ruhr district. The coal, though not so suitable for coking and steam-raising purposes as that from Westphalia, is well adapted to household requirements, and its market extends from Berlin to Vienna. The muschelkalk of the Tarnowitz Plateau contains much lead and the largest deposits of zinc in Europe, while iron ore is mined at Oppeln, not far distant. This combination of coal, zinc, lead, and iron has led to the growth of a considerable metallurgical industry, which is carried on at Tarnowitz, Beuthen, Königshütte, Gleiwitz, Kattowitz, Myslowitz, and elsewhere. Here are obtained five-sixths of the zinc and over one-half of the lead produced in Germany, and here, also, are numerous iron works, which rely largely upon imported ore. In addition, steel, machinery, wire, and a variety of other articles are manufactured. The progress of this region was long retarded by the isolated position which it occupies in Germany, but, with the growth of railways, the improvement of the Oder as a waterway, and the development of its own natural resources, it is rapidly becoming one of the chief industrial areas of the Empire.

COMMUNICATIONS.—In the German Empire there are now over 37,000 miles of railway, of which 33,000 miles are owned or controlled by the various States which constitute the Empire, while the

remainder are in the hands of private companies. Berlin, upon which converge many of the most important lines in the country, may be regarded as the centre of the system. One line places it in direct communication with the great port of Hamburg, while another, which runs to Cologne by way of Hanover, Hamm, and Oberhausen, has connections with Bremen and Emden at Stendal, with the Hook of Holland, Rotterdam, and Amsterdam at Lohne, with Flushing at Oberhausen, and with Ostend at Cologne. The capital is also connected with Cologne by a line which passes through Magdeburg, Soest, and Düsseldorf. From Cologne the gorge and the rift valley of the Rhine open up a great highway to the south, and as far as Basel there are railroads on either side of the river from which important lines branch off. From Coblenz one follows the course of the Moselle by Trèves and Metz to Nancy, while another utilises the valley of the Lahn to cross the Rhine massif on its way to Hanover or Magdeburg by Cassel. The latter line also connects with one from Mainz which strikes up the valley of the Kinzig and down that of the Fulda to arrive at Gotha, whence it runs by Erfurt and Halle to Berlin. From Mainz, too, the Nahe opens up a route to the Saarbrücken coalfield and to Metz. At Strassburg the Orient Express route, which has crossed the Vosges from Nancy by the Gap of Saverne, joins the railway on the right bank of the Rhine, and passes north along it as far as Karlsruhe, where it branches off, turns the flank of the Black Forest, and goes by Stuttgart to Ulm on the Danube. From Ulm the main route is continued across the Alpine Foreland by Augsburg and Munich to Linz, where it rejoins the Danube, while another line of less importance does not depart from the valley of that river. These railways in the south of Germany are connected with those in the north in several ways. The line from Berlin to Halle connects with one to Leipzig, which then runs southwards between the Fichtelgebirge and the Erzgebirge, and between the Franconian Jura and the Bavarian Forest, to Ratisbon, whence it is continued across the Alpine Foreland by Munich to the Brenner Pass. Another line runs from Frankfurt across the Spessart and along the Main to Würzburg, where one branch goes by Nuremberg and over the Franconian Jura to join the line from Berlin to Ratisbon, while the other runs in a south-easterly direction to Munich. Two important railway routes lead from the German capital into the

countries of the Austro-Hungarian monarchy; one goes south to Dresden and then follows the course of the Elbe and the Moldau on its way to Vienna, while the other goes by Breslau along the outer slope of the Sudetes to Cracow in Galicia. In the east and north-east of Germany railways are much less numerous than in the west. Two lines, which unite at Insterburg on the Pregel, leave Berlin for the Russian capital, the one going by Königsberg, the other by Posen and Thorn. A railway from Schneidemühl, on the first of these, to Thorn gives Berlin an alternate route to that town, which is in direct communication with Warsaw. In addition to Königsberg, the ports on the Baltic, Danzig, Stettin, Stralsund, and Lübeck, are all connected by rail with Berlin.

The inland waterways of Germany have also played an important part in the economic development of the country. The great rivers, which even in early times were of considerable value, have, in many cases, been deepened and connected with one another by canals, so that there is now a fairly complete system of water communication over a large part of the Empire. The Rhine was formerly navigable for boats carrying over 400 tons as far as Mannheim, but the head of navigation for such is now being pushed up the river towards Strassburg, and will probably be eventually carried as far as Basel, which can only be reached at present by those of smaller size. The Rhine is connected with the French waterways by the Rhine-Marne canal, which crosses the Vosges by the Gap of Saverne and has branches to the Saar and the Moselle; and the Rhine-Rhone canal, which leaves the Rhine valley by the Gap of Belfort. Of the tributaries of the Rhine, the Main is navigable by larger boats to Frankfurt and by smaller ones to Würzburg, while the Neckar is navigable to Heilbronn, but by smaller boats only.

The Dortmund-Ems canal was constructed to provide the industrial region around the Ruhr coalfield with an outlet in German territory. The canal itself runs from Dortmund to Meppen, where it joins the Ems, a distance of ninety-four miles. For another fifty-five miles the Ems has been canalised, after which the waterway follows the open river as far as Emden. It is proposed to connect the Dortmund-Ems canal with the Rhine by another canal running from Herne to the neighbourhood of Ruhrort. The Weser is navigable for larger boats as far as Bremen,

and for smaller ones to Cassel. Under the law of 1905, the river is to be deepened as far south as Hameln, and at the same time to be connected by a canal with the Dortmund-Ems canal. The Elbe and the Oder are both navigable by large boats, the one to Prague and the other to Kosel. Berlin, situated between these two rivers, is connected with both: with the Oder by the Finow and Oder-Spree canals, and with the Elbe by the Havel and Plauer canals. The Elbe, moreover, is brought into communication with the Baltic by two canals, the Kaiser Wilhelm ship canal from Kiel, and the Elbe-Trave canal from Lübeck. The Vistula, which is navigable for large boats almost to Bromberg, is connected with the Oder by the canalised courses of the Netze and the Warthe. The Danube is of but minor importance within German territory.

The Rhine carries a much larger amount of goods than any other German waterway. Iron ore, scrap iron, and agricultural produce are sent upstream from the Dutch frontier as far as Ruhrort, and coal and some manufactured goods in the opposite direction. Beyond Ruhrort the chief articles going upstream are coal and agricultural produce, while building materials and manufactured products move downstream. By the Dortmund-Ems canal, iron ore and food-stuffs are despatched inland, and coal and coke are sent to the coast. When this canal is connected with the Rhine, it will serve to a much greater extent than at present the whole of the Ruhr industrial region. On the Elbe large quantities of lignite, wood, and sugar are brought down from Bohemia, the sugar going to Hamburg for export, while the lignite is used by many towns along the course of the river. Of the upstream traffic, agricultural produce is the most important item. By the Mark waterways, large quantities of building material, coal, coke, and food-stuffs are brought to Berlin and its suburbs. Coal and coke are sent downstream on the Oder from the Silesian coalfield, and iron ores and food-stuffs upstream.

GENERAL CONSIDERATIONS.—A survey of the natural regions of Germany and of their economic activities shows that in some respects the geographical endowment of the country is but moderate. The soil is often infertile, and although less than 10 per cent. of the total area is actually unproductive, much of the land is devoted to crops which prove but little remunerative. On the other hand, the mineral wealth is considerable. Coal and lignite, it is true,

are imported, but chiefly to those districts which lie remote from the German coalfields, while the total exports exceed the imports. The deposits of iron ore in the Empire and in Luxemburg are the most extensive in Europe, and have gone far to make Germany the second iron and steel producing country in the world. The great supplies of salt, including potash salts, have not only stimulated the growth of the chemical industry, but have played a most important part in the development of agriculture.

Certain other factors have, however, to be taken into account when considering the recent economic advance of Germany, and of these factors some are geographical while others are not. The position of the country in Central Europe, in touch with the chief industrial areas of the continent, has given it a high degree of nodality, which has been increased by the development of the European railway system, and more especially by the construction of the Alpine tunnels, which have provided for Germany an outlet upon the Mediterranean. Moreover, some of the chief rivers of the Continent flow through German territory, and, of these, two of the most important—the Rhine and the Elbe—connect the great industrial centres of the country with that part of the North Sea upon which converges a very large proportion of the world's commerce. But perhaps the most important factor in affecting the transition from an agricultural to a manufacturing régime in Germany has been the increase in population which has taken place since 1870. In that year, it has been calculated, the country with its forty millions of inhabitants reached the limit of density beyond which it could not, at that time, go without ceasing to be self-supporting. A further increase meant either the import of food-stuffs or the emigration of the surplus population. Without colonies of their own, handicapped to some extent in North America and elsewhere by ignorance of the prevailing language, and unwilling, it may be, to cut asunder the ties which bound them to the Fatherland, the latter course presented obvious difficulties to the German people. On the other hand, their possession of coal, iron, timber, and other natural resources, rendered industrial development comparatively easy, though the existence of various manufactures in parts of the country, where these resources do not exist, shows that the movement was, in part, an artificial one. But to its success various circumstances have contributed.

Government help has not altogether been wanting. The control of the railways by the different States, and the gradual evolution of working agreements between them, have enabled a certain amount of indirect help to be given to the manufacturing interests of the Empire. Rates, for example, have been so adjusted as to favour the exportation of goods by German ports, while in certain of the more sterile parts of the country railways have been laid which private companies would find unprofitable to operate. Again, fiscal enactments have sometimes played an important rôle in the establishment of a new industry, as in the case of beet-sugar, or in the maintenance of an old one, as in the case of agriculture. But much more pregnant of result has undoubtedly been the readiness with which the Prussian people have availed themselves of the results of scientific research. The utilisation of the minette ores of Lorraine, the extraction of sugar from beet, the use of Stassfurt salts in agriculture, and the manufacture of aniline dyes, are all processes involving the practical application of scientific discoveries. Nowhere, indeed, is scientific and technical education carried further than in Germany. In addition to numerous universities, and the great technical college at Charlottenburg, there are various institutions at which specialised instruction may be obtained. For example, there are agricultural colleges at Hohenheim and Berlin, as well as a great number of agricultural and farming schools scattered over the country; forest academies at Eberswalde, Aschaffenburg, and Karlsruhe; and mining schools at Berlin, Freiberg, and Clausthal; technical training in the manufacture of textiles is given at Crefeld, Barmen, Chemnitz, and elsewhere; and there are schools for those engaged in the ceramic industries in the districts where such industries are located.

FOREIGN TRADE.—The table shown at the top of the next page indicates the general character of the foreign trade of Germany.

These figures offer an interesting addition to the general considerations discussed above. They show that the imports of Germany consist in the main of food-stuffs and raw materials, while the exports are made up very largely of manufactured goods.

Of food-stuffs, wheat, barley, coffee, eggs, maize, and oats are imported, while rye and sugar are exported. The chief imports

Live Animals	12.1	} Average value of goods imported and entered for home consumption in the years 1906-10 (in £ million).	} .5	} Average value of goods of domestic produce exported in the years 1906-10 (in £ million).	
Articles of Food	106.5				30.9
Raw materials and partly manufactured Articles	228.6				82.1
Manufactured Articles	64.6				217.5
Total	411.8				331.0

of raw material and partly manufactured goods include raw cotton, hides, raw wool, timber, copper, coal, raw silk, iron ore, chemicals, and woollen and cotton yarns, while coal and coke, hides, crude iron and steel, woollen and cotton yarns, and chemicals are the leading exports under this head. Manufactured imports consist of chemicals, leather, machinery, silks, iron and steel goods, cotton and woollen goods, jewellery, and a great variety of miscellaneous articles, while iron and steel goods, chemicals, machinery, cotton and woollen fabrics, furs, and glass make up a large part of the exports.

The following figures show the percentage of special imports and exports imported from or exported to each of the countries mentioned during the years 1906-10 :—

IMPORTS (AVERAGE FOR 1906-10)	EXPORTS (AVERAGE FOR 1906-10)
£411,800,000	£331,000,000
<i>Average Percentage</i>	<i>Average Percentage</i>
United States 15.0	United Kingdom 15.4
Russia 13.9	Austria 11.2
South America 10.7	United States 8.9
United Kingdom 9.6	Russia 7.7
Austria-Hungary 8.9	Netherlands 6.8
France 5.4	France 6.7
British India 4.6	Switzerland 6.3
Belgium 3.4	South America 5.8
Italy 3.2	Belgium 5.1
Netherlands 2.8	Italy 4.5

The United Kingdom and the United States occupy the first and second places respectively in regard to the combined import

and export trade of Germany. From the United States the principal imports are raw cotton and copper ore, but lard, fats, and petroleum also figure prominently in the list. The exports from Germany are of a somewhat miscellaneous character, but manufactured cotton and woollen goods, including hosiery and lace, toys, rubber, and potash salts are among the most important. From the United Kingdom the chief imports are coal and cotton and woollen yarns, while herrings, wool, and woollen goods occupy a secondary place. The exports include sugar, raw iron and steel, chemicals, skins and furs, leather goods, machinery, and zinc. From Russia, Germany obtains grain, timber, eggs, and furs, and sends in return rye, hides, raw cotton, coarse cotton goods, wool, and coal. Austria-Hungary exports to Germany lignite, grain, eggs, and timber, cattle and hides, and imports coal, raw cotton, wool, books, and leather. Among South American countries the Argentine and Brazil have the largest dealings with Germany. From the former linseed, wool, wheat, and hides are obtained, and from the latter coffee, rubber, and hides. In return, rails, malleable iron, and cotton and woollen goods, along with a great variety of miscellaneous articles, go to the Argentine, while to Brazil the exports are somewhat similar, except that iron and steel goods are not in such demand. The imports from France, which ranks sixth in respect to total trade, include wool, silk, wine, and iron ore, while among the principal exports to that country are furs, coal and coke, locomotives, and machinery. The Netherlands send dairy and garden produce, cattle, and fish, and take coal, rye, woollen materials, and iron and steel goods. Belgium imports coal, iron ore, and crude iron and steel from Germany, while Italy exports raw silk to that country, and India sends wool, jute, and rice.

The overseas trade of Germany is conducted through various ports, not all of which are within the country itself. Of those which are, the most important are situated near the mouths of the larger rivers. Hamburg on the Elbe, with its outport at Cuxhaven, and Bremen on the Weser, with its outports at Bremenhaven and Geestemünde, occupy the first and second places respectively, and conduct the greater part of the American trade. Emden, at the mouth of the Ems, is being developed as the port of the Ruhr industrial region. On the Baltic coast, Stettin, near the mouth of the Oder, which connects it with Berlin (to which it is the

nearest port) and with upper Silesia, holds the first place. Danzig, near the mouth of the Vistula, Königsberg on the Pregel with its outport of Pillau, and Memel at the outlet of the Kurische Haff, are the chief ports of Eastern Germany, and carry on at the same time a considerable part of the export trade of adjoining parts of Russia.

CHAPTER XI

DENMARK

DENMARK consists of the peninsula of Jutland and a number of islands lying between it and the coast of Sweden, the most important of which are Zealand, Fünen, Laaland, and Falster. The total area is 15,582 square miles and the population numbers over 2,700,000.

Denmark is in reality a continuation of the North German Plain. It is overlain by Quaternary deposits, and only in a few places, as along the west coast of Jutland, do the underlying Cretaceous rocks come to the surface. The land is generally flat, and, although the extension of the Baltic Ridge into Jutland gives the eastern part of that peninsula a more undulating appearance than the western, the height is nowhere as much as 600 feet. Even at the best the soil is poor, and along the west coast considerable areas are covered by sand dunes, heath, and bog.

CLIMATE.—Surrounded as it is by the sea on all sides, and exposed to the influence of westerly winds, Denmark enjoys a fairly temperate climate. The mean temperature for January does not fall far below freezing point, while that for July does not rise much above 60°F. The atmosphere is generally humid, as might be expected, but the mean annual precipitation amounts to only about 25 inches.

AGRICULTURE is the chief industry of the country, and gives direct employment to rather more than one-half of its inhabitants. Over 80 per cent. of the land is productive, and of that the greater part is divided into small farms which are worked by their owners. Holdings, varying in extent from 33 to 270 acres, constitute considerably over one-half of the total agricultural area. Oats, rye, and barley are the chief cereals grown, and potatoes, roots, and sugar-beet are all raised on a fairly extensive scale.

Climatic conditions and the sterility of the soil have combined to render dairy-farming of more importance than the cultivation of the land, and, with the development of the co-operative system, the butter industry has, within recent years, made such rapid progress that it is now the chief element in the agricultural economy

of the people. Co-operative dairies, of which there were in 1909 between 1,100 and 1,200, with a membership of over 150,000, collect the milk and convert it into butter under conditions much more favourable than the farmer, and more especially the small farmer, has at his disposal; and the milk from over 90 per cent. of the milch cows in the country is now dealt with in these dairies. Danish butter possesses a high reputation in Great Britain, to which practically the whole of it is sent. Since skimmed milk, a by-product of the dairy industry, can be beneficially used as a food for pigs, their number has also increased rapidly; in 1881 there were 527,000, and in 1909, 1,466,000. The bulk of the bacon is prepared in co-operative factories, of which there are between twenty and thirty in the country. The export trade in eggs, which has now assumed considerable dimensions, is also controlled by co-operative societies in whose establishments all eggs are examined before being despatched to the consumer. In explaining the success of the co-operative movement in Denmark, it ought to be noted, in the first place, that all the articles dealt with by the co-operative societies can be easily graded, and, in the second place, that they can be held back for a time (butter may be salted, and eggs preserved) if market conditions happen to be temporarily unfavourable. These facts, which have contributed greatly to the success of co-operation in Denmark, are frequently lost sight of by those who hold up the Danish system as an example to other countries. At the same time it ought to be remembered that the reputation of their dairy products is jealously guarded both by the people and the Government of Denmark.

MANUFACTURES.—As Denmark is practically without mineral wealth its manufactures have not attained more than local importance. Shipbuilding, and industries connected therewith, have grown up at several of the ports, especially Copenhagen, and agricultural machinery is made at various places. There are cement works on the west coast, where chalk and clay are both abundant; sugar is produced in the beet-growing districts; artificial manure is manufactured at many of the ports; and breweries are scattered over the country.

COMMERCE.—Butter, bacon, eggs, and live stock make up the bulk of the exports. Of each of the first three of these about 95 per cent. goes to the United Kingdom, while Germany is the principal

purchaser of live stock. The imports include large quantities of grain and feeding stuffs, oil-cake being the most important item on the list. Coal, textile goods, timber, metals, and manufactured articles of various kinds are imported. The average value of special imports for the five years 1906-10 was £32,000,000, and of special exports £24,000,000.

CHAPTER XII

SWITZERLAND

SWITZERLAND, with an area of 15,976 square miles, may be divided into three physical regions—the Alps, the Central Plateau, and the Jura—which extend across the country from south-west to north-east. The Alps, which cover about three-fifths of the whole of Switzerland, rise in places to great heights, but are penetrated by the longitudinal valleys of the Rhine, the Rhone, the Inn, and numerous other rivers, so that their topography is very varied. The Central Plateau, whose area is about one-half that of the Alpine region, has been much cut up by the rivers which flow across it, and its height ranges from 1,000 to 3,000 feet above sea-level; it consists of Tertiary sandstones generally covered by glacial deposits which frequently provide a fertile soil. The Jura, which occupies the remainder of the country, is of limestone formation, and has an average height of about 3,000 feet; it has been thrown into a great series of folds, which run nearly parallel to one another and present a serious barrier to communications.

CLIMATE.—The climatic conditions of Switzerland vary greatly with altitude, with the slope of the land from, or towards, the sun, and with the direction of the prevailing winds. The mean temperature of the plateau in January ranges from about 32°F. in the lowlands to about 26°F. in the uplands, and in July from about 68°F. in the former districts to about 62°F. in the latter. The temperature on the mountains decreases with increasing elevation, and over considerable areas snow lies throughout the year, while in the Jura the climate is somewhat more severe than at similar altitudes on the Alps. Several factors which introduce local variations, frequently of considerable economic importance, may be noted. The larger lakes exercise a modifying influence upon the winter temperatures of the land in their vicinity; the difference in mean temperatures on the two slopes of a valley, one of which faces the sun while the other looks away from it, frequently corresponds to a difference of many degrees in latitude; the Föhn winds hasten the spring in the valleys down which they blow. The precipitation varies greatly from one place to another, but over the plateau it is generally between 30 and 40 inches, while on the Alps

it is as a rule much greater, though some of the Alpine valleys are so sheltered from the rain-bearing winds that irrigation is necessary.

THE ALPINE REGION.—The cultivated area is confined to the valleys which produce cereals, fruit, and vegetables. In the Valais, which is *the valley, par excellence*, the vine is extensively cultivated, and wine is an important item in the food of the inhabitants. Pastoral farming is, nevertheless, the main occupation of the people who dwell within the Alpine zone. In the spring the cattle are driven forth from the villages in the valley, where they have spent the winter, to the "voralp" (the lowest bit of pasture above the timber-line). Later on, when the snow has melted, they are moved to the "alp" proper (the highest pasture land immediately below the limit of perpetual snow) where they spend the summer, returning to the "voralp" for a short time in the autumn before descending into the valley again for the winter. During the summer sojourn on the "alps" the cows yield rich milk from which large quantities of cheese are made for export. Other manufactures are of little importance, though it is not impossible that the increased use of water-power may lead to their development in this region in the near future. The large numbers of tourists who visit Switzerland each year provide a great deal of employment of one kind or another, and many of the Swiss hotels, in which £32,000,000 is said to be invested, are situated within the Alpine zone.

THE CENTRAL PLATEAU is the best cultivated and most densely populated part of Switzerland. Cereals are grown, but not in sufficient quantities to meet the home demand, and potatoes supply a considerable part of the food of the people, while the vine flourishes best round Lakes Geneva and Neuchâtel. The area under crops is decreasing before that under grass, partly because of the increased demand for milk for the manufacture of cheese and chocolate and for export in a condensed form.

Several causes have contributed to the growth of industrial life in Switzerland. Its origin is probably to be found in the various manufactures carried on by the people in their own homes during their spare time in the winter months. The decline of these domestic pursuits before the growth of the factory system in other countries, and the increase in the population of Switzerland itself, rendered necessary an outlet for those whom the soil was unable to support, and for whom no colonies of their own were available. Over-population

has probably ceased to be operative, as Italian labour is now employed in some of the cotton mills. The growth of industry was further fostered by the abundant supplies of water-power, of which full use has not even yet been made. The manufacture of cotton goods holds the first place in importance, the cantons principally engaged therein being Zurich, St. Gallen, Aargau, and Glarus (the last of which, indeed, belongs to the Alpine zone). Water-power is used to work most of the mills, either directly by driving turbines, or indirectly by generating electricity. Spinning is chiefly concentrated in Winterthur and the surrounding villages. Wald is noted for its muslins and the fine calico required for embroidery. Glarus manufactures bleaching and printing cloth, and is also engaged in calico printing. In St. Gallen, Appenzell, and elsewhere, embroidery is carried on both in factories and in sheds attached to the homes of the people engaged therein. Switzerland ranks next to the United States, France, and Germany in the manufacture of woven silk goods. This industry, which has settled in the cantons of Zurich and Basel, was formerly a domestic one, but has now been taken over by power-looms, the number of which has greatly increased during the last thirty years. Of other manufactures the construction of various kinds of machinery is the most important. Rüti and Horgen, both in the canton of Zurich, produce textile machines; agricultural implements are made at Frauenfeld; Geneva has a large output of dynamos; Zurich is engaged in various kinds of mechanical work. Other industries of the Central Plateau include brewing, chocolate-making, the preparation of condensed milk, and the manufacture of chemicals.

THE JURA.—On the limestone region of the Jura the soil is poor and the climate severe. Only a small area is fit for cultivation, and pastoral farming is the main support of the agricultural population. The development of watch-making, introduced in the eighteenth century, and for long carried on as a purely domestic pursuit, has proved the salvation of the region. Within recent years the industry has been partially concentrated in large factories, situated principally at Locle and Chaux-de-Fondes. In 1911 Switzerland exported over 11,000,000 watches, most of which were made in the Jura.

COMMUNICATIONS.—The development of navigation on the Rhine, between Strassburg and Basel, has, within the last few years, enabled

Switzerland to import considerable quantities of raw material such as iron, coal, and phosphates, by water, and to export some of her manufactured goods in the same way. It is hoped eventually to continue the navigable waterway as far as Lake Constance. Swiss railways are important largely because of their trans-Alpine connections. A line from Geneva by Lausanne follows the shore of Lake Geneva and the valley of the Rhone to Brig, whence it passes by the Simplon tunnel into the valley of the Rio Toce, and thus unites the railway systems of France and Italy. The railways of Western Germany meet at Basel, and from that town a line goes through Lucerne, and, by the valley of the Reuss and the St. Gothard tunnel, into the valley of the Ticino. With this latter way to Italy the Simplon route has now entered into competition, since the construction of the Lötschberg tunnel through the Bernese Oberland has opened up direct railway communication between Bern, which is connected with Basel, and Brig. With the East, communication is maintained by lines which go from Basel by the valley of the Rhine, and from Zurich by the shores of Lakes Zurich and Walenstadt and the valley of the Rhine, to Feldkirch, in the Vorarlberg, whence there is a route to Innsbruck by the Arlberg tunnel.

COMMERCE.—The imports of Switzerland include food-stuffs, raw materials, and manufactured goods, while the exports consist principally of manufactured goods. The following figures indicate the nature of the special trade for the years 1906-10 :—

	Imports (in £ millions).	Exports (in £ millions).
Raw Materials .	24·36	5·27
Food-stuffs .	18·21	5·84
Manufactured Goods	21·34	33·32
	—————	—————
	63·92	44·44

Raw silk, cotton and wool, coal, and metals make up the bulk of the raw materials imported ; food-stuffs include wheat and other cereals, live animals, wine, sugar, fruit, and vegetables ; manufactures consist largely of cotton and woollen goods, iron and steel, and machinery. Among the most important manufactures exported are cotton goods (including piece-goods, ribbons, embroidery, and lace), silk goods, watches and clocks, machinery, and cheese.

CHAPTER XIII

AUSTRIA-HUNGARY

AUSTRIA-HUNGARY consists not of a single state, but of an agglomeration of states, each of which has a geographical basis, although the country as a whole has none. The Bohemian massif, the Eastern Alps, the Danubian plains, the Carpathian mountains, and the Dinaric range are the great physical regions around which the lands of the Dual Monarchy are grouped. The Danube itself, which serves as the only connecting link between these different regions, does so only partially and imperfectly; Bohemia, for example, drains to the Elbe, Galicia and Bukovina to the Vistula and the Dniester, and the Tyrol to the Adige. In these circumstances it is better, instead of giving an account of the general geographical features of the whole Monarchy, to treat each of the parts separately.

THE EMPIRE OF AUSTRIA

BOHEMIA consists in the main of an ancient block of Archæan age, though Silurian rocks cover a wide extent of country between Pilsen and Prague. To the west and north of these Silurian rocks is a district in which the Coal Measures were deposited in a great inland lake, while in the north and north-east of Bohemia, where the ancient massif fractured and sank to a lower level, there is a large area of Cretaceous rock, in which many of the river valleys are covered with Tertiary and Quaternary material. The Mittelgebirge in the north are of volcanic origin. The mountains surrounding Bohemia, though they frequently form a serious barrier to communications, do not rise to any great height, the average elevation of the Böhmerwald, on the south-west, being about 4,000 feet, and of the Erzgebirge, on the north-west, about 2,500 feet. On the north-east are the Sudetes, the northern part of which is known as the Riesengebirge. To the south of these latter mountains lies the coal basin of Waldenburg, which extends into Silesia. On the south-east towards Moravia there is no mountain range, and the two countries are separated by a line of uplands which nowhere forms a well-defined boundary.

Climatic conditions are, on the whole, favourable to agriculture.

Especially is this the case in the north, where the elevation is lower than in the south. There is sufficient heat in summer to ripen maize and the vine, and, although the winters are cold, they are not prolonged. The rainfall varies from 20 inches, and even less in some parts of the interior, to 40 inches and more on the mountains of the north-west and south-west.

(Over one-half of the surface consists of arable land). In the south, the soils upon the Archæan rocks are generally poor and infertile, and it is interesting to note that Budweis, the only large town of the region, besides being at the meeting place of several important lines of communication, is situated where Tertiary materials have been deposited in a basin on the older rock. Except in such favoured localities rye is the prevailing crop; grazing is an important pursuit, and much of the land is still forested. In the north, on the other hand, there is much fertile soil, especially in those river valleys which are covered with recent alluvium, and which contain such districts as the "Golden Road," near Königgrätz, and the "Garden of Bohemia," near Leitmeritz; and in the volcanic areas where there are fruitful tracts of country, such as that one known as "Paradise" in the Mittelgebirge, near Teplitz. These alluvial and volcanic soils are famed for their crops of hops and sugar beet, although both are also grown within the Cretaceous area. Bohemia produces more than half the sugar manufactured within the empire, and exports a considerable amount. The chief collecting centre is Aussig, on the Elbe, whence the sugar can be sent by water to Hamburg. In the country round Saaz, fifty miles north-east of Karlsbad, is grown more than half the hop crop of Austria-Hungary. Wheat is cultivated chiefly on the Cretaceous soils, and the yield per acre is high, averaging from 28 to 30 bushels. Potatoes, which form the staple food of the inhabitants, are extensively grown on all kinds of soil.

The mineral wealth of the country is extensive. Coal is obtained at Kladno and Schlan, to the north-west, and at Rakonitz to the west, of Prague, and in the country about Pilsen. Iron ore occurs in the Palæozoic rocks between Prague and Pilsen, and is mined at Krušnáhora and at Nučic. Lignite is found along the site of ancient swamps which stretched from Aussig to the Eger. Over 40 per cent. of the lignite mined is exported, large quantities going to Germany, partly by water.

Bohemia is the most important industrial region in Austria-Hungary. The proximity of coal and iron ore has led to the development of iron foundries at Kladno and Königshof, and industrial and agricultural machinery is manufactured at Pilsen and Prague not far off, as well as at Reichenberg which is the centre of the textile region. Brewing is carried on at Pilsen and in other districts where barley and hops are both grown. Bohemia contains over half the spindles of the whole empire (estimated at 4,600,000), and these are found chiefly in the valley of the Upper Elbe in the north-east of the country, where water-power can be obtained from the Sudetic mountains. Reichenberg is engaged in spinning and weaving cotton goods; woollens are also manufactured there, and linens at Trautenau and Rumburg. Glass is made at Haida and Steinschönau in the north of the country, where quartz can be obtained from the sandstone and fuel from the forest. Karlsbad is the centre of the porcelain industry, as kaolin is found in the granitic hills in the neighbourhood. Paper mills are mostly situated near the mountains, where water-power is available.

MORAVIA.—The greater part of Moravia falls within the drainage area of the March. The west and north-west of the country belong to the Bohemian massif, but are overlaid in many places by recent alluvium. To the east of this region, and in the north of the country, there are areas of Palæozoic rocks, some of which contain iron and others coal. In the south-east, Moravia has a lower elevation and consists in the main of Tertiary and Quaternary materials. On the Archæan uplands the climate is similar to that of southern Bohemia, and, as the soil is poor, potatoes and flax are the chief crops; but in the south-east, where climatic conditions are less forbidding and the soil more fertile, cereals, especially barley, and sugar beet are grown. As in Bohemia, considerable care is devoted to the scientific improvement of existing breeds of cattle and sheep.

The mineral wealth of Moravia renders it one of the industrial regions of the empire. Coal and lignite are both obtained in a long narrow strip of country running north and south to the west of Brünn, coal at Lesitz and Ratiskowitz, and lignite at Rossitz and Oslawan. The chief coal-producing region is, however, in the north-east, around Witkowitz and Mährisch-Ostrau, where the Silesian coal basin of Prussia extends into Moravia. Iron ore is

mined at Blansko, Adamsthal, Rossitz, and Stefanau, in the Lower Palæozoic rocks near Brünn, in the Carpathians near Witkowitz, and at Zöptau in the north. Iron foundries have been established at Stefanau and Rossitz, at Witkowitz and at Zöptau. Agricultural and industrial machinery is manufactured at Brünn, Blansko, and Adamsthal. The textile industries are situated upon the coalfields, the manufacture of linen being carried on at Mistek, and that of cotton at Sternberg.

AUSTRIAN SILESIA.—The north-eastern projection of Moravia cuts into two parts the remnant of Austrian Silesia, which lies to the north of the Sudetes and Beskides. Much of the land is traversed by spurs of these mountains, and is relatively infertile, while the climate is somewhat severe. The chief agricultural products are cereals, beet, and dairy produce; and sugar refining and brewing are important industries. The mineral resources of the country are considerable. The coalfield of Prussian Silesia and north-east Moravia extends into Austrian Silesia around Polnisch-Ostrau, and; as iron ore is obtained in the neighbourhood of Teschen, not far off, various metallurgical works have been established in the eastern section of the country. The western section is the seat of an important linen industry, which is carried on at Freiwaldau, Freudenthal, and Bennisch. Woollen goods are manufactured at Jägerndorf and Engelsberg in the west, and at Bielitz in the east, and cotton goods at Friedek. Industrial and agricultural machinery is made at Troppau, Jägerndorf, Ustron, and Bielitz.

THE ALPINE COUNTRIES OF AUSTRIA.—This region includes Vorarlberg, Tyrol, Salzburg, Styria, Carinthia, and part of Carniola. The central range of the Alps becomes lower towards the east, while the limestone ranges are more developed both on the north and on the south. These limestone ranges are separated from the central range by longitudinal valleys, those of the Inn and the Enns in the north, and those of the Adige and the Drave in the south; and it is in these valleys that the cultivated land is generally found. From the climatic point of view, the whole region may be subdivided. The valleys opening towards the south have warm winters like those of Italy; those opening to the east, such as the Drave and the Save, partake of the cold, continental winters of the land towards which they look,

while the northern valleys have winters which occupy an intermediate position between the two previous types.

The Eastern Alps differ from the Western in being, on the whole, more productive. The land which is absolutely useless does not exceed one-tenth of the whole ; over four-tenths is covered with forests, and much of the remainder is suitable for grazing purposes. The climatic conditions of the valleys are reflected in their products. In those opening to the north and east cereals are grown, while in those opening to the south the mulberry and the vine find a favourable environment.

Its mineral resources constitute much of the wealth of this region. Gold was formerly obtained in the ancient rocks of the central range, but the supplies there are now exhausted. Iron is found at various places, notably at Eisenerz, in the valley of a tributary of the Enns, where half the total amount of ore produced in the empire is obtained. Iron is also mined at Werfen in Salzburg, Saualpe in Carinthia, and elsewhere. Lignite occurs in several Alpine valleys, chiefly in Styria, where it is worked at Leoben and Köflach, near Voitsberg and Eibiswald, and around Trifail and Hrastnig. The principal lead mines of the empire are at Bleiberg and Raibl in Carinthia, while copper and salt are both obtained in Salzburg, and mercury comes from Idria in Carniola.

The manufactures of the region are based to a great extent upon its mineral wealth. Among other places where iron is smelted, either by coke or by charcoal, are Eisenerz, Vordernberg, and Trofaiach in Styria, and St. Gertraud and St. Leonhard in Carinthia. Both provinces are engaged in the construction of agricultural and industrial machinery, and in the manufacture of arms. Styria is noted for its cutlery and tools, and Carinthia for its lead works. Leoben in the former province, and Klagenfurt in the latter, are important industrial towns.

The textile industries are situated chiefly in the Vorarlberg and in the Tyrol. In the Vorarlberg, the manufacture of cotton originated in the example set by Switzerland and in the presence of abundant supplies of water-power ; and, as electricity is now used in many of the mills, water-power is still of importance. The centre of the industry is at Dornbirn. There are also cotton mills in the north of the Tyrol, and silk is manufactured in the south of that province.

THE DANUBIAN DISTRICTS.—Between the Bohemian massif on the north and the Alpine countries on the south, there lies on the right bank of the Danube a flat, or gently undulating, land which forms part of the provinces of Upper and Lower Austria. The soil, which is derived from Tertiary and Quaternary materials, is generally fertile, and agriculture is extensively carried on, especially in Upper Austria. The industrial life of the region is situated in and around Vienna, which is the natural meeting-place of lines of communication from all parts of the Monarchy, and is thus able to receive both the mineral products of the western regions and the agricultural products of the eastern. Among the industries which have consequently grown up in the city, and in the neighbouring towns lying chiefly to the south of it, where water-power is abundant, are the manufacture of different kinds of iron and steel goods, spinning and weaving, brewing and milling, and a host of others. In Upper Austria the chief industrial town is Steyr, on the Enns; it is principally engaged in metallurgical work, the raw material coming from the Erzberg.

THE KARST.—The southern folds of the Eastern Alps curve round towards the south-east, and form a region to which the title of Karst, originally applied to a more limited area, has been extended. This region includes parts of Carniola and Croatia, the most of Istria, Dalmatia, and Herzegovina, and the west of Bosnia. Its distinguishing feature is the limestone of which it is almost entirely composed. This limestone has been much affected by water, and a great part of the drainage is now underground, so that, notwithstanding its heavy precipitation—frequently over 60 inches—the country suffers severely from drought. In certain places, to which the name of *polje* is given, the water comes to the surface, and, the land being rendered fertile thereby, cereals can be grown. On the poorer uplands pastoral pursuits prevail, and sheep and goats are raised in large numbers. The vine is cultivated on the richer soils near the coast, while the olive thrives on the poorer land in the interior. In some parts of Istria the mulberry is grown and the silkworm reared. Tobacco is one of the chief crops of Herzegovina.

Manufactures are, on the whole, unimportant, but Trieste, which owes its growth to the fact that it is the great Austrian port, has shipbuilding yards, oil, jute, and soap factories, and smelting works. Fiume, which belongs to Hungary and is the port of that

country, has been vigorously developed by the government and is now an important centre, with manufactures similar to those of Trieste.

BOSNIA, with the exception of the western part, which falls within the Karst, consists of Tertiary sandstones and slates, with some areas of Palæozoic rocks. Much of the land is mountainous, and forests cover half the entire area of the country. The soil in the lowlands is fertile, and cereals, especially maize, and olives, vines, mulberries, and figs flourish, but the most characteristic product of the country is the plum, which is converted into a kind of brandy, called *šljivovica*. In some of the mountains iron is found, and in the river valleys, coal. Notwithstanding the care devoted by the Austrian Government in recent years to the development of railways and highways, the country is still in a backward condition, and manufactures and industry are of little importance.

THE CARPATHIAN LANDS OF AUSTRIA.—Galicia and Bukovina lie on the outer slope of the Carpathian curve, and consist in part of the sandstone ridges of the Carpathian mountains, and in part of the lowlands which lie beyond and belong physically to the plains of Russia. The climate is accordingly more continental in character than in other parts of Austria; and the summers are hot and the winters long and severe.

In the uplands large tracts are still covered by forests, but in the lowlands the soil is generally fertile, and agriculture is extensively carried on, though by somewhat primitive methods. Cereals, leguminous plants, potatoes, and beet are all grown. There is considerable mineral wealth. Petroleum occurs in the sedimentary rocks of the Carpathian range, and is bored for at Boryslaw and elsewhere. Some of the richest petroleum fields in Europe are in this region, but they are as yet only partially known, and during the last five years have yielded on an average less than 3 per cent. of the world's total output. Salt is found along the whole length of the Carpathian curve, but the principal mines are at Wieliczka. In the west, a small part of the Silesian coalfield lies in Galicia, and coal is mined in the Cracow district.

Notwithstanding the fact that Galicia and Bukovina cover three-tenths of the land occupied by the Austrian Crown (which, of course, does not include Hungary), and that the density of their

population is a little above the average for the same area, manufactures are but slightly developed. The bulk of the people are devoted to agricultural pursuits, and such industries as there are consist mainly in the preparation for export of the raw materials produced within the country. There are distilleries (brandy being made from potatoes), sugar refineries, saw mills, flour mills, and a few other industries of a similar nature.

HUNGARY

Two great physical types—mountains and plains—are represented in the structure of Hungary. Of the former the most important are the Carpathians, which begin at the Danube, opposite the eastern extremity of the Alps, and extend in a great curve running north-east, east, south-east, and finally west, to the Iron Gates at Orsova. In some respects these mountains may be regarded as a continuation of the Alps, but it is only the sandstone ranges which are continuously developed throughout, and these do not rise to anything like the same height as the Central Alps. In places there are fragments of an older mountain system which was partly destroyed by the foundering of the region now occupied by the plains. Its remains are found in the north, where the Tatra is formed of granitic rock, and in Transylvania, where ancient rocks appear on the outer, and more especially on the inner side of the Carpathian curve. On the inner side of the curve, also, the line of fracture between the ancient rocks and the plains is marked by the appearance of volcanic outpourings. The last efforts of the Alps themselves may be distinguished in the south-west of the country, in the Bakony Forest, and in the hills of Croatia and Slavonia.

The plains represent an area of subsidence filled up by deposits in the Miocene Sea which formerly covered the region, and which, as it disappeared, left great beds of salt among the clays and sands upon its floor. The Little Plain, which has an area of 5,000 square miles, is cut off from the remainder of the Lowlands by the Bakony Forest and the southern spurs of the Carpathians, and generally consists of fertile soil. The Great Plain, which is known as the Alföld, has an area of about 37,000 square miles, and contains wide areas of loess deposited during great dust storms. Elsewhere, especially between the Theiss and the Danube, there are long rows

of sand dunes which frequently interrupt the drainage of the land. In places, also, are still to be found remains of the ancient sea—deep hollows impregnated with salt—as at Ecsed, by the side of the Kraszna, and at Sarret, along the course of the Körös.

The climate of Hungary is essentially continental in its main characteristics, even although the great plains are to some extent protected by the Carpathians from cold northerly winds. In the highlands of the north and east, the winters, which are very severe, last for about six months, and even in the plains the mean temperature is below freezing-point during the coldest season. On the other hand, the summers of the lowlands are hot, and in the south are little short of tropical. In Transylvania the winters are cold and the summers warm. The mean rainfall ranges from 20 to 25 inches on the plains to over 40 inches on the mountains; but its irregularity from year to year is a source of much trouble to the agriculturists of the Alföld. In some years the drought is so great that all vegetation is burned up, while in others large areas are inundated by floods. The years of maximum precipitation have an amount five or six times as great as the years of minimum precipitation.

The vegetation of the mountains presents a complete contrast to that of the plains. The former, with their heavy rainfall, are covered with coniferous and deciduous trees, oaks, beeches, and pines being predominant, while the latter, with their steppe climate, have also a steppe vegetation. Grasses cover the land in the early summer, but are burned up before it closes, and there are few trees except in places where their growth has been patiently fostered by man.

THE CARPATHIAN REGION.—The Carpathians are of considerable economic importance. The sandstone ridges, of which they mainly consist, are peculiarly favourable to the growth of trees, and, as scientific methods of forestry are encouraged by the State, Hungary is able to export large quantities of timber. The vine finds a favourable environment within the Carpathian curve, the most renowned wines being those which are produced in the Tokay district on the right bank of the Theiss. Hungarian vineyards, like French, suffered severely from the ravages of the phylloxera, but the disease has been overcome by grafting the shoots of the native vine upon stumps of American origin. In many places the Carpathians are

capable of cultivation, and considerable areas are cropped with cereals, but the yield per acre is generally low.

The mineral wealth of Hungary is chiefly centred within the Carpathian region, and, with the exception of coal and iron, occurs more especially in those districts where volcanic material is associated with the older sedimentary rocks, that is, in the north and in Transylvania. The precious metals do not form so large a proportion of the product as formerly. Gold, the annual output of which is increasing, is chiefly obtained in Transylvania. Silver, lead, and copper usually occur together, but the yield of silver, which is mined mainly at Selmeczbánya, is decreasing. The production of iron, on the other hand, is becoming more important. The principal deposits are embedded in the older rocks of the Transylvanian mountains, in the valley of the Cserna, a tributary of the Maros, and in the Gömör and adjacent districts to the south-east of the Tatra. The manufacture of pig-iron is not advancing at the same rate as the production of iron ore, and every year increasing quantities of the latter are sent to Silesia to be smelted there.

The most important coal mines of the country are also situated within the mountain area, where they occur in most geological formations from the Carboniferous to the Tertiary. True coal is limited in quantity, and is found mainly in the south-western part of Transylvania, and, as may be noted here, in the neighbourhood of some outliers of the Alps in western Hungary. Lignite is much more widespread, but the principal deposits are situated in the north and east of the Carpathian range. As a result of the industrial development of the country, the production of coal has increased very greatly within recent years, but it is still insufficient to meet the home demand.

THE PLAINS constitute the great agricultural region of Hungary, and over two-thirds of their area is now devoted to arable farming. Wheat, which is the most important crop, is cultivated mainly in the southern part of the Alföld, but is also grown in the north about the Carpathian foothills, and in parts of the country between the Danube and the Theiss. In the Plains the average yield is from 20 to 22 bushels per acre, and in the whole of Hungary 18 bushels; but, in obtaining the latter figure, considerable areas of relatively unproductive soil in the upland districts are included.

As a result of the climatic conditions under which it is grown, Hungarian wheat is hard and especially valuable for milling purposes. Maize ranks next in importance to wheat, and in some parts of Transylvania it occupies about one-half of the arable land, though on the plains the proportion is generally lower. Hungary is the chief maize-producing country in Europe, but the amount grown there is much less than in the United States. The greater part of the crop is devoted to feeding stock.

The production of rye is declining before the advance of wheat, and it is now cultivated mainly on the sandy soils in the west, and in some parts of the north of the country, as well as in some of the Carpathian districts. Barley and oats are grown in the uplands, and to a less extent in the lowlands. The area under beet has been widely extended within recent years, and sugar is manufactured in increasing quantities. Of other industrial plants, tobacco, flax, hemp, and hops are the most important.

In early times cattle-breeding was probably the chief pursuit of the Hungarian people, and it still holds an important place in the agricultural economy of the country, though its character has almost entirely changed. The natural pasture lands, over which the cattle formerly roamed, are rapidly decreasing in extent, while the area under fodder plants is largely on the increase. At the same time, scientific methods of breeding stock have been introduced, and the dairying industry is of growing importance.

Agriculture, which affords employment to over two-thirds of the inhabitants of Hungary, has made great progress within recent years, and in this progress the State has played a prominent part. Agricultural schools and experimental farms have been established in many parts of the country. Government help has been given to co-operative societies, more especially to those connected with the sale of agricultural produce. Colonies, in regions hitherto uncultivated, have been established, and the margin of cultivation has been steadily pushed forward. The practice of husbandry has also advanced. The rotation of crops is now common over a great part of the country instead of the old three-field system, which still, it is true, survives in places; and the proportion of land which lies fallow every year has been gradually reduced. On the other hand, nearly one-half of the agricultural area consists of small farms of from 5 to 100 acres, the holders of which do not yet seem

to have adapted themselves with much success to intensive methods of cultivation, as far, at least, as the production of wheat is concerned; while the large estates of over 1,000 acres, which occupy one-third of the agricultural domain, frequently suffer at certain times of the year from a scarcity of labour. The medium-sized farms are, unfortunately, disappearing, some being divided into small holdings, and others being absorbed by large estates.

Manufacturing industry was for long confined to supplying the more immediate wants of the people. With the great development of industry in Austria after 1866, it became evident that, if Hungary were not to become economically dependent upon her more powerful neighbour to a greater extent than was politically expedient, it would be necessary for the State to encourage the development of native manufactures. This encouragement took the form of freeing from taxation for a number of years certain groups of industries. The law of 1907, for example, provides that for fifteen years new industrial enterprises manufacturing goods not hitherto manufactured in Hungary, or only manufactured in insufficient quantities, are to be exempted from a variety of taxes and tolls; it also provides that desirable enterprises may be subsidised by the State. It is yet too early to estimate the beneficial effects of this policy, but it has undoubtedly been of value.

The most important industry of the Plains at the present time is flour-milling, which has its centre at Budapest, and is based upon the large wheat production of the country. Sugar is manufactured mainly in the districts in which the sugar-beet is grown. Among other industries, carried on to a greater or less extent, are distilling and brewing, the manufacture of pottery and glass, the preparation of tobacco, and different branches of the chemical industry. The manufacture of textiles is still in an undeveloped condition.

CROATIA-SLAVONIA is mountainous in the west, lowland in the east. The greater part of the mountainous region falls within the Karst country, which has already been described; but in the north, the uplands are somewhat more fertile. In the lowlands, where climatic conditions and soil are similar to those of the plains of Hungary, cereals, especially maize, are grown. The vineyards, which are numerous, suffered severely from the phylloxera, as elsewhere, but are beginning to recover. Plums are grown everywhere, and are either distilled for brandy or dried for prunes.

Horse-breeding, pig-raising, and bee-keeping are all important pursuits. These varied occupations give employment to the mass of the people, but agricultural methods, although they have made considerable progress within recent years, are still somewhat backward, and the land does not yield what it might under more favourable conditions.

The manufactures which exist are chiefly concerned with working up the agricultural produce of the country; distilleries and breweries, flour mills, and silk and tobacco factories are widely distributed. Agram, Esseg, and Semlin are among the most important industrial towns.

COMMUNICATIONS.—The navigable waterways of Austria-Hungary belong mainly to the Danubian system. The Danube itself, since its course has been regularised and the obstructions at the Iron Gates removed, is the most frequented of these waterways, but its importance is lessened by the fact that it leads, not directly to the open ocean, but to a sea of relatively little commercial importance. As there is considerable trade, however, between the industrial regions of Austria and the agricultural regions of Hungary, the river is much used by both countries. Of its tributaries, the Drave and the Save open up routes from the Danube to the Adriatic, and Esseg on the former and Sissek on the latter are large river ports. The Theiss, having been canalised in places and brought under a certain amount of control, is navigable for the greater part of its course. The rivers of the Alpine region are floatable rather than navigable, but considerable quantities of wood are brought to the lowlands by them. The Moldau-Elbe is the great waterway of Bohemia, and is of special value for trade with Germany. At present it is only open to steamboats as far as Melnik, but the improvement of the Moldau to permit steam navigation as far as Prague is being rapidly pushed forward. Among other schemes under consideration for improving the Austrian waterways are projects for connecting the Danube with the Elbe, the Oder, and the Vistula by a series of canals.

Austria has 14,000 miles of railway, and Hungary 13,000, and their respective capitals are the two most important railway centres in Austria-Hungary. The Orient Express route traverses the Monarchy from Linz to Semlin, following in general the course of the Danube and passing through Vienna, Pressburg, Budapest,

and Peterwardein. From Vienna a line runs to Prague, which is the meeting place of routes from Southern Germany by the Gate of Furth, from Central Germany by the passes round the Fichtelgebirge, and from Northern Germany by the valley of the Elbe between the Erzgebirge and the Riesengebirge. Another line from Vienna follows the course of the March, and, after entering the valley of the Oder, passes through the Moravian Gate between the Sudetes and the Carpathians; it then goes, by Cracow and Lemberg, through Galicia and Bukovina, finally terminating at Odessa. The most important route from Vienna to the Adriatic runs south-west from the Austrian capital, crosses the Semmering pass, follows the Mürz-thal to Bruck, then the Mur-thal to Unzmarkt, passes into the valley of the Drave near Villach, and, after tunnelling through the Karawanken and Julian Alps, descends the Isonzo to Trieste. Two important railways follow the longitudinal valleys of the Alps—one, branching off near Bruck from the Semmering route, utilises the valleys of the Enns, the Salzach, and the Inn, and some of their tributaries to reach Innsbruck, and, after passing through the Arlberg in a tunnel over six miles in length, arrives in Switzerland; the other runs from Villach along the Drave-thal and the Puster-thal, and joins the route from Innsbruck to Verona by way of the Wipp-thal, the Brenner pass, and the valleys of the Eisak and the Etsch. These two longitudinal lines have now been joined by a railway which passes by a tunnel over five miles long through the Hohe Tauern, and forms part of the shortest route from Salzburg and south-west Germany to Trieste.

The development of Hungarian railways is largely the result of the national policy pursued in recent years by the Hungarian Government, and the country has now, on the whole, a fairly good network of communications. The zone system is, however, in operation, and is for political purposes worked in favour of direct communication with Budapest, so that, while radial movement is easy, cross-country traffic frequently finds many obstacles placed in its way.

Among the more important lines from Budapest are those which cross the Carpathians to Cracow, Lemberg, and Bukarest; and the Karst to Fiume. Budapest also has direct communication by Sarajevo with Uvac on the frontier of Bosnia and Novi-Bazar, and Vienna will be similarly connected when the line from Agram

to Sarajevo is completed. It is proposed to continue the railway from Uvac through Novi-Bazar to Mitrovica and thus open up a new route to Saloniki and Constantinople.

COMMERCE.—For the five years, 1906-10, the value of the goods imported for consumption in the monarchy averaged £107,000,000. For the same period the average value of the exports from the country itself was £98,000,000. Among the chief imports are cotton from the United States, India, and Egypt, wool from different parts of the world, coal partly from Great Britain but mainly from Germany, cotton yarn from Great Britain, and machinery largely from Germany. Of the exports, sugar and eggs are sent in large quantities to the United Kingdom, lignite and oil find their chief foreign markets in Germany, cattle go to Germany and Italy, and wood to Italy and the Mediterranean countries. Hungarian wheat is consumed largely in Austria, but some is sent to Great Britain. Austria-Hungary now imports more wheat than she exports.

In the foreign trade of Austria-Hungary Germany holds the first place, both with regard to exports and imports, as she takes over two-fifths of the former, and supplies nearly two-fifths of the latter. The United States and the United Kingdom rank second and third as importers, and the United Kingdom and Italy as exporters.

The chief ports are Trieste and Fiume, but their trade is principally with the Levant and the East, and a great part of the overseas commerce of Austria-Hungary is transacted through German ports. American cotton, for example, is imported through Bremen, while sugar for the United Kingdom is dispatched through Hamburg.

CHAPTER XIV

ROUMANIA¹

IN Roumania, several distinct physical regions may be recognised. The outer slopes of the great south-eastern curve of the Carpathians lie within the country, and fall away to a belt of foothills which gradually broadens out as it approaches the Danube. To the east of this belt, in the northern part of the country, lies the plateau of Moldavia, which has an average height of about 900 feet, and is bounded by the Sereth and the Moldau on the west, and by the Pruth on the east; while in the south, between the foothills and the Danube, stretches the great Wallachian plain, which is almost everywhere perfectly level. Beyond the Danube, and bordered by it on the west and north, lies the Dobrudja, which is hilly in the north, marshy in the east, and a plateau in the south. Part of the foothills, and most of the Moldavian plateau and the Wallachian plain, are covered with deposits of loess, to which additional fertility seems to have been imparted, as in the black soils of Russia, by the secular decay of steppe vegetation. The climate is, on the whole, continental in character, and the summers are very hot, while the winters are cold. The annual precipitation is about 20 inches.

THE CARPATHIANS are forest-clad to a height of over 5,000 feet. On the lower slopes the beech is the prevailing tree; but, further up, it gives place to coniferous trees, such as the fir and the spruce. Minerals are probably to be found within the region, but, so far, little has been done to exploit them.

THE FOOTHILLS contain considerable areas of forest where the principal trees are the oak, the beech, the plane, and the ash. The loess-covered districts are generally cultivated, and produce large crops of maize, which is the staple food of the Roumanian people. Fruits, such as grapes and prunes, are also extensively grown.

In the Tertiary rocks of the region, especially in the south-east, there are large deposits of petroleum and salt. The output of the first of these, which is obtained mainly in the vicinity of Prahova, has greatly increased within recent years, and now amounts to over 3 per cent. of the world's supply. From the

¹ See note on page 161.

residuum left after distillation, a valuable fuel is obtained for use on the railways. Coal of a lignitic character is found in the south.

There are few manufactures in this region. The timber industry is of some importance, as the mountain streams provide power, and the means by which sawn timber can be floated down to the plains. Glass is also manufactured, as fuel and carbonate of potassium from wood-ash can both be easily obtained.

THE MOLDAVIAN PLATEAU.—Rather less than one-half of this region is devoted to agriculture, the principal crops being maize and wheat. Oats and forage plants are also grown, and considerable areas are devoted to pastoral pursuits. As there are large mixed forests in places, the timber and glass industries are carried on as in the previous region. Jassy, the capital, and Botosani in the extreme north, are the chief towns.

THE WALLACHIAN PLAIN, except in the north where oak-woods are found, is a true steppe-land. Much of it is now devoted to agriculture, and it is the chief wheat-producing region in the country, more than half of the total acreage under that cereal being found within it. Maize comes next in importance, and covers considerable areas. With the progress of agriculture, stock-raising has declined in importance, but large numbers of horses are still reared. The region, which is the most densely populated in the country, contains several important towns, including Bukarest, the capital of the kingdom, situated in the middle of the plain; Craiova, the chief town in the west; and Galatz and Braila, both grain-exporting cities, on the left bank of the Danube. In each of these there are numerous small manufacturing establishments.

THE DOBRUDJA does not offer much fertile soil, and agriculture is mainly confined to the plateau in the south, where oats and barley are grown. Flax is also cultivated and large numbers of horses are reared. Constanta is the chief port of Roumania on the Black Sea.

GENERAL CONSIDERATIONS.—It is obvious from the above survey that the great majority of the Roumanian people depend upon agriculture for their livelihood. Over 40 per cent. of the land is cultivated, and of that about 42 per cent. is in the hands of 1,000,000 smallholders, each of whom owns less than 25 acres; while 38 per cent. belongs to 1,600 large proprietors, who each possess more than 1,000 acres. The smallholders suffer from the

fact that, under the methods of extensive farming which still prevail, their farms do not yield sufficient to maintain them in those years when, owing to drought or other causes, the crops are below the average. On the large farms, on the other hand, more modern methods of husbandry have generally been adopted, and the yield per acre is, as a rule, above the average for the whole country.

CHAPTER XV

THE BALKAN STATES¹

THE topographical features of the region which is known as the Balkan Peninsula are very irregular. On the west, the Dinaric Mountains, which are formed by a continuation of the Alpine fold, run from the Austrian lands on the Adriatic, south-east and south through Montenegro and Albania into Greece. These mountains, which consist of numerous parallel ranges, are formed of limestone, which has in places, and especially in Greece, been affected by metamorphic action. Their average height is over 4,000 feet, and they present considerable barriers to communication, as they have been deeply cut into by rivers, which generally follow the direction of the folds. In the north-east of the Peninsula are the Balkan Mountains, which continue the fold lines of the Carpathians. From the Danube, they strike southwards, with an average height of 1,000 feet, and then curve round towards the east, where, for a considerable distance, they run with an average height of 5,000 to 6,000 feet. In the first part of their course they consist of crystalline rock, but further east they appear to be mainly sedimentary. Between the Dinaric range and the Balkans lies the ancient crystalline mass of the Thracio-Macedonian region, the topography of which is very irregular. It contains high mountain masses like the Shardagh and the Rhodope, open highlands like those of Old Servia and Macedonia, enclosed lake basins like Monastir, river valleys like those of the Vardar and the Struma, and large plains like Thessaly and Thrace. The rivers can best be spoken of in connection with communications in determining the main lines of which they play an important part.

BULGARIA

Bulgaria has an area of 33,600 square miles, and a population estimated, in 1910, at 4,337,000. The Balkan range divides the country into two parts. To the north of it lies the Bulgarian plateau, which is built up of Secondary material—sandstones and limestones overlaid in places by loess—and is deeply dissected by

¹ See note to page 161.

the rivers which flow northwards from the mountains to the Danube ; while to the south there is the region of Eastern Roumelia, which is more irregular in form, and contains much fertile soil in the valleys which separate the Balkans from the Anti-Balkans, and both from the Rilo-Rhodope section of the Thracio-Macedonian massif. Climatic conditions differ in these two divisions of the country, but in both are more or less continental. To the south of the Balkans the region is more sheltered than in the north, and the temperature is higher, especially in the winter months. The rainfall generally varies between 20 and 30 inches.

Agriculture is the chief pursuit of the inhabitants. About 36 per cent. of the total area of the country is cultivated (including meadow land which amounts to about 4 per cent. of the total cultivated area), over 10 per cent. is pasture land, and nearly 30 per cent. forest land. About 40 per cent. of the land is held as private property and about 24 per cent. as parish property (or, altogether, about 84 per cent. of the area which can be utilised). The bulk of the holdings, which are in the hands of their owners, are of less than 100 acres in extent. Of the land which is cultivated, about three-fourths is devoted to cereals, wheat yielding the largest crop, and maize and barley occupying the second and third places respectively. Rice is confined to the south. The principal industrial plants are tobacco, roses, and beetroot. Tobacco is grown mainly in the south, and is used chiefly for home consumption ; roses, which are cultivated entirely for the manufacture of attar of roses, are found exclusively in the provinces of Philippopolis and Stara-Zagora in Eastern Roumelia ; beetroot is chiefly cultivated near Sofia. Cattle and sheep are raised in considerable numbers, and forage ranks next in importance to cereals ; some attention is also now being paid to the improvement of stock. The forest lands are of considerable importance. In the lowlands, and on the lower slopes of the hills, the principal trees are oaks ; above these, to a height of about 4,000 feet, is a belt where the beech flourishes, as well as the ash and the plane ; the higher parts of the hills are covered with pine and spruce. The parishes own over one-half of the forest lands, chiefly on the lower hill slopes in the west and south of the country ; and one-third, mainly in the mountainous districts, is in the hands of the State, while the remainder is scattered over the lowlands, and belongs to private individuals.

Within recent years, attempts have been made to improve the economy of the forests. The mineral wealth of the country is as yet but little known, and, though numerous concessions for the working of various minerals have been granted, lignite from a State-owned mine, 16 miles south-east of Pernik, is the most important product at present.

Manufactures are of comparatively little importance. The old handicrafts, which were carried on in the homes of the people, have declined in importance with the admission of foreign goods, while modern manufactures have only been partially established. The weaving of woollen fabrics and a few other industries are chiefly carried on in regions where water-power is obtainable, though electric motors are now being used in places.

The chief exports of the country are wheat and maize, which constitute about one-half of the total exports. With eggs, oats, rye, barley, attar of roses, sheep's and lambs' wool, and silkworm cocoons, they make up over 75 per cent. of the total exports. The imports consist, in the main, of textiles, metals, and machinery.

Austria-Hungary, Germany, and the United Kingdom are the chief importing countries. The bulk of the exports go to Turkey, Belgium, Germany, and Austria.

SERVIA

Servia has an area of 18,650 square miles, and a population of about 2,900,000. The greater part of the country is mountainous; in the west and in the south are the ancient formations of the Thracio-Macedonian region, while, in the Balkan districts of the east, ranges of crystalline rock alternate with broad plateaus of limestone. Only in the north, near Belgrade, is there any considerable area of lowland.

Agriculture, in one form or another, is the principal occupation of the Servian people. Arable farming is practised mainly in the low-lying districts of the north, and in the valleys of the rivers, more especially in those of the Morava and its tributary, the Western Morava. Maize and wheat are the principal products; the first of these constitutes the staple food of the population and is also used for fattening swine, while the second is largely exported. Climatic conditions favour the cultivation of fruit, and vines and plums are both extensively grown. From the former,

a good wine is obtained; and the latter are either converted into plum brandy, the national drink of the Servians, or exported as prunes. In the oak forests, which cover considerable areas in the upland districts, large numbers of pigs find a ready supply of food, and sheep and cattle are also raised. The timber resources of the country, derived mainly from oak and beech forests, are considerable, though their value has been considerably reduced as a result of the reckless exploitation to which they have been subjected.

Mineral wealth is believed to be abundant, but little has been done to develop it. Coal, mostly of a lignitic character, is worked in the north of the country and elsewhere, but the output is not large. Copper, lead, and zinc are also obtained in small quantities, and other minerals are known to exist. Manufactures are of little importance.

The economic development of Servia has, as yet, hardly begun. It is true that there is little real poverty in the country, as practically every peasant occupies a small holding, of which he is the proprietor; but he is far from being a good farmer, as his agricultural methods are primitive, and full advantage is not taken of the fertility of the soil. The exploitation of minerals is handicapped, not only by the absence of good means of communication, but by the want of capital within the country itself, and by the disturbed political conditions which have hitherto prevented its free flow from without. The geographical situation of Servia, moreover, compels it to look to Austria-Hungary for a market for the cereals, cattle, and pigs, which are its chief exports; but tariff wars with its more powerful neighbour have seriously crippled its trade within recent years. An outlet in the Adriatic has become for Servia a matter of urgent necessity.

TURKEY IN EUROPE

The European part of the Turkish Empire has an area of 104,000 square miles and a population which numbers slightly over 8,000,000. The physical and political divisions to some extent correspond; Albania belongs to the Dinaric range; Old Servia and Macedonia form part of the old mountain system known as the Thraco-Macedonian; and Thrace consists, in the main, of the plains of Eastern Turkey.

ALBANIA is, as a rule, mountainous throughout, but, while the north is rugged and bare, the south is generally covered with oak woods, and contains considerable areas of land fit for cultivation. The inhabitants are among the least civilised people in Europe, and find a much greater interest in fighting with one another, or in raiding their more prosperous neighbours, than in any branch of economic activity. Sheep and goats are reared in large numbers in the north of the country; while, in the south, maize and other cereals are grown in the lowlands, and olives near the coast. Minerals are said to be abundant, but, owing to the undeveloped state of communications, are practically unworked.

THE THRACO-MACEDONIAN REGION.—Encircled by the hills which cover so large a part of this region, there are many fertile plains, such as those of Monastir and Uskub, Drama, Serres, and Saloniki. Much of the soil could, under good management, be rendered productive, but under the existing régime little has been done for its amelioration. Saloniki is the centre of a district in which cotton and vines are cultivated; Drama and Kavalla are noted for the best tobacco grown in Europe; the silkworm is raised round Ghevgheli; grain is the chief product of Monastir and Uskub. Among other agricultural products of the region are opium, sesame, eggs, fennel, and beans. The mineral wealth of Macedonia is said to be abundant, but its extent is almost entirely unknown. Chrome and manganese have been worked, but the exports suffer from the lack of good communication with the coast, and the competition of the mines of New Caledonia. There are few manufactures in the region; but in and around Saloniki cotton yarn is spun, much of the raw material employed, however, coming from abroad.

THE BASIN OF ADRIANOPLE includes the remainder of European Turkey, with the exception of the low Istranja hills which lie along the coast of the Black Sea, their continuation along the Sea of Marmora, and the plutonic promontory upon which Constantinople stands. Owing to its steppe-like character much of the plain is given up to pastoral pursuits, and cheese (made from sheep's milk) is one of the principal products of the region, although cereals are also grown. In the north, where a certain amount of shelter is provided by the hills, there are vineyards and rose gardens; and Adrianople and Kirk-Kilisse are engaged in

the production of wine, much of which is exported for blending purposes. In the fertile valley of the Maritza the mulberry tree is cultivated and the silkworm reared, but most of the cocoons are sent to Italy. Tobacco is grown in the west round Xanthi, and garden produce in the vicinity of Constantinople.

Adrianople, situated at the confluence of the Maritza with its tributary the Tundja, is an important centre, and might be greatly developed were a little trouble taken to render navigable the river upon which it stands. Constantinople, at the crossing place of routes which connect the Black Sea with the Mediterranean, and Europe with Asia, has always been one of the great nodal points of the world, and it will probably gain in importance by the construction of railways in Western Asia.

GREECE

The Kingdom of Greece has an area of 25,000 square miles and a population of 2,630,000. The country is mountainous almost throughout its whole extent. The Dinaric range runs through the west of Northern and Central Greece, and occupies the greater part of the Morea, while the Ionian Isles also belong to it. In the north-east, mountains of the Thraco-Macedonian system encircle the plain of Thessaly, the largest lowland area in the country. Elsewhere the plains are generally of small extent, and are surrounded by the mountains among which they lie. The climate is typically Mediterranean. The mean temperature for January ranges from 45° F. to 50° F. and for July from 75° F. to 80° F. The rainfall, which occurs during the winter half of the year, averages between 20 and 30 inches. In a country so irregular in its topography as Greece, a division into natural regions would involve great detail; and it will suffice here to note some of the more important areas into which the country is divided.

THE PLAINS OF THESSALY form the chief agricultural region of Greece, but much of the land, though fertile, is as yet uncultivated. The principal crops include wheat, barley and maize, tobacco, olives, and cotton. Of these, wheat holds the first place in importance; but Greece has still to import considerable quantities of that cereal, though it is possible that Thessaly may yet become its granary. Tobacco ranks next to wheat in the value of the output, and is largely exported to Egypt to meet the demands of the cigarette

industry. The cultivation of cotton is increasing, but the amount produced is inconsiderable. Volo is the chief port of the region.

CENTRAL GREECE contains numerous fertile districts, though most of them are but indifferently cultivated. The drained basin of Lake Kopais forms the largest lowland area in the region; and there, and in several fertile and well-watered plains of Bœotia, cotton is extensively cultivated, while other crops include cereals, olives, vines, and tobacco. Sheep, goats, and pigs are raised in large numbers in the upland districts. At Laurium, in Attica, lead, iron, and zinc are obtained, but the mines do not appear to be so productive as formerly. Further to the north, white and blue marble is obtained in the quarries of Pentelikon. The large island of Eubœa, off the east coast, is principally noted for the wine which it produces; but it also exports marble, magnesia, and carbonate of magnesia. Piræus, about six miles from Athens, is the chief port of Greece, and has spinning, weaving, and engineering establishments.

THE MOREA is, above all, noted for its currants, which are grown mainly on its north and west coasts. Owing to increased production and the fiscal legislation of other countries—notably France and Russia—prices fell seriously some years ago, and the output is now restricted; but whether this will afford more than temporary relief remains to be seen. Among the other agricultural products of the Morea are olives, wine, tobacco, and valonia.

THE IONIAN ISLES include Corfu, Zante, and Cephalonia. Corfu exports olive oil, and Zante and Cephalonia currants.

THE CYCLADES.—Several of the islands export fruit and wine; iron-ore is obtained in Seriphos; emery in Naxos; and volcanic cement in Santorin.

COMMERCE.—The chief exports are currants, minerals, wine, and olive oil; while the imports consist mainly of food-stuffs, textiles, coal, timber, and machinery. The bulk of the exports go to the United Kingdom, Austria-Hungary, France, and Germany; and the United Kingdom, Russia, Austria-Hungary, Turkey, Germany, and France are the chief importing countries. The total value of the trade does not exceed £10,000,000.

COMMUNICATIONS IN THE BALKAN PENINSULA.—The development of communications has been greatly hampered by the mountainous character of the country. There are few good roads; and,

with the exception of the Danube and the Save, the rivers are of little use for navigation. The most important railway is that which follows what is known as the "diagonal furrow" for the greater part of the way from Belgrade to Constantinople; it ascends the valley of the Morava to Nish, and then that of its tributary the Nishava, after which it passes through the basin of Sofia and descends the valley of the Maritza, in which it continues till it has passed some distance south of Adrianople, when it turns to the east and runs across the Thracian plain to Constantinople. From Nish another line continues up the valley of the Morava, crosses over by Uskub into that of the Vardar, and descends to the coast at Saloniki. Saloniki is connected with Constantinople and with Monastir, and Uskub with Mitrovica on the frontier of Novi-Bazar. Bulgaria is placed in communication with its ports on the Black Sea by two lines, one of which runs from Sofia, across the Balkans by the valley of the Isker, and eastwards to Varna, while the other connects Philippopolis with Burgas. In Greece, the most important railway is that which runs north from Athens by way of Larissa to Karalik-Derven on the Turkish frontier. A line from Karalik-Derven to Gida on the Saloniki-Monastir route would link up Greece with the European railway system.

Chapters XIV and XV were in page proof before the readjustment of boundaries following the recent Balkan war could be regarded as permanent, and they are therefore left in their original form. Albania is now recognised as an independent State, and the greater part of Macedonia has been divided between Servia, Greece, and Bulgaria. Roumania has annexed a small part of Bulgaria.

CHAPTER XVI

ITALY

A GLANCE at the map of Italy shows three great physical regions standing in marked contrast to one another. The zone of Alpine mountains surrounds the country on the north; the Apennines constitute the backbone of peninsular Italy; and the plains of the Po form a lowland area enclosed, except on the east, by the adjacent highlands.

The southern or Italian slope of the Alps differs in several respects from the northern. The descent is much more abrupt, and in the west the outer rocks are entirely wanting. Further east the limestone appears, but nowhere is it so fully developed as on the northern slope. Many of the rivers are transverse as they issue on to the plain, but within the mountains there are numerous longitudinal valleys, of which that of the Adda is the most important. The morainal material brought down by Alpine glaciers has built up between the mountains and the plains a belt of hills, which in many cases has dammed the river courses and caused the formation of lakes.

The plains of the Po were formerly occupied by a branch of the Adriatic, which gave place to solid land, partly as a result of the deposition in it of the débris carried down by Alpine and Apennine glaciers and streams, and partly as a result of the upheaval of its bed. The surface of the region is thus composed of Quaternary material and is generally level. Even at the present time the work of the rivers in building up the plain has not ceased, and around the mouths of the Po the land is gaining at the expense of the sea.

The Ligurian Alps are considered to end, and the Apennines to begin, at the Collo dell' Altare, west of Savona. From that pass the Apennines pursue their course throughout the whole length of the peninsula, crossing over to the east coast at Ancona, and returning to the west in Calabria. They do not form a simple anticlinal fold, but consist of a series of folded ranges. In Liguria and Emilia in the north, where they are built up of clays and other material of Tertiary age, the general trend of the ranges is

to the south-east, and each fold in turn loses its height towards that direction, while its function as a watershed is taken over by the range lying immediately to the east. On the west the rivers are generally longitudinal, flowing in synclinal valleys, and thus facilitating communications, while on the east they are, as a rule, transverse. The Central Apennines of Umbria and the Marches in the north, and the Abruzzi in the south, also exhibit a folded formation, but in a less marked degree than in the north. The rocks of which they consist are largely of Jurassic and Cretaceous origin, and the scenery is bolder and wilder than it is on the Tertiary clays, while in places the characteristics of a Karst region prevail. The southern Apennines are distinguished rather by their broken and irregular features than by folding. They fall into two divisions: the Neapolitan and the Calabrian. The former are built up of Triassic and Tertiary rocks, while the latter consist in part of Tertiary rocks, and in part of the mountainous regions of Sila and Aspromonte, fragments of the ancient Archæan land mass of Tyrrhenia. Of this land mass, Sardinia and parts of Sicily, Elba, Tuscany, and Calabria are now the only remains.

On the west coast, between the Apennines and the Tyrrhenian Sea, there is a region of comparatively low elevation, built up in various ways. In Tuscany, in the north, are fragments of the Tyrrhenian block already mentioned. Further south, along the zone of fracture, there are volcanic districts such as the Alban Hills, and the Phlegræan Fields with the active cone of Vesuvius. The plains of Rome and Campania consist in the main of volcanic débris, which was originally deposited on the floor of the ocean, and subsequently raised above sea level; but the lower basins of the Arno, the Tiber, and some smaller rivers, are covered with alluvium brought down from the Apennines.

On the east coast, there extends from the river Fortore to the Gulf of Taranto the province of Apulia, a low-lying plateau with an average height of about 600 feet. Tertiary rocks prevail except in the Murge where Cretaceous formations, frequently covered with loess, reach an elevation of over 2,000 feet.

The climate of Italy presents several features of interest. The temperature is affected by the modifying influence of the sea, and by the protection from cold northerly winds afforded by the Alps, and in a less degree by the Apennines. In the Alps, of course,

temperature decreases with altitude, but many of the sheltered valleys have mild winters ; milder, indeed, than those of the plains. The latter, being cut off from the westerly winds by the surrounding mountains, have a range between summer and winter almost continental in character ; the average temperature for January being about 34° F., and for July about 74° F. In peninsular Italy, where the influence of the sea is felt to a greater extent, the January temperature is higher and varies from 40° F. in the interior and about 41° F. on the Adriatic to about 45° F. on the Tyrrhenian coast, while the average July temperature over the whole region is from 74° F. to 76° F.

The rainfall occurs mainly in the winter half of the year. In South Italy the summers are rainless, but further north the distinction between summer and winter is less marked, and in the northern parts of the plains of the Po the rainfall is fairly evenly distributed throughout the year. On the Alps and on the Alpine borderland the annual precipitation varies from 40 to 60 inches, while on the Ligurian coast, on the Northern Apennines, and over a district lying to the south of Rome, it exceeds 40 inches. Elsewhere it varies from 30 to 40 inches, except in Apulia and Sardinia, where it is generally between 20 and 30 inches.

THE ALPINE ZONE.—In this region economic activity is limited almost entirely to the valleys and the lower slopes of the surrounding hills, where climatic conditions are generally favourable to the cultivation of the olive and the vine. The Valtellina (the valley of the Adda) especially is noted for its red wine. Mulberries grow in the more favoured localities, and figs and pomegranates are also cultivated. On the higher slopes pastoral farming alone is possible. A certain amount of industrial development has taken place within recent years. Iron ore is found in the Dora Baltea, the Val Trompia, and elsewhere, and is smelted either by charcoal derived from the forests, or electric power derived from the rivers. The textile industries which have developed in the valleys may best be considered along with those of the plains to which they really belong.

THE PLAINS OF THE PO.—This region contains over 40 per cent. of the inhabitants of Italy, and is, both agriculturally and industrially, the most important in the country. The soil is generally productive, though the conditions under which it can be cultivated vary from

place to place. Near the foothills of the Alps, where glacial gravels cover much of the surface, the land does not easily lend itself to arable farming, and considerable areas are kept permanently in grass. This is also the case in the districts which lie in the lee of the Apennines to the south of the Po. West of Mantua, irrigation from the Po and its tributaries is extensively practised, but to the east of that town drainage frequently becomes more important than irrigation, owing to the seepage from the rivers, whose beds are continually being raised above the level of the surrounding country.

The chief cereals grown are rice and maize. The former is cultivated on the irrigated lands between Alessandria and Milan, and in the swampy districts near the mouth of the Po. Italy is the only European country in which rice is grown to any extent, and there is a large home demand for it, a demand, however, which is partly met by importation from abroad, much of the Italian product, on account of its superior quality, finding a more profitable market elsewhere. Maize is one of the most important food-stuffs of Italy, and can best be grown on the irrigated lands of this region, where the necessary amount of moisture can be obtained. Much of it is made into polenta, the favourite food of the inhabitants of North Italy. On the grasslands large herds of cattle are pastured, and such well-known cheeses as Gorgonzola and Parmesan are manufactured.

The winters are too cold to allow the olive to flourish, but the mulberry is extensively grown, and over three-fourths of the raw silk produced in Italy comes from this region, more especially from Piedmont and Lombardy. It is said that sufficient care is not devoted to the rearing of the silkworm, and that the product is beginning to suffer.

Various circumstances combined to foster the great industrial development of the north. For the manufacture of silk there was the initial advantage of a large supply of raw material. Textile pursuits generally were encouraged, both by the example set by the neighbouring countries of France and Switzerland, and by French and Swiss operatives who emigrated to Italy, taking with them a knowledge of their craft. From the densely populated plains of the Po a large supply of cheap labour was readily obtainable. The absence of coal has, no doubt, been a serious drawback, for, although it can easily be imported, the expense is considerable.

On the other hand, the large supplies of water-power available from the Alpine rivers have been extensively utilised during the last ten years for the generation of electricity. For example, the station at Paderno, on the Adda, supplies Milan and Monza; while those at Vizzola, on the Ticino, and at Campocologno, on the Brusio (in Switzerland), a tributary of the Adda, provide electric energy for an important industrial area between Gallarate and Milan.

The plain of the Po is naturally the most important region in the country for the manufacture of silk, and 90 per cent. of the Italian output is produced there and in the neighbouring Alpine valleys. Lombardy alone accounts for 60 per cent. of the total product, the chief towns engaged in the industry being Como, Milan, and Bergamo. Formerly, the Italians confined themselves to the spinning and throwing of silk, and the thread was sent abroad to be woven, but recently large weaving establishments have been set up within the country itself, especially at Como and Milan. The continued progress of the industry necessitates the importation of an increasing amount of raw material from the Levant and the Far East, as the production of raw silk in Italy itself is growing but slowly. The quantity imported has trebled during the last twenty years, and now amounts to over one-fifth of the total quantity manufactured. Milan is the centre for the collection and distribution of silk in Italy, and has of late years entirely surpassed Lyons as the chief silk market in Europe.

While the silk industry has considerable natural facilities in the proximity of large supplies of raw material, the cotton industry, with which it may be compared, is without any such advantage, the production of raw cotton in Italy being negligible. Until 1887, Italy imported large quantities of cotton goods, but, when a highly protective tariff was imposed in that year, many of those Swiss manufacturers who had hitherto supplied the Italian market built additional mills in Italy, and thus gave a great impetus to the industry in that country. With the lapse of time the proportion of Swiss-owned to Italian-owned mills has fallen, and the cotton industry may now be regarded as naturalised. At present there are about 4,500,000 spindles and 110,000 power-looms in the country, and these are chiefly found in the region under consideration, more especially in Lombardy and Piedmont, where electric

power is frequently used for driving the machinery. The greater part of the raw material consumed in the mills comes from the United States, the remainder being supplied by India and Egypt. The yarns which are produced tend on the whole to be coarse, but the quality is steadily improving; while woven goods, besides supplying almost entirely the home demand, find a ready market in the Levant and in South America, where the large Italian population in Brazil and the Argentine prefers to have materials of a kind to which it has been accustomed.

Woollen goods are in considerable demand in North Italy, as the winters are cold; and they are manufactured in various places, but more especially at Biella in Novara, where over 25,000 people are engaged in the industry. A considerable amount of cotton is, however, used along with the wool in the manufactures of this town.

The development of metallurgical work is due rather to the general industrial movement which is taking place than to any direct advantage of a geographical nature. Although some iron ore is found and worked in the Alpine valleys, the most of that which is used comes either from other parts of Italy or from abroad. At present, the chief establishments connected with the manufacture of iron and steel goods are situated in the larger towns and at the ports. Milan turns out locomotives, wagons, and electric machinery; Turin makes railway stock, and especially wagons. There are large engineering works at Pont-Saint-Martin in the Val di Aosta, and at Udine; and Venice is engaged in shipbuilding.

Among other industries which may be mentioned is the manufacture of chemical manures, mainly superphosphates, at various towns throughout the region; of calcium carbide at Pont-Saint-Martin and other places where water-power is obtainable; of glass at Murano; of lace in Venice and the neighbouring islands; of straw hats at Marostica, near Bassano; and of arms at Bologna.

PENINSULAR ITALY.—Although the general character of cultivation and economic development remain much the same throughout the whole of peninsular Italy, the differences in structure, topography, and climate, which have already been noted, make it possible to distinguish a number of regions each with its own characteristics.

THE NORTHERN APENNINES contain a large area of fertile land which can be utilised, although it is frequently necessary to terrace

the hillsides. The extremely favourable climate on the southern slopes of the Ligurian Apennines renders possible the cultivation not only of the olive and the vine, which are grown throughout the region, but of the orange and the lemon, the typical fruits of southern Italy. On the extensive pasture lands large numbers of cattle are raised. The manufactures are mainly confined to the ports. Genoa is engaged in shipbuilding, iron smelting, and cotton spinning, Savona has engineering works, and Spezia shipbuilding yards.

THE CENTRAL APENNINES being more rugged than the northern, and presenting in places the appearance of a Karst country, are frequently ill-adapted for cultivation. In Umbria, only the plains, which are of limited extent, and the lower slopes of the hills are fertile. The greater part of the Abruzzi consists of broken wooded country, cut up into isolated plateaus, but the eastern slope contains more fertile soil, and both there and in the Marches the usual products of the Apennines—olives, vines, cereals, flax, and hemp—are grown. The Marches and Umbria produce large quantities of the first of these, but the Abruzzi is less noteworthy in this respect. Of the manufactures of this region the most important are the steel works at Terni, which have electric power, generated by the Nera.

THE SOUTHERN APENNINES contain large areas of mountainous woodland, where, as in the Basilicata, little cultivation is possible. On the lower slopes of the hills, and in the valleys, olives, vines, fruit, and cotton are grown. The olive crop is of importance, but the cotton only amounts to a few thousand bales, and cannot be used for anything but the manufacture of coarse articles.

THE APENNINE FORELAND—WEST COAST.—This includes several distinct physical regions. The greater part of Tuscany consists of an intermingling of hill and plain. In the Apuan hills in the north, limestones of Triassic and lower Jurassic times have been converted into marble and are quarried at Carrara. The chief agricultural products are olives, the oil from which is much in demand; vines, from which the well-known Chianti wine is made; and wheat, which forms the basis of the straw-plaiting industry of the district. Along the coast of Tuscany is the Maremma, a lowlying strip of land built up of débris brought down by the rivers, and swept in by the current. Formerly it was marshy and

unhealthy, but drainage has converted much of it into rich pasture land, and it is now an important dairying district. Further south on both sides of the lower Tiber, and occupying a considerable part of Latium, is the region to which the name Campagna is somewhat loosely given. The soil consists of volcanic débris, but, although it is fertile, it is lowlying, subject to flooding, and productive of malaria. Hence it is devoted mainly to grazing purposes, and there are few inhabitants. Attempts at reclamation have been made, and it is possible that it may ultimately regain its ancient fertility. On the volcanic soil of the Alban Hills and of Campania are some of the richest districts in all Italy, olives, vines, figs, and other fruits being grown in great profusion. In Campania, especially, where there are many opportunities for irrigation, the methods of cultivation are intensive, and the individual holdings are small. Accordingly, there is a dense population.

Manufactures are growing up around the principal towns. Leghorn, in addition to long-established industries such as the preparation of olive oil and the plaiting of straw, has recently established copper and glass works. Florence is the centre of the straw hat industry, and makes large quantities of macaroni, both pursuits being based on the wheat production of the surrounding country. Rome is still largely a non-manufacturing city, but, with the development of the water-power of the Aniene at Tivoli and Subiaco, it is likely to make rapid progress in the near future. Naples has made the greatest advance within recent years. In order to encourage industrial development the municipality has offered, practically free, sites and water-power for manufacturing establishments, and has remitted for two years all taxation of manufacturers who settle in the town. Accordingly, a varied selection of industrial concerns, including textile factories, sugar mills, and motor works, has sprung up within the free zone. All these are under the disadvantage of being unable to draw upon a supply of skilled labour. On the other hand, what labour exists is cheap, water-power is available, and there is a good port. To what extent the main disadvantage will be overcome remains to be seen, but the prospects appear to be fairly good.

APULIA, lying to the east of the Apennines, has a low rainfall, but is well adapted to the cultivation of wheat, which ripens during the spring months, before the hot, rainless summer begins. The

province is the most important wheat-growing region in Italy at the present time, and the hard wheat produced is specially suitable for the manufacture of macaroni. The Murgie is covered with vineyards and olive plantations, the area under olives in this region being greater than in any other part of Italy. The chief towns are Bari, Brindisi, and Taranto, but their importance is commercial rather than industrial.

SICILY may be regarded as, in the main, a continuation of the Apennine chain. In the north-east there is a fragment of the Tyrrhenian block, and around Etna much of the country is overlaid with volcanic rocks. Sulphur, obtained in the latter district, is the most important mineral product of the island, and the refining of sulphur gives employment to a large number of people. But the industry appears to have got into difficulties within recent years. There has been overproduction, the French have imposed heavy duties on the refined article, and the use of sulphur has been abandoned in favour of pyrites by the Norwegian paper mills.

The north and east coasts have the most favourable climate, as they are exposed to the influence of warm winds from the sea. Hence, they constitute the most important agricultural districts, and grow olives, vines, fruit, and wheat in large quantities. The mulberry is raised in the province of Messina, and there is an important silk industry.

Palermo, the largest town in Sicily, is engaged in shipbuilding, the manufacture of iron and steel goods, and various other industries. Messina is beginning to recover from the damage done by the great earthquake of 1908. Catania has large sulphur refineries.

ELBA consists of part of ancient Tyrrhenia. Olives and vines are grown, but the chief product of the island is iron ore, which is extensively worked. There are blast furnaces at Portoferraio, and Bessemer steel works have recently been established. Coal is imported for the manufacture of coke.

SARDINIA is likewise a fragment of the Tyrrhenian block. The interior is wild and forested, but on the lower slopes of the hills the usual products of the Mediterranean region are grown. Oranges and lemons thrive, especially on the volcanic soils of Monte Ferru. The chief economic products of the island are minerals, lead and zinc being the most important.

COMMUNICATIONS.—The growth of the railway system of Italy, and more especially the construction of the Alpine tunnels, has influenced the economic development of the country in a marked degree. The Alps, although they never offered an effective barrier, either in war or commerce, yet presented a considerable obstacle to that free movement of heavy goods, which is so striking a feature of modern trade. Since the opening of the tunnels, the industrial region of Italy has been brought into easy communication with the most important industrial regions of Central Europe. The chief lines are as follows. One railway connected with the Paris-Lyons-Mediterranean system enters the country from France by the Mont Cenis tunnel and descends the Dora Riparia to Turin. Of the lines from Switzerland, that from Lausanne passes through the Simplon tunnel and follows the course of the Toce to Novara, while that from Basel enters the Val Leventine by the St. Gothard tunnel and runs alongside the Ticino to the head of Lake Maggiore, whence it goes by Lugano and Como to Milan. The line from Innsbruck passes over the Brenner, and utilises the valleys of the Eisack and the Etsch, or Adige, as far as Verona. Further east, a line from Venice joins the line that runs from Vienna to Trieste by the Semmering pass. The towns which have been mentioned—Turin, Novara, Milan, Verona, and Venice—are all connected by a railway which follows the general direction of the ancient highway upon which they stand, a highway which ran from east to west sufficiently near the meeting place of mountain and plain to be free from the occasional floods along the Po and the lower courses of its tributaries. Another important line runs from Turin by Alessandria, Piacenza, Cremona, Mantua, and Padua to Venice, while a third, breaking off at Piacenza, follows the Emilian way to Rimini, and touches those towns which have grown up where the Apennine valleys open out on to the plains of North Italy. Lines from Milan and Turin pass through tunnels in the Apennines, and place Lombardy and Piedmont in communication with the port of Genoa; and Savona is also connected by rail with the North Italian lowlands. The general configuration of peninsular Italy forces many of the railways of that region to run at no great distance inland, and from Genoa to Rimini, round the south of Italy, all the towns which stand on or near the coast are linked together by lines which are seldom more, and frequently

much less, than twenty miles from the sea. Notwithstanding the difficulties presented by the Apennines, a number of railways now connect the Tyrrhenian and Adriatic sides of the peninsula. One runs from Pisa to Bologna by way of Pistoja, taking advantage of the valleys of the Ombrone and the Reno. Another runs alongside of the Arno from Pisa to Florence, passes through several tunnels, and descends the valley of the Lamone to Faenza. From Rome a railway follows the route indicated by the Tiber, the Nera, and the Topino, and, after descending the eastern slope of the Apennines by the valley of the Esino, runs to Ancona. In the south of the peninsula several lines cross from Naples to the east coast.

The Italian rivers are of little use for navigable purposes. Numbers of small boats are found on the Po as well as on some of its tributaries, and on the irrigation and other canals, but all these are alike unsuitable for larger craft. On the other hand, the great length of the peninsula has led to the development of a considerable coasting trade in which sailing ships are chiefly engaged.

COMMERCE.—Silk is the most important element in the foreign trade of Italy at the present time. Much of the native product is exported to Switzerland, France, Germany, and the United States, while considerable quantities are imported from the Levant and the East. Of importance, also, is the export of manufactured silk, which goes mainly to the countries of Central Europe, to the United Kingdom, and to the United States. Cotton goods, as already mentioned, find their market in the Levant and in South America. The exportation of wine suffered a severe check a few years ago as the result of an increase in the Austro-Hungarian tariff on that commodity, but a new market for it appears to be opening up among the Italian population of the Argentine. Of the other exports, olive oil is sent to France; butter, eggs, and cheese to the United Kingdom and elsewhere; and macaroni to the United States. Of the articles imported into the country, coal comes chiefly from Great Britain, but to some extent from Germany, and the latter country has, since the opening of the Alpine tunnels, been able to capture the greater part of the trade in iron and steel goods, including machinery. Wheat comes from Russia, the Argentine, the United States, and Roumania. Within the last few years Germany has advanced to the first place in the

list of countries from which Italy obtains her imports, the United Kingdom being second, and the United States third. On the other hand, Switzerland is still the chief consumer of Italian produce, Germany comes second, the United States third, and France fourth. For the years 1906-10 the imports for home consumption were valued at £117,000,000, and the exports of domestic produce at £76,000,000.

CHAPTER XVII

THE IBERIAN PENINSULA

THE Iberian Peninsula, which includes the two countries of Spain and Portugal, has an area of 226,000 square miles. Its central part, which belongs to the zone of ancient massifs and is known as the Meseta, consists of a plateau with a height of over 2,000 feet. On the north-east, the Meseta is bordered by the Iberian mountains which separate it from the basin of the Ebro; and on the south-east by the Sierra Morena which overlooks the basin of the Guadalquivir, and is in reality only the escarpment of the plateau. The surface of the Meseta consists of great plains separated from one another by mountain ranges which have a general trend from south-west to north-east. Of these ranges the most important are the Sierra de Gredos and the Sierra de Guadarrama, which separate the plains of Old Castile from those of New Castile. In the north-west, in Galicia and in Upper Portugal, the rocks of which the mountains consist are of Archæan age; in the south-west they belong in the main to early Palæozoic times; and in the north-east and east they were formed during the Secondary period. The plains of Old and New Castile are overlain by Tertiary deposits, as are the basins of the Guadalquivir and the Ebro, the latter of which is cut off from the sea by the mountains of Catalonia. To the south of these mountains, the plateau withdraws from the seaboard sufficiently far to allow the formation of the narrow coastal plain of Valencia. On the west it slopes down to the plain of Lower Portugal. The basin of the Ebro is bounded on the north by the Cantabrian mountains and the Pyrenees, while to the south of the Guadalquivir is the Sierra Nevada. These ranges were folded during the Tertiary period, and consist in the main of old rocks, flanked in places by later formations.

CLIMATE.—Although the Iberian Peninsula is almost entirely surrounded by water, the direct influence of the ocean upon its climate is comparatively slight, and is felt mainly upon the north and north-west coasts where the range of temperature between summer and winter is less than in any other part of the peninsula. There, the January mean (at sea-level) varies from 46°F. to 50°F., while that of July lies between 68°F. and 70°F. On the plateau the range is much greater, the summers being hotter and the winters

colder. At Madrid, for example, the mean temperature for January is 40°F. and for July 76°F. In Andalusia and along the Mediterranean seaboard the summers are everywhere hot, the July mean in the lowlands ranging from 75°F. to 80°F. To the south of the Meseta, however, the winters are somewhat warmer than they are along the north-east coast, the January mean in the former region being above, and in the latter below, 50°F. Except on the north and north-west coasts, which have from 30 to 60 inches, the annual precipitation is slight, and only occurs during the winter half of the year. In the south-west the amount received does not exceed 30 inches, while on the plateau and along the Mediterranean coast it is generally less than 20 inches.

NATURAL REGIONS.—Climate and position are the chief factors in determining the natural regions of the Iberian peninsula. In Spain, the Cantabrian mountains in the north, and the greater part of the Archæan mass of Galicia in the north-west, have a climate essentially different from that of other parts of the country. The Meseta, again, is effectively marked off from the lands to the south and east, both by its elevation and by the great range of temperature which exists between the heat of summer and the cold of winter. In the south of Spain, the lowlands in the basin of the Guadalquivir and along the Mediterranean coast have a sub-tropical climate; and with them may be included for convenience the slopes of the Sierra Morena and the folded range of the Sierra Nevada. Along the north-east coast the climate is typically Mediterranean. The lowlands in the basin of the Ebro occupy a position which is climatically intermediate between the Meseta and the Mediterranean, while the Pyrenees stand by themselves. On the west coast a broad distinction may be noted between Upper Portugal, which is on the whole mountainous and possesses a climate somewhat similar to that of north and north-west Spain, and Lower Portugal, which contains considerable lowland areas and has a climate approximating to that of southern Spain.

SPAIN.

THE NORTH-WEST COASTAL REGION is the most densely populated of all the natural regions of Spain. This is due in part to its favourable climate, and in part to the vast stores of minerals which it contains. Agriculture is carried on in the valleys and in other

favoured localities, maize being the principal cereal grown, especially in the west. The vine is extensively cultivated, but the wine produced therefrom is somewhat inferior in quality, and little of it is exported abroad. Other plants include beet, flax, and potatoes. This region is also well adapted to cattle-raising owing to the good grasslands which it contains, and over one-third of the cattle in Spain are found within it, mainly in Galicia and the Asturias. The mountains are well wooded, and from their upper slopes are obtained the pines which are made into pit-props and exported to Cardiff. The mineral wealth consists in the main of coal and iron. Coal is obtained in the province of Oviedo, where the mines at Gijon produce about two-thirds of the total Spanish output. The production of iron is still more important. Siliceous ore is mined in the Asturias, but the bulk of the output consists of red hæmatite from the provinces of Santander, Vizcaya, and Guipuzcoa. This ore, which is suitable for conversion into Bessemer steel, has in the past been obtained from open quarries, but these are already worked out; and it is believed that at the present rate of production the resources of the Basque provinces and Santander will be exhausted within a comparatively short time. On the other hand, large quantities of ore are known to exist in Oviedo, Lugo, and Leon, further to the west, and it is probable that these will in the future constitute the chief source of supply. The north-west region produces about two-thirds of the iron ore mined in Spain at the present time. Much of it is exported, especially to the United Kingdom, from Bilbao, Santander, and various ports along the coast. Other minerals include manganese ore from Oviedo, and zinc from Santander.

Manufactures have not been developed to any great extent. Bilbao and Santander have blast furnaces, and are engaged in the iron and steel industries, and Bilbao has also shipbuilding yards. For these, coal is imported from the Asturias and from the United Kingdom. Further west, fishing is the chief pursuit of the inhabitants of the coastal towns.

THE MESETA is of less economic importance than the preceding region. The want of sufficient moisture renders considerable areas unfit for cultivation. In Old Castile, which is more exposed to oceanic winds and has a somewhat greater rainfall than the remainder of the plateau, agricultural conditions are not altogether unfavourable, but in Estremadura and in the south and south-east

of New Castile there are large tracts of infertile soil. Wheat is the principal grain crop, especially in Old Castile; it is noted for its whiteness and softness, and large quantities of it are milled at Valladolid, which is an important collecting centre. Oats and rye are cultivated in the more mountainous districts. The vine is grown all over the region, but the olive is restricted to the more southerly parts of it. These crops are all grown on unirrigated land; but, as a general rule, land on which cereals are produced is only cultivated every other year. For the growth of beetroot and fruit, irrigation is necessary, but the facilities for this upon the Meseta are very limited and the area irrigated is small.

Pastoral farming is an important pursuit, and considerably more than one-half of the sheep in Spain are found upon the Meseta, Estremadura, from which come the finest merino wools, rearing the largest number. Sheep are generally moved from the plains to the more mountainous districts of Old Castile and Leon during the summer, in order that they may not suffer so much from the drought which then prevails. With the exception of Madrid, upon which lines of communication converge from all quarters, and Valladolid, the largest trading centre in Old Castile, the towns are of little importance.

SOUTHERN SPAIN enjoys warm winters, and a considerable variety of sub-tropical plants can be cultivated. On the other hand, the low rainfall renders irrigation necessary, especially in eastern Andalusia and along the Mediterranean coast. Oranges and lemons, which cannot stand the cold winters of the Meseta, grow in abundance to the south of it, and the vine reaches a higher state of perfection than in any other part of the country. The wines of Jerez, Malaga, and Alicante alone have a reputation outside of Spain, while the raisins of Malaga, Almeria, and Alicante are well known. Sugar-cane is cultivated in places, and sugar-beet has become an important crop in the south, where it is grown especially in Granada, Malaga, and Almeria. Irrigation is, of course, necessary, but, although the yield of beet per acre is higher than on the unirrigated lands further north, the sugar content is not so large. Cotton is grown, but not to any great extent, and among other products are the banana, the prickly pear, and esparto grass.

The mineral wealth of the region is great, though it has been, as

yet, only partially exploited. Iron ore of excellent quality is found in the Sierra Nevada and other folded ranges of the south, and is exported from Seville, Almeria, Aguilas, Cartagena, Garrucha, and Porman. The region at present produces about one-third of the total output of iron ore in Spain, and will probably produce more in the future, as considerable deposits, which are as yet untouched, are known to exist. The slopes of the Sierra Morena are also rich in minerals. In the province of Huelva are the Rio Tinto mines, which produce the greater part of the copper obtained in Spain. Silver-lead ores are worked in Cordoba and Linares, and zinc ore, or calamine, is obtained a few miles from Almeria. Seville, on the Guadalquivir, about 70 miles from its mouth, is the largest town of the region and conducts most of its trade. The Alphonso XIII Canal will, when completed, improve the navigation of the river and make the port accessible to larger vessels than hitherto, though constant dredging will still be necessary. The town itself possesses iron foundries, cork factories, and various other industries. Cadiz, which has been almost entirely superseded by Seville, is mainly engaged in the evaporation and exportation of salt. Malaga, on the Mediterranean seaboard, has similar industries to Seville, but its value as a port is steadily declining.

THE MEDITERRANEAN REGION.—This region is typically Mediterranean in its climatic characteristics and economic products. The soil is, as a rule, scanty, and in many places cultivation is only possible after the hillsides have been carefully and laboriously terraced. The rainfall is light, and without artificial irrigation the vine and olive alone would flourish, but, by means of irrigation canals, advantage is taken of whatever water the rivers contain; and Valencia and Catalonia, which are naturally among the least fertile provinces of Spain, are two of the most productive in the country. In addition to the vine and the olive, oranges, lemons, and other fruits are raised in large quantities. The mulberry, too, is cultivated, but unfortunately the Spaniard does not take much interest in the silkworm, and the manufacture of silk, which was once in a flourishing condition, has been allowed to decay. Esparto grass is also grown.

The pursuits of the people are in the main agricultural, but Barcelona, besides being the chief seaport of Spain, is, and has for

long been, the centre of considerable industrial activity. There, and in the neighbouring towns, cotton and woollen materials are manufactured on an extensive scale, and linen and jute goods and electrical machinery are also made. Valencia, which ranks next in size to Madrid and Barcelona, is mainly engaged in the export of fruit.

THE EBRO BASIN.—In this region the soil is in many places infertile and the rainfall is light. The winters are colder than along the Mediterranean coast, and the orange and lemon cannot be grown. The chief crops are therefore olives, vines, and cereals, but for the latter irrigation is generally necessary. Saragossa, which is the principal town, has sugar refineries and iron and steel works.

THE PYRENEAN REGION is of but little importance from the economic point of view. The inhabitants are mainly occupied in pastoral pursuits and in forest industries.

COMMERCE.—For the five years 1906-10 the average value of the exports of Spain was £40,000,000, and of the imports £42,000,000. Mineral ores and metals account for over 30 per cent. of the total value of the exports. Iron ore, which comes first in importance, is exported mainly to the United Kingdom, but also to Germany. Lead and copper, in various forms, find their chief market in the United Kingdom, but are also sent to France and Germany, and some copper goes to the United States. Fruit exports, which rank in importance next to mineral ores and metals, consist of almonds, grapes, oranges, raisins, and nuts. Of these, oranges, which are the most important, are sent to the United Kingdom and various European countries. Wine comes next to fruit in value, and red wines are exported to France and Cuba; Malaga wines to France and the United Kingdom; and sherry to the United Kingdom. Among other exports cotton goods are sent to France, Cuba, and the Philippines; animals, chiefly cattle, to Portugal; skins and hides to France; cork to Italy; and onions and esparto grass to Great Britain. The United Kingdom holds the first place as a purchaser of Spanish produce; it is followed by France, Cuba, Germany, and the United States. The chief imports include raw cotton, coal and coke, chemical products, iron and steel manufactures, machinery, wheat, and timber. The bulk of the raw cotton comes from the United States. Coal and coke are supplied mainly by the United Kingdom, but

to some extent by Germany. Chemicals are imported from Belgium and the United Kingdom; and iron and steel manufactures and machinery from the United Kingdom, France, Germany, and Belgium. The wheat is mainly of Russian origin, while the timber comes from the United States.

The United Kingdom is the chief importer into Spain, but is somewhat closely followed by France. The United States ranks third.

CONCLUSION.—The economic development of Spain has been hindered by a variety of circumstances. The infertile nature of much of the soil, the want of sufficient moisture, and the difficulties of communication, are all serious obstacles to progress. Even more important are political and social conditions. The glamour of the past has made the Spaniard indifferent to the realities of the present, and he does little to overcome the difficulties of his environment. An improvement in the means of communication would permit the exploitation of vast mineral sources hitherto untouched; irrigation might be extended, and considerable areas at present of little value might be rendered fertile; at the same time the methods both of agriculture and manufacture might be considerably improved.

PORTUGAL

NORTHERN PORTUGAL belongs, in the main, to the same block of Archæan rock as Galicia, and like it has a somewhat diversified topography. Climatic conditions are favourable to the growth of maize and rye, but much of the land is still uncultivated, and considerable areas are devoted to pastoral pursuits. The vine is extensively grown, especially in the eastern part of the Douro basin, where the wines known as port are produced. The mineral wealth of the region is not great. A little anthracite is mined, and wolfram, of which there are considerable quantities, is collected by the country people from the surface of the land. Portugal is the largest producer in Europe of this mineral, which is used in metallic filament lamps, and in the manufacture of a particular kind of steel which remains hard even at very high temperatures. Oporto, which is the chief town of Northern Portugal, is situated near the mouth of the Douro; but the approach to the town is a difficult one, and much of its trade now passes through the harbour

which has been constructed on the coast at Leixoes, a little to the north-west. Oporto itself has cotton and woollen mills, and is also engaged in trawling and in the export of wine.

SOUTHERN PORTUGAL is mountainous in the south and east, but contains large areas of lowland in the west. Wheat is grown, but not in sufficient quantity to meet the home demand, and rice is cultivated, especially on the easily irrigated lands about the lower Tagus. The vine flourishes round Lisbon and in the vicinity of the Tagus, as well as in the south and south-east; and red and white wines are made, largely for exportation to Brazil and the Portuguese colonies. The cork-tree is extensively grown throughout Southern Portugal, but the chief plantations are in the lowlands about the lower Tagus. The raw cork is collected at Lisbon where it is prepared for export, much of it being sent abroad in the form of bottle corks. Portugal now produces about one-half of the world's supply of cork. Among other crops are olives, lemons, and figs.

Copper, which is the most important mineral worked at present, is found in various parts of the Meseta, especially at São Domingos, Aljustrel, and Serra da Caveira. Lisbon is the chief port of the region. It has iron works, shipbuilding, and woollen manufactures. Setubal is actively engaged in the preservation and export of sardines, which are found in large numbers off the coast.

COMMERCE.—Wine, cork, fish, and copper, along with rubber and cacao obtained from the Portuguese colonies, make up the bulk of the exports. The imports consist of coal from the United Kingdom, raw cotton from the United States and Brazil, wheat from the Argentine and the United States, iron and steel goods from Great Britain and Germany, and fish from Norway and the United Kingdom. The average official value of the exports for the years 1906-10 was £7,000,000, and of the imports, £14,000,000.

CONCLUSION.—Portugal is still in a very backward condition. The methods of agriculture are generally of a most primitive description, and much of the land is still uncultivated. Little has been done to develop the internal resources of the country. Iron ore, for example, is everywhere abundant, but up to the present has been worked only to a slight extent. The coastal towns alone, as a result of their long contact with the outside world, are more energetic, and there the chief manufactures of the country are settled.

COMMUNICATIONS OF THE IBERIAN PENINSULA.—Madrid, which is the natural meeting-place of routes across the Meseta, may be regarded as the centre of the railway system of the Iberian Peninsula. It is connected with the French railways by a line which crosses the Sierra de Guadarrama, and, after passing through Valladolid and Burgos, descends from the Meseta by the Pass of Pancorbo, crosses the Ebro at Miranda de Ebro, and runs to San Sebastian on the frontier. From this line there are connections with the ports of Bilbao, Santander, and Gijon, and from Leon on the last of these a branch breaks off and goes by the valleys of the Sil and the Minho to Vigo, while near the confluence of these rivers a second branch strikes off to the north-west for Corunna. Another route from the capital descends into the valley of the Ebro at Saragossa where it meets a line which follows the valley of that river for the greater part of the way from Miranda de Ebro to Tarragona on the Mediterranean seaboard. The south-east seaboard is connected with the capital by lines to Valencia; by Albacete to Alicante, Cartagena, and Aguilas; and to Almeria. From near Linares on the last of these a railway makes use of the valley of the Guadalquivir to go to Cordoba (connected with Malaga and Gibraltar) and Seville (connected with Cadiz and Huelva). The ports on the Mediterranean from Perpignan as far south as Aguilas are linked up by a line which keeps to the coast for the greater part of the way. To Portugal there are several lines. One runs westwards, south of the Sierra de Gredos, to Plasencia where it bifurcates; one branch going northwards to Salamanca, and then crossing over into the valley of the Douro which it follows to Oporto, and the other going westwards into the valley of the Tagus which it follows to Lisbon. From Salamanca a line runs north to meet that from Leon to Vigo, and from a junction near Caceres (on the route to Lisbon) another runs south to Huelva. Lisbon is connected with Faro in the south, and through Oporto and Vigo with Santiago in the north.

CHAPTER XVIII

RUSSIA

THE low depression which runs from the Black Sea to the Baltic, by the valleys of the Dnieper and the Pripet and the plains of the Vistula, separates two entirely different geographical regions ; and in the contrasts between them in regard to position and configuration, structure and geology, climate and vegetation, must be sought at least part of the explanation of the differences in the economic development of Russia and Western Europe respectively.

The Archæan plateau of Scandinavia is continued in Finland, but disappears in Russia under a covering of sedimentary rocks which lie horizontally, since they have not been submitted, as in Western Europe, to the forces which cause mountain folding. These sedimentary rocks have been gradually worn down by denudation, and nowhere exceed a height of 1,150 feet. There are, nevertheless, certain broad distinctions in the topography and characteristics of the vast area covered by European Russia. Finland, and the country lying to the west of a line drawn from the Prussian frontier of Poland to Archangel, by Lake Ilmen and east of Lake Onega, present the appearance of a recently glaciated country, the land being covered with lakes of glacial origin, and the river systems being badly defined. Between this region and a wavy line which runs from Kiev to Kasan the land has also been glaciated, but at a more remote period. so that the river systems have become more clearly articulated, and the lakes have disappeared. To the south of this glaciated territory lies the Black Earth country, a region enriched partly by the loess deposited by the melting ice-sheet, partly by the organic matter derived from centuries of rich vegetation. The Black Earth passes gradually in the south and south-east into the true steppe, where the salinity of the soil, due to the comparatively recent disappearance of the sea, and the aridity of the climate, render the cultivation of the land impossible. In the east, Archæan rocks again appear in the Urals, while the Crimea may be regarded as a continuation of the Caucasus.

Climatic conditions, too, differentiate Russia from Western

Europe. On the great lowlands, far distant from the modifying influence of the sea and unprotected by mountains, the heat of summer and the cold of winter are alike extreme. During the latter season the isotherms run from north-west to south-east, and in January range from zero to freezing point on the Fahrenheit scale; while in the former they run from south-west to north-east, and in July range from 46° F. to 80° F. The rainfall, which occurs chiefly in summer, is heaviest in the west and centre, where it is from 20 to 24 inches. Outwards from this region, it decreases in all directions, and in the far north and in the south-east it is less than 10 inches.

The various vegetation zones of Russia are also of considerable significance in its economic development. Along the Arctic, and as far south as the 66th or 65th parallel, stretches the tundra. South of this, and coinciding in a general way with the remainder of the glaciated area, lies the now partly cleared forest region, characterised by the pine, the fir, and the birch in the north, and in the south by deciduous trees of the Central European Forest, such as the maple, the linden, and the oak. Further to the south, the Black Soil and fertile steppe region is generally unsuited to the growth of trees, but particularly favourable to that of cereals and grass, while in the extreme south-east the vegetation is of the scantiest description.

NATURAL REGIONS.—The tundra, the forest, and the steppe lands of Russia obviously form three great natural regions into which the country may be divided. But the Baltic lands belonging to the more recently glaciated area may be considered apart from the remainder of the forest region, partly because of their relations to the Baltic, and partly because of the effect of their recent glaciation upon their development. The remainder of the forest zone falls into two regions: that north of the 60th parallel, where comparatively little agriculture is possible; and that to the south of it, where much of the land has been permanently cleared. The Black Soil and fertile steppe, the infertile steppe, the Crimea, and the Ural must also, because of their geographical peculiarities, be considered as separate natural regions. The coalfields round Moscow and in south-west Poland, and the coal and iron deposits of South Russia, are the centres of industrial areas which, because of their importance, require to be treated apart from the regions in which they are found.

THE TUNDRA it is hardly necessary to mention. The only inhabitants are a few Samoyeds and Lapps who, with their reindeer, support a precarious existence.

THE BALTIC LANDS may be divided into several distinct regions. FINLAND, which consists of a granitic mass, has a poor and infertile soil. Forests cover about two-thirds of the whole area, while only one-fortieth of it is under crops, and one-twentieth is pasture land. The chief occupations of the people, who number 2,500,000, are forestry, agriculture, dairy-farming, and fishing. Timber, wood-pulp, and paper, along with dairy produce, are exported, mainly through Helsingfors and Abo.

THE LAKE REGION, containing the governments of Olonetz, Novgorod, St. Petersburg, Pskov, and Vitebsk, resembles Finland in many respects, but a greater proportion of the land is cultivated, and agriculture is the chief pursuit of the people. The most important crop is flax, the moist climate being particularly favourable to its growth, and Pskov is the chief flax-growing district in the Empire. The cutting of timber and the cultivation of grain also give employment to a considerable number of people, but the cereal production is unable to meet the demand of the region, which, as a result of its position on the Baltic, has an importance and population greater than its other geographical conditions would warrant. The growth of St. Petersburg is partly, no doubt, the result of political considerations, but its position in relation to north-west Europe has undoubtedly been the chief factor in its progress; and manufactures naturally developed there and in other towns where coal and raw material could easily be obtained. St. Petersburg has engineering and textile works, and Narva, aided by water-power, manufactures linen and cotton goods. The chief ports are St. Petersburg and Cronstadt, which export timber from the Lake Region and grain from various parts of Russia, while coal and raw cotton form the most valuable of the imports.

THE BALTIC PROVINCES, Esthonia, Livonia, and Courland, together with a small part of the surrounding country, form the third division of the Baltic Lands. The soil is generally poor, and, as agriculture is the main pursuit of the people, the density of population is not great. In addition to agriculture, dairying and timber-cutting are important occupations. Manufactures are followed in the towns of the coast which also serve as ports. Riga,

along with Pernau, Windau, and Libau, exports flax, timber, dairy produce, and eggs. Windau and Libau are open during the whole year, and are thus of special importance in shipping perishable goods. Reval imports cotton from the United States.

THE NORTHERN FOREST REGION lies between the 60th and 65th parallels, and is almost entirely covered by trees of the northern forest. Climatic conditions being severe, agriculture is carried on only in the south to a limited extent and by primitive methods. A piece of land is cleared, cultivated continuously with flax or the hardier cereals for a number of years, and then allowed to return to forest again. Cattle-rearing in the basin of the Northern Dwina, fishing along the shores of the White Sea and along the banks of the rivers falling into it, and timber-cutting, are among the principal occupations of the people. Archangel is the port through which much of the trade of the region is carried on, but it is only open during the summer and autumn months.

THE SOUTHERN FOREST REGION has, in many cases, been permanently cleared, and agriculture is the chief pursuit of its inhabitants. The western part of this region is, with the exception of the country round Moscow, the most densely populated, while in the east, where forests still cover two-thirds of the land, the population is small. The crops include flax, rye, barley, oats, and potatoes, but on the whole the agricultural produce of the region is not sufficient to meet the needs of the people, and food has to be imported. The exports, apart from manufactures, are timber, flax, hemp, and linseed.

THE MOSCOW INDUSTRIAL REGION, situated in the central part of the Southern Forest zone, has developed largely as the result of geographical conditions. Its position in the centre of the country, whence the great rivers flow out in all directions, gave it nodality from an early period; the infertility of the soil rendered other pursuits than its cultivation necessary for the surplus population; the neighbouring flax-growing area provided the raw material first in request; the forests supplied the fuel; the Black Soil region to the south secured a food supply and guaranteed one market, while the Oka and the Volga offered a route to others more distant. In place of wood as fuel, coal is now obtained from the neighbouring mines, but, as the quality is poor, much is imported from the Donetz basin. The manufacture of cotton is now the most important

textile pursuit of the Moscow region, which contains over 60 per cent. of the 8,600,000 spindles in the country, and accounts for over 66 per cent. of the annual product (valued in 1910 at £60,000,000). The raw material is obtained partly from various districts within the empire, and partly from abroad, the United States being the chief source of supply. Linen and woollen goods are also manufactured in this region. Moscow itself is the centre of the engineering industry of Russia, and produces much of the machinery used in spinning and weaving, flour milling, sugar refining, railway construction, and agriculture.

SOUTH-WESTERN POLAND.—The greater part of Poland falls within the Southern Forest region, but in the south-west an important industrial area owes its existence partly to the Dombrowa coalfield, which lies within it, and partly to proximity to similar industrial areas in Germany and Austria-Hungary. The Dombrowa coalfield, which is continuous with that in the adjacent parts of Silesia, has an annual output of nearly 6,000,000 metric tons, or rather less than one-fourth of the whole output of European Russia; and, though the product is only of moderate quality, it supplies the fuel required in the manufactures of Poland. Iron is also found, but it is of low grade, and most of the ore used is imported from South Russia. From 8 to 10 per cent. of the pig-iron made in the country comes from Poland, the chief centres of production being round Sosnowice. The textile industries are of considerable importance, and cotton is manufactured in and around Lodz, where is to be found over one-seventh of the total number of spindles in Russia. Czenstochowa, Lodz, Tomaszow, and other towns are engaged in the production of woollen goods, the raw material being largely of domestic but partly of foreign origin. Other industries of the region include the spinning and weaving of linen and jute, brewing and distilling, the manufacture of flour, and the preparation of timber for export. Warsaw, which is the chief centre of trade between Russia and Western Europe, is also a large manufacturing town engaged in the production of articles of many different kinds.

THE BLACK SOIL REGION, including the fertile steppes, is the great agricultural area of Russia, and its western section is the most densely populated part of the country with the exception of Poland and the district round Moscow. The fertility of the soil, the

facility with which it can be cultivated, and the favourable climate, have led to the large production of wheat in this region, which may be divided into three belts, running from south-west to north-east. In the most northerly belt the area under wheat is less than that under all other crops, which include beet (chiefly in the west), barley, oats, and rye. The central zone, including the governments of Kherson, Ekaterinoslav, Don Territory, and Samara, devotes about one-half of its cultivated area to wheat; while the southern belt, in which are the governments of Kuban, Stavropol, Astrakhan, and Orenburg, has wheat on 60 per cent. of its cultivated land. The dry, warm climate of the south-east of Russia is obviously one reason for the concentration of wheat in this region; but, although it is grown under favourable conditions, the yield per acre is low, and for the ten years, 1901-10, the average did not exceed ten bushels. The reasons for this must be sought for in a variety of conditions which affect Russian agriculture generally. One-third of the land is held by the mirs, or village communities, and the arable parts of it are subject to re-allocation from time to time among the individuals or families constituting the mir. Such a system is absolutely antagonistic to the practice of sound agriculture; and it is satisfactory to note that it is gradually becoming less general, as a result, partly of the wealthier farmers opposing re-allocation, partly of arrangements having been made by which government permission may be given to individuals to withdraw from the mir, and partly of the extension of agriculture into regions, especially in the south-east, where the mir does not exist.

The three-field system of agriculture, which is the most prevalent in Russia, is also unfavourable to the full development of the land. Under it a winter crop, such as rye, is sown one year, a spring crop, such as wheat or oats, the second, while during the third the ground lies fallow. In the less densely populated parts of the Black Soil region a method analogous to the forest system of the north is pursued, the steppe being ploughed and continuously cultivated for several years till the land is exhausted, after which it is allowed to become derelict. With the gradual increase of population, these systems, both of which are exceedingly wasteful, are steadily being replaced by one of rotation of crops.

When the poverty of the peasant, the primitive implements to which his poverty condemns him, and his ignorance of sound

agricultural methods, are taken into consideration, it is not a matter of surprise that the yield from the lands of the peasantry is lower than from the lands of the Crown, the nobles, and the towns. On the other hand, within recent years, the Zemstvos (provincial and district assemblies, constituted on an electoral basis) have done much to enable the peasants to buy agricultural machinery and to teach them modern methods of husbandry. It is probably due in part to their influence that the export of wheat from European Russia, which for a time showed signs of rapidly declining, has risen again to its former level and during the years 1906-10 averaged over 3,700,000 tons per annum. The greater part of this export took place from ports on the Black Sea and the Sea of Azov, to which the wheat was brought by river, railway, and sometimes even by wagon.

Among other crops of the Black Soil region are maize and beet, grown chiefly in the south-western governments, where there is sufficient precipitation. Rye and barley also cover considerable areas.

THE SOUTH RUSSIAN INDUSTRIAL REGION may be considered, apart from the Black Soil, as it owes its importance to the large supplies of coal and iron which it contains. The coal occurs in the Donetz basin, which includes the southern portion of the government of Kharkov, the eastern portion of that of Ekaterinoslav, and the western part of the Don Cossack province. The quality varies in different parts of the field from lignite to anthracite, but it is bituminous coal which is chiefly worked. The total production of the Donetz region has been increasing rapidly; in 1898 it was less than 7,500,000 tons, but thirteen years later it exceeded 19,500,000 tons. The coal is extensively used in the metallurgical industries of South Russia; large quantities are sent to the Moscow Industrial region; some goes to the Baltic by ship; and it is proposed to build a new railway from the Donetz field to facilitate the trade with the St. Petersburg district.

Deposits of iron ore are found in the vicinity of Krivoi Rog, on the boundary of the governments of Kherson and Ekaterinoslav, where it is estimated that there are at least 82,000,000 tons of hæmatite and red hæmatite. In the east of the Crimea, near Kertch, also, there is believed to exist 700,000,000 tons of ore similar in character to that obtained from Luxemburg. In addition to

the proximity of coal, these fields are favoured by the presence of large supplies of manganese ores near Nikopol in South Russia, and by the ease with which metallic fluxes and building materials can be obtained. The growth of the industry here has also been encouraged by the development of railway communications, heavy import duties on iron from abroad, the influx of foreign capital and labour, and the adoption of modern methods of manufacturing iron. During the last few years the output has not been sufficient to meet the demands of the country, and it has been found necessary to reduce the duties on imported iron. At present the South Russian fields produce over two-thirds of the output of pig-iron in the whole country.

The chief ports of the agricultural and industrial regions of South Russia are situated on the Black Sea and the Sea of Azov. Odessa still has the largest trade, and imports considerable quantities of oil, raw cotton, tea, and coffee, but it has lost much of its grain trade owing to the improved access to Nikolaiev at the mouth of the Bug, and Kherson at the mouth of the Dnieper. On the Sea of Azov, Mariupol, Taganrog, and Rostov-on-Don are all largely engaged in exporting cereals.

THE REGION OF THE CAUCASUS is noted for its mineral wealth, and more especially for its stores of mineral oil, which are found chiefly around Baku in the Apsheron Peninsula on the Caspian Sea, and at Grozny in Cis-Caucasia. From the crude petroleum refined in these districts both illuminating and lubricating oils are obtained, while from the residuum is manufactured a valuable fuel used on all the steamers plying on the Caspian and lower and middle Volga. The Russian wells produced during the five years 1907-11 one-fifth of the world's supply of crude petroleum, practically the whole of which came from the region under consideration. Baku has suffered greatly within recent years from political disturbances, and the output of many of the wells is diminishing, so that the present condition of the industry is somewhat unstable. At Grozny, on the other hand, the production is steadily increasing, and now amounts to over one-tenth of the total Russian output. Batum, on the Black Sea, is the chief port for Baku, with which it is connected both by railway and by pipe line. The Caucasus region also contains copper, manganese ore, iron, and coal, but very little has as yet been done for their development.

THE URAL MOUNTAINS form another great mineral reserve of Russia, in which are found gold, platinum, copper, iron, and coal, as well as other substances. The production of iron is the most important industry of the region; and the Ural works, with about 20 per cent. of the national output, rank next to those of South Russia in this respect. There is, however, a great contrast in the methods employed in the two districts. The Ural is dependent on wood for fuel, the labour and capital is entirely Russian, the processes are old-fashioned, and it is only recently, and to a limited extent, that railways have supplied the means of transport. Of the world's supply of platinum about 95 per cent. is obtained from the Ural, chiefly from the government of Perm.

COMMUNICATIONS.—Before the introduction of railways the rivers of European Russia formed the chief means of transport within the country, notwithstanding the fact that they were closed by ice for a period which varied, according to the position of their basins, from three to six months each year. Among the more important of these rivers are the Volga, the Dnieper, the Don, the Vistula, the Niemen, the Neva, and the Dwina, but it is estimated that the total navigable waterways of European Russia have a length of about 50,000 miles, though only 16,000 miles are suitable for steamships. The basin of the Volga is connected with that of the Neva by three canals; while the Dnieper is connected with the Western Dwina, the Niemen and the Vistula.

European Russia possesses about 35,000 miles of railway. Moscow may be regarded as the geographical centre of the system, and from it lines radiate in all directions, among the most important being those which connect the former capital with Warsaw, whence there are connections with Berlin; with Odessa and other ports on the Black Sea; with St. Petersburg, Archangel, Siberia, and Turkestan. From St. Petersburg there are several important lines; one runs by Viborg to Helsingfors and Abo with connections to other parts of Finland; another connects the capital with the ports on the Baltic; a third goes by Vilna where it divides, one branch going to Warsaw, and the other to Eydtkuhnen on the Prussian frontier, where it meets the line from Berlin by way of Königsberg. The capital is also connected with the trans-Siberian railway at Cheliabinsk by a line which runs eastwards through Perm and Ekaterinburg. A railway from the latter town to Tiumen is being continued

to Omsk, while a line from Samara by Orenburg connects the trans-Siberian and trans-Caspian railways.

COMMERCE OF THE RUSSIAN EMPIRE.—For the five years 1906-10 the value of the exports of the Russian Empire averaged £127,000,000, and of the imports £96,000,000. The following table indicates the leading features of each :—

	EXPORTS IN £ MILLIONS.	PERCENTAGE.		IMPORTS. IN £ MILLIONS.	PERCENTAGE.
Grain	.. 58·67	46·2	Raw cotton	10·84	11·3
Timber	.. 12·19	9·6	Tea ..	.. 7·10	7·4
Flax	.. 6·35	5·0	Metals	.. 4·41	4·6
Eggs	.. 6·09	4·8	Wool	.. 3·84	4·0
Butter	.. 4·95	3·9	Machinery	.. 3·79	3·9
			Coal and coke..	3·26	3·4
			Rubber	.. 2·97	3·1

Wheat is sent to Great Britain and Germany, which also take the bulk of the timber. The United Kingdom, France, and Belgium consume most of the flax exported. Eggs and butter find their chief market in the United Kingdom. Of the imports, raw cotton is supplied by the United States, India, and Egypt, tea by China and India, and metals and machinery mainly by Germany. Coal and coke are imported from Great Britain and to some extent from Germany. Rubber is purchased on the English market.

5

ASIA

CHAPTER XIX

ASIA

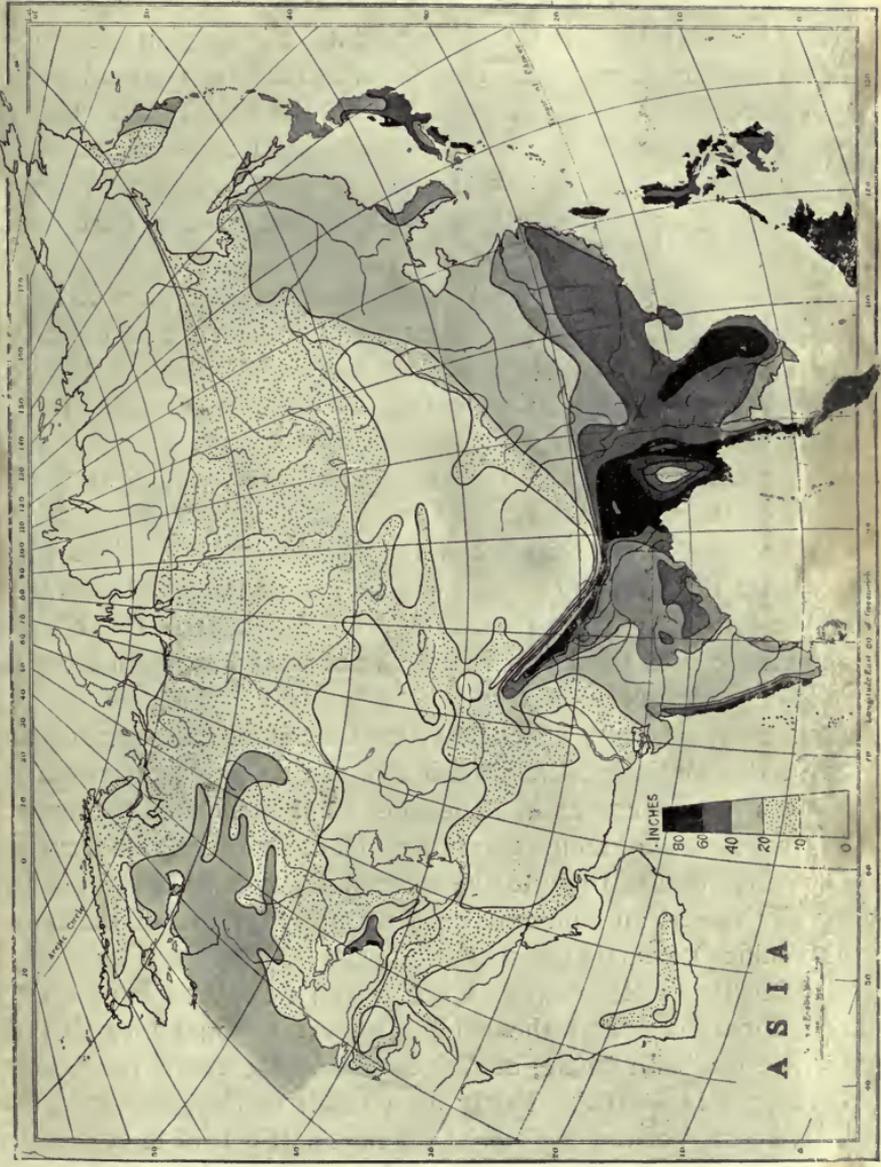
PHYSICAL STRUCTURE.—The continent of Asia, which has an area generally estimated at about 17,250,000 square miles, occupies nearly one-third of the land surface of the globe. The most prominent feature in the physical structure of this vast area is the great system of mountains and plateaus which extends across it from west to east. This system is much contracted in the region of the Pamirs, which practically divide it into two parts, the eastern part, however, being much more extensive than the western. To the west of the Pamirs, the system is again contracted in the Armenian Knot where meet the Pontus and Taurus ranges, which enclose between them the plateau of Asia Minor. This plateau has a height varying from 2,000 feet in the west to about 6,000 feet in the east. The Taurus mountains, on the south of the plateau, rise in places to over 10,000 feet, but the Pontus range on the north is somewhat lower and more irregular. To the east of the Armenian Knot, where Mount Ararat is over 17,000 feet above sea-level, the fold ranges of Asia again diverge to enclose the plateau of Iran. In the north are the Elburz Mountains which curve round the southern extremity of the Caspian Sea and are continued through the highlands of North Afghanistan eastwards to the Pamirs, while to the south the Kurdistan Highlands, the Zagros Mountains, the South Persian ranges, and the Suláiman Mountains extend from Armenia to the Hindu Kush and the Pamirs. These various ranges differ greatly in height. Mount Demavend, in the Elburz, is over 18,000 feet, while in the Hindu Kush the peaks rise to over 25,000 feet. In the southern loop the mountains are lower, but everywhere present considerable barriers to communication. The plateau of Iran, which has an average height of about 3,000 feet, contains two basins of inland drainage, that of Iran in Persia and that of Seistan in Afghanistan. To the north of the plateaus of Asia Minor and Iran, and of the mountain ranges which border them, is a region of relative depression, occupied by the Black Sea, the valley of the Kura, and the Caspian. This region is bounded on the north by the Caucasus, which are continued by the Kopet Dagh, east of

the Caspian, to the highlands of North Afghanistan. The Caucasus and the Kopet Dagh form, on the west of the Pamirs, the northern boundary of the Asiatic mountain system.

East of the Pamirs, which consist of a series of high valleys separated by still loftier mountain ranges, the same distribution of land forms is continued but on a much more extensive scale. The plateau of Tibet, much of which has an elevation ranging from 14,000 to 17,000 feet, is buttressed on the south by the greatest mountain range in the world, the Himalayas, in which the passes are from 17,000 to 19,000 feet above sea-level. The Himalayan fold is continued southwards in the Naga and Arakan Yoma hills of Burma and the Andaman and Nicobar Islands, and then eastwards through Sumatra and Java. To the east of this fold, other ranges running southwards, apparently from the Tibetan plateau, separate the various river systems of Indo-China from one another. On the north the Tibetan plateau is bordered by the Kwen-lun Mountains. About latitude 100°E . these bifurcate, one branch running eastwards into China as the Tsin-ling Mountains, and the other running north-east as the Inshan and Khingan Mountains. To the north of these various ranges the area of relative depression is represented by the basin of the Tarim in the west, and by the Mongolian plateau, with the desert of Gobi, in the east. The folded Tian Shan enclose the Tarim basin on the north, while further east the Mongolian plateau is bordered by a series of ancient highlands which include the Altai, the Sayan, and the Yablonoï and Stanovoi Mountains. These present a steep escarpment to the Siberian Lowlands, and form, to the east of the Pamirs, the northern limit of the Asiatic mountain system. On the south-east the Inshan and Khingan ranges overlook the lowlands of North China and Manchuria, while to the south of the Tsin-ling Mountains lies the ancient massif of South China. Both in Manchuria and in South China the hills have been formed by the fracturing of an ancient land mass.

The second great physical region of Asia is the Northern Lowland, which everywhere extends from the borders of the mid-world mountain system to the shores of the Arctic Ocean. This lowland, which is practically continuous with that of Northern Europe, has its greatest breadth in the west, and gradually becomes narrower towards the north-east. In the west, also, its altitude is less (the

197.



by permission

RAINFALL OF ASIA

After the C. J. Ford Wall Maps,

districts around the Caspian are below sea-level), while in the north-east it rises to a height of 1,700 feet. This difference in altitude is partly due to differences in geological structure, the western section being of much later date than the eastern. The Caspian and the Sea of Aral are in regions of inland drainage, and most of the land around them is covered with shifting sands. In the basins of the Ob and the Irtysh recent alluvium is the prevailing formation, though in places older rocks come to the surface. Further east, Palæozoic with some Secondary rocks prevail over the greater part of the country.

In the south, the mid-world mountain system is separated by the great alluvial valleys of the Tigris and Euphrates, and the Indus and Ganges, from the ancient plateau lands of Arabia and Southern India. These two plateaus, which seldom exceed 6,000 feet in height, are composed of ancient rocks, and seem to have remained above sea-level for the greater part of the geological period. In places they have been considerably affected by volcanic action.

CLIMATE.—Only a brief account of the general conditions which determine the climate of Asia need be attempted at present, as it will be necessary later to examine in some detail the climatic characteristics of those regions which are most important from the economic point of view.

Among the factors which have to be considered are the great size of the continent, the situation of the whole of it within the northern hemisphere and of the most of it outside of the tropics, the great system of mountains and plateaus by which it is traversed and the relation of these to the surrounding regions, and the existence of the African land mass on the south-west, and of the Indian and Pacific Oceans on the south and east.

During the winter months the greater part of Asia is an area of low temperature, and the coldest known region on earth is in north-east Siberia where, at Verkhoyansk, the mean temperature in January is -60°F . Partly as a result of the great cold, and partly because of the position of the northern belt of high pressure, the region is one of high pressure, the maximum being established over Mongolia. Hence the winds blow outwards, and being cold, give to the districts over which they blow temperatures that are below the normal. They bring little rain except when they have crossed the sea as in north-west Japan, or where, as in Farther

India, they are merely reinforcing the ordinary trade winds. On the west of the continent, Asia Minor, Northern Arabia, and Western Persia fall within the region with a Mediterranean type of climate and receive their rainfall during the winter half of the year.

During the summer months the land surface becomes greatly heated, and an area of low pressure, which is deepest between the Red Sea and Northern India, is developed over the continent. This low pressure region sucks in the trade winds both of the Indian and Pacific Oceans, and so gives rain to the whole of the region backed by the mid-world mountain system from India to Korea. The mountain system itself, on account of its position and configuration, receives but little rain, except on the slopes exposed to the monsoon rains, and the interior plateaus are therefore dry at all seasons of the year. Over the lowlands, precipitation takes place mainly in the summer months. The south-west, around the Caspian Sea and the Sea of Aral, is dry at all seasons of the year, as in the summer it is sheltered by the configuration of the land, while in winter it falls within a region of high pressure. Further north there is a gradually increasing rainfall, and a great part of Siberia has between 10 and 20 inches, the most of which falls in summer, when moisture is sucked into the northern part of the continent from various directions, but mainly from the west. This region is bounded both on the north and on the south by a belt of country in which precipitation is less than 10 inches.

CHAPTER XX

ASIATIC RUSSIA

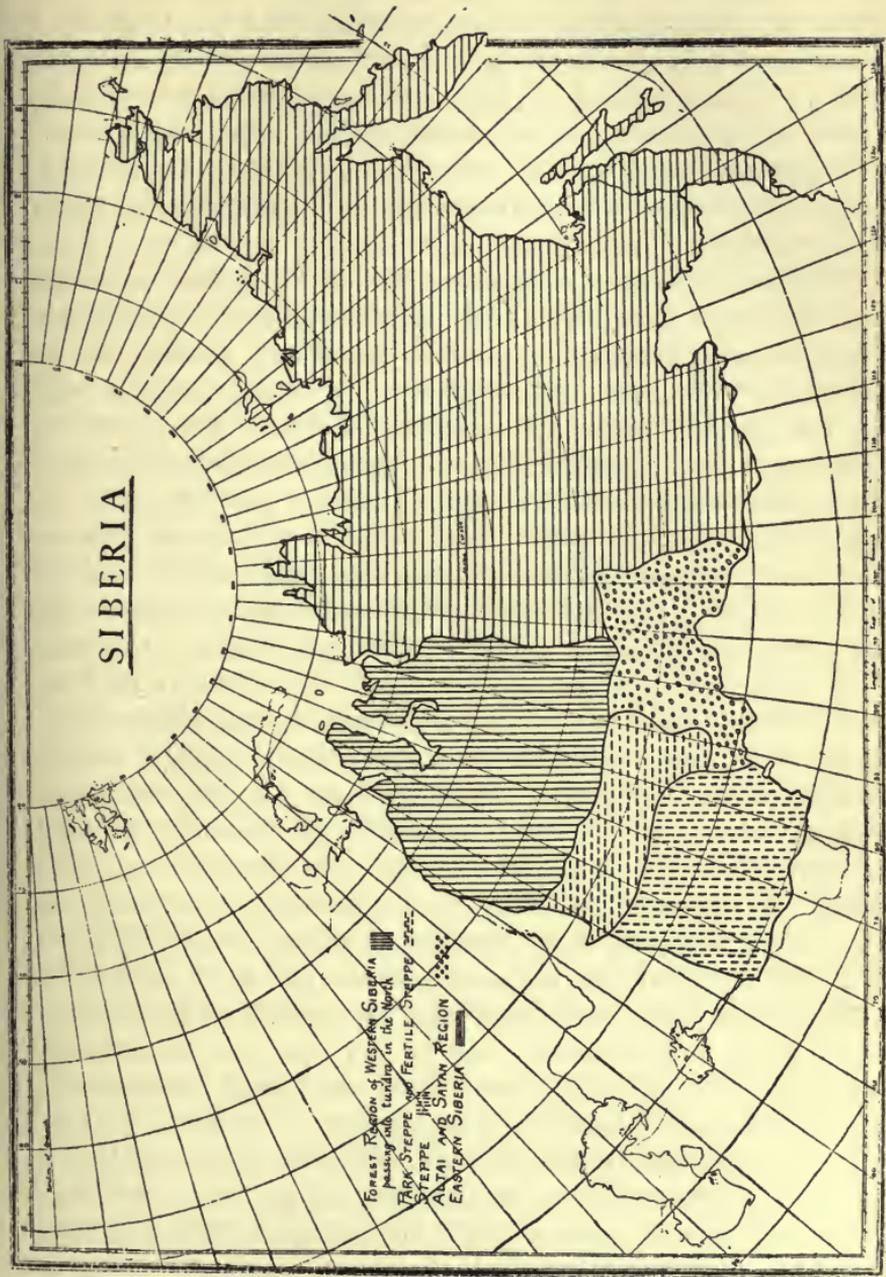
SIBERIA

SIBERIA may be defined in a somewhat general way as that part of Asiatic Russia which drains to the Arctic and Pacific Oceans. Including the steppe governments of Akmolinsk and Semipalatinsk, it has an area of over 5,200,000 square miles. Except in the south-east, where it is bordered by the Altai Mountains, the country west of the Yenisei consists, in the main, of a vast low-lying plain. To the east of the river this plain becomes higher and more contracted; while the Sayan, the Stanovoi, and the Yablonoi uplands, and the mountains of the Manchurian coign, occupy a gradually increasing area towards the south and east.

CLIMATE.—The climate is continental in character. The winters are extremely cold all over the country, while the summers are cool in the tundra region of the north, but hot in the steppe provinces of the south-west. The rainfall, which is but scanty, occurs mainly in the summer months. In the north and north-east of the country, and in the south-west, less than 10 inches fall; but elsewhere the average precipitation is between 10 and 20 inches.

VEGETATION.—Along the shores of the Arctic Ocean, tundra is the prevailing type of vegetation; but south of the Arctic Circle it gives place to taiga, which covers the whole of the Siberian lowland east of the Ob, as well as much of the upland. West of the Ob the forested area is more restricted, and, north of the 53rd parallel, a belt of park steppe, with a maximum breadth of about four degrees, extends from that river to the Urals. To the south of the park steppe there is a true steppe-land, which further south gradually passes into semi-desert country.

NATURAL REGIONS.—The economic development of Siberia is at present taking place mainly to the west of Lake Baikal, and here several natural regions stand out in marked contrast to one another and to the country further to the east. West of the Yenisei, the taiga covers a marshy lowland, which has but recently emerged from the sea, and in which the watercourses are as yet but badly defined. The park steppe (along with which may be included the



NATURAL REGIONS OF SIBERIA

western valleys of the Altai) has a soil and climate which render it capable of great agricultural development. The steppe-land to the south, with but a meagre precipitation, is fit only for pastoral pursuits; while the Altai and Sayan mountain districts are chiefly valuable for the mineral wealth which they contain. To the east of the Angara-Yenisei the country is only imperfectly known, and, as any subdivision of it would necessarily be incomplete, the region will here be treated as a whole.

THE FOREST REGION OF WESTERN SIBERIA is of little economic importance, as it is marshy, incapable of cultivation, and difficult of penetration. Fishing is the most important pursuit of the inhabitants, who catch large numbers of salmon, sturgeon, and other fish for the Russian and Siberian markets. The timber of the region varies in quality; on the more elevated districts it is often good, but in the marshes the trees are frequently rotten.

THE PARK STEPPE is at the present time the sphere of greatest economic activity in Siberia. It contains large areas of good agricultural land; and the steppes of Ichim, which lie between the Urals and the Irtysh, the steppe of Baraba, further to the east, and the valleys and steppes on the west of the Altai, are all more or less covered with a fertile black soil similar to that of European Russia. Over much of the steppe of Baraba the rainfall is insufficient for the growth of crops; but, in the other districts mentioned, cereals are extensively cultivated, although they are always exposed to a certain amount of danger from summer drought and early autumn frost. Wheat ranks first in importance, and during the years 1905-10 occupied on an average an area of about 6,000,000 acres; but the yield was low, and did not exceed 11 bushels to the acre. For this, there were several reasons. The Siberian peasant is but a poor farmer, and he has been confirmed in his slipshod ways by the fertility of the soil, which leads to extensive, rather than intensive, methods of cultivation. Formerly, the practice was to crop the land with the same cereal for a number of years in succession, only allowing an occasional year's rest, and then to let it lie fallow for a considerable time; but recently a system of rotation has been introduced, American machinery is being more extensively used, and the prospects of better cultivation are, on the whole, somewhat brighter than they have hitherto been.

Cattle are raised in large numbers, but, partly as a result of the

rigorous winters which prevail, the breed is of an inferior type, and there has been a tendency to sacrifice quality to quantity. With the development of the butter industry, attempts have been made to improve the native cattle by the importation of animals from abroad, and these attempts seem to have been at least partly successful, notwithstanding the great difficulty there is in acclimatizing foreign stock. The manufacture of butter, which has now become the most flourishing of Siberian industries, owes its origin to Danes, who first made the farming population acquainted with modern methods of dairying. The matter was then taken up by the State, and the export of butter, very largely to the United Kingdom, has gradually increased until it now amounts to about 55,000 tons annually. The chief centres of production are at Kurgan, Omsk, and Petropavlovsk, although over one-third of the total quantity is obtained from the rich valleys and steppes round Barnaul, on the west of the Altai. Two reasons may be adduced for the rapid rise of the butter industry: the Siberian grasslands are said to produce milk of great richness, and the freight on butter is in proportion to its value much less than that on wheat.

Although this region is the most densely populated in Siberia, and contains over one-half of the total population of the country (which, in 1910, numbered 10,000,000, including that of Akmolinsk and Semipalatinsk), manufactures have made but little progress. Such as exist are connected with working up agricultural, pastoral, and forest products, and include flour-milling, brewing, tanning, and match-making. The inhabitants are, as a rule, too poor to buy much, and what they actually require can be imported more cheaply by the Siberian railway than it can be manufactured on the spot.

THE STEPPE, which lies to the south of the previous region, is generally unfit for agriculture, and it is only in a few scattered oases, where irrigation can be practised, that colonisation has been attempted. The Kirghiz tribes, who are the chief inhabitants of the steppe, have large herds of horses, camels, cattle, and sheep, and practically live in the same nomadic fashion as their fathers have done for many centuries. Tallow, obtained from the fat-tailed sheep, horse-hair, and camel's-hair are the chief exports; sheep's wool is too coarse to find a market outside of Siberia.

The economic development of this region in the future will depend mainly upon the exploitation of its mineral wealth. In the Ekibastuz beds, in the neighbourhood of Pavlodar on the Irtysh, there are vast reserves of coal, which have as yet been worked only to a slight extent. Gold, silver, and copper also exist, and it is believed that the supplies of copper, at least, are very considerable.

THE ALTAI AND SAYAN REGION is noted for its mineral rather than for its agricultural wealth. There is a belt of cultivable land along the course of the railway; but the most fertile district is that round Minussinsk, on the Upper Yenisei, where the rich, black soil and favourable climatic conditions combine to produce sufficient grain to meet the demands of the mining population of Central Siberia. Gold is found in placer deposits in the valleys of various rivers, such as those of the Tom and its tributaries, especially round Kusnetz; it is also obtained in the valley of the Yenisei round Minussinsk, Atchinsk, and several other places further to the north. Round Kusnetz there are also great deposits of iron ore, but these have not been worked to any great extent. Coal occurs in various places; the largest deposits are probably those in the Jurassic rocks which occupy the whole valley of the Tom, but the mines chiefly worked at present seem to be those of Cheremkovo, situated near the town of Irkutsk, which supply the railway with much of its fuel. Notwithstanding the great mineral wealth of this region, the total production is still small, and much of the iron and steel used in the country is imported from South Russia. For this there are several reasons: the search for gold has always proved more attractive to the mining population; there is an absence both of the capital and labour necessary for manufacture; and the means of communication are still very badly developed.

EASTERN SIBERIA.—The greater part of Eastern Siberia is imperfectly known, as far at least as its economic resources are concerned. Most of the land is covered with forest, and the proportion fit for agriculture is believed to be much lower than in Western Siberia. The climate also is more severe, and tends to restrict agriculture to such favoured localities as the southern part of trans-Baikalia and the more sheltered districts in the valleys of the Amur and the Ussuri. The amount of grain grown is not

sufficient to meet the requirements of the inhabitants, who are obliged to import it from Western Siberia. Timber will probably prove a valuable source of revenue in the future, more especially near the coast where it can be easily worked, and even now a considerable quantity is exported, mainly to Australia. Fishing is an important pursuit along the lower reaches of the Amur and in Kamchatka, where large quantities of salmon are caught. From the Amur, caviare is now exported to European Russia, but the fisheries of Kamchatka are mainly in the hands of Japanese. Herring are found along the coast and in Sakhalin.

But it is for its mineral wealth that Eastern Siberia is chiefly important at the present time. The region produces the greater part of the Siberian output of gold, much of it being obtained from the districts of Vitimsk and Olekminsk in the basin of the Lena, from those of Zeiski and Boureynsky in the basin of the Amur, and from the valley of the Ussuri. For working the alluvial sands, which alone are exploited to any extent at present, steam dredgers have recently been introduced. The richest deposits are believed to lie near the coast, and a strip of land extending inland for about 66 miles has, until lately, been closed to private mining enterprise. Coal of poor quality occurs in the basin of the Ussuri and elsewhere, but the richest deposits of that mineral are said to lie along the west coast of Sakhalin, from the Russo-Japanese frontier northwards.

COMMUNICATIONS.—The rivers of Siberia, although they are, with one or two exceptions, closed by ice for more than half the year, are of considerable value as waterways. The Ob is navigable as far as Biisk, and, along with the Tobol and the Irtysh, is used for the conveyance of grain from the agricultural regions to Tiumen on the Tura, whence it is sent by rail to Kotlas to be floated down the Dwina to Archangel. The Yenisei, notwithstanding its great volume, plays a less important part, and is used mainly for local purposes, such, for example, as forwarding the grain of Minussinsk to the mining districts further north. These two systems are connected by a short canal, which has not proved of great value. The Lena is of some service to the mineral districts of Vitimsk and Olekminsk, while the Amur is navigable nearly to its source and carries on a considerable amount of trade. But the most important route of all is undoubtedly the

trans-Siberian railway which runs from Cheliabinsk, where lines meet from St. Petersburg and Moscow, by Omsk and Irkutsk, round the southern end of Lake Baikal, and across Manchuria by Harbin to Vladivostok. Two important lines to connect with it are at present under construction : one is intended to run from a point a short distance east of Lake Baikal, by Kiakhta and Urga, to Kalgan in China, and so connect with the Chinese railway system ; while the other will leave the main line several hundred miles further east, and follow the courses of the Shilka and the Amur for the greater part of the way to Khabarovsk, where it will meet the line running to that place from Vladivostok along the valley of the Ussuri. The first of these will shorten the journey to Peking by several days, while the second will provide an all-Russian route across Siberia to Vladivostok. The completion of the trans-Siberian railway has undoubtedly been the most important factor in the economic development of the country. Between 1861 and 1895 (the year in which the line was opened to Irkutsk) less than 1,000,000 emigrants entered the country. Since then over 3,000,000 people have moved into it from European Russia, the present rate being over half a million per year.

RUSSIAN CENTRAL ASIA

This region may be considered as including that part of Asia which borders upon Siberia (including the steppe governments of Akmolinsk and Semipalatinsk), Chinese Turkestan, the Pamirs, Afghanistan, Persia, the Caspian Sea, and European Russia. It has an area, including the semi-independent Khanates of Khiva and Bokhara, of over 1,000,000 square miles, and a population which is estimated to number 10,000,000.

Russian Central Asia varies greatly in its physical aspects. In the east it belongs to the region of the Pamirs and the Tian Shan, while in the west it passes into the plains of the Aralo-Caspian depression. The climate throughout is extreme, and is characterised by cold winters, hot summers, and a very low rainfall. Hence, much of the land is desert or, at best, steppe ; and it is only in the vicinity of rivers, which are fed by melting snows on the mountains, that settlement is possible. Of these rivers, the most important are the Ili in Semirechensk, the Syr-Daria in Ferghana and Syr-Daria, the Zerafshan in Samarkand and

Bokhara, the Murghab in trans-Caspia, and the Amu-Daria between Bokhara and Syr-Daria on its right, and trans-Caspia and Khiva on its left banks. Where the conditions are favourable, the inhabitants of the districts bordering these rivers have developed an elaborate, if primitive, system of irrigation and settled down to agriculture, but on the steppes nomadism still prevails. In the irrigated districts the soil is generally very fertile, and the crops grown include wheat (sometimes raised without irrigation), rice (where water is abundant), and other cereals, sesame, flax, and great quantities of fruit and vegetables. Most important of all, however, has been the extension within recent years of the area under cotton, which flourishes best in Ferghana, but is grown to some extent also in Syr-Daria and in Samarkand. During the three years 1908-10 the annual output averaged about 95,000 tons of ginned cotton. The seed used is American, and the product, the quality of which is fairly good, goes exclusively to European Russia.

Russian Central Asia is now connected with the European railway system by a line which runs from Samara through Orenburg to Tashkent. There it joins the trans-Caspian railway which connects Krasnovodsk on the Caspian with Merv (whence there is a branch to Kushk on the frontier of Afghanistan), Bokhara, Samarkand, and Andijan.

CHAPTER XXI

ASIATIC TURKEY AND ARABIA

ANATOLIA

THE plateau of Anatolia, which is buttressed on the north and on the south by the Pontic and Taurus ranges respectively, extends from the Ægean eastwards to the Armenian knot. To the west of the Anti-Taurus the plateau forms a great central plain, of which the elevation is between 2,500 and 3,000 feet; but to the east the land, besides increasing in height, becomes more irregular in contour, and the region consists of elevated plains, separated by the numerous ranges which finally converge in the highlands of Armenia. The mountains which border the plateau approach closely to the sea and leave little room for the formation of coastal plains, the most important of which are those of the Kizil and the Kalkid in the north, and of Pamphylia and Cilicia in the south. To the west the slope of the land is more gentle, and many broad valleys open out upon the Ægean, and offer the natural routes for penetration into the interior.

On the coastal regions, which include both the plains and the lower slopes of the hills, the climate is typically Mediterranean. At Smyrna, for example, the mean temperature for January is 46° F. and for July 80° F. On the plateau, the summers are hot and the winters very cold, especially in the east, where snow lies for many months in the year. The rainfall, which occurs during the winter half of the year, is heaviest in the coastal districts, and is generally between 20 and 30 inches, except along the eastern part of the Black Sea littoral, where it exceeds the latter amount. On the plateau the precipitation is almost everywhere less than 20 inches, and over a great part of Western Anatolia it is less than 10 inches.

For the division of the country into natural regions, it is most important to distinguish between the coastal plains and the lower slopes of the plateau on the one hand, and the plateau on the other.

THE COASTAL DISTRICTS, along with which may be included the Ægean Islands (Samos, Rhodes, Mitylene, Chios, and others), contain considerable areas of fertile soil, but their full development

has been greatly retarded by the disturbed political conditions which have so long prevailed in the country. The cereals grown include wheat, maize, and barley, the last of which is exported to England, where it is esteemed for malting. The west coast is especially noted for its fruits, the most important of which are the grape, the olive, and the fig. Of these, the grape, which is exported in the form of raisins (the manufacture of wine being forbidden by Mahommedan law), has the widest range; the olive does not extend inland more than fifteen or twenty miles from the coast, except in the district round Aidin; while the fig flourishes best in the valleys of the Cayster and the Maeander. Cotton, generally of inferior quality, is grown, among other places, in the districts round Kassaba and Aidin in the west, and on the Cilician plain in the south-east; but it is believed that the latter district, at least, if developed and irrigated, might produce large quantities of excellent material, as at present only part of it is cultivated, and that is devoted mainly to cereals. On the north coast, tobacco is extensively grown on the river deltas in the country between Trebizond and Sinope, while from the warm temperate forest, which borders the Black Sea, large quantities of hazel nuts are exported. Among other products of the coastal districts are sesame, valonia, opium, etc.

Apart from agriculture, there has been but little economic development. Soap, in the manufacture of which olive oil is extensively used, is made in the island of Mitylene, at Smyrna, and elsewhere; carpets are woven in various places; and there are cotton mills, cigarette factories, tanneries, and a number of other small manufacturing establishments.

THE PLATEAU.—On the plateau the conditions of economic activity are very different. Some wheat and millet are grown in favoured localities, but the principal pursuits of the region are pastoral, and, in the west, are mainly confined to rearing the famous Angora goat, from which mohair is obtained. Upon this raw material is based the carpet-making industry, which is carried on in many small villages throughout the region. In the east of the plateau the horse replaces the goat as the mainstay of the inhabitants, who are typical nomads.

MINERALS are believed to be abundant in both regions, and among those known to exist are silver, copper, lead, antimony,

chrome, and emery ; but, although numerous concessions have been granted for their exploitation, comparatively little actual work has been done. Chrome, emery, and antimony are exported to a small extent.

COMMERCE.—The principal exports of the country include raisins, tobacco, barley, figs, liquorice, wool, hides and skins ; but at present it is impossible to give exact details of their actual value.

SYRIA

The coastal strip, which is narrow in the north, but broadens out in the south into the plains of Sharon and Philistia, is bordered by a series of highlands which include the Giaour Dagh, Lebanon, and the hill districts of Samaria and Judæa. Beyond these lies the rift valley of the Jordan and the Dead Sea, the eastern walls of which form the escarpment of a plateau that falls away gradually towards the Euphrates. The climate is of an extreme Mediterranean type and the summers are hot, especially in the rift valley and on the eastern plateau, while the winters are warm (except in the north, where there is often heavy snow). Precipitation is heaviest on the slopes of the Lebanon, which have an average rainfall of over 40 inches ; but this amount decreases slightly towards the north, and rapidly towards the south and east.

Agriculture is the main industry of the inhabitants, but, though much of the soil is fertile, a great part of it is uncultivated ; and there is little doubt but that improved methods of husbandry, and more especially the development of irrigation, would increase to a considerable extent the productive powers of the land. The chief agricultural areas lie either upon the slopes of the hills facing the sea, or on the plateau beyond the rift valley. In the first of these regions, the olive is extensively grown, and the manufacture of oil, and soap therefrom, are two of the most important industries in the country. Round Alexandretta in the north, and Jaffa in the south, there are now many orange plantations, though in the latter district irrigation is necessary. Lemons also are of increasing importance. The rearing of the silkworm has long been practised in the Lebanon province ; but the industry is beginning to spread along the coast, both to the north and south, as well as inland to the Anti-Lebanon. The silk is spun in the district and

the product is exported, the bulk of it going to Lyons. Tobacco is cultivated in different parts of the country, but the export consists mainly of that which is grown in the mountains behind Latakia. Between the Lebanon and the Anti-Lebanon there are numerous vineyards, and within recent years the cultivation of the vine has extended to the coastal regions round Haifa and Jaffa, where sesame is also an important crop. On the plateau region, to the east of the rift valley, the products are of a somewhat different character, and cereals are grown in sufficient quantities round Damascus, Hama, and Aleppo to permit of a considerable export, especially of barley; while cotton is an important crop round Idlib in the north, where there is said to be much fertile land, at present lying fallow, suitable for the cultivation of that plant. To the east of the regions mentioned, the want of rainfall condemns the country to pastoral pursuits alone, and even these disappear towards the Syrian desert. Among the more important industries of Northern Syria are weaving and dyeing at Aleppo, and the tanning of leather at Aintab.

Minerals are known to exist in different parts of Syria, but, so far, little has been done for their development. The principal exports of the country include oranges and lemons, sesame, silk, soap, barley, and liquorice.

MESOPOTAMIA

Mesopotamia, which belongs to the basins of the Tigris and Euphrates, lies between the Syrian desert and the hill country bordering the Iranian plateau. The land has a gradual slope from the north-west as far as an old coast line, which runs from Hit on the Euphrates towards Samara on the Tigris, and beyond which stretches a level plain that is really the delta of these great rivers. The scanty rainfall occurs during the winter months, and at Bagdad probably does not exceed 5 inches, though to the east of the Tigris it is over 10 inches. The winters are warm and the summers hot: at Bagdad the range is from 45° F. in January to 87° F. in August. In the north, and in the vicinity of the rivers as far south as the latitude of Bagdad, there are considerable areas of grazing land, but much of the true "Mesopotamia" is desert. In the delta, past civilisations have maintained themselves by the aid of great systems of irrigation which have fallen into decay;

and, even with the primitive methods at present adopted, crops of wheat, millet, and sesame are grown, while barley is often cultivated with winter rainfall only. In the more southerly parts of the delta, where the land is inundated yearly, population is densest, and the cultivation of the date-palm has given to its people a more settled character than is the case in other parts of the country. The proposed scheme for the restoration of the irrigation system in the delta is of considerable interest. As the rivers are in flood during the spring when the highland snow is melting, and as the summers are hot and dry, the basin system of ancient Egypt is impossible, and perennial irrigation is necessary. The total area of the delta is about 5,000,000 hectares ; and Sir William Willcocks estimates that the available water supply is sufficient to irrigate 3,000,000 hectares of winter crops (wheat, barley, beans, and roots, which require irrigation from November to May), and 1,250,000 hectares of summer crops (millet, sesame, and cotton, which need water from April till the middle of July). At present, a beginning has been made to works, which, if they are eventually completed as proposed, will bring 1,400,000 hectares under irrigation.

The principal towns of Mesopotamia are Basra, at the head of navigation for ocean-going ships on the Shat-el-Arab, and the chief port of the country ; Bagdad, which is reached by river steamers from Basra, and carries on an important trade with Persia ; and Mosul, which is the centre of the pastoral area in the north of the country. The principal exports include dates, wool, barley, and opium ; while cotton goods and other textiles, sugar, and timber form the greater part of the imports.

ARABIA

Arabia is a great plateau almost one-third the size of Europe, with a slope from the west and south towards the east and north. Owing to the low rainfall, the greater part of the region is a desert, and the bulk of the population is settled upon the margins of the plateau, where the conditions are somewhat more favourable. In the centre, in the country known as the Nejd, where the limestone is uncovered by the sands of the deserts which lie to the north and south, there are a number of scattered oases ; and on the poor steppe lands which surround them, the Bedawins feed their flocks.

On the west coast, Turkey possesses the provinces of Hejaz and Yemen, in the latter of which there is sufficient summer rainfall to permit the growth of the plant from which the famous Mokha coffee is obtained. Yemen has, within recent years, suffered greatly from the competition of Brazil, and its output now holds a relatively unimportant place in the world's markets. The chief towns on the west coast are Jidda, the port of Mecca, and Hodeida, which carries on most of the trade of Yemen. In the south of Arabia is the district of Hadramut, once famous for its myrrh and frankincense; while in the south-east is the mountainous country of Oman, an independent sultanate, from which dates are exported. Its capital, Muscat, has some coasting trade.

RAILWAYS OF ASIATIC TURKEY.—In Asia Minor the principal railway is that which runs from Haidar Pasha to Konia, with a connection to Smyrna. Konia is now all but linked up with Aleppo, and the line is being continued to the east, whence it will go by Mosul to Bagdad. There is a branch from the main line to Alexandretta. From Aleppo, a railway runs south by Damascus to Medina, and may ultimately be continued to Mecca. This line is connected with the ports on the Syrian coast by branches from Homs to Tripoli, Rayak to Beirut, and Deraa to Haifa and Acre. A line also runs from Jaffa to Jerusalem.

CHAPTER XXII

PERSIA AND AFGHANISTAN

PERSIA

THE area of Persia is estimated at 628,000 square miles, while the population is believed to number 9,000,000. Though the country belongs, in the main, to the Iranian plateau, its topography is somewhat varied. In the north-west, an irregular mountain system forms the connecting link between the ranges of the Elburz and the Kopet Dagh, which border the plateau on the north, and the parallel ranges of Kurdistan, Laristan, and Arabistan, which border it on the south-west. East of the latter uplands a great high plain contains many of the most fertile districts in the country. This plain is bordered on the east, as on the west, by several parallel ranges, which separate it from the deserts that extend over the greater part of Eastern Persia. In the extreme east some irregular mountain districts lie between these deserts and Afghanistan.

CLIMATE.—The climate of Persia is continental in character, the summers everywhere being hot, except in some parts of the highlands, while the winters are cold, with the exception of a strip along the Gulf coast where they are mild. The precipitation occurs mainly during the winter half of the year, and is heaviest on the northern slopes of the Elburz Mountains where it ranges from 20 to 40 inches or more. Elsewhere, on the uplands it is generally over 10 inches, but throughout a great part of Central Persia considerably less than that amount of rain falls.

NATURAL REGIONS.—The physical divisions already mentioned probably form the best basis for the treatment of the country by natural regions, more especially as they correspond, to some extent, with the climatic differences which exist.

THE ARMENIAN KNOT.—The irregular mountain system of the north-west, which forms part of the Armenian Knot, is practically co-extensive with the province of Azerbaijan; and, owing to its position, has a somewhat greater rainfall than many other parts of the country. On the uplands, which are devoted to pastoral pursuits, the people are nomadic, and follow their herds from place to place; but in the lowlands, where the soil is fertile and water fairly abundant, the inhabitants are sedentary, and are chiefly

engaged in agriculture—cereals, cotton, the vine, and various fruits all being extensively grown. Minerals are believed to be plentiful, and iron, copper, and lead have for long been worked in a somewhat haphazard fashion. Tabriz, which is the chief town of the region, lies in the fertile basin of Lake Urmia, and is a place of considerable commercial importance, as it is the centre of one of the most densely populated parts of Persia.

THE NORTHERN PROVINCES.—The two provinces of Gilan and Mazanderan belong, in the main, to the northern slopes of the Elburz range, and differ in many respects from other parts of Persia, chiefly as a result of the much heavier rainfall which they receive. Along the coast, the level land consists of alluvial tracts built up of sediment carried down by mountain streams; much of it is covered with jungle, but in numerous places clearings have been made in which rice, sugar, and cotton can all be grown. The cultivation of cotton is on the increase, but, like all Persian varieties, the staple is short. Above the jungle lies the forest, which consists mainly of deciduous trees. Along its lower fringes the chief towns of the region are situated, as malaria forbids settlement on the coastal plains, and in their vicinity oranges, lemons, citrons, olives, and other fruits all flourish. Gilan is still noted for its silk, though the industry has never recovered from the disease by which it was devastated over forty years ago, and the place of the mulberry has in many places been taken by rice. Owing to difficulties of transport and other causes, the timber of this region has never been exploited. Above the forest-belt there is bare pasture land, where the inhabitants are largely nomadic and depend upon their flocks for subsistence, though cereals are also grown. Manufactures are confined mainly to the towns, where cotton, woollen, and silk goods are all produced. Coal and iron exist on both slopes of the Elburz, but, because of the proximity of the capital, have been mainly worked on the southern. Enzeli, which is the port of Resht, the capital of Gilan, is the principal seaport of Persia on the Caspian, and through it passes much of the trade of Central Persia with Russia. Other ports are Bender-Gez, at the south-east extremity of the Caspian, and Meshediser, the port of Barfurush.

NORTH KHORASAN.—The Kopet Dagh and other mountain ranges which occupy the northern part of the province of

Khorasan, form a distinct natural region. The valleys, which have an elevation varying from 3,000 to 4,000 feet, are sometimes well watered, and when this is the case they are the centres of considerable agricultural activity. The districts along the courses of the Keshef-rud, which drains into the Hari-rud, and of the Atrek and Gurgan, which drain into the Caspian Sea, have made north Khorasan the granary of Persia. On the neighbouring uplands, which are only fit for pasture, large numbers of camels are raised. The manufacture of carpets and shawls is carried on both by the sedentary peoples in the towns and villages of the lowlands, and by the nomads of the uplands. Mineral wealth is believed to be abundant, but, so far, has been little worked. Meshed, in the valley of the Keshef-rud, is the chief town of the region, but is badly placed for trade except with Russia.

THE SOUTH-WESTERN MOUNTAINS.—A great part of Kurdistan, Laristan, and Arabistan is occupied by parallel ranges, which in the north are separated from one another by narrow valleys and plains, but unite in the south into a single range. The inhabitants of the region are engaged mainly in agricultural and pastoral pursuits, many of them leading a semi-nomadic existence. Sheep and goats, horses and cattle, are reared in large numbers, and butter and cheese are important products. Opium is grown in some of the plains, while gum-tragacanth is collected from the hills and mountains around. Woollen goods, and especially carpets, are the chief manufactures. There are few towns, and the patriarchal form of society prevails in many parts of the region.

THE CENTRAL PLAIN.—The waters which flow eastwards towards the desert from the mountains in the west of Persia are used for purposes of irrigation in the arid steppes of the Central Plain, and account for the fertility of that long line of oases which extends from Teheran in the north to Shiraz in the south. In these oases, where most of the inhabitants of the region are settled, agriculture is an important pursuit. Cereals and cotton are grown everywhere; the best Persian tobacco is cultivated round Shiraz, Kashan, and Tabbas; and Isfahan, Niriz, and Shiraz are noted for their opium. As is generally the case among the dwellers in oases, considerable attention is paid to industry and trade. Kashan, where the silkworm once flourished, is still noted for its manufacture of silks, sateens, velvets, and brocades.

Isfahan is famous for its brassware, and Hamadan is the great tannery of Persia. Teheran, Isfahan, Kashan, and Shiraz are all important trading centres.

THE CENTRAL RANGES, which border the Central Plain on the east, are generally of limestone formation. As a rule, the soil is poor and infertile; but round Yezd, in the north, and Kerman, in the south, there are various districts where rice, cotton, tobacco, opium, and henna can all be grown. In these districts the people are sedentary, but elsewhere they are nomadic and are engaged in pastoral pursuits. Kerman is noted for its carpets made entirely from cotton, but other manufactures are of little importance. Minerals are believed to be extensively distributed, especially in the south, where iron, copper, and coal are all known to exist. Yezd and Kerman are important centres for the caravan trade across the desert.

THE EASTERN DISTRICTS.—Of the great deserts of Persia it is unnecessary to speak here. Further east, the country is mountainous, and, although a little agriculture is possible where there is sufficient rain or where irrigation is practicable, the bulk of the people are nomadic, and wander about with the cattle, sheep, goats, and camels, which constitute their worldly possessions. Wool, skins, and clarified butter are, therefore, the chief products of the region, although some opium and silk are obtained from the settled districts. The manufacture of carpets is also of some importance.

THE GULF COAST.—The escarpment of the Iranian plateau runs along the entire length of the Persian Gulf, sometimes approaching close to it, but generally receding from it a distance of 15 to 30 miles. The coastal strip is sandy, and, except in places where there are clusters of date palms, is one of the least inviting parts of Persia. The valley of the Karun is an exception to this general rule, and only requires the development of an irrigation system to render it one of the most productive districts in the country. The chief towns situated upon the coast—Bushire, Bunder Abbas, and Lingah—all derive their importance from the facilities which they offer for penetration into the interior.

COMMUNICATIONS.—Economic progress in Persia has been greatly retarded by the want of good means of communication. With practically no railways and with few carriage roads, the country

has been forced to rely almost entirely upon caravans for its means of transport. In the north, it is true, matters are somewhat better than in the south. Julfa, the terminus of a branch line from Tiflis on the trans-Caucasian railway, is connected with Tabriz by a good carriage road, which was built by the Russians. Another carriage road leads from Enzeli to Teheran, while a third runs from Ashabad on the trans-Caspian railway to Meshed. Caravan routes connect Tabriz with Trebizond on the Black Sea, with Astara on the Caspian, and, by way of Teheran, with Isfahan and Meshed. In the south of the country the Karun opens up river communication from Mohammerah, the port of transshipment near its mouth, to the rapids at Ahwaz, whence a caravan route leads to Isfahan. From Basra, on the Shat-el-Arab, a considerable quantity of goods for Persia makes its way upstream to Bagdad, from which town it is forwarded by caravan to Teheran through Kermanshah and Hamadan. Bushire is connected by way of Shiraz with Isfahan and Kerman, and Bunder Abbas with Yezd and Kerman. From Kerman, caravan routes lead to Isfahan by Yezd, and to Meshed by Birjand. Meshed is also connected directly with Yezd, and, by a long caravan route, with Nushki on a branch of the railway from Karachi to Chaman.

COMMERCE.—Persia transacts the bulk of its foreign trade with Russia and the British Empire ; and, as regards the northern part of the country, at least, Russia is much more advantageously situated than either Great Britain or India. Among the more important articles imported are cotton goods, sugar, and tea, which together account for over 60 per cent. of the total imports. In the supply of cotton goods, Great Britain comes first, with Russia second, and British India third ; sugar is largely of Russian origin, while tea comes mainly from India, but partly from China by way of Russia. Among the exports of Persia are raw cotton, dried fruits, carpets, rice, opium, silk, and gums. Russia is the chief purchaser of raw cotton, fruits, and rice, and along with Turkey takes the bulk of the carpets ; silk goes mainly to France and Italy ; opium to Turkey and China ; and gum to various countries. For the five years 1906–10, the average value of the imports amounted to £7,900,000, of which Russia supplied almost 50 per cent. and the British Empire about 36 per cent. During the same period the exports averaged £6,500,000, of which two-thirds

went to Russia and one-tenth to Great Britain, India, and other parts of the Empire.

AFGHANISTAN

The eastern part of the Iranian plateau belongs to Afghanistan which has an area of about 246,000 square miles. The Hindu Kush and its outliers form the northern boundary of the plateau, and run across the country separating the basins of the Oxus and the Hari-rud from those of the Indus and the Helmand. Except in the north and west, the elevation of the land is generally over 4,000 feet above sea-level, while the mountain-ranges rise to 15,000 or 20,000 feet. Climatic conditions are, therefore, determined by altitude rather than by latitude. The winters are generally cold, and over considerable areas snow lies for several months each year; even at Kabul the mean temperature for January is below freezing-point. On the other hand, the summers are hot and dry. The total precipitation, which does not exceed 15 inches, falls in the form of snow in winter, and of rain in spring.

The crops, which are frequently grown with the aid of irrigation, include the ordinary cereals and rice, European vegetables, temperate and sub-tropical fruits, tobacco and cotton; but as a rule the Afghan peoples are pastoralists rather than agriculturists, and their main wealth lies in their flocks and herds. Horses, camels, cattle, sheep, and goats are all reared in large numbers. Manufactures are of comparatively little importance, though silk goods are woven at Herat and Kandahar, carpets are made round Herat, and coats are fashioned from sheep-skins throughout the country. Minerals, including coal, silver, copper, and lead, are known to exist, but so far little has been done to develop them.

The chief imports are textiles from Russia and British India, and tea, sugar, and hardware from the latter country. The exports include raw silk, which is produced in the districts bordering the Oxus and is sent to Persia and Turkestan, wool forwarded to Persia *en route* for Russia, France, and America, and fruits, carpets, wool, and coats exported to British India. A considerable amount of trade between Persia, Turkestan, Afghanistan, and India is still carried on by nomadic Afghans known as Powindas, who descend into India by the Gomal Pass, cross the Oxus to Bokhara, and go to Persia by Meshed.

CHAPTER XXIII

INDIA AND CEYLON

INDIA

THE main physical regions of India may be comprehended at a glance. On the north-west, north, and north-east lie the great mountainous borderlands, and separating them from the plateau of peninsular India is the wide Indo-Gangetic depression. From the Pamirs the Himalayas extend in the form of a scimitar as far as the great bend of the Brahmaputra, beyond which the mountain system of Burma runs in parallel ranges from north to south. To the south-west of the Pamirs, the borderland consists in the north of part of the Hindu Kush and its offshoots, and in the south of the parallel and concentric ridges of Baluchistan, which rise in the Suláiman and Kirthar ranges to hills of considerable height. Between the Himalayas and the north-west borderland certain great physical differences ought to be noted. The former are higher and more continuous, and are formed of rocks of more ancient origin than are found in the latter except in the Hindu Kush. The passes across the Himalayas are few and difficult, while to the south-west of the Pamirs there are several routes by which India may be entered with comparative ease. In Burma the mountains appear to correspond in age to those of the north-west borderland.

The Indo-Gangetic plains may be considered as consisting of the basins of the Indus and the Ganges below the 1,000-foot contour line. The earth movements, which led to the upheaval of the lofty Himalayas in the north, led likewise to the formation of a great depression further south. This depression has gradually been filled up by the alluvium carried down by the rivers draining into it, a process of land building still being carried on in different parts of the region.

The general character of peninsular India, which is the oldest land mass of the country, is that of a plateau with a gradual slope from west to east. On the west it is buttressed by the lofty wall of the Western Ghats, between which and the sea lies a narrow coastal plain. The so-called Eastern Ghats merely form the low escarpment of the plateau, which stands back some distance from

the Bay of Bengal, so that the coastal plain is much wider than on the west. The surface of the plateau is generally an area of open valleys and wide plains, broken up by a number of ridges running eastwards from the Western Ghats. Over the greater part of this region the rocks are of Archæan age, but the great volcanic outbursts, which took place at the end of Cretaceous and in early Tertiary times, have covered in the north-west an area over 200,000 square miles in extent with igneous rocks, generally known as Deccan trap. In various parts of the peninsula, but especially in the basins of the Son and Godavari, there are patches of the Gondwana series formed during Carboniferous and later times, which are of especial importance as they contain the bulk of the coal supplies of India. Much of the east and part of the west coastal plain consist of post-Tertiary deposits.

The soils of these different regions vary greatly in different parts of the country. The alluvium of the Indo-Gangetic valley and of the coastal plains is, as a general rule, the most productive, but it varies in character from drift sands, on which nothing will grow, to clays so stiff that they cannot be drained. The Deccan trap furnishes in the upland regions a poor and infertile soil, but in the lowlands it affords a deep, black soil of a peculiar consistency, which makes it very retentive of moisture and thus renders it especially valuable in these districts where the rainfall is not great. The soils derived from the Archæan rocks also vary greatly in character and fertility, but, except in the valley regions, they may, as a general rule, be classed as poor.

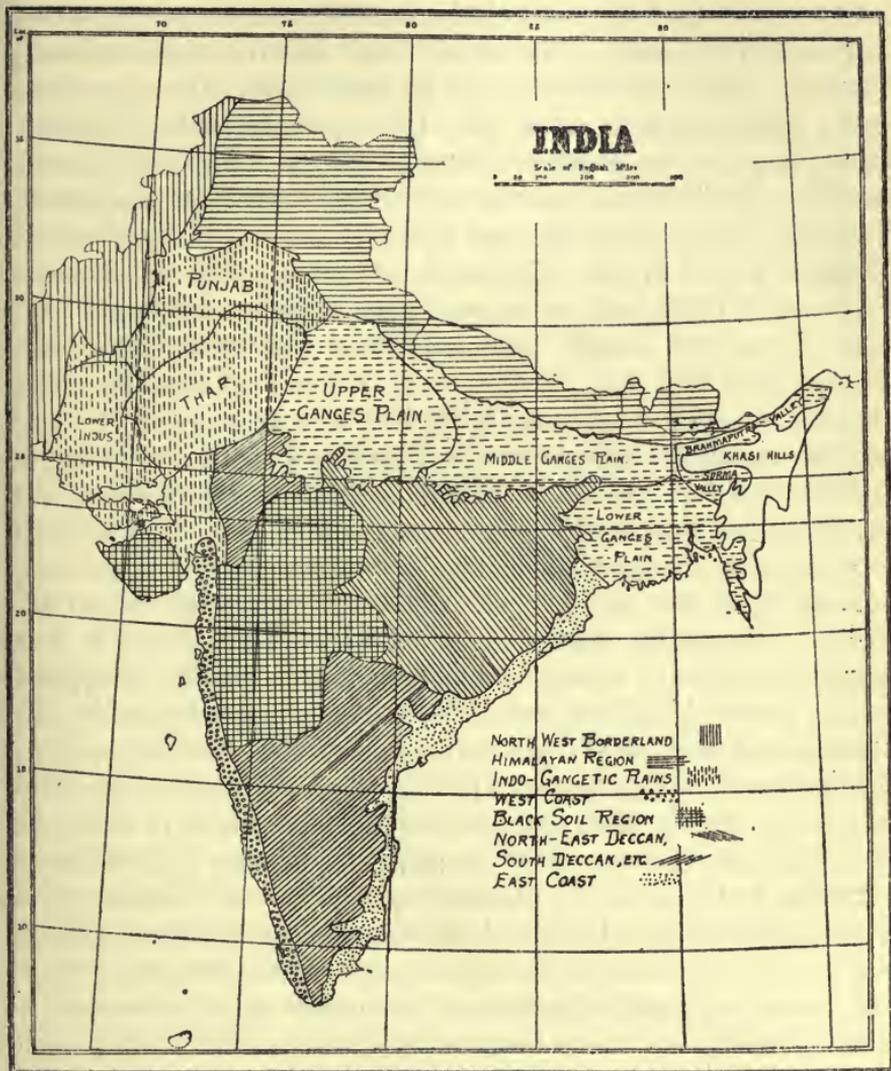
CLIMATE.—India falls within the monsoon region of Asia, and its climate is mainly controlled by that fact. Two seasons may be recognised: the dry, or north-east monsoon lasts from the middle of December to the end of May, and the wet, or south-west monsoon, from the end of May to the middle of December. During the first part of the dry monsoon a belt of high pressure stretches across Asia but from the outflowing cold winds India is protected by the Himalayas. In January, its actual mean temperature ranges from over 75°F. in the south to less than 55°F. in the north-west. As pressure is therefore highest in the north-west, winds flow down the Gangetic plains in a south-easterly direction, and, veering round by north over the Bay of Bengal, blow across southern India from the north-east. While crossing the ocean they pick up a certain

amount of moisture which they deposit on the southern part of the east coast and in Ceylon. At the same time there is a slight amount of precipitation on the Himalayas and in northern India, as a result of storms in the upper air current moving from the equator towards the north.

During the second half of the period under consideration temperature rises, and in April the greater part of the country has an actual mean of over 80°F. India becomes relatively a low-pressure area, so that the north-east monsoon blowing over the ocean is weakened, and winds blow inland from the Bay of Bengal and the Arabian Sea. As these winds are saturated with moisture, considerable precipitation takes place, chiefly in Malabar, Tenasserim, Bengal, and Assam.

When the low-pressure area over Northern India and adjacent lands closes up with the equatorial low-pressure belt during the summer months, the atmospheric conditions are entirely changed. The north-east monsoon disappears and its place is taken by the south-east trades, which are sucked across the equator and reach India as the south-west monsoon. This is heavily charged with moisture and brings to the country about 90 per cent. of its total rainfall. One branch of the current strikes the Western Ghats upon which it deposits much rain; it then crosses the Deccan, to which, however, it only brings occasional showers; and finally it unites with the other branch of the monsoon current which has advanced up the Bay of Bengal. This latter branch is directed in the first instance towards Burma and Tenasserim, but part of it is deflected, first by the Arakan Hills, and later by the Himalayas, so that it passes in a north-westerly direction up the basin of the Ganges, and into that of the Indus. Here it is joined by the northern part of the Arabian Sea current which, on account of the low elevation and great heat of the land, has passed over western Rajputana without depositing much moisture except in the neighbourhood of the Aravalli range.

June, and more particularly July and August, are the months of heaviest rainfall. In September the monsoon begins to withdraw southward, as the low-pressure area over the land is gradually filled up, and a shallow depression over the Bay alone remains. This depression, which gradually moves southward, sucks in the south-westerly winds so that they blow on to the east coast of



NATURAL REGIONS OF INDIA

peninsular India, where they deposit considerable moisture. By the middle of December this depression has passed out of the Bay, and the conditions of the north-east monsoon again prevail over the whole Indian area.

VEGETATION.—A division of India into vegetation regions can best be made on the basis of the physical and climatic regions already discussed. The Himalayas may be subdivided into an eastern and a western section. The first of these—to the east of Nepal—faces the advancing monsoon current and has, therefore, a heavy rainfall. The lower slopes are covered with a dense tropical forest, in which the sac, magnolia, and various kinds of oaks, palms, and bamboos are all found. The temperate zone, which lies between 6,500 and 11,500 feet above sea level, contains deciduous trees such as the oak, maple, and magnolia; coniferous trees, such as the silver fir; and shrubs, such as the rhododendron. The alpine zone, at a height of 12,000 feet and over, has but a few coniferous trees. The Western Himalayas, with their higher latitude and drier and cooler climate, are less richly endowed, but the general character of the vegetation is the same. The tropical forest, indeed, is lower, and does not extend beyond the Indus, but, owing to the greater breadth of the mountains, the alpine zone is more fully developed. The Indus Plain, with its low rainfall, has but a scanty vegetation, which rapidly disappears as the desert is approached. Trees, such as the tamarisk and acacia, are found chiefly in the neighbourhood of rivers, and on the flanks of the Himalayas and the Aravalli hills; elsewhere the land is covered with a low, herbaceous vegetation which is burnt up during the dry season. The Gangetic Plain may be subdivided according to the humidity of its different parts. West of the great bend of the Ganges at Rajmahal, the indigenous vegetation is that of a dry country; in the extreme west it is continuous with that of the Indus plain, while further east such trees as exist are leafless during the dry season, and the grass is burnt up. East of Rajmahal where the moisture is much greater, the mango, fig, bamboo, and different varieties of palm all flourish, while in the Sundarbans, or lower part of the delta, the vegetation is luxuriant, and mangroves and other evergreen trees abound. The indigenous vegetation of the Gangetic plain, it ought to be noted, is only of secondary importance to that of the cultivated lands. The west coast, from

southern Gujarat to Cape Comorin, has, on the whole, a heavy rainfall, and, except in the most northerly parts, is covered with a dense evergreen forest which includes valuable timber trees such as teak, ebony, and sandal-wood, and many varieties of palms and bamboos. The west coast vegetation is carried eastwards across the Deccan on the loftier parts of the plateau, but elsewhere the lower rainfall only permits the existence of deciduous forests, jungles of small trees, herbaceous vegetation, and grassland. The Coromandel coast vegetation has the same general character as the Deccan, but the presence of dry evergreen plants differentiates it to some extent. Burma is partly covered with forest of a tropical character. In the centre of the country, where the rainfall is lower, there are areas of deciduous trees and grassland, but round the coasts and on the mountain slopes there is a wet evergreen forest.

THE PEOPLES OF INDIA.—As the population of India consists of many diverse elements, and as there is a remarkably close connection between the different geographical regions of the country and the inhabitants of each, it may be as well to sketch briefly their distribution before proceeding to divide India into natural regions. The scheme here adopted is that suggested by Sir H. H. Risley in the Report on the Census of India, but it must always be borne in mind that the study of ethnical questions has not advanced sufficiently far to allow absolutely definite statements to be made.

It is believed that at one time the whole of India was occupied by people of Dravidian stock who have gradually been pushed back into the most inaccessible and least fertile parts of peninsular India. These people are distinguished physically by their black skin, long head, broad nose, and low stature, and mentally by their primitive social and religious ideas. It would seem that they represent the earlier inhabitants of the country.

The invading race is supposed to have entered India by the north-west. In the Punjab and Rajputana there is found an entirely different type from the Dravidian—a people of light brown colour, with a relatively long head, straight, finely cut nose, a long narrow face, high stature, and well-proportioned figure. To this people the name Indo-Aryan has been given, and they are probably connected with the Mediterranean race. In the plains of the Ganges and the Jumna, from the eastern frontier of the Punjab to the

southern extremity of Bihar, the prevailing type suggests an intermixture of Indo-Aryan and Dravidian blood. The upper classes approach the former in physical characteristics, the lower classes the latter. It is noteworthy, too, that it is among the Aryo-Dravidian peoples that the caste system has been most fully developed.

While many invasions took place by way of the north-west borderland, the Himalayas prevented anything but a slow infiltration of the Mongol peoples, who are found along its lower slopes. Further east, however, where the Brahmaputra and the rivers of Burma offered easier means of access, there was a larger influx, and Burma has an essentially Mongol population. The delta of the Ganges, on the other hand, is occupied by a Mongolo-Dravidian people. It would appear that the Dravidians, retreating before the Aryan invaders, were driven into the swampy lands of Bengal, where they intermingled with Mongol tribes entering India by the Brahmaputra.

An area of broad-headedness extends along the west of India from the western Punjab through the Deccan southwards as far as Coorg. In many places it coincides in a remarkable degree with the more fertile districts of the Black Soil region. Here it is evident that the original Dravidian stock has been powerfully modified by the infusion of a foreign element, and it has been suggested that, after the settlement of the Indo-Aryans in the Punjab and Rajputana, various nomadic peoples, generally known as Scythians, made their way into India from the steppe-lands of Asia, and, finding their progress eastwards barred by the earlier invaders, pushed their way to the south, where they seized the best lands still left to the Dravidians, and to a certain extent intermingled with that people, forming what is now known as the Scytho-Dravidian type.

Lastly, in the regions of the north-west borderland are the Turko-Iranian peoples, formed by an intermixture of Turki and Persian elements. They are broadheaded, but have a fair complexion, stature above the average, and a prominent but moderately narrow nose. They represent the invading tribes who came last and had their further progress into India barred by the earlier settlers.

In conclusion, it must be noticed that, although the peoples of India are distributed on a geographical basis, no one type is in exclusive possession of the region to which it is referred.

THE NATURAL REGIONS OF INDIA.—In dividing India into natural regions it is obvious that physical conditions must first be considered. The mountainous borderlands, the Indo-Gangetic plain, and the plateau of peninsular India form three entirely distinct areas, the economic development of each of which is quite unlike that of the others. The first of these—the mountainous borderlands—must be further divided. It has already been shown that there are considerable physical differences between the Himalayas and the frontier regions of the north-west. The position of each with regard to the monsoon current, moreover, has led to a heavy rainfall in the one, and to a very low rainfall in the other, and as a result each has its distinctive vegetation.

Physically, the Indo-Gangetic plains seem to form one natural region, but it is impossible to neglect the influence of great rivers, like the Indus and the Ganges with their tributaries, which tend to give a distinct individuality to the countries through which they flow. It is better, therefore, to recognise the Indus plain and the Ganges plain (including that of the Brahmaputra) as separate natural regions, each of which must be further subdivided according to differences in physical structure, humidity, vegetation, and potentialities for economic development.

The whole of the Ganges plain is composed of alluvium, but to the west of the great bend at Rajmahal the rivers have generally sufficient velocity to carry off their silt, while to the east the slope is so gentle that they are in many cases unable to do so. Flooding consequently takes place, and the surface of the land consists of recent alluvium. In the west, on the other hand, old alluvial soil prevails. A further subdivision, based chiefly upon rainfall, may be made. West of Allahabad the old alluvial soils have generally a rainfall of less than 40 inches, while to the east of Allahabad the precipitation is between 40 and 50 inches. On the recent alluvium, as far east as the Brahmaputra, between 50 and 75 inches of rain fall, while beyond that river the amount is from 75 to 100 inches.

Physically the Indus plain is not unlike that of the Ganges, but in climate and vegetation it differs to a great extent. The influence of the monsoon is slight, except in the northern plains of the Punjab, where along a comparatively narrow belt, which really forms an extension of the western division of the Ganges

plain, and which stretches from the Jumna to the Jhelum, the rainfall varies from 40 inches in the east to 15 or 20 inches in the west. To the west and south-west lies a dry area with a rainfall from 5 to 15 inches, or even less. For a discussion of economic potentialities, this region may be divided. In the basins of the rivers forming the Panjnad, and in that of the Indus, a certain amount of settlement, based on irrigation from rivers or wells, is possible, but in the Thar or Indian desert a small nomadic population is all that can find subsistence.

The third great physical region is that of peninsular India. Here the east and west coastal plains may be distinguished by their topography and climate from the Deccan proper, where the region covered by the Black Soil, the north-eastern Archæan area with its high rainfall, and the southern Archæan area with its low rainfall, must all be treated separately.

THE HIMALAYAN REGION.—Except indirectly, the Himalayan region is of little economic importance. The physical difficulties facing the cultivator are naturally great, and in many places means of communication are practically, if not entirely, wanting. Hence it is that the Mongoloid tribes, who form the bulk of the population, add very little to the output of the country. Rice and other food grains are grown on the outer ranges such as the Siwaliks, and in the hot, moist valleys, between these and the Himalayas proper, chillies, turmeric, and ginger are cultivated. In the higher hills wheat and buckwheat form the staple crops. The vale of Kashmir in the north-west is noted for fruit, and Darjeeling has considerable tea plantations. The numerous hill stations, used as health resorts, make life in India bearable to the European.

THE NORTH-WEST BORDERLAND includes the mountainous districts of the North-West Frontier Province, British Baluchistan, and the Baluchistan Agency. The region is an upland one, and, as agriculture is possible only in the river valleys, the population is scanty, being less than 100 to the square mile. The rainfall is under 10 inches per year, and irrigation from mountain streams is generally an absolute necessity. Among the more important crops are wheat, millet, and barley, but in the Makran dates provide the staple food crop of the people. Sheep and cattle are bred, and wool and hides are exported. The chief commercial importance of the region, however, lies in the fact that it is crossed

by the main trade routes which connect Central Asia and Afghanistan with India. Until within recent years the inhabitants, chiefly of Turko-Iranian stock, found their greatest interest in raiding the more peaceful occupants of the neighbouring lowlands. To prevent such raids, and to keep open the passes, British influence has gradually been extended outwards to the borders of Afghanistan.

THE GANGES PLAIN.—Throughout the whole of the Ganges plain there is a dense population, and agriculture is the chief occupation of the people, but the conditions under which it is pursued, and the crops grown, vary from one division to another. In the western section of the old alluvium, where the rainfall is generally less than 40 inches per year, irrigation on an extensive scale has been found necessary. The Upper Ganges Canal waters about 1,000,000 acres in the Upper Doab, while the Lower Ganges Canal is designed to water about 800,000 acres in the Lower Doab. In addition to these and other canals, there are hundreds of thousands of wells, and the natural depressions in the alluvial plain have also been utilised for the purpose of storing water. As a result, the population, amounting to 410 per square mile, is much larger than might have been expected. The principal food grains of the region are rice, which is grown with the aid of irrigation during the rains, on the heaviest soils; wheat, which is a winter crop; and *bájra* and *juar*, varieties of millet, which form the staple food of the people. Gram or chick pea and various oilseeds are also raised. Cotton is the most important fibre and covers about 3 per cent. of the cropped land, and sugar-cane occupies a like area. In the United Provinces, which may be taken as typical of the region under consideration, 66 per cent. of the population are dependent upon agriculture for their livelihood.

In the eastern section of the old alluvium, where the rainfall is greater, rice becomes the staple food of the population, and occupies about one-half of the cropped area. The rainfall has to be supplemented by irrigation, which is easy, as the broken surface of the land permits of the storage of water obtained by damming the smaller streams. The population of this region, which is about 490 to the square mile, is chiefly engaged in agriculture. Food crops (rice and the cereals of the previous region) are almost exclusively raised, but there is little or no surplus supply for export, and the people are, as a rule, poor.

In the third region—the recent alluvium—the surface of the land is generally level, the rainfall is great, and a considerable part of the country does not require artificial irrigation. Hence rice and jute constitute the staple crops, the two together occupying not less than 75 per cent. of the cropped area. Of these, jute is commercially the more important, as it provides the Bengal agriculturist with a surplus crop which he is able to sell, and his economic position is accordingly somewhat better than in the districts previously discussed. The density of population is greater than in any other part of the Ganges plain, being over 550 per square mile, and, outside of the towns, agriculture engages between 70 and 80 per cent. of the people.

The Brahmaputra valley north of the delta (along with which may be taken the upper part of its tributary, the Surma, and the intervening hills) has generally a rainfall of over 75 inches, and in the hill regions of over 100 inches. Rice is still the staple food of the people, but tea is the most important commercial product of the region. Formerly, it was grown mainly on the lower slopes of the hills, which were believed to be particularly adapted to it, but many of these situations have been abandoned in favour of reclaimed swamp lands, so that it is in the Brahmaputra and Surma valleys that the tea plantations of Assam and Eastern Bengal (covering about 700 square miles, or 85 per cent. of the Indian tea area) are now chiefly found. The heavy rainfall of these districts constitutes their chief advantage for the cultivation of the tea plant which grows best with an annual precipitation approaching 100 inches. The density of population in the Brahmaputra valley is low and does not exceed 100 to the square mile. This is due, partly to historical conditions, and partly to the fact that the land is not so suitable for the cultivation of rice as it is in the delta of Bengal. Agricultural operations are practically the only pursuit of the inhabitants.

The Gangetic plain is the most densely populated part of India, and probably contains about 40 per cent. of its inhabitants. The majority of the people are engaged in agricultural pursuits or in domestic industries, and only a small proportion live in towns. Of these the most important are on the old alluvial soil, where the diversity of products and favourable climate made the country particularly attractive to the invaders from the north-west, and

where the confluences of great rivers afforded suitable sites for the growth of urban communities. On the recent alluvium, flooded every year, and occupied by a people of a lower type of civilisation, the conditions were less favourable. Hence it is that while in the United Provinces, which may be considered typical of the first region, 11 per cent. of the population live in towns, in Bengal, which is typical of the second, only 5 per cent. are town dwellers. In the Brahmaputra valley the proportion is lower still and only amounts to 3 per cent.

The more important towns include Delhi, Agra, Allahabad, Benares, Patna, and Calcutta. Delhi is on the Jumna at the very apex of the triangular plateau which forms the northern part of peninsular India, and hence is a meeting place of lines of communication from the south-east, the south-west, and the north-west. Agra, in a fertile part of the Jumna valley, was formerly the centre of the empire of Akbar, and is still engaged in such industries as marble-inlay work, gem-setting, and the preparation of mosaics, accomplishments learned by its earlier artisans during the building of the Tajmahal by the Emperor Shah Jehan. Allahabad, at the confluence of the Ganges and Jumna, is now the meeting place of railways from Calcutta, Peshawar, and Bombay. Benares, the sacred city of the Hindus, is dependent on the pilgrims who flock thither; Patna, a few miles below the junction of the Son with the Ganges, is the centre of the opium manufacture; and Calcutta, on the Hooghly, a distributary of the Ganges, was, until lately, the capital of British India. Calcutta, although situated at the foot of the Gangetic plain, is in some respects not well placed, as the navigation of the river is difficult, and it owes its supreme importance to its selection as the centre of British influence. Within the last few years it has become the centre of an important jute manufacturing industry.

THE INDUS PLAIN.—The first of the regions into which the Indus Plain may be divided—the central Punjab—is economically the most important, but it is only able to maintain its large population—over 400 to the square mile—by means of an extensive and well-developed system of irrigation. As the west and south-west Punjab and the plains of the North-West Province also present considerable facilities for irrigation, these regions may be considered along with the central Punjab, notwithstanding their lower rainfall

and much smaller population—about 130 to the square mile. Naturally, it is in the drier regions that irrigation is most essential, but only about 50 per cent. of the whole Punjab (including the well-watered mountain districts) is entirely dependent on rainfall. The remainder of the country obtains either the whole or part of its water supply from canals or from wells. Of the former, which are the more important, there are over 10,000 miles, while of the latter there are hundreds of thousands.

The principal crops, sown in the autumn and reaped in the spring and early summer, include wheat, gram, and barley, while such cereals as maize, millet, and rice, are sown during the summer and reaped in the autumn. Of these, wheat is commercially the most important, and its rapid extension in the northern region under consideration, where it now covers over 15,000 square miles, is largely the result of the development of the irrigation system of the Punjab. Cotton is also becoming important as an export of this region; it is of the short-stapled variety known as Bengals, but is in much demand by the Bombay mills.

Although agriculture is here, as in other parts of India, the chief occupation of the people, it only gives employment to about 56 per cent. of the labouring population, and this percentage, lower than that of the Ganges plain, reflects the less favourable conditions under which it is carried on. On the other hand, manufactures are more important. At the last census about 20 per cent. of the working population were engaged in these, as against 15 per cent. in the United Provinces, and 12 per cent. in Bengal. Cotton spinning is an important domestic industry, the region itself supplying the raw material. Sheep are raised largely in the south-west Punjab, and the manufacture of wool ranks next to that of cotton. Amritsar is noted for its carpets, the finest being made from the hair of the Tibetan goat. The manufacture of gold and silver ornaments, brass and copper ware, and pottery, are all carried on to an even greater extent than in other parts of India. Within recent years there has also been a considerable extension in the Punjab of the modern factory system, and several cotton mills have been established.

In the basin of the lower Indus—the region known as Sind—the conditions of economic development are much less favourable, and the total population is less than 70 per square mile. As the

river brings down more silt than it is able to carry to the sea, it is constantly changing its bed, and the whole area is covered with recent alluvium. The deserted beds of the river in many cases offer favourable opportunities for irrigation, without which agriculture is impossible: The crops are much the same as in the Punjab, rice; wheat, and cotton being the most important, but the total output is small.

In the Thar or Indian desert the scanty population is more or less nomadic. The wells—the only source of irrigation—are not permanent, and as soon as one runs dry the village community, which has settled about it, must move elsewhere.

The Indus plain to the east of the river is the home of the Indo-Aryan people, while the Turko-Iranian stock is found in the narrow plains to the west. Climatic conditions are generally favourable to the development of a more vigorous type than in the Ganges plain, although they do not conduce to so dense a population, and the region probably does not contain more than 8 per cent. of the population of the whole country. The principal towns generally have their sites determined for them by physical conditions. A number, of which Lahore is typical, have grown up where the great highway from Calcutta to Peshawar crosses the rivers of the Punjab, while others, like Amritsar, have developed in fertile doabs between the rivers. Multan, the most important town in the south-west Punjab, is at the meeting place of a number of the routes offered by its great rivers. Hyderabad stands on an eminence of Cretaceous rock at the head of the delta of the Indus, and offers a fixed crossing point in a region where, owing to the shifting of the river, such points are few. Karachi, to the east of the mouth of the Indus, owes its development largely to the railways, which connect it with the Punjab and the North-West Province, and make it their port; it is the Indian port nearest to Europe.

THE WEST COAST REGION extends from the Tapti to Cape Comorin, and consists of a narrow coastal plain backed by the Western Ghats. The plain, which is broken up by numerous ranges of foothills, varies in width from twenty to one hundred miles, being as a rule broader in the south than in the north. The rainfall averages over 100 inches per year, while the temperature is always high. The whole region may be divided into two belts, the first consisting of the plains and the foothills, and the second

of the western slopes of the mountains. The first of these is agriculturally the more important, but the character of its soil varies greatly from place to place. Along the coast it is generally sandy, and suitable only for the cass-palm which is a source of considerable wealth to the villagers. In the river valleys—more especially inland—the soil consists of rich alluvial matter, and, aided by the abundant rainfall, it produces heavy crops of rice. This is the staple food of the region and covers over 60 per cent. of the cultivated area. On the lower slopes of the intervening hills there are many gardens in which plantain, mango, and pepper are grown, while on the poorer soils of the upper slopes coarse grains alone thrive. Wheat, millet, sugar-cane, and cotton are also grown in favourable districts throughout the region. The western slopes of the mountains are generally covered with forest, the most important trees of which have already been mentioned. In the Nilgiris there are coffee and tea plantations, and experiments are being made in the cultivation of rubber.

Taking the West Coast region as a whole the population is fairly dense, amounting to between 300 and 400 persons to the square mile. Except in the south it consists mainly of people of the Scytho-Dravidian stock. Geographical conditions are, on the whole, unfavourable to the growth of large towns, and Bombay alone is of first-rate importance. The growth of this city, which now has over three-quarters of a million inhabitants, has been remarkable. Ceded to England by Portugal in 1661, it became, in 1708, the headquarters of the East India Company, the silting up of the harbour at Surat making that town impossible as a base. The barrier of the Western Ghats was long a formidable obstacle to development, but, after the fall of the Maratha power, and the opening up of the railways which brought it into contact with the rest of the country, Bombay began to make rapid progress. The stoppage, during the Civil War, of the American supplies of raw cotton to the United Kingdom gave a great impetus to the export trade of Bombay, because of the demand which arose for the cotton grown on the black soils of its hinterland; it also encouraged the development of the modern factory system in the city. The manufacture of cotton has continued to increase, and Bombay is now the centre of that industry in India. The opening of the Suez Canal must also be noted, as it placed Bombay in a relatively

more favourable position for trade with Europe than it had formerly occupied.

THE BLACK SOIL REGION.—The greater part of the Bombay Presidency south of the Narbada, along with the detached district of Kathiawar, the Malwa plateau in Central India, the whole of Berar, the west and centre of the Central Provinces, and the west of Hyderabad are covered with a basaltic formation known as Deccan trap. The soil derived from this rock by weathering is often fertile, and, being peculiarly tenacious of moisture, is specially adapted to the needs of this part of India where, except in the Central Provinces, the rainfall is generally less than 40 inches per year. The black cotton soil, as it is called, is, it must be noted, not continuous throughout the whole region of the Deccan trap, but it serves to give to its economic activities their distinctive characteristics, and entitles it to be considered as a separate natural region.

The most important food grains are wheat and millet, except in the more humid Central Provinces where rice is the principal food crop. Wheat is exported, but, in the Central Provinces at least, its cultivation has been largely abandoned in favour of that of cotton, which is now the chief commercial product of the region, where it covers over 15,000 square miles, or very nearly two-thirds of the total area devoted to its growth in India. But although, on the black soil, cotton has been grown for thousands of years, it is inferior both in quality and in yield. The staple is short and coarse, and the average return per acre is only about 100 lbs. It is said, indeed, that within the last century or two Indian cotton has greatly deteriorated, but, whether this be so or not, it remains true that the quality of the cotton produced might be greatly improved. Within recent years attempts have been made to do so, both by the introduction of exotics, which have thriven in their own environment, and by the endeavour to breed up native varieties to a higher degree of productiveness. The first of these methods seems to have been a failure, and it cannot be said yet that the second has proved a success. On the Government experimental farms, both the quality and the yield have been greatly improved, but whether it will ultimately be possible to induce the somewhat careless Indian cultivator to take the necessary care and trouble remains to be seen. It would appear,

however, that it is in the improvement of native varieties that the best hopes of Indian cotton lie.

The opium poppy has hitherto been cultivated to a considerable extent on the black soil of the Malwa plateau, the greater part of the product being sent to China. Pulses, oilseeds, and sugar are also grown in many parts of the Deccan trap region. Stock-raising has not reached a high state of development. Cattle are found in all parts of the region, but, except when climatic conditions tend to the growth of good grassland, the quality is poor. Buffaloes are generally found where the rainfall is heavy, and sheep and goats where it is moderate.

Throughout the whole region agriculture is the chief occupation of the people, and, outside of the industrial districts, is their only important pursuit. Besides the usual manufactures of most Indian towns, cotton mills, obtaining their raw material from the black soil, have been established in Broach at the mouth of the Narbada, at Ahmadabad in Gujarat, at Nagpur and Jubbulpore in the Central Provinces, and at Hyderabad in the state of the same name.

In that part of the Bombay Presidency which lies within the Black Soil area the people are, as a rule, of Scytho-Dravidian origin. This race, as represented by the Marathas, extends into other parts of the region where, however, the Dravidian element generally prevails, more especially on the poorer upland soils. Indeed, in many places the line separating good and bad soils also separates Maratha and Dravidian peoples. This is especially noticeable in Hyderabad, where the trap areas are occupied by Scytho-Dravidians and the granitic and calcareous tracts by Dravidians.

NORTH-EAST DECCAN.—The north-east part of peninsular India, which contains the Chota Nagpur and Orissa divisions of Bengal, the eastern part of the Central Provinces, and the Madras Presidency to the west of the escarpment of the plateau and to the north of the Godavari, consists in the main of Archæan rock, and the soil is, therefore, generally much poorer than in the previous region. On the other hand, the frequency of cyclonic storms over this area during the south-west monsoon period gives it a much heavier rainfall, the annual precipitation over the greater part of it exceeding 50 inches. Accordingly, it may be considered as lying outside the famine zone.

Rice is the chief crop of the region, but it cannot be grown without

irrigation, and it is here, accordingly, that tank irrigation is most fully developed. The rainfall, coming in cyclonic bursts, would quickly run off the land without doing much good were the various channels by which it escapes not dammed and the water retained for use as required. Cultivation is, as a result, confined chiefly to the valleys, and it is there that the bulk of the population is found. Over the whole area this averages less than 200 to the square mile, and consists in the main of various Dravidian peoples, the more civilised being found in the lowlands and the less civilised in the uplands.

In the patches of Gondwana deposits still remaining, notably in those in the basin of the Damodar, there are valuable coal beds, but, although of great importance to India as a whole, they have affected to a very slight extent the economic development of the region in which they are found.

THE SOUTHERN DECCAN includes the eastern and southern parts of Hyderabad, the Deccan districts of the Madras Presidency, and the eastern parts of Mysore. Along with these may be mentioned the outlying Archæan districts of Rajputana and Central India, north of the Black Soil Region. The soils derived from the Archæan rocks are often poor in quality and do not retain moisture easily. The mean temperature of the region is over 75° F., and the yearly range is not great, while the precipitation, which varies from about 25 to nearly 40 inches, is irregular, both in the time of its occurrence and in its distribution. Hence much of the land is covered with scrub jungle, and the area which can be cultivated is not large. Advantage has been taken of the irregular nature of the land to construct tanks, and dams on rivers, in order to retain the rainfall, which frequently falls in sudden heavy showers as in the previous region. Rice, and in places sugar-cane, are the principal products of the irrigated areas, while various kinds of millet are grown as dry crops. The uncertainty of the rainfall brings the greater part of the region within the famine zone, though the worst evils of a shortage in the crops have been overcome to some extent by the construction of railways. Nevertheless, the density of population is low, and does not exceed 150 people to the square mile. These belong, as a rule, to the Dravidian stock, and with many of them the standard of living is exceedingly low.

THE EAST COAST REGION has on the whole a more fertile soil than

the Deccan, its rainfall is greater, being as a rule from 40 to 50 inches, and the lower courses of such rivers as the Mahanadi, Godavari, and Kistna, afford facilities for the irrigation of large areas. Hence rice is the most important crop of the region, although millet and cotton also cover a considerable area. The density of population is greater than in the Deccan, being over 200 to the square mile in the north, and over 300 in the south.

Of the towns, Madras is the most important, but it is handicapped as a port by its want of a good natural harbour, and it has also been affected, since the opening up of the south of India by railways, by such ports as Tuticorin and Negapatam, and even by such west coast ports as Cochin and Calicut. Hides and skins form the most important articles of export, followed by Indian piece goods and raw cotton. The trade of the other east coast ports is similar in character.

BURMA.—In the Indo-Chinese peninsula the mountain ranges, which take their rise in the eastern extension of the Tibetan plateau, run, as a general rule, from north to south, and are separated from one another by the valleys of great rivers. Of these rivers the Irrawaddy is the most important in Burma. After leaving the confused mountainous mass in the north of the country, it flows south to its delta through broad but not continuous plains, bordered on the west of its tributary, the Chindwin, by the Naga and Manipur hills, and further south by the Arakan and Arakan Yoma ranges, which separate it from the Bay of Bengal; and on the east by the Kachin Hills and the Shan plateau, which form the divide between it and the Salwen. Further south the Pegu Yoma mountains separate it from the Sittang, while the Paunglaung range lies between the latter river and the Salwen. Beyond the Salwen, again, lies mountainous country which extends southwards, at no great distance from the coast, to the extremity of Lower Burma. Plains of varying breadth lie between the coasts and the ranges which border them.

It is to the coastal plains and ranges, and to the delta lands at the mouths of the rivers, that the south-west monsoon gives the heaviest rainfall, which is usually far in excess of 100 inches per year. In the lowlands of the Irrawaddy, on the other hand, between the 20th and 23rd parallels, the precipitation does not exceed 40 inches, and is in many places much less. The mountainous region

to the north, west, and east of this dry area has over 50 inches, while southwards, as far as the deltaic lands, the rainfall gradually increases to 100 inches.

Four natural regions based upon physical and climatic differences may be recognised: the littoral districts with a heavy rainfall but with little space for economic development; the mountainous parts of Upper Burma, also with a heavy rainfall but generally unsuitable for settlement; the dry region of Upper Burma, consisting chiefly of plains in the valleys of the Irrawaddy and the Chindwin; and the sub-deltaic and deltaic divisions which may be taken together, although the rainfall increases greatly from north to south.

THE LITTORAL DISTRICTS are engaged chiefly in the cultivation of rice, for which the climate is specially suited. The population is but scanty, and, owing to the obstacles to communication with the interior, there are few towns of importance.

UPPER BURMA (WET) is the least densely populated part of the country, having only fifteen people to the square mile. The lower slopes of the mountains are generally covered with forests, while above the limits of tree growth there are rolling grasslands. Much land suitable for cultivation in the river valleys has yet to be reclaimed. Rice is the chief food of the people and the chief agricultural product, but that which is grown in the uplands is poor in quality and unsuitable for export. Teak is found in most of the forests, except in the extreme north and north-east, and is floated down to the timber mills and ports at the mouths of the rivers. The mineral output of the region is inconsiderable, but coal is found in the Shan states. There are few towns, the chief being Myitkyina and Bhamo, both on the Irrawaddy.

UPPER BURMA (DRY) is very different in character. Instead of a dense tropical and sub-tropical forest, the land is covered with a stunted shrubby vegetation. Rice cannot be grown without the aid of irrigation, and the chief crops are millet, sesame, and cotton. The level nature of the land, and the facilities which it offers for irrigation by means of canals and tanks, have led to a denser population than in the previous regions, and there are about seventy-nine people to the square mile. The mineral wealth is considerable, petroleum being found in the valley of the Irrawaddy in the south, and rubies in the Ruby Hills in the north. Of the towns Mandalay is the most important.

THE SUB-DELTAIC AND DELTAIC TRACTS contain the greater part of the population of the country, there being, over considerable areas, ninety people to the square mile. The flooding caused by the rivers enables rice to be grown as the chief crop, and over 90 per cent. of the cultivated land is devoted to it. As the population is small, compared with that in the rice-growing regions of India, there is a considerable surplus for export, and rice-mills have been established at Rangoon, Moulmein, Bassein, and elsewhere. Teak from Upper Burma, and from the hills surrounding the deltaic and sub-deltaic tracts, is also prepared for export in these towns.

MANUFACTURES OF INDIA.—The manufactures of India fall into two entirely different categories. Some are carried on by methods which have been practised by the people from time immemorial, either in their own homes or in small workshops, while others are followed in factories planned on European lines. In some cases, the two systems are independent of one another, but in others they are in keen competition.

The group of industries connected with the preparation and supply of food is the largest and most widely distributed. These generally belong to the first of the two categories, but a few are of recent origin and are found where geographical conditions are favourable to their localisation. They include the preparation of tea in Assam, flour-milling in Northern India, and rice-milling in Burma.

The manufacture of textiles ranks second with regard to the number of people employed, and here the competition between the old and new systems is keener. All over India cotton goods are made, frequently but by no means always, as a subsidiary employment of the people engaged in the industry. Different parts of the country have their characteristic products, the quality of many of which is exceedingly good. But along with this ancient industry there now exists the modern cotton mill, whose situation is mainly determined by the facilities for obtaining raw material. These mills are engaged in the production of yarn (Egyptian cotton being imported for the higher counts, the output of which is steadily increasing), and of woven goods, grey unbleached cotton being the most important item under this head. In British India in 1910-11 there were 226 mills, with 79,000 looms, and nearly 6,000,000 spindles. These gave employment to about 214,000 people on a

daily average; but at the census of 1901 the number of cotton weavers, exclusive of those employed in the mills, was returned at 2,670,000.

The silk industry comes next in importance to that of cotton. The raw material is obtained partly at home, different varieties of the silkworm being raised throughout the country, and partly from abroad, China being the chief source of supply. The modern steam-power mills are situated at Bombay and Calcutta, through which ports Chinese silk enters the country. The handloom factories are mainly in Bengal, which is the chief producer of the home supply of raw silk, while all over India weavers, working either alone or along with their families, are engaged in the production of silk fabrics.

The manufacture of woollen goods is general throughout the country, and is followed, as a rule, in small handloom factories. The articles produced are usually of a coarse description, except in Northern India, where the weaving of carpets and shawls has been carried to a high pitch of perfection, the Punjab being noted for the former and Kashmir for the latter. The great demand from Europe for Indian carpets has led to the production of cheap and inferior articles, but within recent years there have been signs of improvement in this respect. In 1911 there were only five steam-power woollen mills in the country, and these gave employment to 3,600 people, while over 150,000 are probably engaged in the native industry at the present time.

Although the manufacture of jute had previously been carried on to some extent as a village industry, it was not till the Russian supplies of hemp and flax were stopped during the Crimean war that its cultivation and manufacture on a large scale began. Calcutta, with its neighbourhood, is now the centre of this important industry which gives employment to over 200,000 operatives. The jute presses, which prepare the raw material for export, also employ a considerable number of workmen.

MINERALS.—With a population of 315,000,000 India has on an average only 150,000 people engaged in mining pursuits. The influence of its mineral wealth upon the economic development of any one of its natural regions is therefore very slight, and for this reason it has been deemed advisable to reserve for a separate section an account of the mineral products of the country. In 1911 the value

of these was estimated at £7,000,000, gold and coal between them accounting for over two-thirds of the total amount. The greater part of the gold produced (£2,200,000 in 1911) comes from the Kolar field in Mysore, where it is worked to a depth of 3,000 feet below the surface. Alluvial deposits are washed in many parts of the country, but the output is small and is generally obtained by people mainly engaged in other pursuits. The production of coal in the same year amounted to over 12,000,000 tons, valued at £2,500,000. Of this all but 5 per cent. came from the Gondwana deposits in peninsular India, the most important being those in the basin of the Damodar where the fields of Raniganj, Jherria, and Giridih are situated, the first two being the largest producers in India, while the third is noted for its steam coal. Coal is also found in the Gondwana deposits in the basin of the Son, where it has recently been worked at Daltonganj, and in the basin of the Godavari, where an immense store has been merely tapped at Warora and Singareni. Outside of peninsular India, coal occurs in the Tertiary rocks of Sind, Rajputana, Baluchistan, Assam, and Burma. The greatest output at present is from Assam, but the Burmese fields will probably prove of considerable value to the railways in that country. The development of the coal resources of India has been of great economic advantage to the country. The native supply is now more than sufficient to meet the home demand, a somewhat larger amount being sent to ports on the Indian Ocean than is imported from abroad.

Salt ranks next in value to, but a long way behind, gold and coal. The largest quantity is obtained by the evaporation of sea water along the coasts of the peninsula. Water from the Sambhar Lake, in a region of inland drainage in Rajputana, is also the source of a considerable supply. Rock salt is mined in the Punjab and in the North-West Frontier Province, the chief deposits being near Khewra in the Salt Range. Petroleum is found in the Tertiary strata of the Punjab and Baluchistan in the west, and of Assam and Burma in the east. Of a total output of 225,000,000 gallons in 1911, Burma contributed over 222,000,000. Here it is obtained at present in the dry zone of the Irrawaddy valley, but it has been located both to the north and south of that region. Although iron is worked only to a slight extent in India at the present time, large supplies both of magnetite and hæmatite are known to exist in the Archæan rocks

of Madras and the Central Provinces. Among other minerals which may be noticed are saltpetre, obtained in Bihar, rubies in Burma, mica in Madras and Bengal, and manganese in various parts of the country. India is now the chief producer of mica in the world, and ranks second in the production of manganese.

COMMUNICATIONS.—Much of the recent economic development of India is due to the construction of railways. Rivers had hitherto formed the chief means of transport, but, while those of the Indo-Gangetic plain are easily navigable, the remainder are of comparatively little value to commerce on account of the rapidity of their courses. Road-building, on the other hand, has always been rendered difficult, in the lowlands by the absence of suitable material, and in the uplands by the irregular topography of the country; and of the roads which were made many became impassable during the rainy season. Hence it was not until the advent of railways that facilities existed for the transport of heavy goods to or from the coast.

India now has over 33,000 miles of railway. The more important systems include the East Indian, whose main line runs from Howrah, opposite Calcutta, to Ambala in the Punjab, where it connects with the North-Western system and thus provides the great trunk route from Calcutta to Peshawar by way of Allahabad, Delhi, and Lahore. The East Indian Railway serves part of the fertile Ganges plain, and at the same time provides an outlet for other systems whose lines cover, as with a network, the remainder of the region. The North-Western Railway, which exports the wheat of the Punjab and North-West Frontier Province, runs from Karachi by Hyderabad to Multan, from which town there are lines to Peshawar, Lahore, and elsewhere. An important strategic branch of this railway follows the west bank of the Indus for a considerable distance, and is continued through Baluchistan by Quetta to Chaman on the borders of Afghanistan.

Bombay is brought into communication with the Ganges basin by several important lines. The Bombay, Baroda, and Central India Railway runs north by Baroda and across Rajputana to Delhi and Agra. The Great Indian Peninsular Railway has two routes from Bombay to the interior, the one crossing the Western Ghats by the Thalghat, and the other by the Borghat. The first of these routes goes by the valleys of the Tapti and Nerbada to Jubbulpore, where it connects with the East Indian line to

Allahabad, and constitutes part of the mail route from Bombay to Calcutta. A branch which breaks off at Bhusawal joins the Bengal-Nagpur system at Nagpur, and provides a shorter but more difficult route to Calcutta. The southern line by the Borghat runs south-east as far as Raichur, where it meets the Madras railway. These two routes from Bombay enable the Great Indian system to tap the wheat and cotton districts of the Deccan. The Southern Mahratta railway, with which it is connected at Poona and elsewhere, runs south to Mysore, west to Mormugao Harbour, the port of Goa, and east to Bezwada, near the mouth of the Kistna. The Madras Railway serves the southern part of India; it runs along the west coast from Mangalore to Cochin, and then crosses by the Palghat to the east coast which it follows from Madras to Vizagapatam. Here it joins the Bengal-Nagpur Railway, the two main lines of which run from Vizagapatam to Calcutta, and from Calcutta to Nagpur. This railway shares with the East Indian much of the coal traffic of the country.

The Eastern Bengal system runs north from Calcutta, having as its territory the land between the Ganges and the Brahmaputra. An eastern extension is designed to connect with the Assam-Bengal line which runs from Chittagong through the Surma valley and across the Khasi hills to the valley of the Brahmaputra. Both lines carry jute, rice, and tea.

The chief Burmese railways start from Rangoon. One follows the valley of the Irrawaddy as far as Prome; while the other, making its way north by the Sittang, strikes the Irrawaddy at Mandalay, from which lines run north to Myitkyina, and north-east to Lashio. Teak and rice are the chief goods carried.

The difference in gauge on which, as a result of geographical and historical conditions, the chief lines in India have been constructed, is a serious drawback, which it has so far been found impossible to remedy. The East Indian, Bengal and Nagpur, North-Western, Great Indian Peninsular, and Madras lines are constructed on a gauge of five feet six inches, while the other lines which have been mentioned are on the metre gauge. Present railway policy in India is directed to connecting as far as possible the different systems which have the same gauge.

COMMERCE between Europe and India has existed from very early times, but its character has undergone various important

changes. When trade was carried on by routes partly overland, and even for a considerable time after the discovery of the seaway by the Cape, the chief articles sent from or to India were, in proportion to their bulk, of high value : and spices, gems, silks, and calicoes exported were paid for by imports of the precious metals. With the improvement of communication, both by land and sea, in the eighteenth and nineteenth centuries, and with the development of the resources of India under British rule, trade became more diversified as it became possible to export and import goods of a less valuable nature. At the present time the exports are such as might be expected from a country in which the vast majority of the people are engaged in agriculture, while manufactured goods constitute the bulk of the imports.

The following table indicates the nature and average value of the chief exports of merchandise by sea for the five years 1906-10 :—

						In £ million.
Average total value	..	..	..	..	..	118·3
Agricultural products :						
Grain—						
Wheat	..	..	..	..	..	6·1
Rice	..	..	..	..	..	12·8
Raw cotton	..	..	..	..	..	18·0
Raw jute	..	..	..	..	..	12·7
Oilseeds	..	..	..	..	..	11·3
Hides	..	..	..	..	..	8·7
Tea	..	..	..	..	..	7·3
Opium	..	..	..	..	..	6·6
Manufactured goods :						
Cotton—						
Yarn and twist	..	..	..	..	..	6·3
Manufactures	..	..	..	..	..	1·3

The greater part of the rice exported from British India is grown in Burma, where there is a considerable surplus production, which is shipped to Europe, to various parts of Asia, and to South America. The wheat of the Punjab and the North-West Province is loaded at Karachi, and finds a market mainly in the United Kingdom. Raw cotton is no longer utilised in English mills to an appreciable extent, but a new market has in recent years opened up in Japan,

which is now the chief consumer of Indian cotton after the home demand has been satisfied. Of the jute crop, about half is consumed at home, and the bulk of the remainder goes to Europe, where Scotland, Germany, and France are the chief purchasers. Oil-seeds, which form one of the staple crops of India, are exported to Europe in large quantities, where they are used in the manufacture of soap, candles, and oil-cake. Opium has hitherto found its chief market in China, but the recent attempts made by the Chinese authorities to reduce the consumption of that drug have induced the Indian Government to put an end to the trade. Tea is exported mainly to the United Kingdom, where, within the last fifty years, Chinese teas, which had previously held the field, have been almost entirely superseded by those of India and Ceylon, which are also beginning to make their way in the United States and elsewhere. The better methods employed in India and Ceylon, both of growing the plant and of preparing the leaf, account in great part for the change which has taken place.

The chief manufactured exports of India consist of cotton yarn and jute goods. The first of these is exported to China, where within recent years it has been in great demand. Jute goods in the form of gunny-bags and gunny-cloth are exported to all parts of the world.

The chief imports of merchandise by sea are as follows :—

					In £ million.
Average total value, 1906-10 .. .. .	..	..	..	..	85·2
Cotton goods—					
Yarns .. .. .	..	..	..	..	2·2
Piece-goods .. .. .	..	..	..	..	25·9
Metals .. .. .	..	..	..	..	8·4
Sugar .. .. .	..	..	..	..	7·1
Machinery .. .. .	..	..	..	..	3·8
Railway plant .. .. .	..	..	..	..	3·8
Mineral oils .. .. .	..	..	..	..	2·1
Government stores .. .. .	..	..	..	..	4·4

At one time India exported considerable quantities of cotton goods, but with the growth of the Lancashire industry the demand for these gradually declined. Instead, India became a large importer, and has continued to be such, though, with the recent development of the modern factory system within the country, the nature of the

trade has somewhat changed. There is no longer the same demand for yarn as before, and the imports of it are confined to the higher counts, for the spinning of which Indian cotton is unsuitable. With regard to piece-goods, conditions are different, and large quantities are imported, though even here Indian competition is making itself felt, and the English manufacturer is being gradually restricted to the higher and finer classes of goods.

Metals and machinery, which together rank next to cotton goods in the table of imports, come principally from Great Britain, but Germany and Belgium supply large quantities of cheap iron and steel, which are much in request.

The demand for sugar in India is a growing one, and instead of exporting, as was formerly the case, almost as much as was imported, India has practically ceased to export, while large quantities are imported from Java, Germany, and Austria-Hungary.

The value of the merchandise exported from India considerably exceeds the value of that which is imported, and this is in part accounted for by the import of treasure, by the charges which the Government of India has to meet in the United Kingdom, by interest on loans, and in other ways.

CEYLON

Ceylon has an area of 25,000 square miles. Plains extend across the north of the island and along the coast, but the centre and south are occupied by a great mountainous plateau which rises in Adam's Peak in the south-west to a height of over 7,000 feet. The climate of the lowlands is tropical, and Colombo has a mean annual temperature of about 80° F., but on the uplands sub-tropical and even warm temperate conditions prevail. Ceylon lies in the path of both monsoons, but the heaviest rainfall takes place on the south-west slopes of the plateau, parts of which have a mean annual precipitation between 150 and 200 inches.

The principal food grain cultivated by the natives is rice, but the agricultural wealth of the island is mainly derived from plantations under European control. Coffee was at one time the chief export of the country, but the plants were attacked by disease and the industry practically disappeared. Its place has been taken by tea, which is grown on the mountain slopes of the south-west, where, above an elevation of 2,500 feet, it forms practically the only crop.

As in India, the leaf is prepared by modern methods and the total production now amounts to about 184,000,000 lbs. annually.¹ The cultivation of rubber has spread rapidly within recent years; in 1890 there were only 300 acres of it in the country, but it is estimated that there are now over 200,000 acres. The plantations, which consist mainly of *Hevea brasiliensis*, lie on the lower slopes of the hills in the south-west, where the rainfall is great and the temperature high. The output, which in 1911 was about 2,500 tons, will probably increase rapidly for some years to come, as the more recently planted trees reach an age at which they can be tapped. The coconut palm is grown mainly on the hot and humid plains in the west and south, and the various articles derived from it—copra, oil, fibre, etc.—when taken together, come next in value to tea among the exports of the island. The only mineral worked to any extent is graphite or plumbago. In quality it is superior to that found elsewhere, and Ceylon's output amounts in value to four-fifths that of the world's production.

Colombo is the chief port, and an important place of call for steamers.

¹ India has an annual output of about 260,000,000 lbs.

CHAPTER XXIV

INDO-CHINA

THE MALAY PENINSULA

THE northern part of the Malay Peninsula falls within the Kingdom of Siam, but the southern part is controlled by Great Britain, either directly or indirectly. The Straits Settlements, which include Penang, Malacca, and Singapore, as well as certain other islands and coastal districts, are administered as a Crown Colony, while the Federated Malay States (Perak, Selangor, Negri Sembilan, and Pahang), the districts of Keda, Trengganu, and Kelantan in the north (recently transferred by Siam), and the State of Johor in the south, are all under British protection. The total area is about 54,000 square miles, and the population, partly Malay and partly Chinese, numbers nearly 2,700,000.

Owing to its position just north of the equator, the country has a tropical climate, and the mean annual temperature is about 80° F. Rain falls throughout the year and the total precipitation is generally over 100 inches. Timber, coconuts, gutta-percha, and gums are all obtained in the extensive forests, while on the plantations rice, manioc, and spices are grown. Within recent years the cultivation of rubber has made rapid progress, and the area devoted to it now amounts to nearly 300,000 acres.

Tin, which is still the most important product of the country, is obtained from alluvial deposits found mainly in the Federated Malay States. The bulk of the ore is sent to the Straits Settlements to be smelted, and the tin is exported from Penang and Singapore. During the three years 1909-11, over one-half of the tin mined throughout the world was produced in the region under consideration.

Singapore, which is situated on the south coast of the island of that name, at the extreme end of the Malay Peninsula, is the chief port of the region, and one of the greatest trading centres in the world, as its position makes it the meeting-place of steamship lines from all parts.

SIAM

The Kingdom of Siam has an area of about 195,000 square miles, and a population which is estimated at over 8,000,000 souls. The

greater part of the country lies within the basin of the Menam, and is separated from Burma by a granitic range which is continued southwards through the entire length of the Malay Peninsula. The northern part of the Menam basin is mountainous, and is traversed by numerous rivers, including the Meping and the Nampo. South of the confluence of these at Paknampo, the mountains disappear, and a great alluvial plain extends to the Gulf of Siam. To the east lies the plateau of Korat, which has an average elevation of about 600 feet. It is bordered on the north and east by the Mekong into which it drains, and on the south by a low range of hills which separates it from Cambodia. The last of the physical regions of Siam belongs to the Malay Peninsula and extends southwards, first on the east and then on both sides of the main granitic range, to the neighbourhood of the sixth parallel of north latitude.

CLIMATIC CONDITIONS.—With the exception of the last-mentioned region the climate of Siam is monsoonal in character, and there are three seasons, a cool, a hot, and a rainy. The mean temperature is high throughout the year, and in the lowlands does not fall below 70°F. even during the cool season. The rainfall is least along the south coast and in the valley of the Lower Menam, where it does not exceed 60 inches. On the more elevated lands to the north and east it ranges from 60 to 80 inches, while in the Malay Peninsula, where precipitation occurs practically at all seasons, it exceeds the latter amount.

UPPER SIAM.—The mountain ranges of this region are covered with forests, while in the intervening valleys there are considerable areas of fertile soil. Teak, which is the principal product of the forests, is floated down to the coast either at Bangkok by way of the Menam, or at Moulmein by way of the Salwen. Within recent years some attempts have been made to protect these forests from the reckless destruction to which they have for long been subject. Other valuable timber trees are known to exist in Upper Siam, but they are too heavy to be floated down the rivers, and their exploitation must await the development of the railway system. In the valleys rice is the principal crop, but, as it is unsuitable for export, the bulk of it is consumed at home. Tobacco is also grown, mainly for domestic use, and among other crops are cotton, tea, and betel-nut. The chief commercial town of the

region is Chieng-mai, which is situated on the Meping and is engaged in trade with the Shan states.

LOWER SIAM.—The alluvial soil, monsoonal rainfall, and high temperature of the lowlands of Siam are peculiarly favourable to the cultivation of rice, which is the chief product of the region, and not only provides the staple food for man and beast within it, but forms the basis of the greater part of its foreign trade. Market gardening gives employment to large numbers of Chinese, especially in the vicinity of the towns. Various attempts have been made to grow cotton, but so far without much success. Other crops include maize, sugar-cane, sesamum, and coconuts.

The lowlands contain the greater part of the population of Siam and its chief towns. Bangkok, the capital, which is situated on the Menam about twenty-five miles from its mouth, is the great port of the country, though it has a very indifferent harbour. It is engaged in the preparation of rice and teak for export, in shipbuilding, and in engineering.

THE PLATEAU OF KORAT has considerable areas of infertile soil and swampy land, and is not well adapted to economic development. Rice is the principal crop grown, but the amount produced is little more than sufficient to meet the demands of the somewhat scanty population. Korat is the only town of any importance.

THE MALAY STATES are as yet but slightly developed. The forests in the more mountainous parts of the country are believed to contain valuable supplies of timber. In the Monthon of Puket, to the west of the axial range, mining has hitherto been the principal occupation of the inhabitants, among whom there are large numbers of Chinese. Gold, silver, petroleum, and coal have all been located, but tin alone has been worked to any considerable extent. Agriculture has not made much progress and food supplies have to be imported. On the east coast, on the other hand, in the Monthons of Chumpawn, Nakon Sritamarat, and Patani, agriculture is the chief pursuit of the people, although a certain quantity of tin and wolfram is mined. The whole region is one in which a considerable amount of economic development is possible, but it is greatly handicapped at present by the want both of labour and of means of transport.

COMMUNICATIONS in Siam are mainly by water. In the southern part of the Menam basin the place of roads is taken by numberless

canals which penetrate in every direction, while the river itself is the great highway between north and south. A railway runs northward from Bangkok to a point near Phre and will eventually be continued to Chieng-mai. Near Ayuthia on this line a branch breaks off for Korat, which is the starting-point of land routes to the Mekong. Another line, which runs from Bangkok to Hua Hin, in the Malay States, will eventually be carried southwards through the entire length of the peninsula, where parts of it are already under construction.

COMMERCE.—Rice is the principal export of Siam and accounts for about 85 per cent. of the total value of all exports. It is mainly sent in the first instance to Singapore and Hong-Kong, whence it is distributed to various parts of the world. Teak and tin are also exported. Among the imports, cotton goods occupy the first place, but silk, provisions of various kinds, iron and steel goods, and machinery are all of importance.

FRENCH INDO-CHINA

French Indo-China falls into several distinct physical regions. To the east of the Mekong and to the south of the Chinese province of Yunnan, there is the wild mountainous region of Luang Prabang, from which runs southwards the crescent-shaped central range of Annam. In the south the lowlands of the Mekong lie to the west of this range, while in the north, in the angle between it and the Chinese massif, is the basin of the Red River of Tongking. Each of the political units into which the country is divided corresponds more or less closely to a well-defined physical region. Tongking is the basin of the Song-Koi or Red River. Annam includes the eastern slope of the Annamese mountains, and the narrow plains between them and the sea. The western slopes of the same mountains together with Luang Prabang constitute the territory of Laos. Cambodia and Cochin-China make up the lowlands of the Mekong, the latter belonging almost entirely to the delta of that river, while the former consists of the region between the delta in the south and the uplands in the north.

All these regions receive their rainfall during the summer monsoon, with the exception of Annam, which alone is excluded from its influence by the mountain ranges that traverse it from north to

south, and make it dependent upon the north-east trades of winter. The average rainfall of the whole region varies from 40 to 80 inches, except in the Laos country and on the slopes of the Annamese hills, where it exceeds the latter amount.

CAMBODIA has an area of 45,000 square miles, and a population which is estimated at 1,600,000. The low-lying districts alongside of the rivers and in the vicinity of the lakes are uncultivated, and on the hills in the north and east a forest vegetation alone is possible. But the intermediate lands, which are inundated each year by the Mekong and its tributaries, are very fertile and produce large crops of rice, which not only satisfy the home demand but afford a considerable surplus for export. Cotton is grown in increasing quantities: it is said to be better than Indian, and commands a higher price, but the difficulty of obtaining a sufficient supply of labour is an obstacle to the rapid extension of the area cultivated. Among other products of Cambodia are gamboge, which takes its name from the country, cardamoms, which are extensively used in Chinese medicines, pepper, cinnamon, tobacco, and sugar. Fishing is an important pursuit both in the rivers and in the great lake Tonle-Sap, and large quantities of fish are exported. Pnom-penh is the chief town of the country.

COCHIN-CHINA, which has an area less than one-half that of Cambodia, has a population with a density four times as great, and is at present one of the most valuable of the French possessions in Indo-China. Rice is extensively cultivated and large quantities are exported, while other crops include tobacco, maize, sugar, and pepper. Various attempts have been made to introduce manufactures into the country, but apparently without much success, and rice milling at Saigon and Cholon is, apart from agriculture, the only industry of importance. Saigon, which is situated on an affluent of the Donnai, can be reached by large ocean-going ships, and is the port not only of Cochin-China but of Cambodia as well.

THE LAOS TERRITORY is as yet in a very undeveloped condition. With an area of 98,000 square miles it has a population which does not exceed two-thirds of a million. The only exports of importance are forest products. Some rubber is obtained from a variety of creeping plants found in the woods. Teak is plentiful, but its exploitation is rendered difficult by the absence of good means of

communication. Cinnamon, lac, cardamoms, and gum benjamin (used in the manufacture of scent) are all found. In the alluvial deposits of the Mekong valley some gold is obtained.

ANNAM, which has an area of 52,000 square miles and a population of 5,500,000, consists of a strip of land about 800 miles in length and nowhere more than 100 miles in breadth. The cultivable land is limited in extent, and occurs mainly in the valleys of the numerous small rivers which descend from the neighbouring mountains. Rice is the principal crop, but on account of the absence of summer rains it has to be planted in the early part of the year, and therefore does not receive both moisture and heat at the same time. The yield per acre is accordingly small, and there is little available for export. Attention has recently been paid to the cultivation of tea, the output of which is increasing, and cotton is also grown though not so successfully as in Cambodia. Other products include rubber, cinnamon, silk, lac, sesamum, and ground-nuts, but none of these is of great importance. Fishing is extensively carried on along the coasts, especially in the south. Minerals, including coal and gold, have been located, but so far the output has been negligible, and the manufactures which exist do no more than meet the most pressing demands of the inhabitants. The principal towns are Hué, the capital of the country, and Turan, its chief port.

TONGKING has an area of 46,000 square miles. In the east are the delta lands of the Song-Koi, and on them the majority of the 6,000,000 inhabitants of the country are settled. In the north the land is hilly, and in the west it is mountainous. Rice, which is the most important product, is grown both in the lowlands and in the valleys of the uplands, and two crops a year are generally harvested, though, owing to the large population, the amount available for export is small. Maize has only been recently introduced into the country but, as is also the case in Cochin-China, its cultivation is rapidly extending. Cotton is grown and considerable attention is paid to sericulture. Other products include coffee, some varieties of rubber, and cunao, a plant from which a much used native dye is obtained. Coal is at present the most important mineral obtained in Tongking, and is worked mainly in the peninsula of Hongay, north of Haiphong, where there are open mines. The coal, which is anthracitic, is used for various purposes, and large

quantities of briquettes are also manufactured. Tin, zinc, and a few other minerals, are worked on a small scale. Tongking is the chief industrial region in Indo-China. Several mills for spinning cotton yarn have been established, and there are also distilleries, soap works, and factories for the production of paper, tobacco, matches, cement, and other articles. The most important towns are Hanoi, the capital, which is situated upon the right bank of the Song-Koi, sixty miles from the coast, and Haiphong, the leading port of the country, at the mouth of the Cua-cam, a canalised off-shoot of the same river.

COMMUNICATIONS.—Communications in Indo-China frequently present considerable difficulties. In Cambodia and in Cochin-China the obvious means of penetration into the interior is by way of the Mekong, but that river, although it is navigable by specially constructed steamers for several hundred miles, is obstructed by rapids at several parts of its course, and has never become the great route into the interior which the French hoped to make it. The principal railway in the south runs from Mytho on a distributary of the Mekong, by way of Saigon, to Phantiet on the Annamese coast, and it is proposed to connect Phantiet with Turan, whence a line 108 miles in length runs to Quangtri. Quangtri may some day be linked up with Vinh, which already has railway communication with Hanoi, 200 miles distant. In Tongking a line runs from Haiphong to Hanoi, whence one branch goes by Laokai to Yunnan-fu and the other by Langson to the frontier of Kwangsi. The branch from Hanoi to Yunnanfu has been constructed to develop French trade with China, and a reduced tariff exists for goods which are of French or Indo-Chinese origin. In the internal trade of Tongking the Song-Koi and its tributaries play an important part.

COMMERCE.—Rice is the most important of the exports of Indo-China and accounts for nearly two-thirds of the total value of the goods of domestic origin sent out of the country. Fish, maize, and cotton yarn are also exported in considerable quantities. Among the imports cotton goods come first, while a great variety of articles, including silk, liquor, paper, oil, iron and steel goods, and opium are all bought to a greater or less extent. The export trade is conducted very largely with Singapore and Hong-Kong, while the bulk of the imports is of French or Eastern origin.

CHAPTER XXV

THE CHINESE EMPIRE

THE Chinese Empire, consisting of China Proper and the dependent states of Manchuria, Mongolia, Tibet, and Eastern Turkestan, covers an area estimated at over 4,000,000 square miles, or nearly one-fourth of the whole continent of Asia. Physically it belongs to several of the great morphological regions of Asia, and the mid-world mountain system, the Mongolian plateau, the Manchurian lowland, and the ancient massif of Southern China all fall in whole or in part within its frontiers. But, as China Proper differs in so many respects, both physically and climatically, from its outlying dependencies, while these in turn differ from one another, it is better to treat the political units separately, though along their borderlands they tend to merge into those which adjoin them.

CHINA PROPER

The physical features of China are extremely complicated and can only be sketched here in broad outline. The country is on the whole mountainous, but there are several plains of considerable importance. North China belongs in part to the mid-world mountain system, its western half being enclosed within, and traversed by, ranges from the Inshan and Tsin-ling mountains, which are folded continuations of the Kwen-lun. Further east, beyond the old plateau of Ordos, the hills of the Shansi upland run from north to south, and those of Chili from north-east to south-west. The eastern part of Northern China is occupied by the Great Plain, which extends from the hills of Chili to the delta lands of the Yangtse, and covers a considerable part of Chili, Honan, Shantung, Anhwei, and Kiangsu. To the south of the Tsin-ling and its continuation, the Funiu-shan, lies the Chinese plateau, the mountain ranges of which were formed by fracture of the ancient land mass, and have a general trend from south-west to north-east. In the west of Szechwan and Yunnan, the mountains run from north to south.

CLIMATE.—The climate of China differs considerably from that of the remainder of the monsoon region of Asia. The greater part of the country lies outside of the tropics, and although the summers

are everywhere hot the winters are cold in the north and mild in the south. This wider range of temperature is in the main due to the fact that China, unlike India which is protected by the lofty wall of the Himalayas, is exposed to the cold winds which blow outward from the Asiatic land mass during the winter season. Canton, for example, has a winter temperature about 14°F . below that of Calcutta which lies less than one degree further south, while Shanghai, practically in the same latitude as Multan, has a winter temperature which is lower by about 18°F .

In January the greater part of China lies between the isotherms of 10°F . and 60°F ., the temperature decreasing on the whole from south to north. In the basin of the Hwang-ho many of the lakes and rivers are frozen during the coldest part of the year, and, although in Central China the climate is less severe, the surface of the smaller lakes in the lowlands of the Yangtse are sometimes covered with a sheet of ice sufficiently thick to permit skating. Even in the basin of the Si-kiang the thermometer frequently descends at night to freezing point, and ice is sometimes found. In summer, on the other hand, when the Asiatic land mass becomes heated, China has a high temperature, and in July the greater part of it lies between the isotherms of 80°F . and 90°F . In the basin of the Hwang-ho the temperature is naturally not quite so high, nor is the period during which it lasts so prolonged, as is the case in Central and Southern China.

The rainfall is monsoonal and occurs mainly during the summer months when oceanic winds from the south and south-east blow towards the heated continental interior. Owing to the general configuration of the country, there is nowhere a precipitation so heavy as that which occurs in parts of India and Indo-China, but, on the other hand, the total amount of rainfall is more evenly distributed. In winter, the winds blowing outwards from the cold continental interior bring but little moisture to the greater part of the country as they come from the north and north-west, but, when they veer round to the north-east and strengthen the ordinary trade wind system, they help to bring a certain amount of moisture to the coastal districts of Central China. The mean annual precipitation decreases from south to north. In the basin of the Si-kiang and in the southern part of that of the Yangtse, it varies from 60 to 80 inches. Except in the north-west, the remainder of the Yangtse

basin has over 40 inches and the Hwang-ho basin over 20 inches. In a country the topography of which is so diverse as that of China the local deviations from these general conditions of temperature and rainfall are very great.

VEGETATION.—The climatic conditions of China are reflected in its vegetation, which varies from warm temperate in the north to tropical in the south. The cold winters which prevail in the basin of the Hwang-ho are fatal to tropical and sub-tropical plants at this season of the year; on the other hand, the hot summers permit the cultivation of cotton, and rice can even be grown in some of the southern districts. Among the trees are the pine, birch, beech, oak, poplar, and willow. The fruits and food grains are those of the temperate zone, the former including apples, pears, peaches, apricots, and cherries, and the latter wheat, maize, millet, peas, and beans. In the Yangtse basin, with its longer summers, milder winters, and heavier rainfall, a sub-tropical vegetation appears. The bamboo, the camphor tree, the mulberry, the banyan, and a variety of the date palm are all found in different parts of the region together with trees which produce wax, tallow, and varnish. Rice, which is the chief food of the inhabitants, is extensively grown, sugar-cane and tea flourish in places, and various fibres are cultivated. The long hot summers, the warm winters, and the heavy precipitation in the basin of the Si-kiang permit the growth of a tropical vegetation in the lowland districts. Among the trees are the mahogany, the ebony, and the date palm; the fruits include the banana, the pine-apple, and the pomegranate; and caoutchouc, aniseed, and several other industrial products are also obtained. In addition, the great variations in elevation throughout the basin of the Si-kiang render possible the growth of most of the plants of the preceding regions.

GENERAL CONSIDERATIONS.—The present state of economic development in China is due in part to considerations of a geographical nature. As the country falls within the monsoon area it supports a large population, the size of which has been variously estimated, but which probably numbers between 300 and 400 millions. The marked climatic differences between the summer and winter seasons, which have already been noted, have probably contributed to the greater physical energy of the Chinese as compared with the inhabitants of the more tropical parts of the monsoon area.

In agriculture, which is their chief occupation, they have become very proficient; nevertheless the large population has pressed heavily upon the means of subsistence, and has, indeed, only been kept in check by war, famine, flood, and infanticide. But, if China is both fertile and densely populated, it is surrounded on all sides but one by barren or mountainous lands which have retarded, though they have not prevented, communication with the rest of the world, and even the ocean was until recently a barrier to intercourse with other countries. This isolation naturally led to a deadening of intellectual life, in consequence of which education became stereotyped. At the same time, their obvious mental superiority to the nomadic races by whom they were surrounded and occasionally conquered, and to the aborigines, whom they had themselves overcome, naturally gave the settled Chinese an exaggerated belief in their own capacities, and induced a contempt for foreigners and for foreign methods. To remedy these evils the rulers of China have, on the whole, been able to do but little. The mountainous topography of the country, no less than its great extent, rendered necessary a certain amount of local autonomy, and the energy of the Government has usually been absorbed, either in maintaining a balance between different parts of the Empire or in readjusting the balance after it had been disturbed. Since the Manchu conquests, moreover, power has been in the hands of aliens, who have cared but little for the ultimate welfare of the people. It would appear, therefore, that the great mass of the inhabitants, poor, uneducated, and ill-informed of what is happening elsewhere, presents a formidable obstacle to the spread of new ideas, and hence it is not surprising that economic progress has only been made in those districts where foreign influences have been most felt. But, as recent events in Japan have shown, the Chinese belong to a race not incapable of rapid industrial advances, and, with the vast supplies of coal, iron, and other raw materials which they possess, it is not impossible that they may initiate an industrial revolution, the results of which will be of much more importance than those of the political one which has just taken place in their midst.

NATURAL REGIONS.—Differences in climate and vegetation justify the separate treatment of each of the three great river basins which together constitute the greater part of China, but the knowledge

at present possessed regarding the geological and geographical structure, climate, and economic potentialities of the country does not permit a final division into natural regions to be made. As will be seen later, each of the river basins may be subdivided, but the available information regarding these subdivisions only allows of their treatment in a general way. Even for the larger divisions reliable statistics are usually wanting, and the relations of these regions to one another can therefore only be imperfectly discussed.

THE BASIN OF THE HWANG-HO.—This region may be considered as including the six provinces grouped along the course of the Hwang-ho, viz., Kansu, Shensi (north of the Tsin-ling), Shansi, Honan, Chili, and Shantung, though it may be noted that the greater part of Chili is drained by the Pei-ho and tributaries of the Liao, much of Shantung by short rivers running directly to the sea, and the south-eastern parts of Honan by the affluents of the Hwai.

Kansu, Shensi, Shansi, and the west of Honan are mountainous, while the east of Honan, the greater part of Chili, and the west of Shantung belong to the Great Plain. In the east of Shantung is an isolated mountain mass formed largely of Archæan rock. Throughout the greater part of the mountainous area in Kansu, Shensi, Shansi, and Honan, the river basins are covered over with, and the rugged outlines of the mountains smoothed down by, large deposits of loess. The loess is, according to Richt-hofen, "an earth of brown-yellow colour, so soft that one can easily rub it to pieces with the fingers, and yet at the same time so firm that in places where through erosion, as by running water, large masses are broken off, it remains standing in perfectly vertical walls several hundred feet high. . . . It is so fine that one can rub most of it into the pores of the skin; nothing then remains but some fine grains of sand, of which there are sometimes more, sometimes less. . . By repeated washing with water one can separate this from a much greater mass of material that may be called clay, and is tinted brownish-yellow by iron. A third important element is carbonate of lime On every bit of loess, even the smallest, one may recognise a certain texture, which consists in that the earth is traversed by long-drawn-out tubes which are in part extraordinarily fine, and in part somewhat coarser; which branch downward after the manner of fine rootlets and generally are coated with a thin crust of carbonate of lime." To discuss here the various

theories held as to the origin of this loess would involve too long a digression. Richthofen himself believed that it was due to the outflowing winds of Central Asia depositing the dust obtained from prolonged denudation of the rocks in regions unprotected by vegetation and exposed to great extremes of heat and cold, while the vertical cleavage of the loess he attributed to the pores left by the decay of grass roots as each successive layer of vegetation was covered up by fresh deposits of sand. A more recent theory involves the action of water as well as of wind in the transportation of the loess, and explains the vertical cleavage by the action of physical principles. Whatever be the true solution, the fact remains that the loess gives to Northern China some of its most characteristic features. Its great fertility is probably due in part to the organic remains of a former vegetation, and in part to capillary action drawing up from below ground water containing lime derived from the underlying limestone rocks. On the other hand, owing to its porous nature, it requires much water in order to render it productive, and irrigation is difficult as the rivers have cut their beds downward on to the rocks below.

The plain of the Hwang-ho, which in appearance is a wide alluvial flat, is also covered with loess to a great extent. This loess has been brought down as the alluvium of the Hwang-ho and other rivers, and has been resorted by the action of wind and water. Near the rivers sandy soils and fine sands are found, while in the open spaces intervening between them loess is the prevailing formation. The poorer soils have, however, often been improved by flooding them with water from the Hwang-ho, in order that the loess which it contained might be deposited.

The loess region is generally well cultivated, though in some places, as in Shansi, it suffers severely from the want of sufficient moisture. The lowlands are, as a rule, more productive than the uplands, and the valley of the Wei in Shensi, the plain of Taiyuen in Shansi, the region drained by the Lo in Honan, and various parts of the Great Plain are noted for their fertility. The staple food crops (wheat, millet, peas, and beans) are widely grown, and some rice is produced in the valley of the Wei. Opium was until recently a flourishing crop in Northern China, which produced much of the best native varieties. Cotton is cultivated, but not to the same extent as in the Yangtse basin where climatic conditions are more

favourable. Wild silk is obtained from silkworms, which thrive upon the leaves of the oak in several provinces, but chiefly in Shantung.

The mineral wealth of this region, as indeed of the greater part of China, is very considerable, but it has as yet been exploited only to a slight extent. Coal, iron, and petroleum are known to exist in both Kansu and Shansi, and in Kansu gold is also found. Shansi is one of the great mineral storehouses of the Empire. In the south-east enormous deposits of coal occur, while in the west, between the Hwang-ho and Fen-ho, lies what Richthofen described as a plateau of nearly horizontal coal-bearing strata, although recent research has shown that dips in the strata frequently occur, and that the coalfields are probably more restricted than Richthofen supposed. The mineral wealth of Shansi may yet make it one of the great industrial provinces of the Empire, but at present the only district in the province where coal appears to be worked is at Ping 'ting 'chou, and the output is small. In Honan the Pekin Syndicate works mines at Chinghuachen, where over 500,000 tons of anthracite and good steam and household coal were recently produced in the course of a year. The most important coal mines in China are those owned by the Kailan Mining Administration at Kaiping and Lanchow, about eighty miles from Tientsin. The output, consisting of bituminous coal suitable for steam purposes, amounted in 1911-12 to nearly 1,500,000 tons. There are also mines at Chinghsing, on the borders of Shansi and Chili, but these have a much smaller output. In Shantung the coalfields lie along the margins of the western half of the mountain region where the rocks are of later formation than further east. A German company, the Schantung Bergbau Gesellschaft, has mines at Fangtze in the Weihsien district, and at Hungshan in Poshan, and these together produced 430,000 tons in 1910-11. The Chinese-owned mines at Poshan are also both valuable and productive. In addition to coal, Shantung has deposits of iron, copper, gold, and other minerals, and iron is also found in Shensi, Shansi, and elsewhere.

The manufactures of the Hwang-ho basin are, with a few important exceptions, confined to the supply of local necessities and are produced by primitive methods. Owing to the cold winters which prevail, woollen goods are in much demand, and are manufactured at Lanchow in Kansu, in Shansi, and elsewhere with wool grown

in these provinces or imported from Mongolia. Native looms for the weaving of cotton are found everywhere, and modern cotton factories have recently been established at Tientsin, at Tsingtau in Shantung, and at Changteh-fu in Honan. At Tientsin there are also dyeworks and distilleries. Shantung and Honan are both extensively engaged in the silk trade, and at Chefoo there are several steam filatures and many hand filatures for the treatment of Manchurian cocoons. Both provinces, but especially Shantung, are also noted for their manufacture of pongees from the tussah silk which they produce. The manufacture of straw plait is an important industry in the west of Shantung and in the south of Chili, where a wheat with a long straw is grown. Japanese straw is also imported for the same purpose.

COMMUNICATIONS AND TOWNS.—Tientsin, situated on the Pei-ho, a little below the place where the river is joined by its principal tributaries, is the great collecting and distributing centre of the Hwang-ho basin and the most important seaport of North China. Owing to the rocky bed in the upper part of its course, the frequent shallows in the lower part, and the rapid flow throughout, the Hwang-ho itself is on the whole of little value as a waterway and is only navigable in places by junks. Accordingly, no great commercial city has grown up near its mouth, and Tientsin, situated on the navigable Pei-ho and serving as the port of Peking, has become the entrepôt of the whole region. Unfortunately its harbour is bad; only by constant dredging can it be made accessible to ships drawing more than 13 feet or so of water, and for some time each year it is closed by ice. From Tientsin great trading routes pass by way of Peking to different parts of Asia. One goes north-east by Shanhai-kwan, and between the hills of north Chili and the sea, to Mukden in Manchuria; another runs north-west by the Nankou pass to Kalgan, almost on the edge of the Mongolian plateau, and formerly the great centre of the Russian tea trade. From Kalgan several routes diverge; one leads across Mongolia by Urga to Kiakhta; another makes its way round the plateau of Ordos by way of Kweihwacheng (situated in the north of Shensi and a great collecting centre for skins and camel-hair ropes from all parts of Mongolia) to Lanchow in Kansu; a third goes to Taiyuen, the capital of Shansi, where it meets a more direct route from Peking by Chengting-fu, and then proceeds by Sian-fu, the capital of Shensi,

situated on the Wei, to Lanchow. Lanchow is the point of convergence of routes from Lhasa and Kashgar; while from Sian-fu there are ways to Chengtu in Szechwan and Hankow on the Yangtse, the first across the western and the second across the eastern end of the Tsin-ling mountains. From Pekin, the most important route to the south is that which crosses the Hwaiyang-shan, a continuation of the Funiu-shan, on the way to Hankow; it is followed by the railway which connects these two towns. Two other railways run from Pekin; one goes by Tientsin and Shan-haikwan to Mukden, with a branch to Newchwang, but it is questionable whether it will be able to prevent Tientsin losing much of the trade of Manchuria as a result of the development of that province by the Japanese. The line to Kalgan, on the other hand, will probably increase the trade with Mongolia, more especially when it is linked up with the trans-Siberian railway. A little to the south of Chengting, on the Pekin-Hankow line, a narrow-gauge railway breaks off from the main line and runs to Taiyuen across a very difficult piece of country; it taps the coal and iron fields of Shansi, and will probably eventually become an important feeder of Tientsin. Another line bringing coal towards Pekin is that which runs from the Pekin Syndicate mines at Chinghuachen by Sinhsiang to Taokow, whence the coal is carried to the capital by the Wei and the Grand Canal. The Grand Canal, one of the great waterways of ancient China, runs from Hangchow, in the province of Chekiang, to Tientsin, a distance of 1,000 miles across the Great Plain; its northern section is of comparatively little value, as it is badly constructed.

In addition to Tientsin two other ports are worthy of mention—Chefoo and Tsingtau. The former is a Chinese port on the north of the Shantung peninsula, while the latter lies on Kiaochow Bay on the south of the peninsula, in the territory leased to Germany in 1898. Tsingtau has made rapid progress under German control within the last few years; it possesses an excellent harbour and is connected with Tsinan-fu on the Hwang-ho. Hence it has been able to attract much of the trade that formerly went to Chefoo, which is without a good harbour to protect its shipping from the strong northerly gales of winter, and is unconnected by rail with its hinterland. Practically the whole of the important straw braid trade has been diverted from Chefoo to Tsingtau, and it is possible

that the latter port may also eventually attract to itself some of the trade of Honan, Shansi, and Shensi. The position of Tsingtau has been considerably strengthened by the completion of the Tientsin-Pukow railway which now runs from Tientsin by Tsinan-fu to Pukow on the Yangtse opposite Nanking.

THE BASIN OF THE YANGTSE-KIANG is the largest and most important region in China. Physically it may be regarded as a series of steps downwards from the Tibetan plateau, each step being tilted upwards towards the east in such a way as to cause the formation of a lake basin between its eastern edge and the step further to the west. The different provinces which make up the region correspond to some extent with these different steps. Szechwan is mountainous in the west and in the extreme east, while in the centre, at a much lower elevation, lies the famous Red Basin formed of Jurassic sandstone. The next step downwards is represented by the provinces of Hupeh and Hunan, the former consisting largely of the basin of the Han, and the latter of the basins of the Siang-kiang, the Yuan-kiang, and the Tse-kiang which drain into the Tungting lake, the remains of the vast sheet of water which once covered the whole alluvial plain of the Middle Yangtse. Still further east another step consists of the provinces of Anhwei and Kiangsi, whose alluvial parts formed the bottom of a great lake of which the Poyang lake is now the largest remnant. Lastly, there is Kiangsu, a plain of comparatively recent formation, built up in the south by the Yangtse, and in the north by the Hwang-ho at a time when that river flowed to the south of the Shantung peninsula.

The Yangtse Basin contains great areas of fertile land. The mountainous parts of Szechwan are probably incapable of much development, but the Red Basin is one of the most productive regions in the world. It has an elevation varying from 600 to 2,000 feet, and every inch of the soil, which is derived from the sandstone rocks, can be cultivated. One part of it, the Chengtu plateau, indeed, would probably be of little use were it not for the marvellous irrigation system which enables it to support a population that has been estimated at over 2,000 to the square mile. In Hupeh much of the Han valley is very productive, and the same is true of the valleys of the various rivers which flow from Hunan into the Tungting lake, while the alluvial land around the lake itself

and on both sides of the Yangtse supports a large population. The mountainous parts of Hupeh are generally barren, but in Hunan they are cultivated in some parts and forested in others. In Kiangsi there is a large area of fertile land around the Poyang lake. Anhwei and Kiangsu are productive throughout, but their northern parts belong climatically to the basin of the Hwang-ho rather than to that of the Yangtse. Throughout the whole Yangtse basin it is generally possible to take two crops per year off the soil, while in the basin of the Hwang-ho not more than one crop can be obtained.

The agricultural products of the region have already been mentioned. Opium was formerly one of the staple crops, but the recent enactments against its use have led to a very great decrease in its cultivation, and in Szechwan, where it was perhaps most extensively grown, various attempts are being made to find a substitute for it. Cotton has been introduced, and wheat, which had been displaced by opium, is beginning to regain lost ground, while an extension of the area under the mulberry is also probable. Szechwan, and still more Kiangsi, are the chief silk-producing provinces in the Yangtse basin, white silk being obtained in the latter and yellow silk in the former. As elsewhere in China, however, sericulture is in a backward condition, and it has been repeatedly said that Chinese silk might be greatly improved within a few years by even slightly better methods of rearing the silkworm. Recently, schools of sericulture have been established in Szechwan, and it is hoped that, as in Japan, the results will be beneficial. Tea is grown mainly in the provinces of Anhwei, Kiangsi, Hupeh, and Hunan, but some is also produced in Szechwan. Though both black and green tea may be obtained from the same plant, the differences between them being due to the method of preparation, some lands produce a leaf more suitable for the manufacture of one kind of tea, and some for the manufacture of the other kind. In the Yangtse basin, Anhwei is the centre of production of green teas, while from the other provinces mentioned black tea is mainly procured. Hankow is the chief market for the latter and Canton for the former. Cotton is extensively cultivated in the valley of the Han, in the lowlands of Hunan and Kiangsi, and in the southern parts of Kiangsu and Anhwei, and it is from these districts that the greater part of the Chinese output of raw cotton is obtained. It generally has a short

staple, but the best varieties are whiter and softer than Indian, especially in the Yangtse basin where they are superior to those grown further north. The export has increased greatly within recent years owing to the demand for it in Japan, but it is impossible to say how much is actually grown, as a very large quantity is consumed within the country itself. The average yield per acre in China has been estimated at 175 lbs., and it is said that in the Yangtse basin between 300 and 400 lbs. per acre are obtained. Attempts are being made here, as in other parts of China, to improve the quality by the free distribution of good seed and in other ways. Among other products may be mentioned the tallow tree (*Stillingia sebifera*) which is found in Hupeh, and vegetable wax, which is deposited on the wax-tree (*Fraxinus Chinensis*) in Szechwan by an insect known as *Coccus pela*. Grass-cloth is made from a fibre hitherto believed to be hemp but now recognised as ramie (*Boehmeria nivea*). In Hupeh and Kiangsi its growth and manufacture are of considerable importance.

The basin of the Yangtse, although not so rich in minerals as that of the Hwang-ho, nevertheless contains large stores of some of the more important. Coal is found underlying the sandstone in the Red Basin of Szechwan where it is at present almost entirely worked by native methods, and, though much of it is said to be inferior, some at least is good. In Hunan, also, the red sandstone, which prevails everywhere in the mountainous districts, appears to cover thick deposits of anthracite and bituminous coal. These extend into Kiangsi where they are worked at Pinghsiang under the control of the company which owns the Hanyang iron works. The annual output in 1910 and in 1911 exceeded 600,000 tons, some of which made its way down the river as far as Shanghai. Coal is also found in Anhwei and Kiangsu, but is as yet little worked. Iron appears to be well distributed, but the most productive districts at present are in Kiangsi, where at Tiehshanpu is found what has been described as one of the richest iron mines in the world. From it is obtained the ore used in the iron works at Hanyang. The Kanchow district of Kiangsi contains valuable copper mines which have as yet been exploited only to a slight extent. Gold, silver, and precious stones are found in various places, and antimony occurs in Hunan.

The manufactures of the region are varied. Cotton and silk

goods are produced by both Chinese and European methods. A large quantity of cotton yarn is imported from India, and an increasing amount from Japan, to serve as a warp upon which the people in their own homes weave a weft spun from native cotton. Hupeh manufactures in native workshops large quantities of piece goods for export to other parts of China, and modern factories have been established at Shanghai, Hankow, and elsewhere. Silk fabrics are produced to a great extent by the peasantry in the districts in which the silkworm is reared, and Szechwan, and more especially Kiangsu, are noted for their piece goods. In addition, there are steam filatures at Shanghai, Hankow, Chenkiang, and other towns. At Hanyang, which is part of the great triple town of Hankow-Hanyang-Wuchang, situated at the confluence of the Han and the Yangtse, a Chinese company has established large iron and steel works on a European basis. This company, which, as already mentioned, owns both coal and iron mines, manufactures large quantities of steel rails for use in China itself and has begun to export pig-iron to Japan and the United States. The Yangtse Engineering Works, controlled by the same company, are situated a few miles lower down the river, and are said to be making good progress. The various concerns of this company are among the few in China, worked by Chinese upon European lines, which appear to be successful, others which have been established at Hankow and elsewhere being only partially so. The manufacture of pottery is still extensively carried on at Kingtehchen, in Kiangsi, with kaolin derived from the decomposed granitic rocks found in the neighbourhood, but the product seems to have lost the high quality which it once possessed, and now consists chiefly of rice bowls, which are exported to all parts of the Empire. Other industries include the manufacture of paper and Indian ink, the extraction of oil from beans and cotton seed, the preparation of tobacco, and a great number of pursuits of minor importance.

The Yangtse is the great means of communication throughout its basin, but its value as such varies greatly at different seasons and at different places. During the summer months the river rises rapidly as a result of the heavy monsoon rains. At Hankow this rise averages between 40 and 50 feet, but in the gorges above Ichang it may be anything between 60 and 100 feet. As a rule, steam navigation is easy as far as Hankow, in summer for

ocean-going steamers, and in winter for river steamers of 1,000 to 2,000 tons register. Between Hankow and Ichang steam freighters ply throughout the year, though they are handicapped in winter by low water. Above Ichang, the bulk of the traffic between it and Chungking, the great port of Szechwan, has hitherto been carried on in junks hauled along by gangs of Chinese; but, within the last year or two, specially constructed tugs with cargo floats in tow have been able to sail between the two towns for eight months in the year, and would probably be able to continue doing so during the whole year were certain improvements made in the bed of the river. On the other hand, junk traffic is easier during the winter months when the water is low than at any other season of the year. Of the tributaries of the Yangtse, the Han can be navigated by small steamers for a distance of 300 miles above Hankow, and part of the Kan-kiang can be similarly utilised during the summer months, but elsewhere junks alone are possible.

A number of important trading centres have grown up upon the banks of the Yangtse. Chungking is the port of Szechwan and more especially of the Chengtu plateau, while Ichang is the port of transshipment for goods going to and coming from that province. Hankow, in addition to being an important manufacturing town, seems destined to become one of the great commercial centres of China. It is already connected with Peking by rail, and will some day be connected with Canton by a line which at present is making slow progress, but will, when completed, follow the Cheling Pass route which goes southward along the valley of the Siang and its tributary the Lin, crosses the Cheling Pass, and descends the valley of the Pei-kiang or North River for the greater part of the remainder of the way to Canton. A line from Hankow to Chengtu has been projected, and the section from Ichang to Wanhsien is under construction; while another line will ultimately run from Hankow by way of Shasi to Nanking, which is already connected with Shanghai. Linkiang, which is situated on the Yangtse, near the mouth of the Poyang Lake, is the great collecting and distributing centre for the rich province of Kiangsi. From it, an important way of communication from the Yangtse to the Si-kiang, known as the Ambassadors' Route, leads up the valley of the Kan-kiang, across the Meiling Pass, and down the valley of the Pei-kiang to Canton. Wuhu is a port for north-east Anhwei with different parts of which

it is connected by a number of minor waterways. Nanking will probably assume greater importance by the completion of the railway from Pukow to Tientsin, which is likely to tap a considerable amount of trade that at present makes its way eastwards to the Grand Canal by the Hwai and its tributaries, and so enable Nanking to become the port of a great part of western Honan and northern Anhwei. Chenkiang is situated where the Grand Canal crosses the Yangtse, but its trade is not so great as might have been expected, as the canal, though it is still used to a considerable extent, has not been altered to suit modern conditions, and has even been allowed to fall into decay in places. Shanghai, situated on the Whangpoo about twelve miles from its confluence with the Yangtse and between fifty and sixty miles from the sea, is the great commercial entrepôt, not only for the Yangtse basin but for the whole of North China.

CHEKIANG AND FOKIEN.—The two provinces of Chekiang and Fokien belong neither to the basin of the Yangtse nor to that of the Si-kiang. Lying along the south-east coast of China, they are to a great extent cut off from the interior by the various ranges of the Chinese massif which run parallel to one another and to the coast. The northern part of Chekiang belongs, indeed, to the delta lands of the Yangtse, but in the south, and in Fokien, there are few plains and the land is generally mountainous. The rivers are naturally short, and, with the exception of the Min, are not of great value as means of communication. The summers are hot and the winters mild, the lowlands at least being protected, except in the north of Chekiang, from the cold winds of winter which blow from the continental interior. The agricultural products are of considerable importance. Green tea comes from Chekiang and black from Fokien, but both provinces have suffered by the great decline in the foreign demand for Chinese teas. Chekiang also produces large quantities of silk, and its piece-goods rank with those of Kiangsi as the best in China. Cotton is grown throughout the whole region and sugar-cane in the south. The camphor tree (*Cinnamomum Camphora*) is found in both provinces, and the distillation of camphor has been an important industry for some years. Unfortunately, the reckless destruction of the older trees is unaccompanied by the planting of others to take their place and the end of the industry is said to be in sight.

Minerals are believed to be fairly abundant, but so far little has been done to develop them. The chief trading centres include Hangchow, Ningpo, Foochow, and Amoy. Hangchow, on Hangchow Bay, is at the southern entrance of the Grand Canal, and is also able to communicate with the interior by means of the Tsientang; it is connected with Shanghai, and will eventually be connected with Ningpo, by the Shanghai-Hangchow-Ningpo railway. Ningpo, near the south shore of Hangchow Bay, and Foochow, on the Min-ho, about 35 miles from its mouth, both have considerable local trade. Amoy, situated on an island at the mouth of the Lung-kiang on the south-east coast of Fokien, was formerly the great centre for the export of tea from Formosa. Since the annexation of that island by Japan this trade has been lost, and Amoy, which has an excellent harbour, is seeking to develop commercial relations with the interior of Fokien.

THE SI-KIANG BASIN.—The four provinces of Yunnan, Kweichow, Kwangsi, and Kwangtung may be considered as forming the basin of the Si-kiang, although the north of Yunnan and Kweichow is drained to the Yangtse, the south of Yunnan to the Red River of Tongking, and the west to the Mekong and the Salwen. The whole region is mountainous in character; in the west the ranges run from north to south but further east their trend is from north-east to south-west. The different provinces may be regarded as so many steps downward from the Tibetan tableland to the Pacific Ocean. Yunnan, which is the first step, is a plateau with an average elevation of about 7,000 feet; it slopes towards the south and east, but is much cut up by mountain ranges which enclose the high plains upon which the majority of the inhabitants live, the valleys in the west and south being generally too unhealthy for settlement. Kweichow, which is the second step downwards, has a height varying from about 5,000 feet in the west to less than 3,000 feet in the east, and like Yunnan is much cut up by mountain ranges which enclose high plains. Kwangsi, which is the third step, is considerably lower than Kweichow, the average height of the mountains being from 2,000 to 3,000 feet. In Kwangtung the land gradually descends to the delta of the Si-kiang.

Throughout the whole region rice is the staple crop, but in many of the upland districts wheat, barley, and beans are cultivated, while maize is grown in Kweichow and Kwangsi and in the lowland

valleys of Yunnan. Opium has hitherto been an important crop in Yunnan and Kweichow, but in both provinces the amount produced is rapidly decreasing. Tea is grown to some extent in Yunnan and Kwangtung, but, while the product of Yunnan is still sought after, that of Kwangtung is now of little account in the world's markets, and Canton has practically entirely lost the tea trade for which it was once so famous. Wild silk is obtained in Yunnan, and in Kwangtung the mulberry is cultivated, but the silk produced is inferior in quality to that from Kwangsi and Chekiang. Among other products may be mentioned cotton, which is grown but not to a great extent, ramie, cassia, and spices.

The mineral wealth of the region, has as yet been exploited only in a superficial way. Coal is widely distributed, the best known mines being those of Shaochow-fu in Kwangtung, and iron, copper, lead, zinc, as well as gold and silver, are also found in various places. Tin is worked on an extensive scale, but by native methods, at Kochiu, near Mengtze in Yunnan, where between 50,000 and 100,000 men are employed, according to the season of the year. Quick-silver is obtained in Kweichow and antimony in Yunnan. Attempts have been made to open up the mineral wealth of the country by foreign capital and on modern lines, but so far they do not appear to have met with much success.

The manufactures of the region, which are not of great importance except in Kwangtung, include the production of silk and cotton goods, the preparation of tea, paper-making, and a few other industries of a similar nature. Canton, and Fatshan a little further up the West River, are great industrial centres and manufacture cotton, silk, and woollen goods, lacquer-ware, matting, and a great variety of articles of minor importance.

The Si-kiang with its tributaries is the great means of communication in the region which it drains. During periods of high water the main stream is navigable by steamers as far as Wuchow, on the borders of Kwangsi, but at other seasons of the year only smaller boats can get as far as that town. Hence there has been a great development of the use of motor boats both on the main river and on its tributaries, and by means of these not only Kwangtung and Kwangsi, but to some extent the south of Kweichow and the east of Yunnan, are enabled to trade with Canton. That city is situated on the West River, a distributary of the Si-kiang, and owes its

importance as a commercial centre to its position. It is connected by waterways with almost every part of the fertile and well-populated province of Kwangtung, and has trade relations, not only with the remainder of the basin of the Si-kiang, but with that of the Yangtse. On the other hand, it is in easy communication with Hong-Kong, and large ocean-going steamers are able to ascend the river as far as Whampoa, twelve miles below the city. Railways are beginning to move outwards in different directions. One line connects Canton with Kowloon, opposite the island of Hong-Kong; another runs to Samshui, at the confluence of the North River with the Si-kiang, while the railway to Hankow has been completed as far as Lin Kong Hou, 75 miles from Canton. At the same time the importance of Canton has been adversely affected to some extent by the opening to foreign trade within recent years of Wuchow, which is now the entrepôt of Kwangsi, of Samshui, which taps the trade of the North River, and of Kongmoon, which serves the district north and west of Macao. Nevertheless, Canton continues to prosper, largely as a result of the efforts of its inhabitants who are among the most energetic and industrious people in China.

The west and north of Yunnan are difficult to reach by way of the Si-kiang, and a large proportion of the goods imported into these districts comes from Burma through Tengyueh to Tali-fu, whence it is distributed over the country, some of it even finding its way northwards into Szechwan. The route from Burma is a mule track, and, as the carriage of goods along it is both tedious and costly, trade may be diverted from it to some extent by the new route opened up by the French railway from Haiphong in Tongking to Yunnan-fu by way of Mengtze. Various schemes have also been suggested for connecting some Burmese ports by rail with Tali-fu, and Yunnan-fu with Chengtu, but it is unlikely that anything will be done in either direction in the immediate future.

Great Britain, France, and Portugal have each a foothold in the province of Kwangtung. To Great Britain belongs the island of Hong-Kong and the leased territory of Kowloon on the mainland. Portugal possesses Macao, and France has recently acquired control of Kwangchow-wan. Hong-Kong, which has an excellent harbour, is thus enabled to perform the same functions as a collecting and distributing centre for South China that Shanghai performs

for Central and Northern China. It is also engaged in sugar refining and other industries. Macao has lost much of the importance which it formerly possessed, and Kwangchow-wan has not yet developed much trade of its own.

MANCHURIA.—To the east of the Mongolian Highlands lies a region to which the name of the Manchurian Lowland has been given. South-east of the Khingan range it forms a high plain with an elevation varying from 800 to 1,500 feet. This plain, which is drained in the north by the Amur, in the centre by the Sungari, and in the south by the Liao, is traversed by several ranges of hills generally trending from south-west to north-east, and, as a result, presents, on the whole, a somewhat mountainous appearance. On the east, it is separated from the low plain occupied by the Lower Amur, the Lower Sungari, and the Yalu, by ranges of hills which rise to over 6,000 feet. To the east of the low plain, again, are mountain ranges which occupy the country between it and the Pacific.

The political region, to which the name of Manchuria is given, does not, however, occupy the whole area just described, and in the north does not extend beyond the Amur, nor in the east beyond the Ussuri. The greater part of it belongs to the high and low plains, and only in the north-west does it stretch beyond the Khingan mountains and occupy a small part of the Mongolian plateau.

Agriculture is at the present time the chief occupation of the inhabitants of Manchuria. The crops include several varieties of millet, the most important being tall millet (*Holcus Sorghum*), which is the staple food of the people. Wheat, barley, and buckwheat are grown, especially in the northern province, while rice and maize are cultivated to some extent in the south. The area under soya beans has increased greatly within recent years and is likely to continue to do so for some time to come as the northern districts, where climatic conditions favour the growth of the best beans, are gradually being brought under cultivation. The soya bean can be utilised in a great variety of ways. For human food it is converted into a sauce, or worked up as a paste, or made into bean curd; it can also be used as a table vegetable or converted into a kind of confectionery. The oil which is extracted from it is used as an illuminant, and as a lubricant, and also enters into the manufacture of a variety of articles such as waterproofs, umbrellas, varnish, and ink, while in

Europe, to which it has recently been imported in increasing quantities, it forms an important constituent in the manufacture of soap. The refuse from the beans after the oil has been extracted is given as food to cattle or is used as manure. Opium has hitherto been cultivated in various parts of the country, but especially to the north of the Sungari, one reason being that it was better able than most other articles to stand the heavy cost of carriage to the coast. Wild silk is obtained in considerable quantities in that part of Fengtien in which the hills slope towards the south. Ginseng (*Panax ginseng*), which the Chinese believe to have valuable medicinal qualities, grows both in a wild and in a cultivated condition.

Trapping is carried on in the mountains and forests of the north, where bears, leopards, tigers, sables, and squirrels are all found. In these districts, also, there are thousands of farms where dogs and goats, which have developed magnificent coats of hair to protect them from the cold of winter, are reared for the sake of their skins.

The mineral wealth of Manchuria is as yet but little developed. Gold is worked by native methods in several places, but the output is not great. The principal productive coal mines, which are situated at Fushun, near Mukden, and are owned by the South Manchurian Railway (Japanese), yielded in 1911-12 over 1,300,000 tons of good bituminous coal. Iron is found north of Mukden.

The manufactures of Manchuria are not important. Much of the millet grown in the north is too far from good lines of communication to enable it to make its way to the coast, and is disposed of to the local distilleries. At Newchwang and Dairen there are numerous mills for the extraction of oil from soya beans and the manufacture of bean-cake. Chinchow-fu, in Fengtien, is the chief centre where carpets and rugs are made from camel's-hair and sheep's wool imported from Mongolia.

The development of Manchuria in the past has been much retarded by the absence of good means of communication. The roads, which are badly made, are impassable quagmires during the rainy season, and are only available for heavy traffic when they are frozen hard during the winter months. The Liao, on the other hand, offers a good means of penetration into the interior during the

summer, but is icebound in winter. In these circumstances railways are invaluable. The trans-Siberian runs across Northern Manchuria to Vladivostok by Harbin, where a line breaks off for Mukden and Port Arthur. From Changchun to Port Arthur this line is under the control of Japan and is known as the South Manchuria Railway. Mukden is connected with Tientsin by the North China Railway, and with Antung by a line which is continued through Korea to Fusan. Newchwang is linked up by short branches with the lines from Mukden to Tientsin and to Port Arthur.

The two principal ports, Newchwang and Dairen, compete with one another. The former is situated at the mouth of the Liao river, and has the further advantage of offering a shorter land route than Dairen into the interior. On the other hand, it is icebound during the winter months; and it has to some extent been silted up, though steps are now being taken to remedy this defect. Dairen, to the east of Port Arthur, in the leased territory acquired from Russia at the conclusion of the Russo-Japanese war, is open all the year round, and the longer land route which it involves to the interior is compensated for to some extent by favourable rates on the South Manchuria Railway, offered by the Japanese who are doing all in their power to develop the port.

SINKIANG or EASTERN TURKESTAN includes two distinct regions, Kashgaria and Dzungaria. The first of these consists in the main of the basin of the Tarim, which is surrounded on three sides by the Kwen-lun, the Pamirs, and the Tian Shan. The climate is arid, and the greater part of the country enclosed by these mountains is covered with shifting sands. Cultivation is only possible along the banks of streams which descend from the snow-covered ranges around, but with few exceptions lose themselves as they approach the desert. The principal products are cereals, including wheat, barley, and rice, cotton, and fruits. Horses, camels, sheep, and goats are also raised in considerable numbers. The more important towns, Khotan, Kashgar, and Yarkand contain bazaars in which are sold carpets, and cotton, woollen, and silk goods, the chief manufactures of the people.

Dzungaria lies between the Tian Shan and the Altai. Much of the land is exceedingly poor, and it is only in the vicinity of the rivers, and especially in the valley of the Ili, that cultivation and

settlement are possible. The northern slopes of the Tian Shan provide considerable areas of good pasture land. Urumtsi, the chief town, trades in skins and furs. Kuldja, the only other town of note, is on the Ili.

Formerly, all trade between China and the west went through Turkestan, the most frequented route passing by Lanchow and Ansichow in Kansu, and Hami in Turkestan, to Turfan where it bifurcated. The northern branch crossed the Bogdo-ola to reach Urumtsi, and re-crossed the Tian Shan to Kuldja, while the southern, keeping to the south of the Tian Shan, went on to Kashgar.

TIBET.—The greater part of the Tibetan plateau is of little economic importance, and is only frequented during the summer months by a few nomad tribes. In the south, in the valleys of the Indus and Brahmaputra, and in the south-east, in the valleys of those rivers which flow from the Tibetan plateau through China and Indo-China, cultivation is possible, and it is there that settlement has taken place. The principal agricultural products include the hardier cereals, vegetables, and fruits, but the chief wealth of the people is to be found in their herds of goats, sheep, asses; and yaks. Mineral wealth appears to be considerable, and gold has long been extensively worked by primitive methods. Trade, which is carried on mainly with China but to some extent with India, consists in the export of gold, wool, musk, and hides, and in the import of tea and cotton goods. The principal routes from China lead to Lhasa from Chengtu in Szechwan, by way of Tarchendo and Batang, and from Sining-fu in Kansu, by way of Donkyr and the Tangla Pass. From India the chief road is by Sikkim and the Chumbi valley to Gyantse.

MONGOLIA includes parts of two of the great physical regions of Asia. The north-west of the country consists of the Altai and other mountains which belong to the Central Asian Highlands, while the remainder forms the Mongolian plateau which has an average elevation of 3,000 to 4,000 feet, and is part of the region of relative depression north of the folded Kwen-lun mountains. The whole country has an extreme climate, the summers being hot and the winters cold. In the desert of Gobi, in the south, the annual rainfall is less than 10 inches, but in the remainder of the country it is generally sufficient for the growth of grass on the plateau, and of coniferous trees on many of the mountain slopes. Hence the

people are almost exclusively confined to pastoral pursuits and possess great numbers of horses, cattle, sheep, and camels, with which they wander over the country, ever on the search for fresh pasture land. Towns are accordingly few, and Urga alone is of any importance. Formerly, the tea sent from China to Russia was carried by Mongol caravans from Kalgan to Kiakhta, but since the opening of the trans-Siberian line most of it has gone by rail. The exports of Mongolia consist of pastoral products and are sent to China, tea, cotton, and miscellaneous articles being received in exchange.

COMMERCE.—The annual value of the exports of China for the three years 1908-9-10 averaged £44,000,000, while the average value of the imports for the same period was £56,000,000. Between 45 and 50 per cent. of the value of the exports is made up of raw and manufactured silk, soya beans, bean-cake and bean-oil, and tea. China ranks next to Japan as a silk-producing country, and her output might be greatly increased both in value and amount were improved methods of rearing the silkworm and manufacturing the silk more generally adopted. With the introduction of soya beans and their products into Europe during the last few years, the trade in them has rapidly developed, and they now hold the second place among the exports of the country. Tea is exported mainly to Russia and also to the United States, but the British market has been almost entirely lost, chiefly owing to the failure of the Chinese to provide a tea at once good and cheap. Among other articles exported are raw cotton, sesamum, hides, straw braid, and tin which together make up nearly one-seventh of the total exports. Chinese cotton is sent to Japan, where it is preferred to Indian, as it is whiter. On the other hand, Indian cotton is imported to China for the mills at Shanghai, where it is in demand, as it gives a better staple than Chinese. The exportation of cotton from China shows signs of increasing as it is beginning to be cultivated in place of opium. The principal imports of China consist of cotton goods, opium, rice, oil, sugar, metals, minerals and railway plant, fish, and coal. During the three years, 1908-9-10, these accounted for just two-thirds of the total value of all the goods brought into the country from abroad. Almost 30 per cent. of the total imports consisted of cotton goods imported from the United Kingdom, Japan, India, and the United States. The United Kingdom

supplies the bulk of the manufactured goods, though Japan and the United States share the trade in plain grey sheetings, and Japan is gaining control of the market in drills. Yarn is obtained mainly from India, though within recent years the position of that country has been seriously threatened by the activity of the Japanese mills. In China hand labour is still in many respects cheaper than machine labour, and the imported yarn is used along with Chinese cotton in the domestic manufacture of a rough but durable cotton fabric. Opium still held second place in the list of imports in 1907-10, but this was in part accounted for by the rapid rise in price consequent upon the reduction both of the area cultivated at home and of the amount supplied from abroad. Rice is imported from Indo-China mainly to supply the dense population of the province of Kwangtung. Kerosene oil, which comes chiefly from the United States, Sumatra, and Borneo, has grown greatly in favour with the Chinese during the last quarter of a century and has largely displaced vegetable oils as an illuminant. Sugar is imported from Java and the Philippines, coal from Japan and Hong-Kong (probably from Great Britain), and iron and steel goods and railway plant from the United Kingdom, Belgium, Germany, and the United States.¹

KOREA

In the peninsula of Korea, as in Eastern Asia generally, the mountains tend to run parallel to the coast line. In the north, where they are a continuation of those of eastern Manchuria, they cut across the peninsula, but further south they form an axis to it and divide it into two slopes, an eastern and a western. On the east they present a steep escarpment to the sea from which they are separated by a narrow coastal plain, but on the west the slope is more gradual, the rivers are larger, and there are numerous valleys which contain much fertile soil. It is on the west accordingly that the bulk of the population is found. Climatic conditions are somewhat more favourable than in corresponding latitudes on the mainland, the winters being milder and the summers cooler. The rainfall occurs in the summer and is greater on the east coast than on the west.

¹ Mongolia, supported by Russia, has recently asserted its independence.

The principal crops are rice, beans, barley, and wheat, and attempts, apparently successful, are being made to develop cotton-growing and sericulture. Ginseng is abundant and its sale is a profitable government monopoly. The minerals include gold, iron, coal, and copper, but with few exceptions they have hitherto been worked in a most primitive fashion. Manufactures, which are of little importance, are mainly concerned with the supply of local needs. The communications of the country are bad. The principal railway is that which runs from Fusan to Antung with branches to Seoul and Chemulpo. The exports include rice, beans, hides, and ginseng, while cotton and silk goods, oil, and metals are the principal imports. Fusan and Chemulpo are the chief ports.

The Koreans display little energy either in political or economic matters, and have usually been dependent on one or other of their neighbours. Their country was annexed by Japan in 1910, and may for all practical purposes be regarded as part of the Island Empire.

CHAPTER XXVI

JAPAN

THE five large and four thousand small islands which form the nucleus of the Empire of Japan are the remains of a great mountain system lying off the east coast of Asia, with which they were once connected. Their total area is about 161,000 square miles, or one and a third that of the British Isles. The largest is Honshiu, which contains about 54 per cent. of the total extent of the country, and is the centre both of its political and economic development. The physical configuration and structure of this island are extremely complicated. The general trend of the mountains is N.N.W. in the northern half, and W.S.W. in the southern, but in the vicinity of the great rift valley, which runs across the middle of the island from north to south, they bend round towards the zone of fracture, thus giving rise to a number of meridional ranges in central Honshiu. In the northern part of the island the main range consists of granitic rocks overlain by volcanic outpourings, while further to the east are ranges composed of schists and sedimentary rocks, and to the west numerous volcanic mountains. To the west of the rift valley there appear in south Kiushiu, in Shikoku, and in the Kii peninsula, folded sedimentary rocks, behind which are the southern schist mountains. Further north, the islands of the Inland Sea are mainly granitic, as is the case with the mountains of Honshiu, lying immediately to the north of that sea, while beyond these again there are volcanic mountains. Between these different mountain ranges and along parts of the coast, there lie numerous plains of recent origin, the most important being the Kitakami plain between the central and eastern ranges of the north, the plain of Echigo on the west coast, the Kwanto plain, the largest in the country, round Tokio, the Mino-Owari plain to the west of the meridional mountains in central Honshiu, and the Kinai plain, which contains the cities of Kyoto and Osaka. In Shikoku there are several plains of limited extent, while in Kiushiu the most important is that of Tsukushi in the north of the island.

Of the other parts of the country, Yezo, renamed the Hokkaido, is very mountainous, owing to the fact that two ranges appear to cross one another, the schist range of Sakhalin and the volcanic

range of the Kuriles. Formosa, acquired from the Chinese in 1895, is somewhat larger than Kiushiu. A high mountain range composed of ancient rocks extends along the eastern part of the island, while the west consists generally of an undulating, fertile plain of Tertiary and later times.

CLIMATE.—The climate of the Japanese Islands shows considerable variations from north to south and from east to west. This is due to a combination of circumstances—the great latitude over which the islands extend, their position with regard to the Asiatic land mass, and the influence of the sea with its warm and cold currents.

The heat of summer and the cold of winter are alike less extreme than on the corresponding parts of the coast of Asia. The warm Pacific current, or Kuro Siwo, bifurcates to the south of Japan and washes both its eastern and western shores. The eastern and stronger branch follows the direction of the coast as far as latitude 38° N., after which it bears away across the Pacific, while the western and weaker branch enters the Sea of Japan by the Tsushima Strait, and leaves it by La Perouse and Tsugaru Straits in the north. At the same time, one cold current from the north passes along the eastern coasts of Hokkaido and Honshiu as far as latitude 39° N., while another passes along the western coast until it is lost in the warm current moving from the south. The warm currents tend to raise the temperature, especially on the east coast, during the winter months, and the proximity of the sea reduces it in summer.

The direction of the winds is another important factor in the determination of Japanese climate. During the winter, when anti-cyclonic conditions prevail over the Asiatic continent, cold winds blow outward from Siberia in a south and south-easterly direction; and strike the west coasts of Japan. On the other hand, the mountainous backbone of the country shelters the land lying to the east of it, and for this reason also the east coast is warmer than the west in winter. During the summer months Japan lies within the monsoon area, and southerly winds prevail. The heaviest rainfall, therefore, occurs at this season, although to the north-west coasts considerable precipitation is brought by the continental winds of winter which pick up moisture as they blow across the Sea of Japan.

In the Hokkaido the winter is long and cold, and during it the

mean temperature is generally below zero, while in summer, in the warmer districts, it is as high as 70° F. Somewhat similar conditions prevail in the northern part of Honshiu, though the cold of winter is less and the heat of summer somewhat greater. In south-west Honshiu, in Shikoku, and in Kiushiu, climatic conditions are much more favourable. The mean winter temperature nowhere falls much below 40° F., while in summer it is between 70° F. and 80° F. in the warmer districts. Formosa has a tropical climate except in the highlands.

The rainfall is considerable over the greater part of Japan. On the south and north-west of Honshiu it is over 60 inches, and in places over 80, while in the interior and on the north-east coast it is between 40 and 60 inches. In the Hokkaido it is generally between 30 and 40 inches, except along the north-west and south-west coasts, where it is somewhat higher. Formosa has from 80 to over 100 inches.

VEGETATION.—The forests of Japan belong to several distinct types, the distribution of each of which is determined by the climatic conditions just described. The cool temperate forest extends over Honshiu, north of the thirty-sixth parallel, and over the whole of Hokkaido. In the north of the latter island coniferæ alone are found but further south coniferous and deciduous trees intermingle. Among the principal species of this forest are the pine, cypress, fir, beech, walnut, and ash, and these are also found at higher altitudes further south.

Over southern Honshiu, Shikoku, and Kiushiu, the prevailing type of vegetation is the warm temperate rainforest, in which deciduous and broadleaved trees intermingle. Camphor, boxwood, and several varieties of oak and pine are characteristic of the region. In Formosa the forest is tropical, and the banyan, the bamboo, and the camphor tree are among its chief products.

NATURAL REGIONS.—It is difficult to divide Japan into natural regions owing to the way in which uplands and lowlands are distributed, and to the still undeveloped condition of much of the country, but certain broad distinctions may be drawn. The Hokkaido differs greatly from southern Honshiu, Shikoku, and Kiushiu, while northern Honshiu occupies an intermediate position. Formosa, again, is partly within the tropics and its products are of a tropical nature.

GENERAL CONSIDERATIONS.—Owing to the irregular topography of the country the cultivable land is very limited, and does not exceed 20 per cent. of the whole area. As Japan for long supported a population at least as great as that of Great Britain now is, without importing food supplies from abroad, it is obvious that cultivation must have been very intensive in character. Agricultural holdings were generally small, and in many cases did not exceed one acre, but the farmer and his family supported themselves by engaging in one or other of various subsidiary employments. What manufactures there were, were therefore chiefly carried on as domestic industries, and the modern factory system did not exist. Since Japan within recent years became a food importing country, various attempts have been made to increase still further the productivity of the soil, and, at the same time, to extend the margin of cultivation by bringing in land, hitherto believed to be useless.

The HOKKAIDO, which measures just over one-sixth of the whole country, consists to a great extent of forest-covered mountains. It is only in the south-west, in the valley of the Ishikari, and in the south-east, in the valley of the Tokachi, that lowlands are developed to any extent. The relatively unfavourable conditions of soil and climate have prevented the growth of a large population, and, although the number of inhabitants has nearly doubled within the last fifteen years, it is still less than one and a quarter millions, while the density is only 23 to the square mile as against 300 to the square mile in the whole of Japan. The cultivated land amounts to less than 3 per cent. of the total area, and on it the chief crop consists of beans, although some rice and other cereals are also grown. It is believed that there are considerable areas which might be converted into good pasture land. The export of timber is a rapidly growing industry, hard woods being obtained in the centre and south of the island and soft woods in the north. The coal mines of the Hokkaido, which occur in the west, are being developed, and now produce over one and a half million tons of coal annually. Other minerals also occur, but none is as yet of much importance.

Hakodate has hitherto been the chief town and port of the island, mainly as a result of the fact that it is situated on a good harbour in the peninsula which is the nearest part of Hokkaido to Honshiu.

The difficulties of communication inland, and the proximity of Otaru and Muroran to important producing centres, have led to a relative decline on the part of Hakodate. Otaru, situated near the mouth of the Ishikari river, serves the chief agricultural districts, and is also the principal timber port of the island, while Muroran, lying to the east of Volcano Bay, is the outlet for the coal mines. Large steel works are being constructed in the vicinity of the latter town, and it is hoped to utilise the magnetic iron in the sands of Volcano Bay. Kushiro, which is connected by rail with the Tokachi valley, will probably become the chief port of south-eastern Hokkaido.

HONSHIU, SHIKOKU, AND KIUSHIU.—Northern Honshiu is in some respects very different from the remainder of this region. Its climate and vegetation are intermediate between those of Hokkaido and Southern Japan, and, while rice is grown throughout the whole area, the mulberry and tea plant are not extensively cultivated further north than central Honshiu. The density of population, moreover, is 250 to the square mile in the northern region as compared with 500 in the southern, and the latter also contains the chief mines, factories, and towns. As, however, there are numerous points of resemblance between the two regions, they may be taken together.

The agricultural land of Japan consists in part of lowlying fields, generally built up of recent alluvium, in part of upland districts, which can be cultivated, and in part of high plains and pastures. The first of these are known as paddy fields, and constitute nearly 45 per cent. of the agricultural area. The chief crop grown upon them is rice, which is the staple food-stuff of the country, and, as it almost always requires the aid of irrigation, very little is produced in the upland districts. About 30 per cent. of the paddy fields bear a second crop, and these, along with the upland districts amounting to 36 per cent. of the agricultural area, are mainly cultivated with mugi (that is, barley, oats, and wheat), beans, potatoes, and millets. On the high plains and pastures which are uncultivated, a certain amount of stock is raised, but pastoral farming is not yet, and perhaps never will be, an important industry in Japan, although considerable attention is now being given to the improvement of the existing breeds of horses, cattle, and sheep.

Next in importance to the production of food comes the cultivation

of the mulberry and the rearing of the silkworm, pursuits which are chiefly carried on in the upland districts of central Honshiu. Further south, much of the land is more suitable for rice, while in the north the danger of frost renders a spring crop of mulberry leaves uncertain. The trees are planted either in fields or in hedges, and the area cropped in this way is gradually extending, being now about 1,000,000 acres. Three crops of leaves are obtained annually, the spring crop being the most important. The rearing of the silkworm demands considerable skill and labour on the part of the farmer, who has been aided within recent years by the assistance of Government experts. Formerly, the cocoons were reeled off at home by the farmers themselves, but; since the establishment of filatures on modern principles, the greater part of this branch of the industry has been transferred to them. Japan is now the principal silk-producing country in the world.

The tea-plant is grown chiefly in Central and Southern Japan, generally on the lower slopes of hills, though, where there is good drainage, it also thrives on level plains. For some years Japanese teas seemed to be deteriorating, but this retrograde movement appears to have been checked by improved methods, both in the cultivation of the plant and in the preparation of the leaf. There is a large home consumption, but a considerable amount remains for export. Among other plants grown are flax, hemp, rape, and rushes. The cultivation of cotton, indigo, and tobacco is declining.

The extensive use of fish for food in Japan, though partly resulting from the religious ideas of a people who do not eat meat, is also accounted for in part by the distribution in the surrounding seas of warm and cold currents, which contain a great variety of species, and in part by the many indentations of the coast, which provide suitable facilities for the fishing industry. Over 800,000 people make fishing their sole occupation, while an even greater number follow it in addition to agricultural or other pursuits. With the better internal communications the home demand has increased, while the recent improvement in fishing vessels has led to a much larger supply than before. Among the principal fish caught are herring, sardines, bonito, mackerel, and yellow-tail. Japan has also a number of vessels engaged in whaling and sealing in the North Pacific.

The mineral wealth of the region under consideration is considerable, but it has as yet been only partially exploited, and its full extent is unknown. Gold and silver occur chiefly in the sedimentary and eruptive rocks of the country, but the total production is not great, and the value of the annual output of the two combined does not reach £1,000,000. Copper is much more important and is obtained from nearly every geological formation; it is found chiefly in veins in the inner mountain zone, and embedded in sedimentary rocks in the outer zone. The production is now over 50,000 tons, and is between 5 and 6 per cent. of the world's output. Iron ore, including both magnetite and hæmatite, is fairly well distributed throughout the country. The former is extensively mined at the Kamaishi mines in the province of Iwati, in northern Honshiu, and the latter in Echigo and Rikuchiu. The total production is still small.

The most important mineral in Japan is coal. Its distribution is widespread, but it occurs chiefly in the Mesozoic and older Tertiary rocks, while it is not found in those of Carboniferous age. The coal in the Mesozoic strata is mostly semi-anthracitic in character; in the older Tertiary rocks it ranges from lignitic to bituminous; and in the younger Tertiary formations it is generally lignite of poor quality. The coal-bearing Mesozoic strata occur in patches in various districts, but it is among the older Tertiary rocks that the chief coal mines of the region have been located. The most important are those in the north and west of Kiushiu, which produced in 1910 over 11,000,000 tons, or more than 75 per cent. of the entire Japanese output. In Honshiu, the most productive mines lie along the Pacific seaboard to the north-east of Tokio, and in the same year they produced about 5 per cent. of the total output. Petroleum is found in various places, but practically the whole amount obtained at present comes from Echigo.

INDUSTRY.—In no respect is the recent development of Japan more marked than it is in regard to the industrial changes which have taken place. Old Japan, it is true, had its arts and handicrafts, many of which, such as the manufacture of porcelain and lacquer ware, had reached a high state of perfection. But the growth of industry on modern lines is typical of the great changes which were brought about by the renewal of intercourse between Japan and the West. If the old industries have not perished they have at least

suffered, while, if the new have passed beyond the purely experimental stage, it is yet too early to predict with confidence the economic future of the country.

Of the more important industries the manufacture of silk has perhaps been least affected. Reeling, as already stated, is now mainly performed by machinery, but in the weaving of silk fabrics the hand-loom more than holds its own. Power-looms have been introduced, but they number less than 10 per cent. of the whole, and must be regarded as in the nature of an experiment. The chief centres of production of habutae (Japanese manufactured silk) are at Fukui, Kanazawa, and Kawamata, in the prefectures of Fukui, Ishikawa, and Fukushima respectively.

Cotton-spinning and weaving have been influenced to a much greater extent by Western methods. The industry is favoured by the cheapness of labour, the proximity of coal, the comparative ease with which raw material can be obtained from India, China, and the United States, and the neighbourhood of the vast Chinese market for the manufactured commodity. There are now over 2,000,000 spindles in the country, and both yarn and piece goods are made for export. The bulk of the yarn produced consists of lower counts spun from Indian cotton, but there is a growing demand for American cotton. The chief manufacturing districts are in and around Osaka, Kobe, Okayama, Tokio, and Miye.

The production of iron and steel within the country itself is making much slower progress. At Wakamatsu, in the north of Kiushiu, the government has established large iron and steel works, but, although coal is at hand and iron ore can easily be imported from China, the venture does not yet appear to have been a commercial success. Engineering establishments have sprung up in many towns, and the Japanese are now able to do much of their own work of this kind, although they still import the more complicated and delicate machinery which they require. Shipbuilding is carried on at Nagasaki, Kobe, Osaka, and Tokio, and within recent years a number of iron and steel ships have been built at these ports. The large vessels for both the navy and the mercantile marine are still imported, but Japan is making rapid progress in this direction.

Among the native industries in which the Japanese excel are the manufacture of cloisonné ware, porcelain, matting, and other

articles of a similar nature made in the home or the small workshop.

FORMOSA, which has an area of about 14,000 square miles and a population of about 3,000,000, is being rapidly developed by the Japanese. The low-lying western part of the island is settled by people of Chinese stock, while the mountainous eastern part is occupied by aboriginal tribes, said to be of Malay origin. The products of the island are tropical and varied. The southern plains, which receive considerable moisture from the monsoon in summer but are dry in winter, are particularly suited to the growth of the sugar-cane. New varieties of this plant have been introduced by the Japanese, who also employ modern methods for the extraction of the sugar. The result is that the production has now greatly increased, though for the first few years after the Japanese occupation it fell off considerably. At the time of the cession the average export was about 29,000 tons per year, but, during the last three years for which statistics are available, it had risen to over 180,000 tons. It is the hope of Japan to convert Formosa into another Java. Tea is grown in the northern part of the island. One variety, known as "oolong," is in considerable demand in the United States, to which much of it is exported. The production of camphor is a government monopoly. Formerly, the camphor tree grew all over the island, but, as a result of reckless destruction, it is now found only in the mountainous districts, where great numbers of young trees are being planted by the Japanese in order to replace those which have been cut down for the distillation of camphor. Formosa is the chief source of the world's supply of that commodity. Rice is the staple food of the people, and large quantities are produced on the western plains, whence there is a considerable surplus for exportation to Japan proper. The mineral wealth of the island is still largely unknown, but coal and gold are both found and worked to some extent.

The chief ports are Tamsui and Kelung in the north, and Takau and Anping in the south-west.

COMMUNICATIONS.—Owing to the mountainous character of the country, the development of means of communication in Japan has been slow. In feudal times the building of good roads was naturally not encouraged, and, although within recent years many improvements have been made, the condition of the highways is still

unsatisfactory. One reason for the slow progress in this respect is that the attention of the government has been directed to the construction of railways, of which there are now over 6,000 miles, chiefly in Honshiu. Tokio is connected with Kyoto and Kobe, and with Shimonoseki in the extreme west, by lines which follow the coastal plains for the greater part of the way, and with Aomori in the north by two lines which run, one to the east and the other to the west of the Central Highlands. From Kyoto one railway goes north and west to Imaichi, and another north-east to Niigata. There are in addition several branches running across the country connecting these different systems. In the Hokkaido a number of lines have been built to develop its varied resources, and in Kiushiu the coal-producing districts are connected with the coast. In Formosa a railway runs from Takau to Kelung, along the western plains.

The difficulties of communication by land and the facilities for it by sea have naturally encouraged the growth of a considerable mercantile marine. During the period of Japanese seclusion, the building of ships capable of making long sea voyages was prohibited, and the coasting trade was confined to small ships and junks. Since the war with China, however, rapid progress has been made, and Japan had at the end of 1911 nearly 1,400,000 tons of steam shipping. Certain lines have regular sailings for China, India, Europe, and North and South America.

FOREIGN TRADE.—The foreign trade of Japan has made rapid progress within the last quarter of a century. In 1884 the combined value of exports and imports amounted to about £6,000,000, while for the five years 1906-10 the average value of the exports was £43,500,000, and of the imports £46,400,000. The chief imports consist of food-stuffs, especially rice, soya beans, and sugar, cotton and woollen goods, as well as raw cotton and wool for her own factories, iron and steel, and machinery of various kinds. Rice is obtained from Indo-China, Korea, Siam, and Burma; beans from Manchuria and Korea; and sugar from the Dutch East Indies. Textiles come chiefly from Great Britain, raw cotton from India, China, and the United States, and raw wool from Australia and the Argentine. Iron and steel goods and machinery are imported from Great Britain, Germany, Belgium, and the United States.

The exports include raw and manufactured silk, cotton yarn and clothing, copper and coal, straw-plait and matting, tea, sugar,

and rice. The United States and France are the chief purchasers of raw silk, and, along with Great Britain, of manufactured silk. China buys the bulk of the cotton yarn and cotton clothing exported. Copper goes to the United States, Great Britain, and France, coal to China, Hong-Kong, and the Straits Settlements. North America is the chief consumer of Japanese teas, China and Korea of refined sugar, and Great Britain and Germany of the better qualities of rice.

PORTS.—The chief ports of Japan Proper are Yokohama, Kobe, Osaka, Moji, and Nagasaki. Yokohama, the principal port of the country, is situated near the entrance to Tokio Bay, and serves the capital and the populous region surrounding it. As it is the great market for raw silk, it is also the port through which this commodity is sent abroad, and its export trade is accordingly large. As an importing centre it is surpassed by Kobe, the port through which is received much of the raw cotton and other material required for the manufacturing district of which Osaka is the centre. Through these two ports is conducted over 75 per cent. of the trade of Japan. Osaka is handicapped by the want of a good harbour for large ships, but carries on considerable trade with China and Korea. Moji is the chief port of Kiushiu, while Nagasaki owes its importance to the coal found in its neighbourhood.

CHAPTER XXVII

THE MALAY ARCHIPELAGO

THE islands of the Malay Archipelago are in the possession of European and American powers. The Greater Sunda Islands (Sumatra, Java, Bali, Borneo, and others), Celebes, the Moluccas, and the Lesser Sunda Islands (which stretch in a long chain from Lombok to Timor) belong to Holland, with the exception of the north of Borneo, which is under the protection of Britain, and the eastern part of Timor, which is owned by the Portuguese. The Philippines were ceded to the United States by Spain in 1898.

THE DUTCH EAST INDIES

JAVA, along with Madura, has an area of 50,554 square miles. The island is mountainous throughout ; but the soil, almost everywhere derived from volcanic mud, is very fertile. The mean temperature is about 80° F., and the mean annual rainfall of the greater part of the island is over 80, and in many places over 100 inches. The population consists mainly of people belonging to the Malay race, and is estimated to number 30,000,000, but in addition there are over 70,000 persons of Dutch extraction, many of whom, however, have been born in the East Indies. The control exercised by the Dutch government at home, and by its representatives in Java, has enabled that island to become the most prosperous, as it is the most densely populated, of all in the eastern sea.

Rice is the most important crop of the country, but, although it is extensively grown, the supply is no longer able to meet the home demand, and considerable quantities have to be imported. Other agricultural products are grown mainly on plantations and are intended for export. Of these, coffee formerly held the leading place, but within the last few years the output of the original varieties, *Coffea liberica* and *Coffea arabica*, has declined owing to leaf disease, and a new variety, *Coffea robusta*, originally imported from the Congo, has taken their place, though in quality it is somewhat inferior to them. Tea has long been grown in Java, but the recent substitution of plants from India and Ceylon for Chinese

varieties has led to a marked development of the industry, and the annual output now amounts to about 40,000,000 lbs. The gardens are mainly situated in the west of the island, where the rainfall throughout the year is more regular than it is elsewhere. The bulk of the product finds its way to the Netherlands and to the United Kingdom. Cinchona plantations, many of which belong to the government, have been established in the mountain districts, generally at a height of over 4,000 feet. Partly owing to the favourable conditions under which it is grown, and partly owing to the superior methods adopted for the improvement of the bark, the Javanese product is gradually ousting that of Peru and Bolivia from the world's markets. The cultivation of sugar is the most important plantation industry in the centre and east of Java; but attention has recently been given to the production of rubber, and a number of plantations of *Hevea brasiliensis* have just reached the productive stage. Other products include coconuts, grown chiefly on the coast, cacao, tobacco, and pepper.

The commerce of Java is carried on mainly from the ports on the north coast. Batavia is the seat of the government, and through its new harbour at Tanjong Priok passes most of the trade of the eastern part of the island. Semarang serves the central districts, and Surabaya is an important trading and manufacturing town in the west. All three are connected with one another by rail, while an extensive system of steam trams renders nearly the whole island accessible to trade.

SUMATRA.—The island of Sumatra is of much less importance, and, although it has an area of about 166,000 square miles, its population numbers only about 4,000,000. The west of the island is mountainous, while the east is a plain; but much of the land is still covered with a dense forest from which camphor, gutta-percha, and gums are obtained. Coffee has long been grown on the slopes of the western mountains, but the principal districts engaged in export agriculture lie along the east coast. Here, much capital has recently been invested in rubber plantations, some of which are now beginning to give a return. Other products include tobacco and pepper. Gold, coal, and petroleum are all obtained, but in small quantities. The chief ports are Padang and Benkulen on the west coast, and Palembang on the Moesi river in the eastern plains.

THE MOLUCCAS, CELEBES, BORNEO, ETC.—Of the other islands mentioned, the Moluccas are chiefly noted for their spices, such as cloves, nutmegs, cinnamon, and pepper. Celebes exports coffee, copra, and spices through Macassar, its port on the south-west coast. Bali is actively engaged in the production of coffee. In Dutch Borneo and in the Lesser Sunda Islands, various plantation products are grown, and coal is also found in Borneo. Banka and Billiton, detached parts of the Malay Peninsula, off which they lie, are famous for their tin, and produce about one-seventh of the world's supply of that mineral.

THE PHILIPPINE ISLANDS

The Philippine Islands, which are believed to number over 1,400, have an area of about 127,000 square miles. Luzon, the largest, covers 41,000 square miles, while Mindanao is not much smaller. Of the others, Cebu, Negros, Leyte, and Panay may be mentioned. Most of the islands are mountainous, and volcanic activity has everywhere been great. The mean annual temperature is about 80° F., and at Manila the range is from 77° F. in January to 84° F. in May. The mean precipitation varies from 40 to 100 inches, or more, according to position with regard to the rain-bearing winds. The population is chiefly of Malay stock and numbers about 8,000,000.

Over one-half of the land is still forested, and nearly two-fifths of it is covered with the cogon grass which has grown up where the trees have been destroyed by fire in order to effect clearings. Only about five per cent. of the total area is ever under cultivation at one time. The forests are believed to contain valuable building and cabinet woods in addition to rubber, cutch, and other products. Agriculture has hitherto been carried on by very primitive methods, but efforts are being made by the Government to develop it. Rice is the principal food crop, but it is not grown in sufficient quantities to meet the home demand, and large quantities have to be imported. Owing, probably, to some reason connected with the soil, the Philippines have a monopoly of the cultivation of the plant (*Musa textilis*) from which Manila hemp is obtained, and that article accounts for over one-third of the exports of the archipelago. At present it is grown in those districts on the Pacific slope of the islands where the rainfall is fairly evenly distributed throughout the year, but the

area under cultivation is being extended. Copra, obtained from the coconut palms, which grow everywhere, but flourish best near the coast, ranks second in importance to hemp. Within recent years considerable attention has been given to the production of sugar, more especially in the islands of Negros and Panay, and the amount exported is steadily increasing. Tobacco is grown mainly in the valley of the Cagayan river in northern Luzon, and cigars are manufactured at Manila. Over 40 per cent. of the trade is now with the United States. Manila is the chief port.

AFRICA

CHAPTER XXVIII

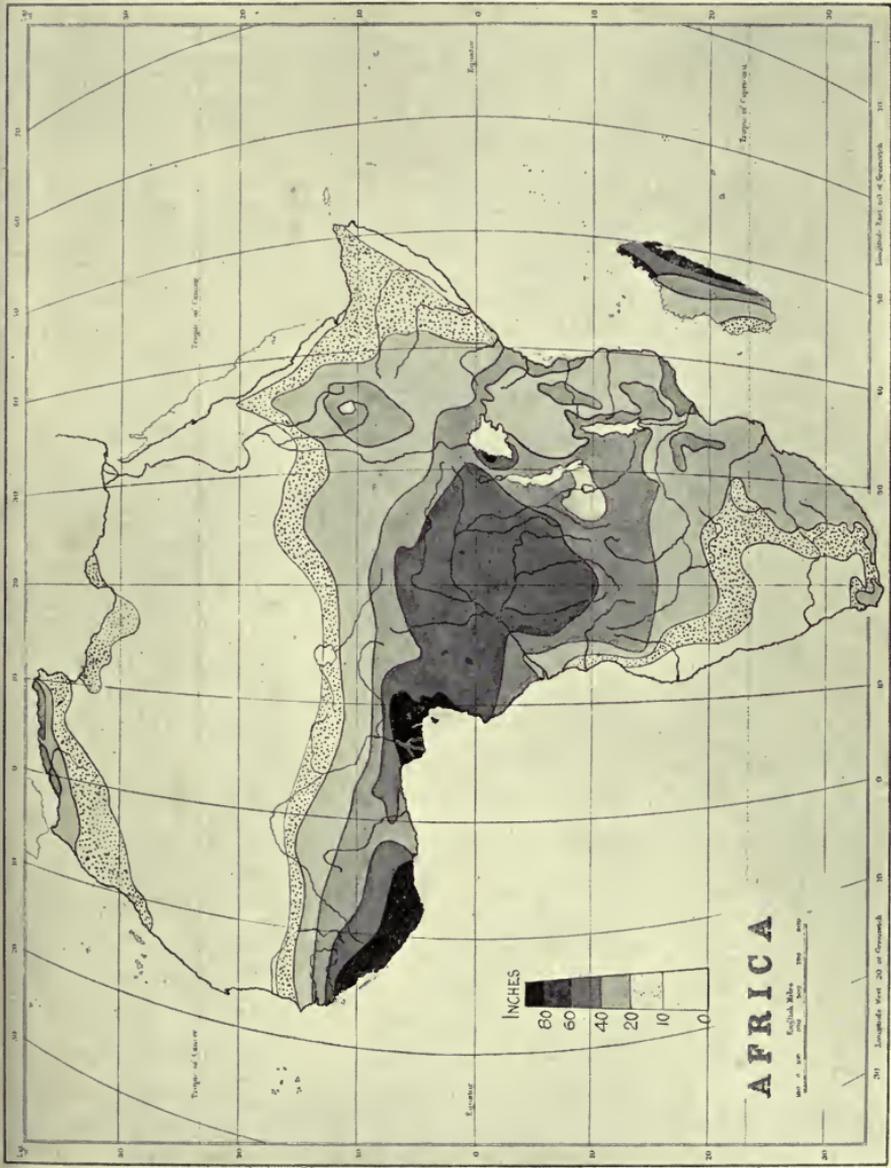
AFRICA

AFRICA, which has an estimated area of 11,500,000 square miles, is remarkable alike for the regularity of its coast line and the comparative simplicity of its topographical features. Its general appearance is that of a plateau, the walls of which rise in some places steeply from the sea, and in others are separated from it by plains of no great breadth. To the south of the equator this plateau has an average elevation of about 3,000 feet, but to the north it generally falls to about 1,000 feet, except in certain regions which may be regarded as extensions of the southern plateau. The first of these lies in the east, where it forms the highlands of Abyssinia and is continued northwards along the coast of the Red Sea; the second runs from south-east to north-west across the centre of Africa, north of the equator, and appears in the Darfur plateau, the Tibesti hills, and the Tasili plateau; the third bends round the Gulf of Guinea, and gives rise to the Upper Guinea plateau and the Futa Jallon mountains. Between the first and second of these extensions of the southern plateau lies the lowland basin of the Bahr-el-Ghazal, while between the second and third lies that of the Middle Congo. The mountains which appear on the plateau itself owe their existence, as a rule, either to volcanic action or to the denudation of surrounding land; and, as they generally occur near the rim, they give to the continent something of the appearance of an inverted saucer. Another feature of importance in the plateau region is the continuation of that great rift valley in which the Jordan, the Dead Sea, and the Red Sea all lie. From the southern extremity of the Red Sea it makes its way southwards, and is occupied by a long line of lakes, of which Rudolf and Nyasa are the most important; while a western branch, which runs from the northern end of Nyasa; contains Lake Tanganyika, Albert Nyanza, and Edward Nyanza. In the north-west of Africa is the Atlas region, which differs in many respects from the remainder of the continent, and belongs physically to the mountain system of Europe.

CLIMATE.—The position of Africa within the parallels of 37° N.

and 35° S., and the relative simplicity of its structural features, render a general description of its climatic conditions comparatively simple. A large area, extending roughly from about lat. 20° N. to about lat. 10° S., excluding the Abyssinian and East African Highlands, but including the east coast as far south as the Zambesi, is hot at all seasons of the year. Of the remainder of the continent, the greater part has hot summers and warm winters; but there are notable exceptions in the Atlas region in the north, and in the High Veld in the south, in both of which the winters are cool. Along the south-west coast there is a comparatively narrow strip of land, which, owing to the proximity of cold currents, does not get hot in summer, but remains warm at all seasons of the year. The rainfall varies greatly from one region to another. During the northern summer, when the Sahara becomes an area of low pressure, the equatorial belt of constant precipitation moves northwards, and; in July, extends from just south of the equator to a line which runs from the mouth of the Senegal inland to the north of Timbuktu, and, after curving round the Tibesti hills, goes by way of Khartum almost to the Red Sea. In the northern part of the area covered by this belt, the rainfall is a summer one; but in the south there are two periods of maximum precipitation, one when the sun is going north and the other when it is returning to the south. Monsoonal influences make themselves felt in two regions during the northern summer: in Abyssinia, where great heating on the uplands draws in part of the monsoon current from the Indian Ocean; and on the west coast, south of the Senegal, where the trade winds of the South Atlantic are pulled across the equator and blow as south-west winds. In other parts of Africa comparatively little rain falls at this period of the year. The Mediterranean States lie under the influence of the tropic belt of high pressure, while the winds drawn into the Sahara from that high pressure belt have but little moisture to deposit. To the south of the equator the land mass is, on the whole, a region of high pressure and outflowing winds; and it is only in the extreme south of Cape Colony, where westerly winds prevail during the southern winter, that much precipitation occurs.

By the month of October, the conditions resulting from the movement of the sun back to the equator have asserted themselves. The belt of equatorial rainfall is practically confined within the



After the Oxford Wall Maps,

RAINFALL OF AFRICA

by permission

parallels of ten degrees north and south of the equator, and does not extend eastward beyond the fortieth meridian ; the Mediterranean States and Cape Colony both lie within the west-wind belts ; while along the east coast, from the Zambesi southwards, the trade winds are beginning to make their influence felt.

In January, when the land mass south of the equator is at its hottest, the belt of constant rainfall does not extend for more than a few degrees north of the equator, but, to the south of it, it covers a great part of the Congo basin. At the same time, the south-east trade winds are sucked into the land by the low pressure area which lies over it ; and, as these winds are moisture-bearing (unlike those which blow over the Sahara), there is rainfall over the greater part of Africa, south of the equator, at this season of the year, the principal exceptions being the south-west coast and part of Cape Colony. On the other hand, there is a comparatively heavy precipitation in the Mediterranean States, and even the coast lands of Tripoli and Egypt receive some rain.

The annual precipitation of Africa is, therefore, distributed somewhat as follows : on both sides of the equator, and especially in the basin of the Congo, on the Guinea coast, and in the highlands of Abyssinia, there is a heavy rainfall. To the north, precipitation rapidly diminishes, and beyond the latitude of Khartum very little moisture is received until the Mediterranean States are reached. To the south of the equator, conditions are somewhat different owing to the influence of the south-east winds, and beyond the twentieth parallel the rainfall decreases from east to west.

VEGETATION.—The north-west part of Africa, with its winter rainfall and hot dry summers, is characterised by a hard-leaved evergreen vegetation, which soon passes, with decreasing precipitation, into poor steppe and scrub-land. These, in turn, give place to the deserts of the Sahara where vegetation is almost entirely wanting, except in the oases scattered here and there over its vast extent, and in the lands which owe their fertility to the waters of the Nile. Further south, where there is a light summer rainfall, a transitional belt of semi-desert, in which acacia forests and occasional grasslands are found, leads to the rich savanna lands of the well-watered Sudan. In Abyssinia, where there is also a summer rainfall, the vegetation is somewhat different, and woodlands, grasslands, and deserts all occur. In the belt of heavy equatorial

rainfall along the coasts of the Gulf of Guinea and in the greater part of the Congo basin, dense forests cover the land, and a somewhat similar forest is found in a gradually narrowing strip along the east coast of the continent from Zanzibar southwards. The savanna lands of the Sudan are continued to the east and south of the equatorial forests, and extend over the greater part of the African plateau as far south as the twentieth parallel, but beyond that they are confined to the eastern part of the sub-continent. On the west and south they pass into steppe-land which in turn gives place to scrub (a strip of which makes its way along the west coast from the mouth of the Cunene almost to that of the Congo), and in the rainless west to desert. The region of winter rains in the south-west of the continent has a vegetation similar to that of the Mediterranean States.

THE PEOPLES OF AFRICA.—Several great divisions of the human family are represented among the peoples of Africa. To the north of the Sudan, various branches of what has been called the Mediterranean race form the basis of the population. The Berbers in the Mediterranean States, the Egyptians in the valley of the Nile, and the inhabitants of north-east Africa, as far south as Somaliland, are all connected with one another, and pass under the general name of Hamites, though they have been diversely affected by various invaders from the neighbouring continent of Asia. Of these, the Arabs, who are of Semitic origin, form a large part of the population of the Mediterranean States, and are also found in many parts of the Sahara, though the Tuaregs, living within the French sphere of influence, are Berbers who have taken up a nomadic life. To the south of the Sahara, Africa is populated by various peoples of negro origin. The Sudan is the home of the true negro, but in places there is considerable intermixture, and the Fulani, who are of Hamitic origin, but with a strong infusion of negro blood, dominate the negro population in many places. The Congo Forest is the home of the negrilloes, but is also occupied by other branches of the black race. The remainder of the negro population of Africa consists of Bantus, who differ greatly among themselves, as they have mingled with negrilloes and Hamites in the north, and with Hottentots and Bushmen in the south. They are found in West Africa from the Kameruns to Angola, in the highland regions of East Africa, and in South Africa where they are

represented by the Kaffirs, Zulus, Bechuanas, and others. The Hottentots of south-west Africa are probably derived from an intermixture of a Hamitic stock and Bushmen, the latter of whom are woolly-haired, yellow-skinned people, now practically confined to the Kalahari region.

CHAPTER XXIX

THE MEDITERRANEAN STATES

THE MEDITERRANEAN STATES—Morocco, Algeria, and Tunis—form a region which differs in many respects from the remainder of Africa. Physically, they belong to the Atlas system of folded mountains which traverses the whole region and gives a certain amount of unity to it. The High Atlas, which runs through Morocco from the south-west, is continued to the north-east by the Middle Atlas, and along the Mediterranean coast by the Algerian Tell. In the south-west, the Anti-Atlas breaks off from the main range, while, further to the north-east, a branch of the High Atlas runs eastwards as the Saharan Atlas. Between the Middle Atlas and the Algerian Tell on the north-west and north, and the Saharan Atlas on the south, lies the Algerian plateau or plateau of the Shotts; while to the south of the High Atlas and the Saharan Atlas is the Saharan plateau. Over a great part of this region the climate is of the Mediterranean type, the winters being mild and moist and the summers hot and dry; but local variations from these general conditions are frequent, owing to the irregular topography of the country. Vegetation is also characteristic of the Mediterranean region, the plants growing in winter and finding their resting period during the summer. South of the Atlas ranges both climate and vegetation rapidly approximate to the Saharan type.

MOROCCO

Morocco has an area of about 219,000 square miles, and a population which has been variously estimated, but which probably numbers about 5,000,000. The High Atlas and the Middle Atlas run through the country from south-west to north-east; while in the north another folded range, the Riff, follows the Mediterranean coast from the Straits of Gibraltar to Melilla. Bordering the High Atlas on the north-west is a tableland, known as the Moroccan Meseta, which has a height varying from 1,600 to 3,200 feet. Between the Meseta and the Atlantic lies a coastal plain, which broadens out in the north into the plain of the Sebu, between the Riff and the Middle Atlas. In the east is a small part of the plateau of the Shotts, and to the south lies the Sahara.

CLIMATE varies greatly with position and altitude. On the coastal plain the range of temperature between summer and winter is not great. Mogador, for example, has a January mean of 61° F. and a July mean of 71° F. On the Meseta the range is greater, and Marrakesh (Morocco City) has a January mean of 51° F. and a July mean of 80° F. In the mountains, snow lies in many places for a great part of the year. Precipitation also varies; on the coastal plains and in the plain of the Sebu from 16 to 20 inches of rain fall; on the Atlas Mountains and in the Riff region the amount is over 20 inches; and on the Meseta it is less than 16 inches and in places less than 12. On the plateau of the Shotts, and in the Sahara, it is generally low.

THE COASTAL PLAINS are covered over in many places with a fertile black soil somewhat similar to that of Russia. The region is, therefore, well adapted to agriculture, and contains the greater part of the cultivated land in the country. Barley, wheat, and maize, and various kinds of seeds are all extensively grown; while in the vicinity of the towns irrigation is practised, and much fruit is raised. In the plain of the Sebu stock-raising is an important pursuit, and large herds of cattle are reared. A number of the chief towns in Morocco are situated on the coastal plains, which probably contain nearly one-half of the total population of the country. Fez stands on the Sebu, while on the coast are the ports of Laraiche, Casablanca, Rabat, Safi, and Mogador. Agadir is the chief town of the detached plain of Sus, which lies in the angle between the Atlas and the Anti-Atlas. There are few manufactures.

THE MESETA has a rainfall too low for successful cultivation, and is devoted chiefly to pastoral pursuits, large numbers of cattle, goats, and sheep being raised upon it. Along the foot of the adjoining mountains is a belt of country which can be irrigated by mountain streams; and on the edge of this belt stands Marrakesh, the capital and chief market of Southern Morocco. It is the centre of a rich fruit-growing district, which, it is believed, could be greatly extended by the development of irrigation.

OTHER REGIONS.—Of the other regions of Morocco it is unnecessary to say much. Many parts of the Atlas ranges are forested; the olive, the cork-oak, and the cedar are among the most important trees on the lower slopes; while, on the upper, mixed

deciduous and coniferous forests grow where climatic conditions are favourable. There is little agriculture except in the valleys, and the population is scanty. The Riff is one of the least known parts of Morocco, but it is believed that conditions generally are somewhat similar to those which prevail on the Atlas. The Sahara is habitable only in the oases, such as Tafilet, where the water from mountain streams can be used for purposes of irrigation before it is lost in the desert.

COMMUNICATIONS AND TRADE.—Morocco is everywhere capable of great development. The methods of agriculture at present employed are of the most primitive description, and in many districts no attention is paid to the possibilities of irrigation, while practically nothing has been done to exploit the mineral wealth of the country. There are no railways and few roads, and goods have to be carried from one place to another by mules or camels. The chief exports are barley, eggs, almonds, skins, oxen, and wool; while the imports include cotton goods, sugar, tea, machinery, and flour. The bulk of the exports go to the United Kingdom, France, and Spain; while the imports come from France and the United Kingdom.

ALGERIA

The French colony of Algeria extends along the Mediterranean coast for a distance of about 650 miles. Its area is estimated at about 343,000 square miles, and its population at 5,000,000.

Three distinct physical regions may be recognised. The Tell includes the whole country from the crest of the mountains down to the coast; the high plateau of the Shotts lies between the Algerian Tell and the Saharan Atlas; the south belongs to the Sahara. Climatic conditions vary greatly from one region to another. Algiers, on the coast, has a mean temperature for January of 54° F. and for August of 78° F.; for Tebessa, on the plateau, the figures are 44° F. for January and 79·5° F. for July (the warmest month); while for Biskra, in the Sahara, they are approximately 52° F. for January and 90° F. for July. Rainfall decreases from east to west and from north to south. On the slopes of the Tell it varies from about 20 inches in the west to 40 in the east, the high plateaus have from 15 to 30 inches, and the Sahara less than 10 inches.

THE TELL may be subdivided into three parallel belts. The

first consists of the coastal districts and the lower slopes of the hills by which they are bordered, the second of plains like the Mitidja and the valleys of such rivers as the Chélif, and the third of the slopes of the higher hills. Throughout the whole region irrigation is necessary to ensure the growth of summer crops; on the coastal belt it is carried on by somewhat primitive methods, but in the inland plains and valleys (where the larger rivers can be utilised) it is practised on a more extensive scale. In the first of these regions, the alluvial soils at the mouths of rivers have been converted into vegetable gardens; while vines and fruit trees, such as the orange, the lemon, and the almond, grow on the neighbouring slopes. The larger valleys and plains of the interior are chiefly devoted to the growth of cereals, and great quantities of wheat and barley are annually produced. Where irrigation is available, forage plants are also grown during the summer months. In the mountainous belt, the district known as the Kabylia, to the east of Algiers, is the best developed, and various fruits are grown in the lower valleys, while cereals and vegetables are cultivated in the upper. At still greater altitudes there is good pasturage for sheep and goats. The whole of the Tell region contains considerable areas of forest land. From sea-level to an altitude of about 2,500 feet, the principal trees are the olive, the cork-oak, and the Aleppo pine; but higher up, there are various varieties of oak and cedar. On saline soils, in the larger valleys near the coast, the eucalyptus tree has been extensively planted within recent years. The chief products of the forests are cork, tan bark, and fuel.

The mineral wealth of the country has so far been located mainly in the Tell region. Large quantities of iron ore are obtained from open mines at Beni-Saf in Oran, and Zaccar in Algiers. Zinc and lead are also worked in various places.

THE HIGH PLATEAUS.—Here, irrigation is only practicable to a slight extent, and the greater part of the region is a steppe land, on which large numbers of sheep and goats are pastured during the summer months by Arabs, who drive them up from the Sahara where they have wintered. Alfa grass is the prevailing type of vegetation, and one variety (*Stipa tenacissima*), which covers considerable areas, is collected and exported for the manufacture of paper.

THE SAHARA.—In the Sahara, settlement is only possible in the oases which have, since the advent of the French, been greatly increased both in extent and in number by the sinking of artesian wells. The date palm is the chief tree of the oasis, and provides not only the staple food of its population, but an important article of export, while in its shade, fruits, vegetables, and cereals can be grown to supply local needs.

COMMUNICATIONS, TRADE, ETC.—Since they conquered Algeria, the French have made great efforts to develop its resources ; and they have so far succeeded, that, in almost all respects, the colony is greatly in advance of the neighbouring country of Morocco. Over 2,000 miles of railway have been constructed, the main line running from Oran by way of Algiers and Constantine to Tunis, with branches to Bougie, Philippeville, and Bona, the ports of Algeria on the Mediterranean, and to the oases of Colomb-Bechar and Biskra in the Sahara. The external trade of the country is conducted very largely with France. The principal exports are wine (which is by far the most important), wheat, sheep, minerals, and barley ; while the imports consist mainly of manufactured goods, such as textiles and clothing, matches, machinery, and furniture. The chief exports to the United Kingdom are alfa grass and iron ore, and the chief imports coal and machinery, but the total trade is small.

TUNIS

Tunis, which is a French protectorate, and has an area of about 50,000 square miles, forms the most easterly section of the Atlas region, but in some respects its physical features differ from those of Algeria. The Tell region may be considered as including not only the northern slopes of the mountains down to the sea, but the valley of the Majerda to the south as well ; the high plateaus are more contracted and irregular than they are further to the west ; and in the Saharan region there are a number of dried-up salt lakes, some of which are below sea-level. On the whole, climatic conditions are similar to those which prevail in Algeria, though in the Sahel (the east coast region) the rainfall is lower. In the main, the country is agricultural. On the Tell, and especially in the valley of the Majerda, wheat and vines are extensively cultivated, and the cork-oak and the olive flourish ; barley is grown in the drier

lands of the Sahel ; on the steppe-lands of the plateau sheep and goats are grazed, and alfa is collected ; in the Saharan region the Djerid group of oases produce some of the finest dates grown. Minerals, the principal of which are zinc and iron ores and phosphates, are obtained, the two former in the hills of the north-west, and the latter on the borders of the Sahara. The manufacture of carpets is carried on in some of the towns, the most important of which are Tunis, Sfax, Bizerta, and Gabes. The principal exports are phosphates, olive oil, hides, cattle, and mineral ores (iron, zinc, and lead) ; while the imports consist mainly of iron and steel goods, cotton fabrics, and food-stuffs. The bulk of the trade is transacted with France, but Italy, the United Kingdom, and Algeria also share in it.

TRIPOLI

Tripoli, which occupies that part of the Mediterranean coast between Tunis and Egypt, falls into several distinct physical regions. Along the coast from the Tunisian frontier to the Gulf of Sidra there lies a low plain of varying width, known as the Jefâra. This is bounded on the south by several mountain ranges, beyond which extends the rocky plateau of Hamada-el-Homra, which separates Tripoli proper from the oases of Fezzan. To the east of the Gulf of Sidra is the elevated tableland of Cyrenaïca. The climate of the northern part of Tripoli is transitional between the Mediterranean and the Saharan types. Sufficient rain to permit of cultivation falls on a narrow coast strip of the Jefâra, on the mountain slopes, and in parts of Cyrenaïca ; and in these districts Mediterranean products are grown. But, over the greater part of the Jefâra, scanty pasturage for camels alone is available, and much of Cyrenaïca is devoted to cattle-raising. Alfa is collected in the mountain districts, and date palms are grown in the oases of Fezzan. Tripoli was at one time extensively engaged in the trans-Saharan trade, but with the opening up of West Africa by European nations this has greatly declined in importance. Tripoli was ceded to Italy in 1912.

CHAPTER XXX

THE BASIN OF THE NILE

THROUGHOUT a great part of its course, the Nile plays an important part in the economic development of the countries through which it passes, and hence it is necessary to know something of the régime of that river and its tributaries. It rises on the Lake Plateau of Equatorial Africa, where the Kagera and various other streams flow into Victoria Nyanza. The Victoria Nile from Victoria Nyanza, and the Semliki from Lake Edward, both descend rapidly from the plateau to Lake Albert in the western branch of the rift valley, and the river which leaves Lake Albert—the Bahr-el-Jebel—also has a swift descent into the plains of the Sudan. From the Nile-Congo watershed, on the south-west of these plains, comes a number of streams, the majority of which eventually unite to form the Bahr-el-Ghazal, which flows into the Bahr-el-Jebel, the combined river taking the name of the White Nile. A short distance below the confluence of these rivers, the Sobat flows into the White Nile, which is also joined at Khartum by the Blue Nile, and near Berber by the Atbara, all three rivers flowing from the Abyssinian plateau.

From the point at which it enters the Sudan plains to its confluence with the Blue Nile at Khartum, a distance of over 1,000 miles, the fall of the Nile is very gentle, and only averages about two inches to the mile. Below Khartum, however, the river passes through a series of cataracts before it enters the Nile Valley at Assuan, where its course again becomes gentle. In this valley, which owes its origin to a fracture in the earth's crust, the Nile has, by the deposition of silt, built up a plain which has a length of about 600 miles and a breadth varying from 5 to 10 miles. The delta at the mouth of the river has likewise been built up of silt.

On the equatorial plateau there is a double rainy season, and the discharge from Victoria Nyanza is fairly constant throughout the year. Further north, on the slope of the plateau and in the basin of the Bahr-el-Ghazal, there is a heavy summer rainfall, which leads to much flooding in the southern plains of the Sudan, but does not affect the height of the river below Lake No. The

basin of the Sobat has also a summer rainfall, but its effect is not felt in the valley of the White Nile until December. The Blue Nile and the Atbara are, therefore, the factors of most importance in determining the rise and fall of the waters of the Nile as far, at least, as the lower part of its course is concerned. On the Abyssinian plateau, whence these two rivers flow, there is a heavy monsoonal rainfall between the middle of May and the middle of September. Both rivers come down in flood, the Blue Nile reaching its maximum about the beginning of September, and the Atbara about the third week in August, with the result that the maximum height of the Nile at Wady Halfa is also reached about the beginning of September. But to this, it ought to be noted, the White Nile contributes but little, as, when the Blue Nile is in high flood, the waters of the White Nile are ponded back and do not begin to run off until the later months of the year, when the former river has fallen very considerably. Below its confluence with the Atbara, the Nile receives no regular stream, but only the results of occasional showers on the hills between it and the Red Sea. Consequently, in its progress through Egypt it loses in volume as a result of evaporation, seepage, and the withdrawal of water for irrigation purposes. At Wady Halfa, where the Nile enters Egypt, the régime of the river is somewhat as follows: it is at its lowest about the middle of June, when it begins to rise rapidly and continues to do so until the beginning of September, throughout which it remains very high. During October and November it quickly loses volume as a result of the fall of the Blue Nile and Atbara; and, after the waters of the White Nile have been drained off in November and December, the river falls steadily until the following June. At Cairo the maximum occurs about a month later than at Wady Halfa. During the flood period the Blue Nile and the Atbara bring down large quantities of volcanic matter from the Abyssinian plateau, and it is this silt that has built up the plain and delta of the Nile which constitute modern Egypt, the rate of deposition being 10 of a metre per century. Concerning the fertilising qualities of the silt there are some differences of opinion.

EGYPT

Egypt may be divided into three regions—the valley of the Nile, its delta, and the surrounding deserts. The delta has a

Mediterranean rainfall, but it is only slight, and diminishes rapidly inland; and, while Alexandria has a mean annual precipitation of 8·53 inches, Cairo has one of 1·35 inches only. Without irrigation, therefore, cultivation in the Nile valley would be impossible. The mean temperature at Alexandria for January is 58° F. and for August 80° F.; at Cairo the figures are 54° F. for January and 83·5° F. for July; and at Assuan, 62° F. for January and 92° F. for July.

THE VALLEY AND DELTA OF THE NILE.—The system of irrigation which for long prevailed in Egypt was that known as basin irrigation. The banks of the Nile were strengthened by artificial embankments called berms, and by means of transverse walls the whole valley was divided into a number of basins. In this way the flood was regulated, but the only crops which could be grown were flood crops, sown immediately after the waters had withdrawn from the land, and winter crops, sown after the flood crops had been harvested. For the growth of summer crops, such as cotton or sugar-cane, perennial irrigation was necessary, and that was only possible in the immediate vicinity of the Nile, where, by primitive apparatus, a certain amount of water could be withdrawn from the river at low water and distributed over the land. Perennial irrigation on a large scale was first begun in 1820, when a barrage was constructed below Cairo, and a number of deep canals were made in the delta; but it was confined to that region, where, indeed, it was only partially successful, until the British occupation of the country. The barrage was then put in a state of repair, and, in order that there might be a sufficient supply of water during the summer months when the river was low, a large dam was constructed at Assuan, where the bed of the river contracts just below a wide expansion. When the Nile began to fall after its annual flood, the gates of this barrage were closed and the water ponded up to a depth of 75 feet, so that a lake about 60 miles long was formed. This water was allowed to escape during the spring and early summer, when it could be utilised for the cultivation of summer crops. At Assiut a regulating barrage was built for the better distribution of the water ponded up at Assuan, and the Nile valley below this second barrage was then brought under perennial irrigation. South of Assiut, however, flood irrigation alone was possible, and, in order to increase the perennially irrigated area, the Assuan

dam has been raised and another regulating dam built at Esneh.

The climatic conditions of Egypt are such that, with the aid of irrigation, the land can be cultivated at all seasons of the year. The summer crops, which require to be watered regularly during the whole period of their growth, are cotton and sugar-cane; rice and maize are Nile crops, and are sown at the time of high Nile; the winter crops, sown later in the year, include wheat, barley, clover, and beans. Of these various crops, cotton now covers the largest area; but, although with the development of irrigation that area is steadily increasing, the yield per feddan shows, on the whole, a no less steady decrease, as the following figures indicate:—

Years.	Average cotton growing area (in feddans).	Average total crop (in qantars).	Average yield per feddan.
1896-7 to 1900-1	1,136,800	5,991,400	5·27
1901-2 to 1905-6	1,377,200	6,198,200	4·51
1906-7 to 1910-11	1,590,200	6,692,000	4·20

1 feddan = 1·038 acres. 1 qantar = 99·049 lbs.

At the same time, it is generally agreed that the quality of the cotton produced is much inferior to what it once was, and this decline, both in the yield and the quality of the staple crop of the country, is one of the most serious of the difficulties which confront the rulers of Egypt at the present time. To explain it, a number of causes have been suggested, and it is probable that all contribute to a greater or less extent. The fellah, long accustomed to regard water as the one thing necessary for successful cultivation, has not yet learned that he may have too much of it, and regularly over-waters his land when he has a chance; it is also possible that seepage from the irrigation canals is raising the level of the water table and that the drainage system will require to be radically altered. Again, with the change from basin to perennial irrigation, the fertilising mud of the Nile is no longer distributed over the land to the same extent as before, and it may be that Lower Egypt, at least, is beginning to suffer from the want of it. The high price of cotton within recent years, moreover, has led to the substitution of a two years' for a three years' rotation of crops over large areas, and it has also led to the cultivation of cotton on inferior lands. The ignorance of the native cultivator

has caused, it is suspected, a considerable deterioration in the quality of the seed which is used, while the growth of insect pests as a result of the destruction of bird life is said to have been considerable.

Cane sugar is chiefly cultivated in Upper Egypt along the course of the Ibrahimieh canal, which leaves the Nile at Assiut and waters a considerable tract of country on the west bank of that river. Maize covers an area nearly as great as that under cotton, the larger part of the crop being grown in Lower Egypt, which also produces the bulk of the rice raised in the country. Wheat tends to be about equally divided between Upper and Lower Egypt, but barley is more extensively cultivated in the former district than in the latter.

The great majority of the 11,000,000 inhabitants are engaged in agriculture, and only in a few places are there any manufactures of importance. Alexandria and Damietta extract oil from cotton seed, and in several towns of the delta cotton is ginned.

THE DESERTS.—In the desert regions there is little economic activity except in the oases where the typical products of such places are grown. More important is the discovery of petroleum along the coast of the Red Sea. In the promontory of Jemsa, which is situated near the southern extremity of the Gulf of Suez, a productive oil field has been located, and arrangements have been made for its exploitation. Phosphates are worked at Safaga, further to the south.

COMMUNICATIONS AND TRADE.—The Nile is now navigable throughout Egypt since a canal has been constructed to avoid the rapids and barrage at Assuan. The principal railway runs from Alexandria southwards as far as Assuan, but there is a break of gauge at Luxor. From Cairo, lines run to Damietta, and, by way of Benha, Zagazig, and Ismailia, to Port Said and Suez. The Suez Canal gives great strategic importance to Egypt though it hardly affects its trade.

Cotton is the chief export of the country, and during the years 1906-10 it accounted for over 80 per cent. of the total value of the exports. Cotton seed, cereals, and vegetables together made up the greater part of the remainder. Cotton and woollen goods, building wood, iron and steel, machinery, and coal are the principal imports.

THE ANGLO-EGYPTIAN SUDAN

The Sudan, which is under the joint control of Great Britain and Egypt, has an area of about 1,000,000 square miles. Its population, which is now about 3,000,000, at one time numbered 9,000,000, but was reduced during the Dervish tyranny to less than 2,000,000.

The climate varies greatly from one region to another. Except along the Red Sea littoral south of Suakin, rain seldom falls north of the 17th parallel, but south of it there is a gradual increase both towards the equator and towards the Abyssinian mountains. Over a great part of the basin of the Bahr-el-Ghazal, and of the country between the Bahr-el-Jebel and the Sobat, there is a mean annual rainfall of from 30 to 40 inches; while in the extreme south, where there is a double rainy season, the amount received is still greater. The mean temperature is generally high. Such observations as have yet been made seem to indicate that at Berber it varies from 67° F. in January to 94° F. in June; at Khartum from 69° F. in January to 92° F. in May and June; and at Mongalla from 77° F. in July to 82° F. in March.

The natural regions of the country may most conveniently be studied by observing the relation of vegetation to rainfall. To the north of the 17th parallel, desert conditions prevail except along the banks of the Nile, where there is a riverine population engaged in agriculture; in a few oases scattered here and there; and in the districts south of Suakin, where cultivation is possible in some of the wadis and on irrigated land, such as that at Tokar on which cotton is grown.

South of the rainless area there lies a belt of country which, as regards its vegetation, is transitional between the desert to the north and the true savanna to the south. The northern parts consist, in the main, of poor scrub-land, but further south there are forests of acacia and large areas of grassland, on which in years of good rainfall a considerable amount of agriculture is possible. Dhurra (a kind of millet), beans, lentils, melons, and onions, as well as some wheat and barley, are all grown; and in many places, as in the south of Darfur and in the Gezira (the country between the White and the Blue Nile), there is good grazing for cattle and sheep. In the forests of "hashab" (*Acacia vereke*), in the south of

Kordofan, gum, one of the most important exports of the Sudan, is found in large quantities, and some ivory and ostrich feathers are also obtained from that province. Along the banks of the White Nile and the Blue Nile, agriculture is more profitable and the population is denser, but the further development of the land in the neighbourhood of these two rivers depends upon the extent to which they may ultimately be used for purposes of irrigation. At the present time, the quantity of water which may be withdrawn from them is, in the interest of Egypt, strictly limited, but it is believed that, owing to the much higher winter temperature which prevails in the Sudan, certain crops can be grown there during that part of the year in which Egypt does not demand water. Investigations in this direction are at present being made in the Gezira, which forms a vast alluvial plain, somewhat more fertile in the east where it has been built up by the deposits of the Blue Nile. It is generally covered with grass and scrub, and is occupied by semi-nomadic peoples, who cultivate considerable areas during the rains, but move with their herds towards the rivers during the dry season. At Tayibai, on the Blue Nile, experiments made in the cultivation of cotton have given very satisfactory results, and it is proposed to construct an irrigation canal which, leaving the Blue Nile at Sennar, will run in the direction of Khartum, and enable a considerable area to be cultivated with cotton and wheat. Other schemes under consideration for the development of irrigation in the Gezira and Kordofan involve the re-modelling and embanking of the Bahr-el-Jebel, and the construction of a reservoir at Khartum to bring wide tracts of country in Kordofan under flood irrigation. But progress in these directions must, necessarily, be slow.

In the southern Sudan, where there is a rainfall of over 30 inches, the vegetation assumes a richer and more varied form. The forests contain rubber-producing plants, such as *Landolphia owariensis*, and valuable timbers, such as African mahogany; while on the extensive grasslands a good deal of cultivation is carried on by native tribes. Ivory, rubber, and some iron worked by the inhabitants of the Bahr-el-Ghazal province, constitute the chief exports of the region.

COMMUNICATIONS AND TRADE.—The principal railway is that which crosses the Nubian Desert from Wady Halfa to Abu Hamed

and then follows the Nile to Khartum. From it there breaks off near Berber, a branch for Suakin and Port Sudan on the Red Sea. Another line runs from Khartum up the Blue Nile to Sennar, crosses over to Goz Abu Guma on the White Nile, and goes on to El Obeid in Kordofan. The Nile below Khartum is navigable except at the cataracts; above Khartum, it is navigable as far as Gondokoro in Uganda. The principal exports of the Sudan are ivory, cattle and sheep, rubber, and cotton; while the imports include cotton goods and machinery.

UGANDA

The Protectorate of Uganda, which has an area of 118,000 square miles, rises from the plains of the Bahr-el-Jebel in the Sudan on to the plateau of East Africa, where it occupies most of the northern part of the region lying between the eastern and western rift valleys. Except in the north, where it slopes down towards the Sudan, and in the east, where it rises to the higher plateaus bordering the Eritrean rift, the average elevation of the land is about 4,000 feet, and much of it consists of rolling country in which numberless rounded hills are separated from one another by broad and swampy rivers.

Notwithstanding its position on the equator, the high altitude of Uganda gives it a more moderate climate than might have been expected. Entebbe, which is situated on Victoria Nyanza at a height of 3,906 feet above sea-level, has a mean annual temperature of 72° F., with a range of less than 2° between June (the coldest) and January (the hottest month). The rainfall, which occurs at all seasons of the year, but is heaviest in the spring and autumn months, is between 40 and 60 inches, except in the north-east, where it is less than 30, and in the south-west, where it is over 60 inches. The natural vegetation of the country consists of scattered forests, grasslands, and thorn bush; while the food crops of the native population include bananas, sweet potatoes, maize, and millet. Cattle, sheep, and goats are also reared.

Considerable attention has recently been given to the cultivation of cotton, the exports of which, though relatively small, are increasing rapidly; and attempts are also being made to grow rubber, sisal, coffee, cacao, and rice. Among other exports are

wild rubber and ivory. Most of the trade passes over the Uganda railway and through Mombasa. The only line within the country itself is that which is being constructed from Jinja on Victoria Nyanza to Kakindu, where it will tap the cotton-growing district round Lake Kioga.

The native population, which numbers about 3,500,000, has recently suffered severely from sleeping sickness. Concerning the suitability of the high plateaus in the east for white settlement but little is as yet known.

ABYSSINIA

Abyssinia belongs in part to the Abyssinian Highlands, where the Archæan rocks of the African plateau are covered in many places with great masses of volcanic material, and in part to the lowlands which lie to the east of the Eritrean rift-valley. The total area of the country is estimated at 432,000 square miles, and its population, which is partly of Semitic origin, numbers 5,000,000. Notwithstanding the fact that the country is as yet but partially known, three natural regions may be recognised. The Kwolla, which rises to a height of 5,000 feet above sea-level, has a tropical climate and yields cotton, coffee, and other products of a tropical or sub-tropical character. The Woina Dega, which lies, roughly speaking, between 5,000 and 8,000 feet, produces cereals and fruits like those of Southern Europe. The Dega, which is above 8,000 feet, is a pastoral country in which sheep and goats are reared. Economic progress is almost at a standstill and the country has but little trade with the outside world. The chief exports are hides, coffee, ivory, beeswax, and gum, while the imports consist, in the main, of cotton goods; but the total amount is small. Most of the trade passes over the railway from Dire Dawa to Jibuti in French Somaliland, but some makes its way by river steamers on the Sobat to Omdurman. The railway is being continued from Dire Dawa to Addis Abbeba.

CHAPTER XXXI

EAST AFRICA

ERITREA and Somaliland, British East Africa, and German East Africa, may all be considered as belonging to East Africa, though they do not form parts of a single geographical unit.

ERITREA

Eritrea, which lies along the coast of the Red Sea between the parallels of 12° N. and 18° N., is an Italian protectorate. It is of little economic importance, as, owing to the small rainfall, it is little better than desert. The inhabitants, who are nomadic, are engaged in pastoral pursuits. Massowa, built on a small coral island, is now connected with the mainland, and from it a railway line runs inland to Asmara.

SOMALILAND

The Somali coast and a considerable part of the interior is divided among Britain, France, and Italy, while the remainder of the horn of Africa belongs to Abyssinia. Throughout the whole region little rain falls, and most of the country is covered with scrub. The inhabitants are, to a large extent, nomadic, and wander about with their herds of camels, horses, and sheep, though, in the more favoured parts of the interior, maize, dhurra, and other cereals are all grown. In French territory the only place of importance is Jibuti, the chief port of Abyssinia. British Somaliland exports myrrh, gum, coffee, hides, and live-stock, mainly from the ports of Berbera, Bulhar, and Zeyla. In Italian Somaliland the chief ports are Barawa and Mogadishu.

BRITISH EAST AFRICA

The physical features of British East Africa present some striking contrasts. Along the coast there is a plain which, at Mombasa in the south, has a width of only two miles, but broadens out, in the neighbourhood of the Juba river in the north, to over a hundred miles. From the plain a steep ascent leads to the Nyika, as this

part of the African plateau is called. Still further west, the land continues to rise to the highlands of the volcanic region, beyond which lies part of the Eritrean rift valley. On the other side of the valley, the mountains fall away to Victoria Nyanza, which is at a height of 3,726 feet above sea-level.

Over the greater part of the country, altitude is an important factor in determining climatic conditions. At Mombasa (lat. $4^{\circ}4' S.$) the mean temperature varies from $78.5^{\circ} F.$ in July to $83^{\circ} F.$ in April; while at Machakos (lat. $1^{\circ}31' N.$), which is at an elevation of 5,400 feet, it ranges from $61^{\circ} F.$ in July to $68^{\circ} F.$ in February. At Port Florence, on Victoria Nyanza, the temperature is nearly as high as on the coast. Rainfall also varies greatly from one place to another. On the coast, over a large part of the highland area north of Nairobi, and in the vicinity of Victoria Nyanza, there is a mean precipitation of over 40 inches. The remainder of the country has in the south from 30 to 40 inches, and in the north from 20 to 30 inches or even less. There is a double rainfall period: on the coast, the heavier rains fall from April to June, and the lighter from October to December; in the highlands, the earlier rains last from March till the end of May, and the later from October till the end of December.

VEGETATION.—Parts of the coast and much of the Nyika have but a scanty vegetation; there is little grass, and the surface of the land is often either bare or covered with acacia bush. The Highland region is a savanna, in which there is rich grass land, interspersed with forests according to local variations in soil and climate. The rift valley is mainly grass land.

GENERAL CONDITIONS.—From the point of view of economic development, British East Africa presents some features of exceptional interest. Although the whole country lies between the parallels of $5^{\circ} N.$ and $5^{\circ} S.$, there are considerable areas which, on account of their high altitude, are well-adapted to European settlement. On the other hand, it is probable that Europeans will never themselves be able to perform all the work involved in the cultivation of the land, and that they will always be compelled to rely upon native assistance. But the natives, of whom it is estimated there are over 4,000,000, have a considerable source of wealth in their herds, and only a limited need for money; and it often happens that there is a scarcity of labour just at those

seasons when it is most in demand. At present, the European population, almost entirely of British origin, numbers over 3,000, and it is unlikely that there will be a rapid increase in the near future.

The coastal region and the highlands alone require further consideration here. Much of the Nyika is of little value, and a great part of Jubaland in the north is as yet only partially explored.

THE COASTAL REGIONS are not suitable for permanent European settlement, and very little has as yet been done for their development. The coconut palm grows both upon the coastal plain and upon the slopes of the plateau facing the sea, and copra and coconuts are exported. Rubber has been planted in places, and is said to promise well. Attempts have been made to cultivate cotton, but there are few places in the Protectorate where it will grow without irrigation, and not until lately have funds for that purpose been available.

THE HIGHLANDS are capable of producing a great variety of crops, but it is as yet uncertain which will prove best adapted to their environment, and at the same time best able to stand the heavy cost of transport to the coast. Sisal-hemp and wattle are both grown, but the cultivation of the latter is handicapped by the want of a market for the timber after the bark has been removed. Coffee does well in those districts, which have a rich soil, and have either sufficient rainfall or are capable of irrigation. Maize and wheat are cultivated over considerable areas, but maize is rather expensive to export, while most varieties of wheat are subject to rust. Cattle, sheep, horses, ostriches, and pigs are all raised in considerable numbers.

COMMUNICATIONS AND TRADE.—The Uganda Railway, which runs from Mombasa to Port Florence, is the chief means of communication in the Protectorate. From Mombasa it ascends, often by steep gradients, to a height of nearly 8,000 feet on the eastern escarpment of the rift valley. After descending about 2,000 feet into the valley, it rises again to over 8,000 feet on the western escarpment, from which there is a rapid descent to Port Florence. The principal exports are copra, grain, hides and skins, ivory and rubber; while the imports consist of cotton goods, provisions, and agricultural implements.

GERMAN EAST AFRICA

German East Africa has an area of 384,000 square miles. Its population is estimated at 10,000,000, of whom about 2,000 are Europeans.

The physical geography of the country is briefly as follows: The 600 miles of coast are bordered by a hot, moist, and frequently unhealthy lowland of varying breadth, beyond which lie various mountain ranges, of which the Usambara and the Usagara are the most important. The coastal plain and the mountain slopes which face the sea have a mean annual rainfall of at least 30, and in places of over 60 inches. Beyond the mountains, but at a lower elevation, lies a plateau with a height of 3,500 to 4,000 feet above sea-level. The rainfall on this plateau, sheltered by the mountains, is naturally low; in the east it probably does not exceed 30 inches, but it increases in the west as the land rises towards the hills which border the plains round Lake Tanganyika.

The coastal plain, and the seaward slopes of the mountains which border it, are generally forested, but, further inland, the vegetation is of the savanna type, and in the regions of low rainfall tends to pass into semi-desert. There are, therefore, two fertile areas—an eastern and a western—separated by a wide stretch of sparsely populated country. German authorities have estimated that not much more than one-fifteenth of the whole region is capable of development.

Agriculture is mainly in the hands of the natives, but European plantations have been established in some of the healthier eastern districts, the more favoured localities being round Mochi (at the foot of the Kilimanjaro and Meru mountains), and on the slopes of the Usambara and Usagara. On these plantations, coffee, wattle, tobacco, cotton, and tea are cultivated; while, nearer the coast, sisal-hemp and rubber are grown on an extensive scale. The native crops include cotton, rice, sesame, and coconuts in the eastern districts, and coffee, ground-nuts, cotton, and palm-oil in the western. Wax, rubber, and copal are collected in various places. The eastern and western districts have not yet been brought into communication with one another, and at present, there are only two railway lines in the country. One runs from Tanga, by Mombo, to the plantations on the Usambara, and has recently been connected with those round Mochi; the other starts at

Dar-es-Salaam, and has been carried to Tabora, so that it has opened up, not only the plantations on the Usagara, but a cattle-raising region on the plateau behind. Many of the exports of the western districts leave the country by way of the ports on Victoria Nyanza and the Uganda railway.

THE ZANZIBAR PROTECTORATE

The islands of Zanzibar and Pemba, which lie off the coast of German East Africa, are under British control. A large trade, carried on mainly by Indians, passes through the port of Zanzibar.

CHAPTER XXXII

SOUTH AFRICA

AFRICA, south of the Zambesi, has an average elevation of about 3,500 feet, but there are three well-marked plateau regions which lie between 4,000 and 6,000 feet above sea-level. The first of these is to the north and west of the Molopo-Orange valley, and is sometimes called the Damanama plateau; the second is the High Veld which extends almost from the south-west corner of the continent to the Limpopo; and the third is the Matabili-Mashona plateau between the Limpopo and the Zambesi. The Damanama plateau belongs to German South-west Africa; the High Veld, with part of the lower land on the north-west and the coastal plains on the south and east, is divided among the provinces which make up the Union of South Africa; while the Matabili-Mashona plateau constitutes Southern Rhodesia.

THE UNION OF SOUTH AFRICA

The Union of South Africa includes the four provinces of the Cape of Good Hope, Natal, the Orange Free State, and the Transvaal. Except in Natal, much of the country suffers from want of sufficient moisture, and is, as a result, more suitable for pastoral than for arable farming. Attempts to remedy this defect by the development of irrigation have been made, but, though local supplies of water have in many cases been successfully utilised, it is doubtful whether any schemes on a more extensive scale are feasible. The long droughts and occasional heavy downfalls have also affected the character of the soil, which has in many places been washed away owing to the absence of a continuous covering of vegetation, with the result that considerable areas are becoming less, rather than more, fertile. The economic development of the whole region, too, has been hindered by the existence, often in the more fertile districts, of a large native population; and by the political differences which for so long separated the Briton and the Boer. The discovery of great stores of mineral wealth, which, for a time, accentuated these differences, has, however, done much within recent years for economic progress in the country.

THE CAPE OF GOOD HOPE

The low coastal plain on the extreme south of the African continent is bordered on the north by the Langebergen and other folded ranges, which lead up to the plateau of the Little Karroo. To the north of the Little Karroo, another series of folded ranges, of which the most important are the Zwartebergen, mark the ascent to the higher and broader Great Karroo. Beyond the Great Karroo, the Stormberg, the Nieuwveld, and the Roggeveld form the escarpment of the High Veld, which gradually falls away towards the Orange River.

The distribution of precipitation presents some features of special interest. In the south-west of the province, from Clanwilliam on the west coast to Port Elizabeth on the south, the greater part of the rainfall occurs during the winter half of the year; but the amount is limited, and only over a comparatively small area does it exceed 20 inches. The remainder of the country, on the other hand, receives most of its moisture from the south-east trade winds during the summer months; but there is a steady decrease in amount from east to west, and, while the eastern part of the province has a mean precipitation of over 20, and in places of over 30 inches, there is a large area in the west which has less than 10 inches.

NATURAL REGIONS.—The south-east and the south-west coastal regions are marked off from the regions which adjoin them by more equable temperature and greater precipitation; and from one another by the seasonal distribution of their rainfall. The eastern slopes of the High Veld are covered with grass, and may therefore be considered apart from the western, which have a vegetation somewhat similar to that of the Karroo, along with which they may be treated. The north-west of the province is one in which little economic activity appears to be possible except in Griqualand West which has great mineral wealth.

THE SOUTH-WEST REGION has mild, moist winters and hot, dry summers. At Table Bay the mean monthly temperature ranges from 54° F. in July to 69° F. in January. Cereals and fruit are both extensively grown, though for the latter, at least, irrigation is often necessary. Wheat and barley, the principal cereals cultivated, find a more favourable environment here than in any

other part of the province. The fruits include grapes, oranges, lemons, and apples. From the grapes, light wines and Cognac brandy are both manufactured, but the export trade in these articles has met with varying fortune. For the other fruits mentioned, a market appears to be growing up in the United Kingdom, where they appear in the early part of the year.

THE SOUTH-EAST REGION, with its summer rainfall and somewhat higher temperature, is more suitable for the cultivation of maize than of wheat, and some of the chief maize-growing districts in the province lie within it. Kaffir corn is also extensively grown, and other crops include oathay, tobacco, and fruit. Sheep and cattle are reared in large numbers throughout the region. There are considerable areas of fertile soil, of which the best use is not always made, as much of the land in the Transkei territories is in the hands of natives, whose standard of cultivation is not high.

THE KARROO.—On the Karroo the rainfall is meagre, while the heat of summer is often great. Graaf Reinet, for example, has a mean monthly temperature ranging from 56° F. in June to 74° F. in February. The region is, in the main, a pastoral one; but, as the vegetation chiefly consists of dwarfed shrubs, the carrying capacity of the land is low, though, where irrigation is possible, matters are somewhat better. On the Little Karroo, where lucerne can be grown to feed the young chicks, large numbers of ostriches are reared. This industry, which is carried on in many places, but notably round Oudtshoorn, has assumed considerable importance within recent years, and the export of ostrich feathers has quadrupled in value since 1890. Large quantities of tobacco are also grown in irrigated districts on the Little Karroo, but elsewhere stock-raising is the chief occupation of the farmer. Cattle were formerly reared for transport, but, with the development of the railway system, they are now less required for that purpose, and more attention is being paid to dairying. Sheep and goats are both raised for the sake of their fleece.

THE NORTH-EAST REGION lies upon the High Veld; and, if it has a lower temperature than the Karroo, it has a better rainfall. The land is grass-covered, and many good grazing districts are to be found. The products generally are similar to those of the Karroo, with the exception of ostriches and tobacco, for which, as a general rule, the climate is unfavourable.

THE NORTH-WEST REGION is economically of little importance, and is but sparsely occupied. Where underground water can be brought to the surface the land is cultivated, but elsewhere only a limited amount of pastoral farming is possible. Towards the west, desert conditions prevail. One of the chief products of the region is copper obtained from the Ookiep mines, and exported from Port Nolloth.

GRIQUALAND WEST.—The diamond mines of this region, to which it mainly owes its importance, consist of "pipes" of breccia, which penetrate the stratified rock of the country, and are probably due to volcanic action, though the precise way in which they have been formed has not yet been determined. Those mines which are worked at present are all situated in the vicinity of Kimberley; and their annual output, which is carefully limited by the De Beers Company, now amounts to over £4,000,000.

NATAL

From the heights of the Drakensberg which, in Natal, form the escarpment of the High Veld, the land descends in a series of deeply incised terraces to the coastal plain which borders the Indian Ocean. Climatic conditions, which are mainly determined by altitude, afford the best basis for the division of the country into natural regions. The coastal plain, which has a breadth of 10 to 15 miles, and rises from sea-level inland to a height of about 1,000 feet, is a sub-tropical region. Durban, on the coast, has a mean annual temperature of 71° F., with a range from 64° F. in August to 77° F. in January. The Midlands, which extend up the mountain slopes to an altitude between 4,000 and 5,000 feet above sea-level, are more temperate in character. Pietermaritzburg (2,225 feet), for example, has a mean annual temperature of 65.5° F., and a range from 57° F. in July to 73.5° F. in January. On the Highlands, which occupy the remainder of the country, the temperature is still lower. Precipitation appears to be heaviest along the coast, which has a mean annual rainfall of just over 40 inches; the Midlands generally have between 25 and 35 inches; and in the Highlands the amount is probably somewhat greater.

THE COASTAL PLAIN contains some regions of great fertility. Sugar is extensively grown on a narrow belt of country which does

not extend inland for a greater distance than 5 or 6 miles. The amount produced now averages about 80,000 tons, which is somewhat less than the total amount consumed in South Africa. Owing to the irregularity and unsatisfactory nature of Kaffir labour, Indian coolies have been introduced into the country, and now perform most of the work connected with the cultivation of the sugar-cane. Further inland tea is grown, as in Natal it thrives best on lands between 500 and 1,000 feet above sea-level and from 6 to 12 miles distant from the coast. The demand for the product is almost entirely a South African one, and as much as 2,000,000 lbs. have been produced in a single year. The cultivation of wattle, which was formerly confined to the Midlands, is now being extended to the coastal plain, apparently with favourable results. Fruits, such as bananas, pineapples, oranges, and lemons, cereals, such as maize and Kaffir corn, and arrowroot, are all extensively cultivated.

THE MIDLANDS are mainly devoted to agricultural pursuits. Arable farming is widespread, and the growing of wattle trees is an important industry which now attracts considerable attention. The bark is exported to Germany, while the timber is in demand for use as pit-props in the mines at Johannesburg. Other agricultural products include maize, wool, and fruit. There are extensive coalfields in the country between Dundee and Newcastle, and from the mines in the vicinity of these towns nearly 2,000,000 tons per year are produced. Various other minerals are also known to exist.

THE HIGHLANDS are more suitable for pastoral than for arable purposes, and considerable numbers of cattle and sheep are raised. Many of the Boer farmers from the Transvaal bring their flocks and herds to this region during the winter months, when food is scarce upon the High Veld. From the forested area, which is extensive, are obtained such timbers as chestnut, ironwood, and sneeze-wood.

THE ORANGE FREE STATE

Practically the whole of the Orange Free State belongs to the High Veld, and, owing to its great altitude, possesses a temperate climate. At Bloemfontein, which is 4,518 feet above sea-level, the mean annual temperature is 62° F. June, the coldest month,

has a mean of 48° F., and December, the hottest, one of 73° F. The rainfall diminishes from the east, where it is probably between 25 and 35 inches, towards the west, where it is less than 20 inches; and the grassland of the former region gives place to the Karroo bush of the latter. Though the country is mainly a pastoral one, the fertile alluvial soils and heavier rainfall in the valleys of the east have led to the cultivation of wheat on a considerable scale; and about two-thirds of the wheat grown in the province comes from the basin of the Caledon River, which has been called the "Granary of South Africa." In the east and north-east, maize is grown; but both districts frequently suffer from drought, hailstorms, and locusts. Cattle are raised principally in the regions already mentioned, but sheep and goats are more widely distributed, and thrive on the Karroo bush of the south-west. The western section of the province is more arid than any other, and little water seems to exist except in brackish pans. Irrigation and dry farming have been attempted in various places throughout the country, but neither appears as yet to have made much progress.

Coal is worked at Vereeniging in the north, and diamonds at Jagersfontein, Koffyfontein, and elsewhere.

THE TRANSVAAL

The Transvaal is generally divided into three physical regions: the plateau or high veld, the bankens, or slopes, which lead up to the high veld, and the bush veld. The plateau, which includes most of the land with an elevation over 4,000 feet, is estimated to include one-third of the whole country and lies mainly in the south, though there are outlying areas in the Waterbury and Zoutpansberg districts. To the north and east of the main parts of the plateau, and around the outlying districts, are the bankens or slopes, which generally lie between 3,000 and 4,000 feet above sea-level, though in places they rise to a somewhat greater height; they cover about one-fourth of the area of the province. The bush veld, or low veld, occupies the north of the Transvaal, with the exception of the outlying parts of the plateau already mentioned; a strip of it also extends along the eastern border to the frontier of Natal. The bush veld altogether covers about two-fifths of the total area of the country.

THE HIGH VELD.—Lines drawn from Pitsani, on the main railway line some little distance north of Mafeking, to Johannesburg, from Johannesburg to Pilgrim's Rest, about thirty miles north-east of Lydenburg, and from Pilgrim's Rest to a point on the Natal frontier to the east of Wakkerstroom, mark off the greater part of the High Veld from the remainder of the country. But a distinction is frequently made between the region to the east of Johannesburg and that to the west. The former—the High Veld proper, as it is called—has an elevation of over 5,000 feet, and consists in the main of rolling downs; while the latter, which is known as the Middle Veld, and usually lies between 4,000 and 5,000 feet above sea-level, is more irregular in appearance and is frequently broken by long lines of low hills.

Over the whole of the High Veld the summers are hot, but in winter the thermometer frequently falls considerably below freezing point. Johannesburg, which has an altitude of 5,735 feet, has a mean annual temperature of 61° F., with a range from 47° F. in July to 70° F. in December. The range between day and night temperature also is often great. The annual precipitation decreases from over 40 inches in the east to between 15 and 25 inches in the west. On the High Veld proper the rains, which occur in summer, are tolerably certain; but on the Middle Veld they are more irregular and vary considerably from year to year.

The vegetation is that of a grass steppe practically unbroken by trees or shrubs, except in the moister and warmer districts. The whole of the High Veld is devoted to stock-raising, and its importance may be gauged by the fact that in 1911 more than two-thirds of the total number of sheep in the country (3,360,000) were found in those districts which almost entirely belong to it. Cattle and goats are also most numerous in this region. The High Veld proper is peculiarly adapted to stock, though it is necessary to "trek" to lower lands during the winter months. In the Middle Veld (to which the outlying districts of Waterbury and Zoutpansberg belong) the grass is not so good, and animals fed upon it are more subject to disease. On the High Veld the land is cultivated only to a limited extent, though it is possible that the development of irrigation and dry farming may lead to an increase of the arable area in the future. Maize and Kaffir corn are the principal crops grown at the present time.

The Witwatersrand, which lies along the northern margin of the Middle Veld west of Johannesburg, has acquired peculiar importance in recent years on account of the vast quantities of gold which it contains. The rocks, which constitute what is known as the Main Reef Series, consist of a quartz conglomerate or banket, in which the gold lies in particles so small that they are rarely visible to the naked eye; and it was not until the introduction of the cyanide process that the region assumed its present importance. During the three years 1909–11 the annual output averaged £32,000,000. Coal, which appears to be of drift origin, occurs at several places, but the principal mines are near Witbank, west of Middleburg. A considerable part of the output of these mines is exported, by way of Lourenço Marques, to the west coast of India and elsewhere. Coal is also obtained at Boksburg and Springs, east of Johannesburg, and at Belfast.

THE BANKEN are better adapted to arable than to pastoral farming; and, although there are no large and continuous areas suitable for cultivation, there are numerous districts, such as those round Pretoria and Rustenburg, and on the slopes of the Zoutpansberg, in which, in addition to the ordinary cereals, fruit, tobacco, and similar crops can be grown. The country is well watered by the rivers which flow down from the High Veld; and a certain amount of irrigation is possible, though at present it is only practised to a comparatively limited extent. Except in the lower valleys, where malaria is rife, the country is suitable for European settlement.

The Premier diamond mine, which lies north-east of Pretoria, has an output valued at over £1,000,000 annually.

THE BUSH VELD is a flat country and, owing to its lower elevation and the more northerly position of the greater part of it, has a much warmer climate than the two previous regions. At Komati Poort, for example, the mean annual temperature is 74·5° F. The rainfall, which amounts to about 30 inches in the east, rapidly decreases towards the north and west, and much of the region is practically without water. The vegetation consists largely of scrub, and there is much good pasture; but the country is unsuitable for stock except during the winter months.

COMMERCE OF THE SOUTH AFRICAN UNION.—For the years 1909 and 1910 the average value of the exports for the South African

Union was £52,000,000, over 90 per cent. of which went to the United Kingdom. The principal articles exported, and their average value were as follows :—

	In £ million.
Gold	31·51
Diamonds	7·42
Wool	3·77
Feathers	2·18
Hides and skins	1·22

The average value of the imports for the same period was £30,380,000. Textiles and clothing (cotton and woollen goods, apparel, and boots and shoes), articles of food and drink (wheat and flour, tea, coffee, and sugar), and machinery (agricultural and mining) contributed over one-half of this amount. About 60 per cent. of the total imports were from the United Kingdom, and the bulk of the remainder from British possessions, the United States, and Germany.

BASUTOLAND

Basutoland, which is governed by a High Commissioner in the name of the King, consists of a mountainous region bordering upon the Cape of Good Hope, Natal, and the Orange Free State. The Drakensberg lie along the south-east frontier of the country, and beyond them are several parallel and subsidiary ranges. Much of the soil is fertile, while the climate is favourable both for arable and pastoral farming. Wheat, maize, Kaffir corn, wool, and mohair are all produced and exported by the natives, who practically form the entire population, as European settlement is forbidden.

THE BECHUANALAND PROTECTORATE

The Bechuanaland Protectorate belongs to the South African plateau, and the greater part of it lies between 3,000 and 4,000 feet above sea-level. In the east, where there is a mean annual rainfall of 18 to 22 inches, the country is a grassland and is inhabited, but in the west it passes into the Kalahari desert. The population is almost entirely a native one; and the chief wealth consists of cattle, which within recent years have suffered greatly from pleuro-pneumonia. Great efforts are being made to stamp out this disease, as, while it lasts, the markets of Rhodesia

and the Transvaal are practically closed to what is the chief export of the Bechuana tribes. Maize and Kaffir corn are grown ; but in years of deficient rainfall, which occasionally occur, the crops are a complete failure. There are believed to be considerable supplies of underground water both in the east and in the west, but so far they have been utilised only to a slight extent.

SOUTHERN RHODESIA

The Rhodesian plateau, to which Southern Rhodesia belongs, lies between the Limpopo and the Zambesi. The greater part of the region has an elevation of over 3,000 feet ; but a considerable area, which runs from south-west to north-east, and forms the divide between the waters of the Zambesi and those of the Limpopo and the Sabi, is over 4,000 feet, and in places over 5,000 feet, above sea-level. To the north and to the south, the land slopes down to the valleys of the rivers between which it lies, and only there is it less than 1,000 feet in height. The greater part of the highland region is built up of granitic and metamorphic rocks. Lower down the slopes there are sedimentary formations, generally consisting of sandstones, shales, and conglomerates, covered over in many places with superficial deposits such as laterite.

Notwithstanding the fact that Rhodesia lies within the tropics, it has, on the whole, a temperate climate. Bulawayo, which has an altitude of 4,469 feet, has a mean annual temperature of 67.5° F., with a range varying from 58° F. in June to 73° F. in January ; while Salisbury, at an elevation of 4,480 feet, has a mean of 65° F. and a range from 56° F. in June and July to 69° F. in January. The rainfall, which takes place almost entirely between the beginning of November and the end of March, decreases from east to west. The greater part of Mashonaland in the north-east has between 30 and 40 inches, while Matabililand in the south-west has, as a rule, between 20 and 30 inches. The highlands are generally healthy, and it is probable that the greater part of the country with an elevation over 4,000 feet could be rendered fit, as much of it, indeed, at present is, for European settlement. At lower levels the white man is liable to contract malaria, though, when the land between 3,000 and 4,000 feet is cleared and

drained, it is possible that he may be able to occupy it. Below 3,000 feet, it is unlikely that he will settle.

MINERALS.—Within the highland area is found much of the mineral wealth which at present is, and for some time to come is likely to be, the principal reason for the exploitation of the country. Gold, which is obtained both from reefs and from banket formations, comes first in importance, and the annual output now exceeds £2,500,000. Many of the mines lie along the route taken by the railway between Bulawayo and Salisbury. In addition to gold, silver, lead, chrome, iron ore, and tin are all known to exist, but have been worked as yet only to a limited extent. Coal, which occurs in rocks of Permian age, is believed to be widespread over considerable areas, but the principal mines from which it is obtained at present are at Wankie, near the western frontier of Matabililand, where the annual output now amounts to about 200,000 tons. The coal from this field makes its way south for railway purposes as far as Kimberley, and a new market is opening up for it in the Katanga mining districts of the Belgian Congo.

AGRICULTURE.—Rhodesia is suitable both for arable and pastoral farming. For the former, the best districts are probably in Mashonaland, where the rainfall is heaviest, but in Matabililand also there are considerable areas of fertile soil. The principal food crops grown during the rains are maize and Kaffir corn. Wheat, which cannot be cultivated in summer, as it is liable to rust, has hitherto been sown as a winter crop on irrigated lands; but recent reports appear to indicate that, in the damper districts at least, irrigation may safely be dispensed with. The cultivation of tobacco, which is rapidly increasing, has, in many cases, given a new importance to light granitic soils, formerly fit for pasture only. Among the fruits grown are oranges, lemons, citrons, bananas, and pineapples. But it is as a stock-raising country that Rhodesia is at present most important from an agricultural point of view. The native herds have suffered severely from various diseases within recent years, but these are being overcome; and, at the same time, the breed of cattle is being improved by importation from abroad. The farmer now finds his principal markets in the mining districts of Rhodesia and the Belgian Congo, but it is possible that an overseas trade in frozen meat may eventually develop.

Bulawayo and Salisbury are the principal towns, but there are

a number of small mining and agricultural communities scattered over the highland region.

NORTHERN RHODESIA.—The territory of Northern Rhodesia is still but imperfectly known. The greater part of the region belongs to the African plateau, but there are lowlands in the valleys of the Zambesi, the Kafue, and the Loangwa. The temperature is relatively high, even on the uplands. In the basin of the Zambesi, from Lealui to Kazungula, the annual mean is estimated at 74° F., with a range from 63° F. in June to 80° F. in March; while at Fort Jameson, which has an altitude of 3,600 feet, the mean for the whole year is 71° F., for July 64° F., and for January 76° F. The rainfall, which is less than 30 inches in the south-west, increases to over 40 inches in the north and north-east. Over the greater part of the country thin forest and savanna are the prevailing types of vegetation. Considerable areas are reported to be fit for cultivation, and maize and other farm crops are grown, though most attention is paid to stock-raising. Both for cattle and maize the best market at present is in the mining districts of the Belgian Congo. Attempts, apparently successful, have been made to raise cotton round Fort Jameson; and it is also grown in the valleys of the Loangwa and the Kafue, which are, however, much less suitable for white settlement. Progress is also being made with the mineral development of the country: copper is worked at Bwana M'Kubwa and in the neighbourhood of the upper Kafue, and lead and zinc are found round Broken Hill. Coal, gold, and tin are all known to exist.

COMMUNICATIONS OF SOUTH AFRICA.—The railway system of South Africa may best be considered as a whole. From Capetown, a line runs across the Karroo and the High Veld to Kimberley, and then on through Bechuanaland and the Bechuanaland Protectorate to Bulawayo in Southern Rhodesia, where it branches. One part goes north-west to cross the Zambesi at the Victoria Falls, and then north-east to Broken Hill. Broken Hill may be considered as the present terminus of the main line, which will probably be eventually continued through Northern Rhodesia into German East Africa; but from it a branch runs to the frontier of the Belgian Congo, where it connects with the railway to Elisabethville in the Katanga. The other line from Bulawayo goes north-east to Salisbury, and connects there with a line to Beira in Portuguese East Africa, which

has thus become the port of Southern Rhodesia. From Port Elizabeth and East London two lines run through the north-east districts of the Cape, and meet at Springfontein in the Orange Free State, from which point the railroad is continued by way of Bloemfontein, Johannesburg, and Pretoria to Pietersburg in the Zoutpansberg district of the Transvaal. This line is connected with that from Capetown to Bulawayo by cross-country branches between Naauwpoort and De Aar, Hamilton (near Bloemfontein) and Kimberley, Johannesburg and Fourteen Springs, and Johannesburg and Mafeking by Zeerust. From Durban, there is railway communication north and south along the coast, but the most important line is that which runs inland by way of Pietermaritzburg to Ladysmith, where it divides, one branch going by Van Reenen's Pass to Bethlehem, which is connected with Kroonstad and Bloemfontein, and the other going by Laing's Nek to Johannesburg. Finally, Lourenço Marques has been made into a port of the Transvaal by a line which runs from it, passes through the coal districts west of Middleburg, and connects with Pretoria and Johannesburg.

NYASALAND

The British Protectorate of Nyasaland consists of a strip of country which lies along the west and south shores of Lake Nyasa, and extends southwards as far as Chiwonga on the Shire River. The lowlands increase in height from 125 feet at Chiwonga to over 1,500 feet along the shores of the lake. Behind them the country ascends in a series of plateaus which have an average elevation of between 3,000 and 4,000 feet, but rise in the Mlanje, in the Shire Highlands, to over 6,000, and in the Nyika, in the north, to over 7,000 feet. The climate of Nyasaland, accordingly, varies greatly from one place to another. At Fort Johnston, at the southern end of Lake Nyasa, the mean annual temperature is 76° F., with a range from 68° F. in June to 81° F. in December; while at Lauderdale, on the Mlanje, 2,540 feet above sea-level, the annual mean is only 70° F.; the coldest month is June, with a mean of 62° F., and the hottest January, with a mean of 74·5° F. Over the greater part of the country the rainfall is between 40 and 60 inches.

Though it is still doubtful whether the uplands of Nyasaland can be colonised, British settlements have existed there for a number of years, and have played an important part in the economic development of the country. Coffee was formerly one of the principal crops grown by the white planters, but, as for various reasons it has proved less successful within recent years, it has been superseded to a great extent by cotton and tobacco. The cultivation of cotton is also being taken up by the natives, and, as the quality is good, there is every prospect of an increased output in the near future. Tea and rubber plantations have been established, and appear to be doing well. Maize, which is grown by the natives, is also exported.

The want of a proper outlet for the products of the country is at present the chief obstacle to its development. The only railway in the Protectorate runs from Blantyre in the Shire Highland to Port Herald on the Shire River, whence goods are sent by steamer to Chinde, at the mouth of a distributary of the Zambesi. The Lower Shire has, however, become silted up to such an extent recently that it is only navigable for a few months in the year; and it is proposed to carry the railway from Port Herald to Villa Bocage, the head of the permanent fairway on the river. Other proposals involve lines from Villa Bocage to Beira, and from Blantyre to Lake Nyasa.

PORTUGUESE EAST AFRICA

Portuguese East Africa, which extends along the coast from Natal to German East Africa, and inland to the borders of the Transvaal, Rhodesia, and Nyasaland, and the eastern shores of Lake Nyasa, has an area of about 300,000 square miles and a population which is estimated at over 3,000,000, of whom less than 10,000 are Europeans. The country consists, in the main, of the East African coastal plain and the slopes of the plateau. South of the Zambesi, it extends on to the plateau itself only in a few places, but, to the north of that river, it includes the part of the plateau which lies east of Lake Nyasa and south of the Rovuma. Comparatively little is known about the climate, especially in the interior. On the coast, Lourenço Marques, in the south, has a mean annual temperature of 75° F., with a range from 68° F. in July to 83° F. in February; while at Mozambique, towards

the north, the figures for the year are 79° F., for July 74° F., and for January 82° F. The rainfall is generally over 30 inches, though in some parts of the interior it is less, while along the coast, north of the mouth of the Zambesi, it is over 40 inches.

Economic progress has been very slow. Except in some of the drier regions of the interior, the country is generally covered with forest, and along the coast it is often swampy and unhealthy. Moreover, with the exception of the efforts made by two chartered companies—the Nyasa Company which administers the region east of Lake Nyasa, and the Mozambique Company, whose possessions lie between the Sabi and the Zambesi—comparatively little has been done to develop the resources of the country. The districts round the Zambesi are agriculturally the most important at the present time. They produce the greater part of the sugar which is exported from the country, though some is also grown in the valleys of the Buzi and the Sabi further to the south. Round Quelimane, to the north of the delta, there are plantations of Ceara rubber, coconut palms, and sisal fibre. In the country round Beira and Mozambique the products are of a somewhat similar character. Mangrove bark, and rubber collected from various species of *Landolphia*, are also exported to some extent. In the interior of Gazaland, in the south, there are considerable areas of good pasture land, of which, however, but little use has as yet been made. The principal mineral district yet known lies in the valley of the Zambesi, about 300 miles from its mouth. There, gold is worked, and copper and coal are known to exist.

A considerable transit trade passes through Portuguese East Africa. From Lourenço Marques is despatched no small part of the exports and imports of the Transvaal. Beira is the port for Rhodesia, and Chinde serves Nyasaland.

GERMAN SOUTH-WEST AFRICA

German South-West Africa, which lies between the Orange and the Cunene, has an area of 322,000 square miles and a mixed native population of about 82,000. From the coastal strip, which consists mainly of sand dunes, the land rises to the Damanama plateau, the greater part of which lies between 4,000 and 6,000 feet above sea-level. Along the coast, and in the interior of the country south of the latitude of Walfish Bay, the rainfall is meagre, but it increases

towards the north-east where a considerable area has over 20 inches per year. In the last-mentioned region agriculture is possible, and cereals and lucerne are grown, though they are always liable to suffer from drought. The central parts of the country are more favourable for cattle-raising than for agriculture, and the south is a desert. It is mainly on account of its mineral wealth that German South-West Africa is exploited at the present time. Diamonds are found along the coastal strip between the 24th and the 28th parallels, and are exported to the annual value of over £1,000,000. Copper is worked in the northern districts. From Swakopmund one railway runs north-east to Tsumeb, in the copper-producing regions, while another goes by Karibib and Keetmanshoop through the central part of the country to Lüderitzort. Walfish Bay, the chief harbour, is British territory.

CHAPTER XXXIII

WEST AFRICA

THE coastal regions of Africa, from the mouth of the Senegal almost to that of the Cunene, together with the basin of the Congo, receive a heavy rainfall and are covered with dense forests. They have been divided among a number of European states whose territory frequently extends inland to the savanna lands lying beyond the forested area.

BRITISH WEST AFRICA

GAMBIA

Gambia consists of a narrow strip of land which extends along both banks of the river of that name for a distance of about 250 miles from the estuary by which it enters the Atlantic. The total area is about 4,000 square miles ; and the inhabitants, who are mostly negroes, are believed to number 150,000. Unlike the other British possessions on the west coast, Gambia has a well-marked dry season lasting from November to May, and the mean annual rainfall at Bathurst only amounts to 47 inches. Along the banks of the river, especially in its lower course, there are mangrove swamps ; but, further inland, savanna is the prevailing type of vegetation. Ground nuts are extensively grown and, along with a small quantity of rubber obtained from several varieties of *Landolphia*, form the chief exports of the region. Bathurst is the capital and only town of importance.

SIERRA LEONE

The colony and protectorate of Sierra Leone, which lie between French Guinea on the north and the Republic of Liberia on the east and south-east, have a total area of about 30,000 square miles and a population, mostly black, of over 1,000,000. The country extends from the slopes of the African plateau, across an intervening region of undulating land, to the deltas of the various rivers by which it is drained. The climate is generally considered to be particularly unhealthy for Europeans ; but the high death rate

of former times seems to have been due, in part at least, to ignorance of the precautions necessary in regions such as this. Freetown, on the coast, has a mean annual temperature of 81° F., with a very slight range throughout the year, and a mean rainfall of 174 inches; but on the uplands, in the interior, the temperature is lower and the rainfall less. Two-thirds of the total value of the exports are obtained from the fruit of the oil palm, while the remaining third is mainly accounted for by such other products of the tropical forest as kola nuts, ginger, rubber, and rice. Freetown, the capital, has a good harbour and is an important coaling station.

THE GOLD COAST, ASHANTI, AND THE NORTHERN TERRITORIES.

The Gold Coast, Ashanti, and the Northern Territories have a total area of about 80,000 square miles, and a population which is probably between 1,500,000 and 2,000,000. Except in the north, where it belongs to the Upper Guinea plateau, the country is generally flat or undulating. The mean annual temperature varies; but, as a rule, it falls between 78° F. and 82° F., the range throughout the year being small. Owing to the configuration of the coast, the rainfall decreases rapidly from west to east; and Axim has over 80 inches, while Kwitta has less than 20; it also decreases inland, and in the northern part of the country the precipitation is about 40 inches. There are, therefore, two well-marked natural regions. The Gold Coast, except in the east, and the southern part of Ashanti are covered with forest, while the remainder of the area consists of savanna land.

THE FOREST.—The rapid advance of cacao to the premier place among the exports of the Gold Coast is partly due to the recent adoption of better methods of preparing the bean for market, though the native grower still leaves something to be desired in this respect. Rubber is obtained from *Funtumia elastica*, which grows in a wild condition; but the quality is inferior, and plantations are being established in those districts where the wild plant has been destroyed by reckless exploitation. The yield of palm oil and palm kernels has decreased, largely as a result of the greater attention paid to the cultivation of cacao. Kola nuts, much in demand for chewing purposes among the natives of the Sudan, are obtained from trees found in the forests north of Kumasi.

Mahogany, which is floated down from the interior, is the most valuable timber of the region. Gold ranks next to cacao in the list of exports, and is obtained partly by dredging the rivers, and partly by mining.

The SAVANNA is freely cultivated, but its exports are inconsiderable. Cotton is grown for home consumption, and it is unlikely that the area under it will be increased until the existing means of transport to the coast have been greatly improved. Small quantities of gum, shea butter, and rubber, and some cattle, are at present the chief exports of the region.

COMMUNICATIONS.—The country is handicapped by the want of a good port, and the inadequacy of its communications. The Volta is navigable for some distance, but its course is obstructed by falls; and the only railway which penetrates far into the interior is that from Sekondi to Kumasi.

NIGERIA

Nigeria, which consists of the colony of Lagos and the former protectorates of Northern and Southern Nigeria, is the most important possession of Britain in West Africa. It has an area of about 336,000 square miles, and a native population which is estimated at 17,000,000.

PHYSICAL FEATURES.—The coast land, of recent, and largely of deltaic, formation, is fringed in places by lagoons. Further inland, and covering a considerable part of Southern Nigeria, is an intermediate belt of clays, sandstones, and shales, which have built up a plain that rises in the north to a height of about 650 feet. Much of the remainder of Nigeria consists of crystalline rocks, which form open, undulating country, frequently broken by groups of rounded hills. On the left bank of the Niger, and along the upper and lower courses of the Benue, there are, however, considerable areas of sedimentary rocks, in which the rivers have cut narrow valleys, and to which they have, consequently, given a plateau-like formation; while along the course of the middle Benue the Cretaceous rocks have weathered down into a great plain. In the north-east of the country there are alluvial plains which occupy a considerable part of the basin of Lake Chad.

CLIMATE.—In Southern Nigeria and in the lowlands of Northern Nigeria, the temperature is similar to that of the Gold Coast.

Lagos, for example, has an annual mean of 79° F., with a range from 75° F. in August to 81° F. in February and March; and Zungeru one of 81° F., with a range from 77° F. in August to 87° F. in March. On the upland districts conditions are somewhat more bracing, and in extreme cases the thermometer even falls below freezing point. Precipitation decreases from south to north; and, while the coastal districts east of the delta of the Niger have a mean annual rainfall of 160 inches, the lands lying near Lake Chad, in the extreme north-east, have less than 20 inches.

NATURAL REGIONS.—Except in the north-east and north-west, the greater part of Southern Nigeria is covered by the tropical forest, which also extends up the valley of the Niger into the southern part of Northern Nigeria. The remainder of the country falls within the savanna lands of the Sudan, as far north, at least, as the eleventh parallel. Beyond this limit, the character of the vegetation changes, and the savanna gives place to a more arid region, in which the gum-bearing acacia and other trees of a similar character are conspicuous. Three natural regions may, therefore, be recognised: the forest, the savanna, and the semi-arid lands.

THE FOREST.—In this region the natives only grow food-stuffs sufficient to meet their own requirements, and depend for their exports mainly upon the natural products of the country. Of these, palm oil and palm kernels, which together hold the first place, are almost entirely obtained from trees growing wild in the forest, the resources of which in this respect have not yet been fully developed. Rubber is procured in a variety of ways. *Funtumia elastica* and *Landolphia owariensis* are indigenous to the region, but both have suffered greatly from reckless overtapping. The former is now grown in communal plantations, but the latter is unsuitable for cultivation. In addition, the Para rubber tree (*Hevea brasiliensis*) has been introduced into the country, and appears to be doing well in those districts where soil and climate are favourable. Cacao was formerly grown mainly in the west, where the trees seem to have suffered from the long, dry season, but plantations have recently been established in the south-east, where the rainy season is more prolonged; and cacao is now an important article of export. Other forest products include mahogany and ebony. Coal of Tertiary age is found on both sides of the

Niger ; and among other minerals known to exist are gold, iron, and tin.

THE SAVANNA.—For the support of the population of this region, which in places is very dense, the chief food crops cultivated are Guinea corn (Indian millet or juar) and other varieties of millet, wheat, maize, and rice. Guinea corn is grown throughout the country, maize in the wetter districts of the south, wheat in the drier districts of the north, and rice in various places where the land is swampy. In years of deficient rainfall, the inhabitants of the northern districts frequently suffer from famine.

Cotton has always been grown by the natives for domestic manufactures, and attempts are now being made to induce them to grow it for export to Lancashire, where there is a ready demand for it. In order to improve the quality, various exotics have been introduced, but these appear to be more subject than native varieties to insect pests, besides being unsuited in other ways to their new environment ; and it is probable that more progress will be made by the improvement of the indigenous plants. The British Cotton Growing Association has established a number of ginneries in the country, and the prospects of an increased output appear on the whole to be good. The climate and soil are favourable, the agricultural population is industrious and experienced, and the demand is likely to prove steady. On the other hand, the methods of cultivation are generally somewhat primitive, and, as a result, much of the land is required for the production of food crops; though, with the extension of railways, it is probable that new areas, especially in the north, will be opened up in the near future. Other products of an agricultural nature which are exported include shea butter, fibres of various kinds, ground nuts, and Kano leather (which is known in Europe as Morocco leather).

Tin, which is the most valuable mineral of Nigeria, is found in various places, the most important of which is the Bauchi plateau, a region in the central part of the crystalline area, with an elevation of between 3,000 and 4,000 feet. It occurs in the alluvial deposits which cover the plateau and its northern margin, and it is these deposits which are at present being exploited ; but the ultimate success of the field will probably depend upon the discovery of paying lodes in the underlying rock. With the extension of the railway to the mineral districts, a rapid increase in the output is probable

in the immediate future. Iron ore occurs in various places, and was formerly smelted by the natives ; but, with the importation of cheaper foreign iron, these works have been abandoned. The ore itself seems unsuitable for export.

COMMUNICATIONS, TRADE, ETC.—During the period of high water, the Niger is navigable by steamers to Jebba, and the Benue throughout its whole course in Nigeria ; but both rivers require a considerable amount of supervision to keep their lower courses clear, as they are liable to be choked by vegetation. The principal railway is that which runs from Lagos by way of Abeokuta and Jebba to Minna. Here it meets another line from Baro, a river port on the Niger some distance above its confluence with the Benue, to Kano, a great native trading centre in the north of the country. From Zaria, on this latter line, a light railway runs to the tin-field of the Bauchi plateau.

The principal exports have already been indicated. The imports consist very largely of cotton goods, hardware, and miscellaneous articles.

FRENCH WEST AFRICA

The French possessions in West Africa include Senegal, French Guinea, the Ivory Coast, Upper Senegal and Niger, and the French Congo. France also claims sovereignty over the greater part of the Western Sahara, but of that region little is known ; and French rule, if acknowledged at all by the wild Tuareg tribes, who are its only inhabitants, is acknowledged only in the most superficial manner. Of much more importance are the other regions mentioned, which belong mainly to the forests and the savanna lands of West Africa.

SENEGAL

Senegal, which has an area of 74,000 square miles, lies between the Senegal and the Gambia. The country, which is generally flat and sandy, lies on the northern margin of the belt of summer rainfall, and, except in the south, the total precipitation is less than 20 inches. For the greater part of the year, therefore, the land has the appearance of a desert, and cultivation is only possible during the summer months. In addition to food crops, such as

rice, maize, and millets, ground nuts are extensively grown, and form the chief export of the colony. From the wetter districts a little rubber is obtained, and, from the drier, some gum. The native population numbers over 1,000,000.

FRENCH GUINEA

French Guinea, which has an area of 95,000 square miles, extends from the coast between Portuguese Guinea and Sierra Leone, across the Futa Jallon plateau, into the basin of the Niger. It lies within the belt of heavy summer rainfall; and on the seaward slopes, where precipitation is heaviest, there are tropical forests from which rubber and oil palm products are obtained. In the interior, where the rainfall is much lower, savanna prevails, and large numbers of cattle are raised for export to Liberia and Sierra Leone. Rice and tropical fruits are everywhere grown in abundance. The population numbers about 1,500,000, of whom less than 2,000 are Europeans. Konakri is the capital and chief port of the colony.

THE IVORY COAST

The Ivory Coast lies between Liberia and the Gold Coast, and extends inland to the Upper Guinea plateau. In the south there is heavy rainfall, and the land is covered with dense tropical forests, in which rubber-producing plants, such as *Funtumia elastica* and *Landolphia owariensis*, oil palms, and mahogany are all found. The difficulties of transport to the coast have hitherto prevented the development of this region, and some of it is still unexplored. The savanna lands in the north contain a large agricultural population, which carries on considerable trade with the Sudan. The area of the colony is about 130,000 square miles, and its population is over 1,000,000. Grand Bassam is the chief commercial centre.

DAHOMY

Dahomey consists of a narrow strip of territory between German Togoland and Nigeria. It rises from the coast inland to a height of about 1,200 feet, and then falls away towards the basin of the Niger. The chief exports of the region are the products of the oil-palm.

THE UPPER SENEGAL AND NIGER

The Upper Senegal and Niger, which has an area of about 370,000 square miles, consists in the main of a somewhat broken plateau of moderate elevation. In the south-west the mean precipitation is over 40 inches, but it rapidly diminishes towards the north and east, and, at Timbuktu, is only about 8 inches. The vegetation ranges from the rich savanna of the more favoured districts to the acacia thickets bordering the Sahara, and considerable areas depend for their fertility upon the annual floods of the Niger. Agriculture is the chief occupation of the inhabitants, and millet, rice, and maize are all grown to meet the home demand, which is considerable, as the population numbers over 6,000,000. The attempts made to cultivate American cotton have proved unsuccessful, and recourse is now being had, as in Nigeria, to the improvement of indigenous varieties. Some rubber and kola are obtained in the south-west; and among other exports are ground nuts, gold, and ivory. The region is one in which a certain amount of economic development is possible, and, as the French have established good government and the population is industrious, such development will probably take place.

COMMUNICATIONS OF FRENCH WEST AFRICA.—Dakar, the chief city of Senegal, is one of the few places on the west coast of Africa which it has been found possible to convert into a good port. It is connected by rail with St. Louis at the mouth of the Senegal river, which has hitherto offered the chief line of penetration into the country, though it is only navigable for about half the year. The head of navigation is at Kayes, and from that town a railway has been constructed to Koulikoro on the Niger. This line is of considerable importance, as by means of it can be exported not only the rubber, gold, and ivory of the Niger districts, but less valuable articles (such as ground nuts), which formerly could not stand the cost of transport. This, between Dakar and St. Louis, is eventually to be connected with Kayes. In French Guinea there is a line from Konakri to Kouroussa on the Niger, in the Ivory Coast one from Abidjean to Dimbokro, and in Dahomey one from Kotonu inland for a distance of about 200 miles. These various lines serve the colonies through which they run, and to some extent, the Upper Senegal and Niger as well, though most of the trade of

that region passes down the Senegal, while a very little goes across the Sahara.

THE REPUBLIC OF LIBERIA

The interior of the country is, as yet, but imperfectly known, but in places it appears to rise to a considerable height. The land is covered by dense forest, except in the south, where clearings have been made, and in the north, where the forest is replaced by savanna. The population is entirely black, the southern districts being occupied by the descendants of freed slaves, who number about 15,000; while the remainder of the country is still in the hands of the aborigines, of whom there are about 2,000,000. Among the chief exports at present are palm oil, coffee, piassava, cacao, ivory, and ginger, but the total output is small. The forest products, which include rubber obtained from *Funtumia elastica* and valuable timbers such as mahogany, have up to the present been exploited only to a slight extent. Communications with the interior are very bad, and the forest paths are often closed as a result of inter-tribal disputes. In fact, when the great natural wealth of Liberia is considered, its economic development can hardly be said to have begun. Monrovia is the chief town.

TOGOLAND

The German Protectorate of Togoland, which lies between the Gold Coast and Dahomey, has an area of 33,000 square miles and a population of about 1,000,000. Much of the country is mountainous; and as the rainfall is comparatively low, ranging from 25 to 30 inches on the coast to 50 to 60 inches in the interior, it is generally a savanna land. The oil palm, which grows near the coast, and *Funtumia elastica*, which thrives in the interior, furnish the chief exports. Plantations for the cultivation, among other things, of maize, cotton, and rubber, have been established by the Germans, and appear to be successful. Lome is the capital and port of the country.

KAMERUN

The German colony of Kamerun has an area of 191,000 square miles. The country rises from a flat coastal plain to the high land of the African plateau, which falls away on the east to the basin of the Congo, and on the north to the depression of Lake Chad. In

the south-west the volcanic massif of Kamerun rises to a height of 14,500 feet. Along the coast and for some distance inland, there is a mean annual rainfall of at least 80 inches, though in places it is much heavier. Towards the east there is a slow, and towards the north a more rapid, decrease in precipitation. Much of the coastal plain is covered with mangrove swamps, and dense forests stretch over the southern and western parts of the plateau; but, in the regions of lighter rainfall further inland, these give place to extensive savannas.

The Kamerun is being steadily developed by Germany, but in a country, much of which has a climate unsuitable for Europeans, progress must necessarily be slow. The forest products include the oil and coconut palms, valuable timbers and cabinet woods, and various rubber-producing plants. Where the soil is fertile, as is the case on the slopes of the Kamerun itself, and elsewhere, plantations have been established mainly for the cultivation of cacao and rubber. The savannas contain large areas suitable for cattle-raising, and it is said that much land north of the Benue is adapted to the cultivation of cotton. Considerable attention is being paid to the development of communications, and a railway is being constructed from Victoria to a port on the Sanga (a tributary of the Congo). The exports consist of forest and plantation produce and ivory, and the imports of manufactured goods. The bulk of the trade is transacted with Germany.

FRENCH CONGO

The French Congo, which is continuous with the other French possessions in West Africa, has an area of over 700,000 square miles. Behind the coastal plain the land rises to the Crystal mountains, which have a height varying from 3,000 to 4,500 feet, and then falls away to the plateau beyond, where the elevation is between 1,500 and 3,000 feet. The southern part of the country lies within the belt of heavy equatorial rainfall and is covered by forests; the northern districts, on the other hand, have a well-marked dry season and form savanna lands.

The country has, as yet, been developed only to a slight extent, partly on account of the great difficulty in obtaining a supply of suitable labour. In the forest zone the population is small, and over the whole country probably averages less than fifteen to the

square mile, while certain districts appear to have been almost entirely devastated by sleeping sickness. The forest products are similar to those of other parts of West Africa, and coffee, cacao, and vanilla are grown on European plantations. On the savanna lands the conditions of economic development appear to be more favourable, but these districts are at present far removed from accessible routes. A railway line has been planned from Brazzaville, on Stanley Pool, to Pointe Noire, on the Atlantic.

THE BELGIAN CONGO

This region, which extends over the greater part of the Congo basin, has an estimated area of over 900,000 square miles, and a population which is believed to number 15,000,000. The country consists, in the main, of a plateau of sandstone formation, which occupies the site of an old inland lake. The general slope of this plateau is toward the Atlantic, and the greater part of it has an altitude ranging from 1,000 to 2,000 feet. In the south-east it is bounded by uplands rising to the Congo-Zambesi divide, and in the east by the highlands that border the rift valley.

The Belgian Congo lies on either side of the equator, and the temperature is everywhere high throughout the year, though, on the whole, it increases from south to north. In the Katanga upland, in the south-east, the mean annual temperature is 73° F., while in the north of the country it is about 84° F. Probably the mean for the whole region is 80° F., the variation between one season and another being very slight. Except along the coast, the rainfall is considerable; over the greater part of the country it occurs at all seasons of the year, but is heaviest when the sun is overhead. In the east and south-east it varies from 40 to 60 inches, but elsewhere it is generally over 60 inches.

Much of the soil is relatively poor, as it consists of laterite, which absorbs water very readily. In the region of heavy rainfall, and more especially in the river valleys, dense tropical forest covers the land. On the higher grounds, between the river valleys, there are lighter forests and, in places, savannas. The drier districts in the south-east and east are mainly savanna lands.

With the scanty knowledge of the country which at present exists, a division into natural regions is practically impossible.

It will suffice to direct attention to the present economic development of the forest lands and of the Katanga.

THE CONGO FOREST.—The chief export of this region is rubber, obtained from a number of wild plants, of which the most important are various species of *Landolphia*, and, notably, *Landolphia owariensis*. In certain districts these plants have been exhausted by reckless overtapping; and, though there are large areas of virgin forest still unexploited, they often lie far from the existing lines of communication. Partly as a result of the decreased productivity of the accessible areas, and partly because of the abolition of forced labour, the output within recent years has shown a steady decline. On the other hand, the Government has done much to encourage the cultivation of rubber-producing trees; and large plantations of *Funtumia elastica*, *Hevea brasiliensis*, and *Manihot Glaziovii* have been established. According to the latest reports, however, these plantations have not yet proved successful, and their total output is almost negligible.

The oil palm also grows throughout the forest region, but hitherto the oil has been extracted entirely by native methods, and the quantity produced has been small. Recently, the Government has begun to devote more attention to the industry, and modern machinery has been introduced into several districts. Cacao, which is grown in a number of plantations, now contributes an appreciable amount to the exports of the country; and experiments are being made in the cultivation of cotton, coffee, and various textile plants. After rubber, the most important export is ivory, which is obtained from large herds of elephants dwelling in different parts of the region.

THE KATANGA, which forms part of the Congo-Zambesi divide, is at present attracting considerable attention on account of its great mineral wealth. This consists principally of copper, but tin and gold are also obtained, and other minerals are known to exist. The Palæozoic rocks, in which all these occur, lie at an elevation of between 4,000 and 5,000 feet above sea-level, in a region which is suitable for white settlement, though, owing to its remote position, the obstacles in the way of its exploitation are very great. Labour is difficult to get; and food supplies have to be obtained from Rhodesia and the Cape, as the Katanga itself is not an agricultural region, though experimental farms have recently been

established within it. The want of fuel on the spot is also a great drawback, and coal has to be imported from the Wankie field; but it is possible that power may be obtained in the future by utilising the abundant supplies of water for the generation of electricity. At present, all that can be said is that the Katanga appears to be rich in mineral wealth, that it is practically undeveloped, and that its development will be a slow and costly matter. Elisabethville, the chief town on it, is connected with the Cape-to-Cairo railway at Broken Hill in Northern Rhodesia.

COMMUNICATIONS.—The Congo and its tributaries offer nearly 7,000 miles of navigable waterway within the State, and, so far, little has been done to develop other means of communication. One railway has been constructed between Matadi and Leopoldville to circumvent the series of rapids by which the Congo descends from the plateau, upon which it flows, to its estuary; another runs from Stanleyville to Ponthierville to avoid the Stanley Falls; while a third connects Kindu with Kongolo. It is proposed to continue the line from Elisabethville to Bukama on the Lualaba, so that there may be continuous rail and river communication from the Katanga to the Atlantic.

ANGOLA

Angola, which is the largest of the Portuguese possessions, has an area of 485,000 square miles. In the north the interior of the country belongs to the basin of the Congo, while in the south it forms part of the high African plateau. Along the coast runs a plain which is narrow in the south, but in the north has a breadth of nearly 100 miles. Each of these regions has its characteristic climate. The northern interior is hot at all seasons of the year, though, owing to its greater elevation (1,500 to 3,000 feet) and more southerly position, it is less so than the Belgian Congo. The rainfall is over 40, and in places over 60, inches per year. On the plateau, which has an elevation of 3,000 to 5,000 feet, and especially on its more southerly parts, the climate is said to be healthy and bracing, and much of it is believed to be suitable for European settlement. The precipitation is less than in the north, and in the extreme south the annual rainfall does not amount to 30 inches. Except in the north, on either side of the mouth of the Congo, the coastal plain receives comparatively little moisture.

Round Loanda there is less than 20 inches, while, further south, a considerable area, which includes the western slopes of the plateau, has less than 10 inches. Three natural regions based on these considerations may, therefore, be recognised. The Congo basin and the districts on either side of its estuary are covered with tropical forest, the plateau is a savanna land, and the coastal plain and the adjacent parts of the plateau are steppe-land and desert.

THE CONGO BASIN.—The chief products are coffee and rubber. The former is grown in plantations, many of which have been made by thinning out superfluous coffee plants in those districts in which they were found growing wild. Rubber is obtained both from indigenous trees and lianes, and from plantations in which imported varieties of *Manihot* are grown. From the Kabinda, the region north of the Congo, come palm oil, rubber, and ivory. The Lunda district in the north-east has never been subdued by the Portuguese, and its trade is entirely in the hands of the natives.

THE SOUTHERN PLATEAU, with its favourable climate and large areas of fertile soil, is eminently suited for European civilisation, and a number of colonies have been established upon it, especially in the basin of the Cunene and its tributaries. Cereals, such as wheat, barley, and oats, and the fruits of temperate climes, can all be grown, and some attention is also paid to cattle raising. Further east, there is said to be land suitable for the cultivation of coffee, cotton, and cacao, but this part of the country is still unsettled. Rubber is collected by natives from a variety of plants which grow upon the plateau.

THE COASTAL DISTRICTS are generally infertile, except where irrigation can be practised, as is the case near Benguella, where there are sugar-cane plantations along the courses of several minor rivers flowing down from the plateau. The manufacture of rum, which was formerly an important industry, has now been prohibited by the Government, and it is possible that more sugar may be exported in the future. From various places along the coast, fishing is engaged in, and considerable quantities of dried fish are exported to Europe. The principal seaports are Loanda, which owes its importance to the facilities offered by the Quanza for penetration into the interior, Lobito, Benguella, Mossamedes, and Ambriz.

COMMUNICATIONS, TRADE, ETC.—Angola is, as yet, in a very undeveloped state, though the potentialities of the country are believed to be great. The total population is estimated at 4,000,000, but of these only a small number are Europeans. One great drawback is the inadequacy of the existing means of communication. The principal railway is that which starts from Lobito and runs across the plateau with the object of eventually reaching the Katanga mining district in the Belgian Congo. Of this railway, which will have a length of about 800 miles in Angola itself, nearly 250 miles have up to the present been constructed. Other lines run from Loanda to Malange, and from Mossamedes to Humpata.

THE ISLANDS OF SÃO THOMÉ AND PRINCIPE, which also belong to Portugal, are included within the Customs union of Angola, although they form a separate province. São Thomé, which lies upon the equator, is entirely of igneous formation; and its soil and climate are alike adapted to the cultivation of the cacao plant, which grows on the hill slopes to a height of over 2,000 feet above sea-level. The island now produces about 15 per cent. of the world's supply of cacao. The work on the plantations is carried on by negroes imported from Angola.

CHAPTER XXXIV

ISLANDS LYING OFF THE COAST OF AFRICA

MADAGASCAR has an area of 230,000 square miles, and a population of 3,200,000. A plateau, which occupies the central part of the island from north to south, slopes down steeply to the east and gently to the west. Climatic conditions vary greatly from place to place. The east coast is exposed to the south-east trades and receives rain at all seasons of the year; the plateau is hot and damp in summer but cold and dry in winter; the west coast is without rain during the winter months. The east of the island is forested, and rubber, both wild and cultivated, is obtained; but owing to various causes the output is tending to decrease. On the plateau, where the gneissic and granitic soils are infertile, though perhaps not so much so as was at one time believed, cattle-raising is the chief pursuit and hides are exported. Other products include raffia fibre and tanning bark, and within the last few years some attention has been paid to the cultivation of manioc and the rearing of ostriches. Gold is found in various places, and coal has recently been discovered in the south. The trade is comparatively small, and for the years 1906-10 the average value of exports and imports combined only amounted to £2,500,000. The principal ports are Tamatave and Vohémar on the east coast, Diégo-Suarez in the north, and Majunga on the west coast.

RÉUNION

The volcanic island of Réunion lies to the east of Madagascar. It has a mean annual temperature of 78°F. and a rainfall of over 60 inches, most of which falls between December and April. Sugar is the principal product of the island, but the amount grown has greatly declined within the last half century. Other products include Mauritius hemp (*Furcraea gigantea*) and manioc. Réunion is a French possession.

MAURITIUS

This island, which is a British possession, is also of volcanic origin. Climatic conditions are somewhat similar to those in Réunion.

Sugar which is the principal product is exported mainly to British India. Mauritius hemp ranks next in importance. Port Louis is the chief seaport.

NORTH-WEST AFRICAN ISLANDS

The islands off the north-west coast of Africa include the Azores, Madeira, the Canary Islands, and the Cape Verde Islands. The soil of all is volcanic, and much of it is fertile. The Azores have a mild and temperate climate and large quantities of pineapples are raised under glass for export to the markets of London and Hamburg. Oranges are also grown. Madeira with an excellent climate is engaged in various agricultural pursuits. Wine, butter, and embroidery are among the principal exports. The Canary Islands are almost entirely dependent upon bananas and tomatoes for their exports abroad, the United Kingdom providing the chief market for both. The Cape Verde Islands are still in a very undeveloped condition. The chief exports, which go to Lisbon, are coffee and castor-oil seeds. The Canary Islands are Spanish, but the others are Portuguese.

358

THE HISTORY OF THE

Faint, illegible text, likely bleed-through from the reverse side of the page.

AMERICA

360 .



CHAPTER XXXV

NORTH AMERICA

NORTH AMERICA, which may be considered to extend as far south as the Isthmus of Tehuantepec, has an area, exclusive of Greenland and the West Indies, of a little more than 8,000,000 square miles. It therefore contains about one-seventh of the land surface of the globe, and comes third in the list of continents according to size ; it is about twice as large as Europe, and has an extent about sixty-six times that of the British Isles.

Taking into consideration the geological and physical features of the whole continent, several main physiographical regions may be recognised. The first of these is the Laurentian Plateau. If a line be drawn from the Arctic Ocean, east of the mouth of the Mackenzie River, through the Great Bear and the Great Slave Lakes to the western extremity of Lake Athabasca, and from there in a gentle southward curve to the northern end of Lake Winnipeg, along the eastern shore of that lake, and then southwards to the Lake of the Woods, eastwards from there to Lake Superior, along the northern shores of the Great Lakes as far as the north-eastern extremity of Georgian Bay, and from there at a varying distance from Lake Ontario and the St. Lawrence River to a point on that river a few miles below Quebec, it will mark off the old Archæan nucleus about which the rest of the continent has grown up. This Laurentian region consists of an old mountain mass, whose height has been reduced by weathering and glacial action so that it now presents the appearance of a roughened plateau with an average elevation in the east of 1,500 to 1,600 feet, though in the west it is somewhat lower.

From the St. Lawrence, there runs in a south-westerly direction an elevated region known as the Appalachian Highland, which may be divided longitudinally into four belts parallel to one another. The first of these belts, the Piedmont Plateau, stretches from central Alabama to New York with a width varying from 60 miles in the north and south to 150 miles in the centre, and it also reappears in the east of New England. On the south-east, where it adjoins the coastal plain, it has an elevation of 250 to 300 feet,

but on the north-west, along its junction with the second belt, it rises to 1,000 feet above sea-level. This second belt is a mountain range, highest in New Hampshire and in North Carolina, formed of the same hard and resistant rock as the Piedmont Plateau. In Virginia it is known as the Blue Ridge, while in New England it forms the Berkshire Hills of Massachusetts and the Green Hills of Vermont. The third belt, the Great Appalachian Valley, stretching from the St. Lawrence to Alabama, with an average breadth of about seventy-five miles, is a region of relative depression carved out of softer Palæozoic rocks, though within it are many short ranges running parallel to one another. In the north it is occupied by Lake Champlain and the Hudson, and further south by the Shenandoah and the upper waters of the James and the Tennessee. The western boundary of this belt is formed by the escarpments of the Allegheny and Cumberland plateaus, of more or less horizontal Palæozoic strata, which slope away towards Lake Erie, the lower Ohio, and the lower Tennessee. These upland regions vary in height; in Pennsylvania they do not exceed 2,000 feet, but in Kentucky and West Virginia they have an elevation of 3,000 to 4,000 feet.

Between the Piedmont Plateau and the Atlantic, there is a low coastal plain which sweeps round the southern end of the Appalachian system, and, skirting the Allegheny Plateau, extends northward as far as the mouth of the Ohio. On the west its boundary touches the Ozark uplift, and then runs in a south-westerly direction to the Rio Grande Del Norte. This region, which may be called the Atlantic and Gulf Coastal Plain, slopes upwards from the shore, but seldom exceeds a height of 300 feet on its inland margin. It is of recent formation, and consists of weak and unconsolidated rocks, usually covered with deep and fertile soil.

From the Laurentian Plateau and the Appalachian Highland on the east to the Rocky Mountains on the west, and from the Arctic Ocean in the north to the Gulf of Mexico in the south, there stretch the great Continental Plains of which the Gulf Coastal Plain forms the southern part. The character of this continental interior varies considerably throughout, and several important subdivisions must be recognised. The sub-Arctic Plain, around the shores of the Arctic Ocean and along the lower course of the Mackenzie River, corresponds generally in configuration and altitude with the Gulf

Plain, and on the south gradually merges into the Great Plateaus. In the east of the Continental Basin the altitudes are low and the plains are either flat or gently rolling, while in the west they rise by degrees to a height of 5,000 feet along the foot of the Rocky Mountains. As these two regions—the Prairie Plains and the Great Plateaus—gradually merge into one another, it is difficult to draw exactly the dividing line between them ; but it may be taken roughly as following the Missouri Côteau in Canada, and in the United States as separating eastern and western North and South Dakota, eastern and central Nebraska and Kansas, and eastern and western Texas. To the east of this line, however, there are two regions which cannot properly be included within the Prairie Plains, one being the Ozark uplift, and the other the Lake Plains, a region lying to the south of the Great Lakes and formerly covered by them.

The Western Cordillera is the last great physical region of North America ; its structure is very complicated, and only its salient features can be mentioned here. In the north, bordered by mountain ranges, there is an undulating plateau country which forms the basin of the Yukon. Further south, besides the Rocky Mountains proper there are, in the east, the Selkirks and the Gold Range, between the last of which and the coastal mountains—the Northern Cascades—lies the interior plateau of British Columbia. South of the international boundary, the term Rocky Mountains is generally applied to the wide stretch of country extending from the western margin of the Great Plateaus in the east to the Wahsatch Mountains in the west. Over this tract there are many ranges running north and south, with great intervening valleys known as parks. To the north-west of it lies the Columbia Plateau, which has been built up by volcanic outpourings filling the depressions between the Rocky Mountain system and the Southern Cascades ; to the south of it there is the Colorado Plateau, an elevated region composed of horizontal rock in which deep cañons have been cut by the Colorado and its tributaries. Between the Wahsatch Mountains and the Colorado Plateau in the east and the Sierra Nevada in the west, lies the Great Basin, a region of inland drainage with a general elevation of 5,000 feet, and with many short ranges running across it from north to south. The general characteristics of this region are preserved in the country to the south of the Colorado Plateau, though there the drainage is

to the sea, and in the Mexican Plateau, where many of the basins are again closed. To the west of the Southern Cascades and the Sierra Nevada lies a series of coastal ranges, with the Puget Sound valley and the California valley intervening.

Mexico is the southern continuation of the Cordilleran system. Two great ranges, the Sierra Madre Oriental and the Sierra Madre Occidental, whose precise relationship with the Rocky Mountain system has not yet been definitely determined, border the country on the east and west respectively, while the intervening region is a plateau which rises from a height of about 4,000 feet on the United States boundary to over 8,000 feet in the south. This plateau has been built up in part by the débris from the surrounding mountains, and in part by discharges from the volcanoes which form so prominent a feature in the topography of the country.

CLIMATE.—A comparison and study of the position of the isothermal lines for January and July throw a considerable amount of light upon the general conditions which determine the temperature of North America. In January the isotherms, outside of the tropics, trend from north-west to south-east with a curve to the south; in July, over a great part of the continent, they run in a somewhat similar direction, but in the west they bend towards the north and are crowded together along the Pacific coast, to which they run almost parallel for considerable distances, and which they leave in lower latitudes than those in which they enter along the Atlantic. In the winter months the land is much colder than the sea, and there is a decrease in temperature along the parallels of latitude with an increase in distance from the coast. Further, as there is during the winter months a high pressure area over the land, the winds blow outwards towards the sea, especially on the east coast, as far south as the twenty-fifth parallel. As these winds, blowing from the west and north-west, are cold, the temperature of the eastern shores of Canada and the United States is greatly reduced by them. The west coast, on the other hand, is protected from cold land winds by the Western Cordillera, and the prevailing winds in higher latitudes are those blowing from the tropic high pressure belt, which extends across the Pacific ocean, and which at this time of the year lies well to the south. These south-westerly and westerly winds, having come from the south and having blown over the Pacific, are relatively warm, and have a moderating effect upon



After the Oxford Wall Maps,

by permission

RAINFALL OF NORTH AMERICA

the climate of the west coast. South of about the twenty-fifth parallel, the country lies within the belt of constant trade winds, the land mass is comparatively narrow, and the isotherms tend to follow the parallels of latitude.

In summer, the heat equator has moved northwards, the land is much warmer than the sea, there is an area of low pressure over the continent, and the winds move inland from the sea. On the east coast, in higher latitudes, they tend to blow from the south and south-west. In lower latitudes the trade winds have been sucked in from their usual course by the continental low pressure area. On the west coast, in higher latitudes, winds from the west and south-west are blowing, and these exercise a cooling influence which prevents the range between summer and winter temperatures from being great. In lower latitudes the trade winds blow off-shore, except in the extreme south where monsoon conditions prevail, the trade winds of the southern hemisphere having been pulled across the equator.

As a result of these various atmospheric conditions, the temperature along the coast is much lower than in the interior along the same parallels of latitude. The greatest extension northward of the isotherms is in the western part of the continental interior, where the influence of sea winds is least felt, and where the dryness of the atmosphere and the barrenness of the land lead to very high temperatures.

North America may therefore be divided into several regions as far as temperature alone is concerned. The Arctic lands in the north have very long, cold winters, and short and cool summers. The eastern parts of Canada and the United States have winters which are cold in the north but cool in the south, and warm along the Gulf coast; and summers which are warm in the north, but become hot in the south and around the Gulf. The great interior region has, on the whole, a more extreme climate, varying, however, according to latitude. The winters in central Canada and in the northern States are very cold, while the summers are warm. Further south the cold of winter is seldom so great, but the heat of summer is more intense. Along the Pacific coast the climate is more equable than in any other part of North America outside of the tropics.

The rainfall of North America occurs chiefly during the summer months. At this period of the year a low pressure area, running

north and south, has developed over the interior of the continent, while high pressure areas have spread northward over the Atlantic and the Pacific. The moist air is therefore sucked inwards into the very heart of the continent, and precipitation takes place as a result of cooling caused partly by increasing altitude, but chiefly by the expansion and uprising of the air in the hot continental interior. The Atlantic trade winds, moreover, are, to some extent, drawn out of their usual course by the low-pressure area over the land at this season, and a heavy monsoonal rainfall takes place along the southern part of the Atlantic coastal plain, around the Gulf, and on the eastern slopes of the mountains of Mexico. On the west coast there is a heavy rainfall as far south as Vancouver, brought by the north-westerly winds from the Pacific high pressure area, but further south the winds contain little moisture, and, as temperature increases rapidly inland, there is no precipitation. On the west coast of Mexico, however, there is a heavy monsoonal rainfall due to the trade winds of the south Pacific being pulled across the equator and turned to the right.

During the winter months the high pressure area over the continent causes the winds to blow outward. In the east, the heaviest rainfall is along the south part of the Atlantic coastal plain and round the Gulf, where, owing to the relatively high temperature, there is a considerable amount of water vapour in the atmosphere, which is drawn inland by local storms and precipitated. To the Mexican coast, also, the trade winds bring a considerable amount of rainfall. On the Pacific coast, precipitation is heavy as far south as San Francisco, the heat equator having moved southwards and the whole region being brought within the influence of the south-westerly winds. Between Vancouver and San Francisco precipitation takes place only during the autumn and winter months, but south of the latter place the winds are off-shore, and the surrounding region is as dry in winter as it is in summer.

The annual distribution of precipitation over North America as determined by these conditions is somewhat as follows : the Atlantic and Gulf Coastal Plains and the interior of the country as far north as the fortieth parallel and as far west as the ninety-fifth meridian (with the exception of the north-west corner of this region), have a rainfall of between 40 and 60 inches per year, except around, and for some distance east of, the Mississippi delta where

the latter amount is exceeded. The shores of the Gulf of St Lawrence, and the country south of the Great Lakes and east of a line running from their western extremity to the Gulf of Mexico, have at least 30 inches annually. A third region is that which lies to the south of Hudson Bay and east of a line which oscillates between the 95th and 100th meridians, and over which the mean annual precipitation is between 20 and 30 inches; this amount is also received by a great part of the Mexican Plateau, especially in the south. On the eastern slope of the Mexican tableland, the precipitation is much greater, and rises in places to over 80 inches per year. On the Pacific coast there is a heavy rainfall which, as a rule, does not extend far inland, except in the Puget Sound region. Along the coast from Sitka to Vancouver it is over 80 inches per year, and as far south as San Francisco there are at least 40 inches. The greater part of the western slope of Mexico has at least 20 inches, while a more restricted coastal strip has over 40 inches. Over the remainder of North America the total precipitation falls between 10 and 20 inches annually except in two regions. The first of these is in the extreme north of Canada, where a triangular area, with its base along the Arctic shores, receives less than 10 inches; and the second, which receives a like amount, is situated in the south-west of the United States and the north-west of Mexico. The first region lies in an area of constant high pressure, while the second lies on the west side of a continent within the belt of constant trade winds.

VEGETATION.—In this section the natural vegetation regions of the continent will alone be described, changes introduced by man, such as the substitution of agricultural land for woodland, being deferred until later.

The forests of the Atlantic and Pacific slopes differ greatly in their essential characteristics, the result of differences both in their past and present climatic environment; but they are connected by a great belt of woodland called the Northern Forest, which stretches across the continent from the one ocean to the other. Its northern boundary is coincident with the limit of tree growth, which runs along the coast of Labrador near the sixtieth parallel, across north-west Canada from the mouth of the Churchill to that of the Mackenzie, and along the north-eastern and north-western slopes of Alaska. The southern limit on the Atlantic coast may

be taken as the fiftieth parallel, and on the Pacific as the fifty-eighth. On these coasts the Northern Forest gradually merges into the Atlantic and Pacific Forests respectively; on the south-west it is limited by drought, and on the north by high winds during cold weather. The characteristic trees are the black and the white spruce, but the pine, larch, birch, and poplar are also found. This forest is not of great value; the trees grow in open formation, and, owing to the shortness and low temperature of the vegetative season, seldom reach a considerable size. On the southern margin some are suitable for timber, but over the greater part of the area they are at best fit only for pulp. The Northern Pine Belt is the continuation to the south, on the Atlantic side, of the Northern Forest. It extends inland as far as the ninety-sixth meridian, and runs southwards along the coast to the fortieth, and along the higher parts of the Appalachians to the thirty-seventh parallel; west of these mountains it does not extend beyond the forty-third parallel, where it merges into the deciduous Mississippi Forest. The white pine is the characteristic, and perhaps the most valuable tree of the region, while the black spruce, sugar maple, birch, and cedar are all extensively found.

South of the thirty-sixth parallel, the Southern Maritime Pine Belt extends along the Atlantic coast with a breadth varying from 100 to 200 miles, crosses over the Florida peninsula, and stretches along the Gulf coast as far as the flood plains of the Mississippi; it reappears in Louisiana over a small area, but gradually merges into the deciduous Mississippi Forest. The characteristic tree of this region is the long-leaved pine (*Pinus palustris*), and the southern cypress is also extensively found. The first of these trees, although coniferous, requires a somewhat warmer climate than the white pine, and is usually found on drier soils; the cypress, on the contrary, generally grows in swampy localities and near the coast.

The Deciduous Forest of the Mississippi basin and the Atlantic coast extends inland from the Atlantic coast between the thirty-sixth and fortieth parallels, and northwards from the Gulf of Mexico; it covers all the country, not already described, east of the lower Mississippi, and of a line drawn from its confluence with the Ohio to the southern extremity of Lake Michigan, together with the trans-Mississippi states of Arkansas, Missouri, and Louisiana, and

parts of Texas and Indian Territory. The characteristic trees of this region, with its high summer temperatures, are the broad-leaved summer-green trees, such as chestnuts, oaks, hickories, walnuts, and tulip trees.

On the Pacific coast the Northern Forest extends south as far as the fifty-eighth parallel. Here begins the Pacific Coast Forest which runs southwards in a narrow strip to the fiftieth parallel, where it extends inland and embraces the region of heavy rainfall around Puget Sound. South of it, the Coast Forest covers the well-watered mountain slopes, as far inland as the crests of the Cascades and Sierra Nevada, and as far south as the thirty-fifth parallel, beyond which it runs along the high ridges of the southern Coast Range to the boundary of the United States. This forest is composed chiefly of coniferous trees; in the north there are the Alaska cedar, the tide-land spruce, and the hemlock; south of latitude 54° the red fir appears and is the most characteristic tree of the coastal region as far as latitude 43° ; in the interior the yellow pine is the principal tree, but the red fir, the hemlock, and the red cedar are still important. In California the chief trees are the redwood and the red fir along the coast ranges, the sequoia, the sugar pine, the red fir, and the yellow pine along the Sierra Nevada at an elevation of 4,000 to 8,000 feet, and oaks in the valleys between.

The Interior Forest includes all the wooded areas between the extreme east of the Coast Forest and the eastern crests of the Rocky Mountains, and between the Northern Forest and Mexico. This forest is thin and poor, when compared with that along the coast, and is found on high mountain slopes which catch the rain, and along the river courses. On the east of the Sierras and Cascades, and on the west of the Rocky Mountains, especially in the south, there is to be found mountain mahogany, yellow pine, spruce, and white pine.

The unforested areas of North America fall into three main groups—the tundras, the grasslands, and the deserts and semi-deserts. The tundras lie to the north of the limits of tree growth, and in Canada are generally known as the Barren Grounds. The extremely short vegetative season, after the snow has melted and the ground has thawed, prevents the development of higher forms of plant life, and mosses and lichens are the dominant species.

Under favourable conditions there are also many shallow rooted plants and berry bearing bushes, all forming a continuous covering, but elsewhere large tracts are bare.

The grasslands cover a much more extensive area, occupying the whole country between the Atlantic and the Pacific Forests. Two distinct types must, however, be recognised. A large region, which lies east of the line separating the Prairie Plains and the Great Plateaus of North America, and west of the Atlantic forests as already described, as well as the northern part of the unforested area belonging to the Canadian section of the Great Plateaus, consist of mixed woodland and grassland, the latter predominating. This is the debatable area between woodland and grassland. The rainfall is sufficient for the former, and it is believed, indeed, that the whole prairie region was at one time forested, but that, the trees being once destroyed, grass obtained the mastery owing to the fine adjustment of climatic and edaphic conditions. Whatever be the true solution of this question, and it has been the subject of much controversy, the region under consideration now forms the greatest natural meadow in the world, the grasses growing in close formation. To the west of it, the country is an original steppe, except along the valleys of the rivers, where trees are sometimes found. From east to west this steppe becomes more xerophilous in character; in the east it approaches meadow, and in the west desert, the controlling factor being the increasing scarcity of moisture.

Large areas in Oregon and Idaho, Nevada, Utah, Arizona, and New Mexico are unforested, and over the greater part of this region sage bush, which covers hundreds of thousands of square miles, is the prevailing vegetation. It is here that there is a nearer approach to desert conditions than in any other part of the United States. Further south these same conditions extend over Lower California and a considerable part of the Mexican plateau.

NATURAL REGIONS OF NORTH AMERICA. CANADA.—As the greater part of Canada east of the Cordillera drains into the Gulf of St. Lawrence, Hudson Bay, and the Arctic Ocean, while the corresponding part of the United States drains into the Atlantic and the Gulf of Mexico, there is some justification for seeking a division of North America into natural regions which do not violate international boundaries.

The Laurentian Plateau is clearly marked off from the remainder of Canada. The Archæan rocks of which it is composed, the character of its topography, the poor and scanty soil which covers it, and its climate which is typically that of the high latitudes of the eastern part of a great land mass, all separate it from surrounding regions. Over so great an area temperature and rainfall naturally vary, and it embraces part of two vegetation zones, but the dominating geological, topographical, and climatic facts constitute it one natural region which may be subdivided.

The Maritime Provinces form a natural region for somewhat different reasons. They do not belong to the Laurentian region, and are separated by the Appalachian uplift from the more recently formed lands of the continent. Their geological structure is varied, but is largely carboniferous, the soil is good in places, and the climate is less extreme than on the Laurentian Plateau, or even in the St. Lawrence valley. Their position gives them a certain unity, and makes them Canadian rather than American; their ports are Canadian ports giving access to the Canadian interior; and their economic conditions are different from those of the New England States farther south.

The third region comprises the lowlands on both sides of the St. Lawrence, between the Laurentian Plateau on the north and the Appalachian mountains on the south, and the Ontario peninsula may also be included within it. The whole of this region is overlain with glacial débris or river deposits, and it is relatively flat, fertile, and suitable for cultivation. Its climate is intermediate between that of the maritime provinces and that of the continental interior, and many of its products occur throughout the whole region. The St. Lawrence is one of the most important factors in its economic development, and binds its various parts together.

The next region, which may be called the Winnipeg Basin, lies east of the Cordillera and west of the Laurentian Plateau. Its northern boundary may be provisionally defined as lying in the belt of country, north of the 54th parallel, which separates the agricultural regions of central Canada from those regions further north where, because of the lack of a sufficiently long summer, cultivation is impossible except in specially favoured localities. The whole of this area has been covered with glacial drift or has formed the floor of glacial lakes. Its topography is flat in the east, undulating in

the west, and hilly only in places. Its climate is extreme, its rainfall limited, and its vegetation is that of an unforested or only slightly forested country. North of the intermediate belt, lie the Athabasca-Mackenzie Plains with their generally flat physical features, their cold winters but fairly warm summers, and their forest vegetation.

In the Cordilleran region physical features form the best basis for the division of the country into natural regions. In the north is the basin of the Yukon with its low temperature, scanty vegetation, and great mineral wealth. Further south is the interior plateau of British Columbia, bordered by high mountains, and separated from the Yukon in the north and the Columbia plateau in the south by the coalescence of irregular ranges. The temperature is higher than in the Yukon, the rainfall is greater than south of the international boundary, and, although the region is not homogeneous, it may for present purposes be treated as one.

THE UNITED STATES.—The New England States, which belong to the northern part of the Appalachian system, form a natural region. They consist of a glaciated peneplain from which much of the soil has been removed, and over which great glacial blocks render cultivation difficult. They are isolated from the remainder of the continent, and communication with the interior is greatly impeded. The inhabitants eventually found agriculture unprofitable, and turned to manufactures, finding a source of power in the waters descending glacial-dammed valleys.

The Middle Appalachian States, with the corresponding part of the coastal plain, really form a unit despite differences in topography, climate, and products. Their position with regard to the ocean and the interior, their communications, and above all their great coal supplies, knit them together and make them the great manufacturing region of the United States.

The Southern Appalachians differ in structure in some respects from the Northern. They possess both coal and iron, and their position in relation to the great cotton-growing region of the United States is leading to a distinct type of economic development.

To the west of the northern part of the Appalachians is the glaciated area of the central plains. The Laurentian ice-sheet made its way southwards during glacial times, entered what is now the

United States, and covered all the area east of the Missouri and north of a line drawn from Nashville, by way of Philadelphia, to New York. Over the central plains the till deposited by the ice-sheet generally forms a fertile soil, the land is flat, and, outside of the forested area easily cultivated; the climate, cold in winter, is warm in summer, and the rainfall is sufficient for the growth of wheat and maize. All these conditions mark this area out as the great agricultural region of the United States. Along with it may be included the remainder of the prairie region north of the Ozark uplift.

The Atlantic and Gulf Coastal Plains, along with which that part of the prairie belt south of the Ozark uplift may be included for the sake of convenience, are destined by climatic conditions to be the great cotton-producing region of the United States. Their economic development differs in many respects from other parts of the country, and these differences are primarily due to the nature of the geographic control.

The Great Plateaus are marked out by physical features, climate, and vegetation as one large natural region. Their undulating surface, considerable elevation, dry climate, and xerophilous vegetation combine to distinguish them from the regions further to the east. Within so great an area there are naturally considerable differences, but with certain exceptions, to be noted later, the general character of the country remains the same throughout.

As in Canada, so also in the United States, the Cordilleras are most conveniently divided into natural regions determined by physical features. The Columbia plateau, built up of lava outpourings, receives but a small rainfall, and a large part is semi-desert covered with sage bush. The soil, however, is fertile, and when water can be obtained large crops are produced. The Rocky Mountain region presents a much less desert-like appearance. The topography is more varied, the rainfall greater, and the vegetation richer. The hill-tops are bare, but the lower slopes are well forested and the parks grass-covered. The Great Basin differs in physical structure and climate from surrounding areas. The region is largely semi-desert, but in places there are facilities for irrigation, and the soil is fertile. The Colorado Plateau is in the desert part of the United States. Physical configuration, soil, and climate all make the region one in which very little economic activity

is possible. The Pacific Slope is distinguished from the remainder of the Western Cordillera by its physical configuration, its coastal position, its heavier rainfall, its slight range of temperature, and its richer vegetation. As in some of the previous regions several subdivisions must be recognised.

The division of Mexico into natural regions will be discussed later.

CHAPTER XXXVI

CANADA

THE LAURENTIAN PLATEAU.—The general characteristics of the Laurentian region have already been described, and it remains to trace their effect upon its economic development. The great shield of Archæan rocks, of which those known as Laurentian are the most widely distributed, although others called Huronian and Keewatin occur in many places, weathers down into a poor and infertile soil. From the upper parts of the plateau much of this soil was removed by the glacial ice-sheet, and in many places the bare ice-polished rocks still appear on the surface. In the valleys the soil is frequently much deeper, but it is only along the river courses, where the débris from the rocks has been resorted by river action and mixed with sediment, that it is really fertile. An exception to this general statement ought to be made, however, in favour of these localities, for example, along the west coast of Hudson Bay, where inliers of younger rocks have weathered down into a much better soil.

To these unfavourable conditions of soil must be added conditions of climate equally unfavourable. The greater part of the whole region has a summer temperature too low for successful agriculture, and it is only in the more southerly parts that cultivation is ever likely to be profitable. With the development of the mineral resources of the region, and the consequent opening up of its communications, it is quite probable that numerous small agricultural communities may ultimately settle in favoured localities. These will probably have recourse to mixed farming, but, although they will meet a gradually growing local demand, they are hardly likely ever to affect the world's supply of agricultural produce.

To the south of lines connecting the Seven Islands, in the Gulf of St. Lawrence, with the southern part of James Bay, and the mouth of the Albany with the Lake of the Woods, the Laurentian area is covered with trees of the Northern Pine Belt, and this is one of the great lumbering districts of Canada. The multitude of rivers, the hard winters, and the spring floods, all facilitate the movement of the timber from the forest; while the falls, which

occur on the margin of the plateau, provide water-power for saw-mills. In this region, also, and for somewhat similar reasons, the manufacture of wood pulp has become of considerable importance. Among the chief centres of the industry are the districts round Chicoutimi, near Lake St. John, where water-power is abundant, Sturgeon Falls on Lake Nipissing, and Hull, Buckingham, Lachute, and Sault Ste. Marie, all on the margin of the Laurentian Plateau.

Although only relatively small areas of the Laurentian Plateau have as yet been carefully prospected, the mineral wealth of the region would seem to constitute its chief claim to economic importance. It is found mainly in those districts in which rocks of the Huronian, Keewatin, and Hastings-Grenville formations prevail, although it also occurs along with intrusive igneous rocks. Of these various formations there are considerable areas in the south, and they are also believed to occur in other parts of the plateau.

The most important minerals obtained from the region under consideration are copper, silver, and nickel. The first of these is found chiefly in the nickel-copper mines at Sudbury, which, although previously known, were not regarded as of much importance until attention was drawn to them in 1883. Since then they have been extensively worked, and in 1911 produced about 17,000 tons of nickel and 9,000 tons of copper. The Sudbury mines, along with those of New Caledonia, practically produce the world's supply of nickel. Copper is also found along the north shores of Georgian Bay, following the line of the Canadian Pacific Railway, but the output is as yet of little importance. In 1903 extensive deposits of silver were found at Cobalt, about 100 miles north-east of Sudbury, and within the last few years the production of this region has greatly increased, the yield for 1911 being 30,000,000 ounces. Along with the silver, cobalt and nickel are also found, the former in such quantities indeed that it is unsaleable. Iron ores occur in various parts of the Laurentian region, but have not been worked to any great extent. The largest output is at the Helen mine in Michipicoten, which in 1911 produced 230,000 tons. Considerable quantities of good iron ore are said to exist in Ungava, and it has been suggested that power to work them might be obtained from the Grand Falls on the Hamilton River.

¶ Although great interest is at present being taken in the Laurentian Plateau, and more especially in its southern parts, geographical

conditions decree that it will remain a mining and lumbering rather than become an agricultural country.

THE MARITIME PROVINCES.—The Maritime Provinces belong in part to the Appalachian system. On the north-west of New Brunswick, and along the coast of the Bay of Fundy, the land, consisting chiefly of pre-Cambrian rocks, in which those of igneous origin prevail, rises to heights of over a thousand feet, while the intervening area, covered with Carboniferous strata, seldom exceeds a few hundred feet. In Nova Scotia a number of ridges, formed by the outcrop of harder rocks, run more or less parallel to the general trend of the peninsula, and are continued in Cape Breton Island, being separated from one another by valleys resulting from the removal of less resistant formations. Along the Atlantic coast the rocks are chiefly Silurian, but in the west of Nova Scotia and Cape Breton, as well as in Prince Edward Island, which is low-lying, Carboniferous and Permian formations with large granitic areas are found.

The climate of the Maritime Provinces is, as a result of latitude, less severe than that of the Laurentian Plateau, and, as a result of proximity to the ocean, less extreme than that of Central Canada. The following figures show its general characteristics :—

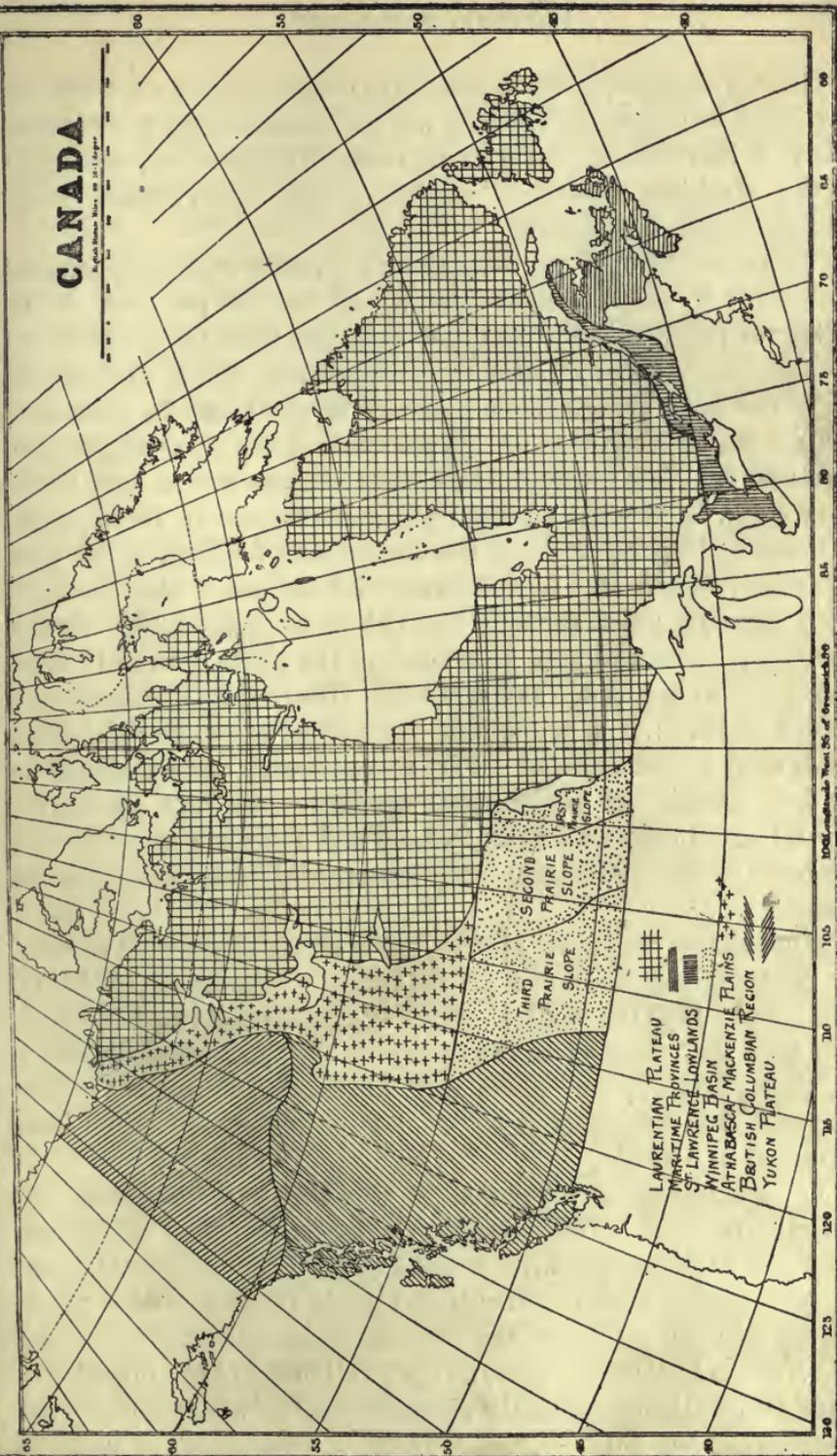
	Mean temperature for three warmest months.	Mean temperature for three coldest months.	Mean annual precipitation. Inches.
Charlottetown (P.E.I.)	62·1° F.	18·0° F.	41·78
Halifax (N.S.) ..	62·4	23·9	54·74
Fredericton (N.B.) ..	63·5	15·4	43·71

The chief agricultural areas of the Maritime Provinces are found in the Carboniferous lowlands of New Brunswick; along the shores of the Bay of Fundy, where land reclaimed from the sea may be fertilised year after year by the opening of the sluices in the dykes; on the western intervalle lands of Nova Scotia, where Carboniferous and Permian rocks prevail; and in Prince Edward Island.

Within the last thirty years the character of agriculture in these regions has undergone a considerable change. Since 1881 the area under wheat has decreased, while that devoted to dairy-farming, stock-rearing, and fruit-growing, has largely increased. The reasons for this change, which is even more marked in the St.

CANADA

English Metric Scale, 1:1,000,000



1000 Kilometers, 1:1,000,000

NATURAL REGIONS OF CANADA

Lawrence Lowlands, will be discussed in connection with that region. The great fruit-growing districts are the Annapolis and Cornwallis valleys in Nova Scotia, which contain over 70 per cent. of the orchards of the Maritime Provinces, apples, plums, and cherries, being among the chief products.

The importance of the Maritime Provinces has been greatly augmented by their mineral wealth, and over 50 per cent. of the total coal production of Canada is obtained from the coalfields of Nova Scotia. These are the Sydney coalfield, which extends for thirty-two miles along the sea coast of the north-eastern extremity of Cape Breton and produces 72 per cent. of the total output, the Inverness coalfield, along the west coast of Cape Breton with about 6 per cent., the Pictou coalfield in the north-west of Nova Scotia with nearly 13 per cent., and the Cumberland coalfield in the west with nearly 9 per cent. In New Brunswick the Grand Lake coalfield, about seventy miles north of the city of St. John, yields a small quantity not amounting to 1 per cent. of the whole. In 1911 these fields together produced 7,000,000 tons. The coal is bituminous and of good quality; it is suitable for the production of gas and coke, and is used as a steam coal. Part is consumed at home, chiefly in the iron works, but considerable quantities are sent by rail or shipped, more especially from Sydney and Louisbourg, up the St. Lawrence as far as Montreal, and along the Atlantic coast as far as Boston.

Although iron ore occurs in many parts of the Maritime Provinces, the production is small and in 1911 hardly amounted to 54,000 tons. Since 1896 the Wabana mines in Bell Island, Newfoundland, have been the principal source of supply for the iron works which are situated chiefly at Sydney and Londonderry. In 1911 these produced 260,000 short tons of pig-iron, most of which was converted into steel.

The agricultural development of the Maritime Provinces will probably be slow. The valuable timber resources of the region retard the expansion of farming and give an impetus to lumbering; the development of the coalfields and the facilities for the importation of iron ore encourage the growth of manufactures; the rich fishing grounds of the continental shelf call many of the inhabitants to the sea, and, along with the possession of the winter ports of the Dominion on the Atlantic, enable them to retain much of their old

interest in maritime affairs. Halifax, on the east coast of Nova Scotia, is generally open throughout the year, and St. John, in New Brunswick, is always open. Both are connected by rail with Montreal.

THE ST. LAWRENCE LOWLANDS are underlain by nearly horizontal Palæozoic strata, and covered with glacial débris and river deposits ; they are, on the whole, flat or gently undulating, fertile, and suitable for cultivation. The climate is somewhat more extreme than in the Maritime Provinces, but less so than in the centre of Canada. Its general character is indicated by the undernoted figures :—

		Mean temperature for three warmest months.	Mean temperature for three coldest months.
Montreal	..	66·9° F.	15·7° F.
Ottawa	..	66·7	13·7
Toronto	..	66·4	23·2

The precipitation of the whole region is considerable, being between 30 and 40 inches ; most of the cyclonic disturbances which pass across North America leave by the St. Lawrence valley.

The agriculture and manufactures of Ontario and Quebec are practically confined to the St. Lawrence Lowlands, where soil and climate are favourable, and where the rivers and lakes offered a great means of communication along which settlement took place.

The change in agricultural conditions, indicated in the section on the Maritime Provinces, is more pronounced in this region, and especially in Ontario. During the last thirty years the area under wheat has decreased, while increased attention has been paid to dairying, fruit-farming, and stock-raising. The change was due to the opening up of the wheatfields of the west ; the eastern farmer, his land exhausted by successive crops of wheat, found himself unable to compete with the virgin soils of the west, and after a time abandoned the cultivation of that cereal in the less suitable districts, finding in the products of the dairy, the orchard, and the pasture, articles for which there was a considerable demand both at home and abroad. The change is less marked in Quebec, where the main object of the French habitant is to obtain from his farm a living for himself and his family rather than to grow for

the market, and where the great conservatism of the bulk of the people renders them impervious to new ideas.

Manufactures in Canada are still in an early stage of development, and consist chiefly in preparing the products of the farm, the mine, and the forest for export abroad. Further progress has been retarded by a variety of conditions. For one thing there is not a large amount of available capital; much money has been invested in land and in agriculture; much is required to finance agriculturists at certain seasons of the year; and large sums have also been spent in laying down railways and in opening up communications. Another drawback has been the smallness of the Canadian market; the French habitant has always made it his aim to purchase as little as possible; for long the Ontario farmer was too poor to buy much; export to a foreign country was impossible. Moreover, the Canadian, belonging to an essentially agricultural community, was not, until recently, seriously interested in manufactures; and there was the additional difficulty that the requisite skill was not always easily obtainable. On the other hand, Canada has great advantages in her large exports of wheat and timber, both offering opportunities for the expenditure of additional labour; in her mineral wealth, which is only now becoming properly known; in her rapidly increasing agricultural population, demanding alike food and clothing, and the means wherewith to cultivate the soil; in her expanding railway system, with its constant demands for rolling stock; and in all the needs of a vigorous and prosperous community.

The St. Lawrence Lowlands contain the chief manufacturing districts in the country, and about 80 per cent. of the total value of the manufactured products of the Dominion may be credited to the two provinces of Quebec and Ontario, the industrial life of which is largely, though not entirely, concentrated in the lowlands.

Ottawa is the centre of the timber industry; pulp-mills have been established in several places where water-power is available; and paper is manufactured at Toronto. The tanning of leather and the manufacture of boots and shoes are leading industries of Quebec; and Montreal provides the Dominion with ready-made clothing. Flour-milling is carried on at a number of towns, especially in Ontario, and butter and cheese are made for export at thousands of places throughout the region. Cotton is manufactured near Quebec with power derived from the Montmorency Falls,

and at Sherbrooke and elsewhere in the Eastern Townships. Iron and steel works have been established, among other places, at Montreal, Hamilton, and Toronto, where agricultural implements are also manufactured.

THE WINNIPEG BASIN, as already defined, has an area of about 275,000 square miles. In general appearance it is a great plain sloping gently down to the north and east; but it may be subdivided into regions known respectively as the first, second, and third prairie steppes or slopes. The first of these is bounded on the east by the Laurentian country, and on the west by a line of heights which cross the international boundary about forty miles west of the Red River, and run in a north-westerly direction. This slope has an average elevation of about 800 feet and an area of about 30,000 square miles. It belonged to the bed of the glacial Lake Agassiz, and the glacial deposits with which it is covered constitute a stiff, compact, "unctuous" clay of great fertility. The second prairie slope is bounded on the west by a height known as the Missouri Côteau, which crosses the international boundary about 250 miles west of the previous escarpment, and like it runs in a north-westerly direction. This slope, which consists chiefly of rolling prairie, is drift-covered; it has an average elevation of 1,600 feet, and an area of about 100,000 square miles. The third slope, with a breadth of 465 miles at the international boundary, rises from a height of 2,000 feet in the east to one of 4,000 feet along the foothills of the Rocky Mountains. The plains, which are drift-covered, are generally more undulating in character than on the first and second slopes, and are broken up in places by hilly regions.

The climate of the Winnipeg Basin is continental in character, and the range between summer and winter temperatures is, as shown in the following table, very considerable.

	Average mean temperature of three coldest months.	Average mean temperature of three warmest months.
Winnipeg	·03° F.	63·5° F.
Qu'Appelle ..	3·3	61·7
Prince Albert ..	·4	59·4
Medicine Hat ..	14·8	65·3
Edmonton ..	11·1	59·1
Calgary	15·4	57·8

It will be observed that over the whole region the mean summer

temperature is sufficient for the growth of wheat and other cereals, although there is danger in many places from early autumn frosts. The great difference between winter temperatures in the east and in the west is due to the influence of the warm Chinook winds which prevail over the latter area. These winds, which blow chiefly in winter, come from the Pacific, but owe their high temperature to compression while they are descending the eastern slopes of the Rocky Mountains.

The rainfall over the eastern and northern parts of the Winnipeg Basin varies from 15 to 20 inches per year, but, in the south-west, there is a large area where it is less, and where, consequently, conditions are much less favourable for arable farming. The southern parts of the first and second slopes constitute at present the wheat-producing region of the Winnipeg Basin. The great stretches of flat prairie, which formed the bed of Lake Agassiz, with their fertile soils, sufficient precipitation, high summer temperatures, and great facilities for easy cultivation and communication, make one of the richest agricultural regions of the world. The corresponding part of the middle slope, though somewhat drier, more especially in the west, has, with the advent of American farmers accustomed to less humid conditions than prevail along the Atlantic seaboard, made rapid progress, and now contains more than half of the wheat lands of the Winnipeg Basin. Throughout these districts wheat may be regarded as a certain crop, and the average yield is relatively high, being about 18 bushels per acre.

In the northern parts of the eastern and middle slopes the land is more broken in character, the drainage in places is bad, and the climate is less favourable. Considerable areas, moreover, on the eastern slope especially, are occupied by communities of Russians and Galicians, whose knowledge of agriculture is somewhat primitive, and who farm for sustenance rather than for export. Mixed farming, accordingly, prevails here to a much greater extent than in the south.

On the third prairie slope, which contains the south-western part of Saskatchewan and the southern part of Alberta, conditions, especially in the semi-arid region in the south, are at present less favourable to agriculture. The semi-arid area "is bounded on the south by the international boundary, on the east and north by a line commencing at the intersection of long. 102° W. with the

international boundary, and running from thence north-westerly to lat. 51° 30', and thence west to the Rocky Mountains. This portion of the territories contains about 80,000 square miles." In this district, fall wheat may be grown in favoured localities without irrigation, but, generally speaking, some modifications in the usual methods of farming are necessary to ensure a certain crop. To the east and north of the semi-arid region wheat may be grown over large areas, although in some parts, more especially in the north-west, oats form a more suitable crop, and the general tendency is to the development of mixed farming.

It will be noticed that the wheat belt of the Winnipeg Basin runs across it from south-east to north-west, following the general trend of the isotherms. On the north-east it is limited by cold, and on the south-west by drought.

The following figures indicate the nature of the progress made in wheat cultivation by this region within recent years.

	CANADA.		THE WINNIPEG BASIN.	
	Area. Acres.	Production. Bushels.	Area. Acres.	Production. Bushels.
1901.	3,961,000	84,814,000	2,516,000	62,820,000
1911.	10,373,000	215,851,000	9,301,000	194,083,000

The distribution of wheat upon the three prairie slopes was as follows in 1911:—¹

	Area (acres).	Production (bushels).
Eastern slope ..	1,277,000	25,698,000
Middle slope ..	6,707,000	121,363,000
Western slope ..	2,195,000	46,718,000

The rapid development of Canadian agriculture, which, as indicated above, has taken place within recent years in the Winnipeg Basin, has naturally led to much speculation as to the future possibilities of the region. It is generally admitted that the present production of the land is but a fraction of what it will ultimately be, but with regard to its potential resources there are grave divergences of opinion. A few years ago several estimates of the future production of wheat in the Winnipeg Basin were made by competent authorities, and they varied in amount from

¹ Compiled from Provincial Reports, which in respect to acreage do not agree with the Census figures for 1911 quoted above. The crop of 1911 was above the average.

250,000,000 bushels annually, to 800,000,000 bushels. All such estimates, however, must, from the very nature of the case, be extremely hypothetical in character, and for their fulfilment must depend upon the extent to which the demands of the country are met. Of these, the most pressing are an increase in population and a further development of communications. It has been estimated that a rural population of 900,000 is absolutely essential to procure an annual yield of 250,000,000 bushels. The rural population in 1911 (the last Census year) was 848,000, and it is probable that no considerable increase will be necessary before the lowest estimate of the possible yield is reached. For the highest, 800,000,000 bushels, it is estimated that a rural population of 2,880,000 would be necessary. Clearly, so large a population, acquainted with the agricultural methods of Central Canada, cannot be obtained for some time, though that it will ultimately be forthcoming, if required, is a matter of little doubt. There are several sources from which it may be recruited. Within recent years a considerable movement from Eastern Canada has taken place, and there has also been a large influx from the United States, made up in part of Canadians or their descendants who emigrated from Canada during the 'eighties, in part of native-born Americans, and in part of naturalised Americans from the continent of Europe. From Great Britain, and from several continental countries, especially Scandinavia, Russia, and Galicia, there is also a steady flow. The settlers from the Eastern Provinces and the United States are perhaps the most suitable, as they already possess a knowledge of farming under Canadian conditions ; of those from Great Britain, the Scottish are generally recognised as more adaptable than the English ; while of those from continental countries, Icelanders, Scandinavians, and Galicians are amongst the most satisfactory. The following figures for the fiscal years 1905-11 (inclusive) indicate the extent of the immigration into the whole of Canada, and the countries from which the immigrants are principally drawn.

From the United Kingdom	.	498,473
From the United States	.	435,971
From other Countries	.	308,542
<hr/>		
Total	.	1,242,986

The climatic conditions of the country present another set of problems. Over no small part of the area on which wheat can be profitably grown, there is the ever-recurring danger of the crop being damaged by early autumn frosts, and, although it is not necessarily rendered useless thereby, it is greatly reduced in value. One of the great demands of the farmer, therefore, is for quick ripening and frost-resisting varieties, and the development of such is being carried on with success on experimental farms in various parts of the Dominion. In the semi-arid area, the deficiency of moisture frequently renders ordinary agricultural methods of no avail, and irrigation and dry farming have to be summoned to the farmer's aid. The two largest districts irrigated at present are situated, the one to the east of Calgary, where a block of 3,000,000 acres, which was granted to the Canadian Pacific Railway, obtains sufficient water from the Bow River to ensure the growth of crops over half its area ; and the other, and less important, in the neighbourhood of Lethbridge, where water can be obtained from the St. Mary's and Milk Rivers. It is not improbable that the future may see a considerable development of irrigation in the western parts of the semi-arid region where a number of streams come rapidly down from the Rocky Mountains. For the full benefit to be derived from irrigated land, it is maintained that hay and fodder must be grown as well as cereals. The ranching industry of the region will therefore also benefit, as stock raised on the prairies can be " finished " for market on the irrigated lands. The system of dry farming, beginning to make its way into Canada, is somewhat as follows : the land is deeply ploughed and well worked ; the subsoil is beaten into a compact mass so as to retain whatever rainfall there is within reach of the plant ; while on the surface there are about three inches of loose soil, the effect of which is to prevent evaporation. Land treated in this way is usually cropped once in two years, but the yield is above the average.

The subject of communications will be dealt with in a later section. The development of railways is absolutely essential for the economic welfare of the north-west, but, as there is no reason to believe that it will be wanting, the subject need only be mentioned here.

As the Winnipeg Basin is underlain mainly by Cretaceous and, in places, Tertiary materials, those minerals which are found

associated with the older rocks are generally absent. The mining industry is therefore confined to the exploitation of the seams of lignite which underlie the greater part of Alberta, south of the fifty-fifth parallel, and extend eastwards into Saskatchewan. Coal of a similar character is found in the Cypress Hills and Wood Mountains of southern Saskatchewan, and is also believed to exist in Turtle Mountain in Manitoba. Edmonton is at present the chief mining centre of all this region, but there are many small mines scattered over the country, and it is said that almost every rancher owns one. Notwithstanding its lignitic character the coal is of considerable economic importance as the country is treeless, and cheap fuel of some kind is absolutely essential for the agricultural population which is so rapidly increasing in numbers. From the mines in the south of Saskatchewan a considerable amount is sent as far east as Winnipeg. Natural gas has been found at Medicine Hat in the south of Alberta, and in the north along the Athabasca.

Winnipeg, situated at the confluence of the Assiniboine and the Red River, and midway between the international boundary and Lake Winnipeg, is the great collecting and distributing centre, and the chief industrial town, of the region. Other towns serve mainly as local centres for the districts in which they are situated, and carry on a few primary manufactures.

THE ATHABASCA-MACKENZIE PLAINS.—To the north of the Winnipeg Basin, and between the Laurentian Plateau and the Rocky Mountains, the Athabasca-Mackenzie plains slope down gently towards the Arctic. In the south there are extensive grasslands intermingled with trees, but further north the country is covered by the thin and poor sub-Arctic forest. Owing to decreasing altitude towards the north, together with the increasing length of the day during the summer months, the mean temperature at that season of the year remains relatively high, as the following figures indicate.

	June.	July.	Aug.	Mean.
Dunvegan, 56° N. (approx.)	56·5° F.	61·3° F.	57·4° F.	57·7
(On Peace River)				
Chipewyan, 59° N. (approx.)	54·0	61·5	58·2	57·9
(On Lake Athabasca)				
Fort Simpson, 62° N. (approx.) ..	55·5	60·2	55·7	57·0
(On Mackenzie River)				

Of the agricultural capacities of this country it is difficult to speak with certainty. It is true, no doubt, that crops of barley have been raised at Fort Simpson, and that wheat has been grown at Fort Providence in almost the same latitude. But it must be borne in mind that, although these crops are grown only in the most favourable localities at the present time, they are always liable to be destroyed by frost. It is probably safe to argue that, while, with the development of frost-resisting wheats and the slight improvement in local climatic conditions which appears to follow the tilling of the soil, the cultivation of wheat may extend, in the low lands, some distance to the north of the Winnipeg Basin, the southern part of the region under consideration is mainly suitable for a limited amount of mixed farming, and the more northerly parts will remain as they are at present.

BRITISH COLUMBIA.—This section of the Western Cordillera, although considered as one natural region, really consists of a large number of such regions, each of which conforms to one or other of a few distinct types. It extends from the Rocky Mountains in the east to the coastal ranges on the west, and includes both; in the south the intervening land is occupied by a grouping of several irregular ranges, and in the north between the 58th and 60th parallels there is a mountainous country which separates it from the Yukon Plateau lying beyond. To the west of the Rocky Mountains, in the south, and separated from them by the Upper Columbia and Kootenay rivers, is the Selkirk Range, which in turn is separated from the Gold Range by the southward flowing Columbia. Beyond this lies what is known as the Interior Plateau, a mountainous region with an average height of about 3,500 feet, intersected by river valleys, which, in the case of the large ones, do not rise to an elevation of more than 1,000 feet above sea-level, while the intervening heights seldom exceed 5,000 feet. The west coast is much broken up by deep, fiord-like indentations, and is fringed by a long chain of islands, which are the continuation northwards of the Olympic mountains of Washington.

The geological formation of the region is extremely complicated. The Rocky Mountains and Vancouver Island consist chiefly of sedimentary measures of Palæozoic age which contain infolded Mesozoic strata; the coastal ranges are built up of granitic rocks; while the interior plateau contains large tracts of country covered

by volcanic rocks of Tertiary times, and great areas of intrusive granitic rocks. Further north, wide stretches of Cretaceous rocks are found.

The climate of the whole of this region is very different from that of Eastern and Central Canada, and is determined mainly by the prevailing westerly winds which, blowing over the North Pacific, are relatively warm in winter and cool in summer. Thus the range between summer and winter temperatures is greatly reduced as the following figures show :—

	Mean temperature for three coldest months.	Mean temperature for three warmest months.
Victoria	39·7° F.	58·8° F.
Kamloops ..	26·8	66·7

In winter the isotherms run from north-west to south-east, while in summer they trend northwards, more or less parallel to the coast, before making their great bend to the south-east. The precipitation of the whole region varies greatly. Along the windward slopes of the coastal mountains it is very high, being frequently between 70 and 100 inches, and on some of the islands even the latter amount is exceeded. On the leeward slopes it decreases, and over a wide belt running north and south across the Interior Plateau it does not exceed 10 inches ; but on the west side of the Rocky Mountains it increases again to over 30, and in some places to over 40 inches per year.

The vegetation of the region varies with climate. The greater part, except in the north, is forested, but in the southern interior, where the rainfall is low, there are wide stretches of grassland. Among the more valuable trees are the Douglas fir, the red cedar, the yellow cedar, the maple, and the western oak. Next to mining, lumbering is the most important industry of British Columbia, and large quantities of valuable wood are exported. Within recent years, sawmills have been set up in the mountainous districts away from the coast for the supply of timber to the treeless plains further east. Preparations are also being made for the establishment of pulp factories.

Agricultural conditions differ considerably from those prevailing east of the Rocky Mountains. There is much fertile land, but it is scattered throughout the country, in the river valleys, along lake shores, on the deltas, and in other districts which have been

cleared of timber. In the dry belt, where grassland occurs, irrigation is necessary to ensure good crops. Mixed farming is general in the southern part of the province. Cereals are grown in many places, but are chiefly used for feeding stock, ranching being an important industry. Further north, along the route of the Grand Trunk Pacific Railway, and in the Peace and Athabasca river districts, more attention is being paid to the cultivation of wheat, but the amount produced is still small. As much of the land is forested, and as cultivation is more difficult than in the east, it is probable that progress will be slow, and that it will not be until more intensive cultivation is necessary in the Winnipeg Basin that wheat-growing on a large scale will prove remunerative west of the Rocky Mountains.

Fruit-growing is one of the most important industries in the south of British Columbia. In all the fertile valleys, west of the Rocky Mountains and south of Cariboo, apples, pears, cherries, plums, and small fruits can be grown. Peaches, grapes, and nectarines are chiefly raised in the interior, south of the trans-continental line, where the warm dry summers produce excellent crops, but render irrigation necessary. Among the principal districts in which fruit is at present grown are Vancouver Island, New Westminster, Okanagan, Lillooet, Yale, and Kootenay.

British Columbia accounts for nearly one-third of the annual value of Canadian fisheries. The Fraser and other rivers along the west coast are ascended each year by vast numbers of salmon, and these contribute about two-thirds of the value of the annual output. Halibut fishing ranks next in importance, and a certain amount of sealing and whaling is also carried on.

Mineral wealth is both abundant and varied, though its full extent is unknown. Gold occurs in placer deposits in many parts of the interior; and it is worked by hydraulic methods, chiefly in the Cariboo district, though the output is small. Gold-copper deposits are frequent in the regions of contact between intrusive granites and older rocks, which lie to the west and south of the Arrow Lakes; and of the two chief producing regions at present, the first is situated in the basin of Trail Creek, which drains into the Columbia, and has Rossland as its chief town; and the second is Grand Forks, in the Boundary district of Yale. The production of gold obtained by lode-mining from these and other areas amounts in

value to over £1,000,000. Copper is produced in the same localities, the output of the Boundary district being over one-half of the total annual output of the Cordilleran region ; while the mines at Rossland produce about one-ninth, and the copper districts situated at various points along the Pacific coast about one-fourth. The total amount averages 42,000,000 lbs. Silver-lead deposits are found also in regions around intrusive rocks in the country between the Selkirk Range and the Arrow Lakes, though some occur farther west in the Yale District. Iron ores exist in various parts, but so far they have only been worked at Cherry Bluff near Kamloops, and in Texada Island. The total output has only on one or two occasions reached 2,000 tons. The coal areas are extensive and widespread. In the Rocky Mountains, the Cretaceous measures containing coal generally occur in long narrow bands among the folded and faulted Palaeozoic and Mesozoic strata, and are found at intervals between the international boundary and the Athabasca River. The coals are, as a rule, bituminous, but in places they pass into anthracite, as at the town of that name and at Bankhead, where the present Canadian supply of anthracite, amounting to 235,000 tons per year, is obtained. Further south are the Elk River and Crowsnest basins, the first of which has an output of over 1,000,000 tons, and manufactures considerable quantities of coke at Fernie, while the second is the chief field in Alberta producing bituminous coals, and yields 1,000,000 tons per year. In Vancouver Island, mining is pursued on the east coast at Nanaimo and Comox, and in 1910 the amount produced was nearly 1,800,000 tons. Much of the coal and coke from the Elk River and Crowsnest areas makes its way across the frontier into Montana, Idaho, and Washington ; while the mines in Vancouver Island serve the coast from Washington to Alaska. Coal has also been located in many places which at present are too distant from good means of communication to render exploitation profitable.

The economic activities of the Cordilleran region are intimately connected with its past history and present conditions. To the geological changes which have taken place it owes the variety of its mineral wealth ; configuration and climate determine alike its timber resources and its agricultural areas ; from the rivers it draws its vast supplies of fish. At present a mere handful of people (392,000 in 1911) are working the vast resources of this region,

but it is not unlikely that the future may see a great industrial population settled here, sending its products not only to the agricultural lands further east but to all parts of the Pacific area. The principal towns include Vancouver, Victoria, Nanaimo, and Rossland. Vancouver, with a population of 100,000, is situated on Burrard Inlet ; it is the western terminus of the Canadian Pacific Railway, has good harbour facilities, and is an important Pacific port. Victoria (31,000), the capital of British Columbia, is on the south-east of Vancouver Island ; it has an excellent harbour, and is an important shipping centre. Nanaimo and Rossland are mining centres ; New Westminster, on the Fraser, is largely engaged in canning salmon ; Nelson is the business centre of the Kootenay District.

THE YUKON region of Canada occupies the south-eastern part of the Yukon Plateau, which stretches from the northern border of British Columbia into Alaska. It is bounded on the east by the last ranges of the Rocky Mountains which overlook the valley of the Mackenzie, and on the west by the Coast Ranges. The interior of the country is cut up by valleys varying from 1,000 to 3,000 feet in depth, but the uplands form broad plains and are the remains of a plateau which has been dissected by the Yukon and its tributaries. The climate is severe, and, although a certain amount of cultivation is possible, the economic value of the region depends entirely upon its minerals. Of these the most important is gold, which is at present chiefly worked in the Klondike, a district bounded by the Yukon, Klondike, and Indian rivers. The gold occurs in placer deposits, both in the valleys of existing streams and in the remains of older valleys on the hillsides. The continuously frozen character of the subsoil, in which the gold occurs, rendered placer mining more difficult than usual ; and it was not till the expensive method of thawing the ground by steam was introduced in 1899 that the maximum yield was obtained. In 1900 the output was valued at £4,500,000, or more than twice the amount of 1898. After 1900, however, the yield of gold rapidly declined, and in 1907 did not exceed £600,000. Since then hydraulic machinery has been introduced and there has been a slight recovery. Coal, copper, and platinum are also found in the Yukon and worked to some extent. A railway has been constructed from Skagway, at the head of Lynn Canal, across the White Pass to White Horse,

from which point there is river communication by the Lewes and Yukon rivers to Dawson, the chief town of the Klondike.

COMMUNICATIONS.—The political and economic growth of Canada is to a great extent the result of the development of its railway system. In earlier times, it is true, the St. Lawrence and the Great Lakes offered a means of access into the country, and rendered possible the foundation of Quebec and Ontario, but the close settlement of the region further west could not be effected until the advent of the railway. Since then the progress of agriculture and the extension of railways have been concurrent.

Four important systems at present exist. The Intercolonial Railway connects Montreal with Halifax and St. John, the winter ports of the Dominion; but the political conditions prevailing at the time the railway was built rendered it advisable that it should be as far as possible from the American frontier, and accordingly it does not follow the most direct route. This is taken by the Canadian Pacific, which, however, passes through Maine, in the United States, on its way from Montreal to St. John. From Montreal westward, this line, as yet the only trans-continental one in Canada, runs north of the Great Lakes, by Sudbury and Port Arthur, to Winnipeg. It then pushes its way across the prairie regions to the Western Cordillera, enters the Rocky Mountains by the Bow Valley, crosses Kicking Horse Pass, and descends into the valley of the Columbia. It leaves this river to cross the Selkirk Range, and then follows, first the South Thompson River, and then the Fraser River, almost to its terminus at Vancouver. Among the more important branches of the Canadian Pacific Railway, one runs from Montreal, by Toronto, through peninsular Ontario to Detroit; a second breaks off at Winnipeg and goes by Saskatoon to Strathcona—on the opposite bank of the Saskatchewan from Edmonton; a third leaves the main line near Medicine Hat, and, entering the Rocky Mountains by Crowsnest Pass, taps the coal-fields of that region; while a fourth runs from Calgary and joins the Winnipeg-Strathcona line near the latter town. In conjunction with the Minneapolis, St. Paul and Sault Ste. Marie Railway, the Canadian Pacific also connects Sault Ste. Marie, Winnipeg, and Pasqua (west of Regina) with Minneapolis and St. Paul.

The Grand Trunk Railway has two important roads running from Montreal; one to Portland, in Maine, and the other to Chicago, by

way of the Ontario peninsula, with the different parts of which the main line has many connections. Another company, the Grand Trunk Pacific Railway Company, closely connected with the Grand Trunk Railway Company, is with the assistance of the government, building a new trans-continental line, the projected route of which is as follows : from Moncton in New Brunswick it will run to the St. Lawrence, near Quebec, keeping within, but, for a considerable part of the way, near to, the Canadian frontier. Crossing the river above Quebec, it will strike westwards considerably to the north of the Canadian Pacific Railway. There will be connections with Quebec, Montreal, and Port Arthur, but the first great town into which the main line will actually run is Winnipeg. From Winnipeg the railway will go by Saskatoon to Edmonton ; and from that town will be continued westwards towards the Yellow-head Pass, by which it will cross the Rocky Mountains. It will then follow the Fraser as far as the great bend of that river to the south, and, crossing into the basin of the Skeena, will descend by its valley to the Pacific coast at Prince Rupert. This route, which is almost completed, will lie entirely within British territory ; it will, because of the more northerly position of Prince Rupert, offer a shorter sea voyage to Yokohama and Northern China than Vancouver does ; it will open up a part of the Laurentian Plateau hitherto untapped by railways ; and it will, because of its easy gradients, be able to convey grain from part of the Winnipeg Basin to the Pacific coast, whence it may be shipped either to the Far East, or by the Panama Canal to Europe.

The main line of the Canadian Northern Railway, which likewise aims at eventually becoming trans-continental, runs from Port Arthur to Winnipeg, passing to the south of the Lake of the Woods, and therefore entering the United States for a short distance, and from Winnipeg to Edmonton, on which part of the route it lies further north than either the Canadian Pacific or the Grand Trunk Pacific. Another of its lines runs west from Winnipeg to Regina, north by Saskatoon to Prince Albert, east to the vicinity of Dawson Bay on Lake Winnipegosis, and south-east to the Winnipeg-Edmonton line near Lake Dauphin. About 150 miles east of Prince Albert is Etomami, whence a line runs to The Pas on the Saskatchewan, the starting-point of the proposed Hudson Bay line, which, as at present determined, will go to Port

Nelson. This railway is to be constructed by the Canadian Government with the object of offering an alternative and shorter route from the wheat-growing regions of Canada to the United Kingdom. From Montreal, and from Port Nelson, the distance to Liverpool is practically the same. At the present time, much of the grain going east is sent to Montreal by Winnipeg and the Great Lakes, but as Winnipeg is over 400 miles distant from the head of navigation on Lake Superior, and as there is, in addition to railway freight, the cost of conveyance down the Lakes, it is obvious that all places in the north-west which are not more than 400 miles, at the least, nearer to Winnipeg than to Port Nelson will find it cheaper, other things remaining the same, to export their grain by the Hudson Bay route. Under these conditions the hinterland of Port Nelson would include the greater part of the agricultural regions on the second and third prairie slopes. The difficulties in the way of the development of the route are connected with the navigation of Hudson Bay and Hudson Strait. Neither of these, it is true, is ever frozen over; but at most times of the year there is much floating ice, from which modern steel-built ships are peculiarly liable to receive injury, and special boats would probably have to be built for the trade. Moreover, the harbour at Port Nelson would be frozen up about the end of October, and, although it might be kept open a few weeks longer by ice-breakers, the period between the end of harvest and the close of navigation would necessarily be a short one. Notwithstanding these defects the route may prove of considerable value, as it will relieve to a great extent the congestion which always occurs on the existing lines when the season's crop begins to move eastward in the autumn.

Of the waterways of Canada, the most important is that afforded by the St. Lawrence and the Great Lakes. The St. Lawrence has been dredged until it now has a minimum depth of thirty feet, which is being increased to thirty-five feet, from Montreal to tide-water. With the aid of a number of canals, of which the most important are the Welland, with a minimum depth of fourteen feet, between Lakes Ontario and Erie, and the Sault Ste. Marie—commonly known as the "Soo"—the minimum depth of which is about twenty feet, between Lakes Huron and Superior, navigation is possible as far as Port Arthur, a distance of 2,233 miles from the Strait of

Belle Isle. Many of the other rivers of Canada, such as the Assiniboine, the Red River, and the Saskatchewan, are also navigable, but the traffic upon them is rather of a local character, and they are not of much use for the transport of grain.

Of the schemes under consideration at present for the improvement of Canadian waterways, the most important is that for the construction of a route from Georgian Bay to Montreal by way of French River, Lake Nipissing, and the Ottawa. Such a route, which would shorten the existing waterway from Port Arthur to Montreal by about 300 miles, would have a length of about 440 miles, of which thirty miles would be purely artificial, eighty miles would consist of canalised lake and river, and the remainder would be entirely natural. As it is proposed to give the canal a minimum depth of twenty-two feet, larger boats could be used than those which at present make the entire journey between Montreal and Port Arthur, and, as the time required for each voyage would be reduced, the amount of freight carried would be increased and the cost of transport lowered. The great drawback would be that which is common to the whole of the lake and river system of Canada—the early-closing of navigation by ice. From about the beginning of the last week in November till the end of the following April, all shipping on the St. Lawrence and the Great Lakes has to be suspended, and the Georgian Bay Canal would, of course, form no exception.

COMMERCE.—The foreign trade of Canada has made rapid progress during the last quarter of a century as a result of the development of the natural resources of the country. The nature of the advance is indicated by the following figures, which show the imports of goods for consumption in Canada, and the export of goods, the produce of Canada (coin and bullion not included) :—

	Average annual exports in £ millions.	Average annual imports in £ millions.	Average annual total trade in £ millions.
1886-90 (5 yrs.)	16·90	21·76	38·66
1906-10 (4 yrs., 9 mnths.)	49·36	63·28	112·64

The chief exports consist of agricultural produce, minerals, and timber. For the five fiscal years 1906-10 (four years and nine months owing to a change in the date of the termination of the fiscal year)

the percentage of the total value of exports of each of the more important items was as follows :—

Timber	17·19	Bacon	4·06
Wheat	15·59	Gold	3·57
Cheese	9·39	Wheat flour	2·98
Cattle	4·51	Copper	2·74
Fish (cod, lobster, salmon)	4·49	Fruit	1·95
Silver	4·12	Coal	1·88

Timber is sent to the United States and Great Britain, the former country taking the larger share. Wheat, cheese, cattle, bacon, wheat flour, and fruit find their chief market in the United Kingdom, though a certain amount of wheat flour goes to the Far East. Gold, silver, and copper are exported to the United States, where they can be refined, and that country is also the chief purchaser of Canadian coal. Fish are sent to various countries, while wood pulp goes mainly to the United States.

Of the total exports of Canadian produce during the same fiscal years the United Kingdom has taken 52 per cent. and the United States 36 per cent.

About two-thirds of the imports into the country for home consumption consist of manufactured goods. The percentage of total imports of the more important articles is as follows :—

Iron and steel	16·46	Sugar	3·40
Coal	7·73	Drugs	2·83
Woollen goods	5·93	Raw cotton	2·35
Cotton goods	4·38	Maize	1·77

Of iron and steel goods by far the greater part comes from the United States, which also supplies the coal imported by Canada. The United Kingdom is the chief source of cotton and woollen goods. Sugar is obtained from the West Indies, and drugs, raw cotton, and maize from the United States.

Of the total imports into Canada for consumption in the country, the United States supplies 59 per cent. and the United Kingdom 25 per cent. Of manufactured goods the United Kingdom supplies about one-third.

The chief ports of the Dominion are Halifax and St. John, through which the Atlantic trade is carried on during the winter months ;

Montreal and Quebec, which conduct it during the summer months when the St. Lawrence is open; and Victoria and Vancouver on the Pacific coast.

NEWFOUNDLAND

The island of Newfoundland has an area of 42,700 square miles. It belongs in the main to the Laurentian region, though in the west there are Carboniferous rocks which are the continuation of those in Cape Breton Island. The climate is, on the whole, less extreme than on the adjacent parts of the mainland. On the submarine plateau to the south and east of the island, there feed at certain seasons of the year enormous quantities of fish which have come down from the north with the Arctic current. Of these, cod are the most important, and dried cod and cod-oil constitute over 70 per cent. of the total exports. In the earlier part of the year before the cod have made their appearance, many fishermen go sealing in the Arctic. Lobsters, herring, and salmon are also caught along the coasts. In Bell Island, in the Bay of Conception, the Wabana mines, which now extend under the sea, are said to contain the largest deposits of low-grade iron ore in North America. They are extensively worked, the bulk of the product being sent to Sydney. Other minerals obtained, or known to exist, include copper, coal, and silver-lead. Agriculture has hitherto been of comparatively little importance, but, with increased knowledge of the interior of the island, the area devoted to it is likely to extend. Lumbering and the manufacture of paper from wood-pulp are also becoming important.

CHAPTER XXXVII

THE UNITED STATES¹

NEW ENGLAND.—In New England the connection between geographical conditions and economic development is of particular interest. The country consists of a raised peneplain, high in the interior, low along the coast. This peneplain is being gradually reduced to base level by rivers which, when they flow over rocks of weak structure, form wide valleys such as that of the Connecticut. The ice-sheet, which at one time covered the whole region, has left its mark in the scanty soils of the uplands, in the innumerable boulders in the lowlands, and in the drift-dammed rivers where many waterfalls occur. The more recent depression of the coast has led to the submergence of river valleys and to the formation of numerous bays and harbours.

The climate is cold in winter, when the mean temperature varies from 15° F. in the north to 33° F. in the south, but warm in summer, when it rises from 65° F. in the north to 70° F. in the south. The rainfall, which is fairly well distributed throughout the year, is generally between 40 and 50 inches in the lowlands, and between 35 and 40 inches in the uplands.

The early colonists settled near the coasts and in the lowland valleys, agriculture and fishing being their chief occupations; and it was but slowly that they spread to the less favoured uplands. With the opening up of the wheatfields in the west, New England, with its soil, scanty in some places, boulder-strewn in others, found itself at a disadvantage in agriculture, as it was unable to make use of the improved machinery which was reducing the cost of production. Dairying, fruit-farming, and the raising of garden "truck" are now the chief pursuits of the agricultural community, but throughout the whole country many farms have been abandoned within the last thirty years.

¹ The statistics of manufactures are based upon the Census of 1905. The Report on the Census of 1910 has not yet been published, but some figures which have come to hand are given in foot-notes. The agricultural and mineral statistics are based upon the returns for the three years 1909-10-11 published by the Department of Agriculture, and the Geological Survey respectively.

Fishing, another occupation of the early settlers, is still carried on from a number of ports along the New England coast. The advantages possessed by the region are the numerous good harbours formed in the drowned river valleys, and the proximity of the fishing grounds of Newfoundland and the continental shelf. Gloucester, in Massachusetts, and Portland, in Maine, are two towns largely engaged in this industry; and cod, mackerel, and sardines are among the principal products.

The growth of manufactures has been, however, the most striking fact in the economic development of the New England States, and, although the place which these States hold is relatively less important than it was fifty years ago, the progress which they have made has been very great. At the census of 1905 it was calculated that, with 2·2 per cent. of the area of the United States, they had 14·7 per cent. of the capital invested in manufacturing industry, and 17·2 per cent. of the average number of wage-earners engaged in it; while the value of the products amounted to 13·6 that of the whole country.¹ Various causes have led to this important position. Domestic industries were naturally started by the early settlers, and these were developed during the latter half of the eighteenth century, when for a time commercial relations with Great Britain were broken off. The rivers, with their numerous waterfalls, offered a plentiful supply of power, and climatic conditions favoured the growth of textile pursuits. Early smelting furnaces obtained their ore from shallow glacial ponds or marshes, and their fuel from the neighbouring forests. Communications by river and sea facilitated both the import of such raw materials as were required and the export of manufactured goods. The opening up of the trans-Appalachian wheatfields, moreover, left much labour and capital, hitherto necessary for agriculture, free to be employed in other directions. The momentum acquired by certain industries from these early advantages is still effective, though changed conditions render some of them less important than formerly. The rivers, for example, supply less than 30 per cent. of the power used, coal from Nova Scotia and Pennsylvania providing the greater part of the remainder. On the other hand, the facilities for importing raw material and exporting manufactured goods,

¹ In 1910 the New England States produced 12·9 % of the manufactures of the United States and employed 16·6 % of the wage-earners.

and the inherited skill of the workers, are now of the utmost value.

The textile industries, which are to a great extent localised in New England, are the most important of all its manufactures. In 1905, practically half the capital invested in works of this description in the United States was invested in the region under consideration, which gave employment to 42 per cent. of the workmen engaged in such pursuits. The manufacture of cotton goods takes first place in this group, and New England possesses about 60 per cent. of the spindles of the whole country, Massachusetts having three-fifths of the number and Rhode Island one-seventh. Of the cotton towns, the most important is Fall River, situated on the east of Narragansett Bay, where it is entered by a small stream which formerly provided the necessary power. Lawrence, Lowell, and Manchester make use of the waters of the Merrimac to drive some of their mills. Providence, at the head of Narragansett Bay and on Providence River, is the centre of the industry in Rhode Island. Notwithstanding the recent great development of cotton manufactures in the Southern States, the country to the east of the Hudson still produces more than 50 per cent. of the total output. There has, however, been a great decrease in the production of medium counts, and an even greater increase in that of finer counts, and this tendency towards the manufacture of finer counts is general throughout the States.

New England produces about 60 per cent. of the woollen manufactures of the United States, Massachusetts again being the leading state, Rhode Island second, and Connecticut third. This industry, is somewhat more widely distributed throughout southern New England than cotton, as in earlier times it was pursued to some extent in every farming district where there was a sufficient water supply. At present, therefore, it is carried on in a large number of towns, but Lawrence and Providence are the most important. The pre-eminence of New England is especially marked in the manufacture of those classes of goods known as "woollens" and "worsted," two-thirds of the national output of each being produced there. Of carpets, it produces only about one-fifth of those made in the country. Boston is the chief wool market of the United States. Clothing wools are imported from Australasia and the Argentine, combing wools from the British Isles, and carpet

wools, which form the bulk of the imports (brought mainly to Philadelphia and New York), from China and Asia Minor.

This group of states also ranks first in the manufacture of boots and shoes, producing more than one-half of those made in the country. The early tanners and shoemakers settled here, as grazing was an important pursuit, and large quantities of oak and hemlock could also be obtained for tanning. In the manufacture of leather New England has failed to retain its supremacy, but boots and shoes are still made by machinery where they were so long made by hand. As steam-power had been introduced before the change in manufacturing methods, the location of towns engaged in this industry is not determined by the proximity of water-power; and Brockton, Lynn, and Haverhill are situated on railways within easy reach of Boston, the market both for the leather and the manufactured product.

Though New England now produces little ore, the momentum which the iron industry acquired there in colonial times has enabled it to retain a leading place in the manufacture of special kinds of iron goods. Connecticut makes large quantities of brassware, chiefly at the town of Waterbury; and ammunition works, which use brass to a considerable extent, are localised in Massachusetts and Connecticut. Textile machinery, as might be expected, is made in these states and in Rhode Island; and cutlery and hardware of all kinds are produced in the Connecticut valley and in the western parts of the state of that name.

As a result of the proximity of suitable timber, especially in the northern part of the region, the facilities for obtaining water-power, and the plentiful supplies of pure water, the manufacture of wood-pulp and paper takes a high place in this group of states, which accounts for nearly 40 per cent. of the total output. Massachusetts and Maine are the leading paper states in New England, and the first of these produces about two-thirds of the fine paper made in the United States.

THE MIDDLE APPALACHIAN REGION.—The states of New York, Pennsylvania, Eastern Ohio, New Jersey, Maryland, Delaware, and West Virginia have a strong claim to be treated as a separate region. Their area is less than one-twentieth that of the whole United States, but they have 23 per cent. of the population, and in 1905 they had 40 per cent. of the capital invested in manufactures, 37

per cent. of the wage-earning classes, and 38 per cent. of the gross value of the products.¹

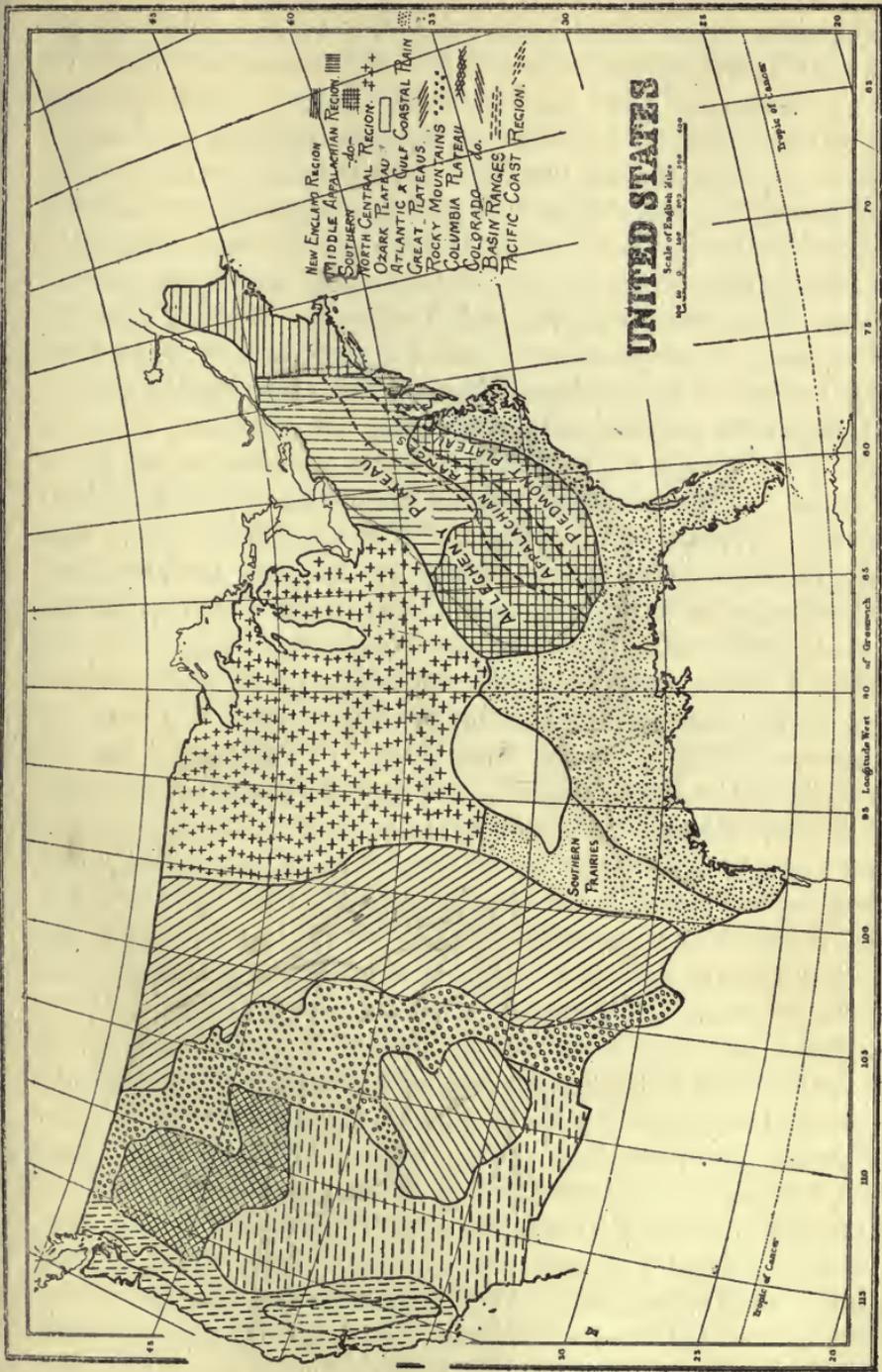
Geographical conditions have determined, to a great extent, the economic growth shown by these remarkable figures. The region belongs essentially to the Appalachian system, the coastal and lake plains being developed only to a slight extent. During glacial times the continental ice-sheet covered nearly the whole of New York and the northern parts of Pennsylvania and New Jersey, leaving in many valleys a deep and generally fertile soil, and offering numerous facilities for the use of water-power. On the Piedmont and Allegheny plateaus, and in the Great Valley, there are many districts capable of cultivation.

As a result of its position and varied topography, the climate of the region is not the same throughout, but on the whole the winters are cold and the summers warm. The mean winter temperature ranges from 17° F. to 21° F. in the north of New York state to 30° F. to 35° F. in Maryland and Delaware, and the mean summer temperature from 60° F. to 65° F. in the northern districts to 70° F. to 75° F. in the southern. Over the greater part of New York state the rainfall is from 35 to 40 inches annually, and over the remainder of the region from 40 to 45 inches.

The surface of the land is too diversified to permit the Middle Appalachian States becoming a great agricultural region, and, although they produce between 6 and 7 per cent. of the wheat and oats, and 4 per cent. of the maize, grown in the country, "truck" farming and dairying are the most important agricultural pursuits, the former being followed chiefly on the Piedmont Plateau and in the Great Valley, where soil and climate are favourable, and the latter mainly on the Allegheny Plateau, where the altitude and damp climate are unfavourable to cultivation. New York is the most important dairying state in the Union.

The second factor of importance in the economic development of this region is its enormous supplies of coal. Anthracite, obtained nowhere else in the United States but in two small coal-fields in the Rocky Mountains, is worked here in large quantities, the mines being found in the east central part of Pennsylvania, in a district bounded on the west by the Susquehanna, on the north

¹ In 1910, 24 % of the population, 36 % of the wage-earning classes engaged in manufactures, and 38 % of the gross value of the products.



NATURAL REGIONS OF THE UNITED STATES

by the north branch of that river, and on the east by the Delaware and Lehigh rivers. The production for 1909-11 averaged 76,000,000 tons. Anthracite is now used chiefly as a domestic fuel, for which it is valued on account of its cleanliness, its freedom from smoke, and its excellent heating qualities. The demand for it is largely local, Pennsylvania and New York taking a great part of the output. Bituminous coal, which occurs throughout the whole length of the Appalachian system, is obtained chiefly in west Pennsylvania, eastern Ohio, West Virginia, and Maryland. The beds usually run in long curves from north-east to south-west, following the general trend of Appalachian folding. The coal is easily worked, and the greater part is won by drifts along the outcrop, or by gentle slopes down the dip of the bed, very few deep mines having as yet been sunk. The production from the Pennsylvania fields in 1909-11 averaged 128,000,000 tons, from Ohio 27,000,000 tons, from West Virginia 51,000,000 tons, and from Maryland 4,000,000 tons. This amounted in all to almost one-half of the total coal production of the United States. Pennsylvanian coal, especially that from the Pittsburg seam, is used in all the industries of Pennsylvania and New York. Large quantities make their way to tide-water at Baltimore, Philadelphia, and New York, to be shipped north and south along the Atlantic coast, while much goes by water routes to the Gulf of Mexico, and considerable quantities are sent by the Great Lakes to various ports in the North Central States and Canada. About one-half of the coke manufactured in the country comes from the Connellsville region on the Pittsburg seam, and is distributed over the greater part of industrial North America. West Virginia consumes comparatively little of its own coal, and the output of the well-known Pocahontas field (a small part of which lies in Virginia) and other producing districts goes either to tide-water at Norfolk, or, by the Kanawha, to the Ohio river. The Ohio mines send part of their output to Canada by the Great Lakes, while a considerable proportion of Maryland coal finds its way to the coast by the railways following the Potomac.

The position of this group of states has been an important factor in their economic development. Their seaboard is conveniently situated with regard to Europe, and, although New York is a hundred miles further from England than Boston is, it has a much larger hinterland, Boston being cut off from the interior

by the Hoosac Mountains of Massachusetts. New York, Philadelphia, and Baltimore are all favoured in regard to their communications with the interior. Behind them, the older Appalachians are much lower and narrower than in any other part of their course, and they are crossed also by several great rivers—the Delaware, Susquehanna, and Potomac—which, by means of the water gaps they have cut, afford easy access to the continental interior. Further, in this region, the ranges of the Great Valley lie to the west, and the Valley itself is open and was easily occupied in earlier times, thus aiding in the development of the towns on the coast. The Delaware and the Susquehanna, moreover, are navigable and make useful waterways, but the Potomac is generally unsuitable for such a purpose.

The Great Lakes on the north-west have also played an important part in the development of the Middle Appalachian States by providing a waterway on which can be cheaply carried much of the raw material necessary for many of the industries established in the region. Of great significance, too, are the easy facilities which exist for communication between the Atlantic and the Lakes by means of the valleys of the Hudson and Mohawk rivers. Lastly, the Allegheny and Monongahela, which along with their tributaries drain the Allegheny Plateau, have, as already indicated, rendered possible water transport, by way of the Ohio and the Mississippi, to the central and southern states.

The most important industry of the Middle Appalachian States is the manufacture of iron and steel. A certain amount of ore is found in the ridges of the Great Valley in Pennsylvania and in New York, and, until the middle of the last century, the deposits from which it is obtained were the chief source of supply. But the development of the Lake Superior ores, and the greatly increased use of coke in place of anthracite in smelting iron, have caused the industry to move further west, and it is now concentrated to a great extent in west Pennsylvania where it is easy to obtain coke from the Connellsville district and ore from Lake Superior. In 1905 the region under consideration had invested in it more than half the capital invested in iron and steel works in the United States, while of the total output it produced nearly two-thirds. Pennsylvania is, of course, the leading state, and produces two-fifths of the pig-iron and more than half the steel of the whole country. The

chief towns engaged in the industry are Pittsburg at the confluence of the Allegheny and Monongahela, Homestead and Duquesne in the valley of the latter river, and McKeesport in that of its tributary the Youghiogeny, all admirably situated for receiving coal and coke, Cleveland and Buffalo on Lake Erie, Youngstown in Ohio, and Easton and Allentown near the iron ore deposits of the Great Valley.

The manufacture of what are known as "foundry and machine shop products" is carried on to a great extent in this region where iron and steel and coal can easily be obtained, and where the large industrial population creates a strong demand. Of the total output in the United States of such articles, which range in variety from steam rollers to nut-crackers, and from motor engines to sewing machines, about one-half is produced in this region, the chief towns engaged including New York, Philadelphia, Buffalo, Pittsburg, Erie, Newark, and Columbus.

The textile pursuits of the Middle Appalachian Region rank in importance after those of New England, but several striking differences are to be noted. The spinning and weaving of cotton is of comparatively little account, and the output, which in gross value amounts to about one-third that of the textile industries of the United States, consists chiefly of woollen and silk goods. Pennsylvania and New York are the principal carpet-making states in the Union, Philadelphia, where the industry has been established for over a century, being the chief town engaged in it. Silk is manufactured mainly in New Jersey, Pennsylvania, and New York, New Jersey alone accounting for one-third of the silk goods of the country, and Paterson, which derives its water-power from the Passaic River, being the centre of the industry. As much of the raw material used in the manufacture of carpets and silk goods comes from the East, the facilities for importing it into this region would appear to be one of the reasons for the localisation of these industries.

The manufacture of clothing is another industry which is localised to a remarkable extent in the Middle Appalachian States, which produce 70 per cent. of the output of the whole country, New York City alone providing over 50 per cent. This is accounted for in part by New York being the commercial and social capital of the United States, but it is largely due to the fact that the labour required in the industry is almost entirely recruited from those

immigrants who enter by the port of New York, but, being unfitted for agriculture, do not pass into the interior. No less than 98 per cent. of the tailors and tailoresses employed in New York are of foreign birth or of foreign parentage.

In addition, among the important industries of this region are the tanning of leather and the manufacture of wood pulp, because of the proximity of raw materials in the Appalachian forest; the refining of petroleum from the Allegheny plateau, and of sugar imported at New York, Philadelphia, and elsewhere; the printing and publishing of books and newspapers, flour-milling, meat packing, and car construction.

The dominant factors in the economic development of the Middle Appalachian States are, therefore, their vast mineral resources and their favourable situation, alike with regard to Europe and with regard to the interior of the continent. It is noteworthy, as illustrating the importance of the latter factor, that, although seven out of the fifteen largest cities in the United States are situated within this region, only one lies within the borders of the Appalachian coalfield. The growth of the others as manufacturing centres is due to the facilities which they possess for the collection of raw material and the distribution of manufactured goods; and similar facilities for collecting exports and distributing imports have made several of them into great seaports. New York is most favourably situated in this respect, because it has not only the same advantages as Philadelphia and Baltimore for access to the interior by means of the routes created by the transverse Appalachian rivers, but it is at the outlet of the Hudson Valley, which brings it into communication both with the St. Lawrence and the Great Lakes. Philadelphia and Baltimore, although they have the advantage of being situated on waterways which penetrate well into the interior, are not quite so conveniently placed for carrying on trade with Europe, nor have they the same choice of routes to the trans-Appalachian States as New York has. Buffalo owes its importance to its position on Lake Erie, at the termination of the route followed by the Erie Canal. The situation of Pittsburg in relation to the Appalachian coalfield has already been described. Newark and Jersey City share in many of the advantages of New York.

THE NORTH CENTRAL REGION.—This region, which lies west of the Allegheny Plateau and east of the Great Plains, south of the

international boundary and north of the Ozark uplift, is the great agricultural, and the second most important manufacturing, area of the United States. Broadly speaking, the land, which rises in all directions from the Mississippi, is flat or undulating, and only in comparatively few places is it mountainous. In the north, in parts of Michigan, Wisconsin, and Minnesota, there are outliers of the Laurentian area which contain much mineral wealth. The greater part of the region was at one time covered by the ice-sheet, and the soil, consisting of the débris of different kinds of rock, is generally fertile, while it is underlain in places by extensive deposits of coal.

The climate is continental in character; the range between the heat of summer and the cold of winter is considerable; and precipitation decreases from the east toward the west and north-west. Over the greater part of North Dakota the mean temperature for the three coldest months is from 5° F. to 10° F., while in Kansas it is from 29° F. to 33° F. The mean summer temperature varies from 65° F. to 70° F. in the northern states to between 74° F. and 78° F. in the southern. In the extreme east of the region the annual precipitation is between 40 and 45 inches, while along the western boundary it ranges from between 25 and 30 inches in Kansas to between 15 and 20 inches in North Dakota.

The following figures are typical of the climatic conditions of different parts of the area under consideration:—

	Winter mean.	Summer mean.	Precipitation.
Columbus (Ohio) . .	31° F.	73° F.	37·2 inches.
Bloomington (Ill.)	26°	74°	36·1
Topeka (Kansas)	30°	76°	34·1
Grand Forks (N.D.)	8°	65°	20·1

Physical features, soil, and climate alike constitute this region the most important in the United States for the production of cereals. The surface of the land offers few obstacles to the use of machinery, the fertility of the soil encourages extensive rather than intensive methods of cultivation, and the temperature and rainfall are sufficient for the growth of wheat throughout the whole region, and for the growth of maize in its southern half.

The North Central States produce about two-thirds of the wheat crop of the country. North Dakota, South Dakota, and

Minnesota, whose most fertile parts belong to the bed of the glacial Lake Agassiz, form the chief hard spring wheat region and yield over one-fourth of the United States crop. Further south, in the region of hard winter wheat, Nebraska, Kansas, and Missouri produce one-fifth of the year's supply, and Indiana, Illinois, and Ohio, which grow semi-hard winter wheat, one-seventh. The development of the spring wheat area within the last thirty years has been largely due to the improvements in flour-milling machinery which have made it possible to remove from the flour of spring wheat all the fine particles of bran, the presence of which had hitherto affected both its colour and quality. On the other hand, there has been a great decrease in the area under wheat in Illinois, Iowa, and Wisconsin, due partly to the increased cultivation of maize in these states, but chiefly to the deterioration of the land as the result of a long succession of wheat crops. Mixed farming is much more generally adopted now, though in the Dakotas wheat is still the prevailing crop.

The yield per acre is small: only in the east has the average for the last ten years exceeded fifteen bushels; elsewhere it is usually somewhat below that amount. With the favourable conditions of soil and climate which prevail, it is obvious that the future will see a considerable increase in the yield per acre, as increasing demand brings the land under more intensive cultivation.

The manufacture of flour has naturally become an important industry in the North Central Region, which in 1905 produced nearly two-thirds¹ of the American supply. Minnesota is the leading state, and it is followed by Kansas, Missouri, and Illinois. The chief towns engaged in the industry are Minneapolis, which in earlier times derived its power from the Falls of St. Anthony, though much is now obtained from steam; Milwaukee and Chicago, which have excellent shipping facilities; and St. Louis, the centre of the winter wheat region, which is able to export both to the Gulf of Mexico and the Atlantic seaboard.

Maize, which requires a higher summer temperature and a greater rainfall than wheat, is grown in large quantities in the southern parts of the North Central States. Western Ohio, Indiana, Illinois, and Iowa produce over 30 per cent. of the maize crop of the United States, and along with Missouri, Nebraska, and Kansas,

¹ In 1910, three fifths.

where decreasing precipitation accounts in part for a smaller yield per acre, they produce considerably more than one-half of the output of the whole country.

Since 1890 the area under maize has increased from 35,000,000 acres to about 60,000,000 acres, a result largely due to the growth of the live-stock industry. Many cattle are reared in the region, and many others are drafted in from the Great Plateaus, as far south as Texas, to be "finished" for market. The rapid growth of population, both in the North Central and in the Middle Atlantic States, has greatly increased the demand for meat and dairy produce, while the development of transport and the use of refrigerating cars have made it easy to meet that demand. The number of cattle in the region under consideration cannot be determined exactly, but it is probably about 32,000,000 (United States 70,000,000). Hogs are even more concentrated in the maize belt, and over half of the entire number in the United States (48,000,000) are found within it.

Over 70 per cent. of the slaughtering and meat packing of the United States is done in the North Central Region, where the industry is to the maize belt what the manufacture of flour is to the wheat fields. Chicago is the chief city engaged, and produces nearly 30 per cent. of the country's output. It owes its pre-eminence, on the one hand, to its suitable position for receiving live stock from the whole of the north-west, and, on the other, to its facilities for distributing the manufactured product. Kansas City and South Omaha, which practically do nothing else, have become of considerable importance within recent years with the extension of the corn belt in Nebraska and Kansas; and East St. Louis, St. Joseph, and Indianapolis has each a large output. With the exception of New York, which produces one-twentieth of the whole, the leading cities in this industry are in the maize-growing states.

In addition to its great agricultural resources, the North Central Region has much mineral wealth, and three large coalfields of Carboniferous age lie within it. The most important of these is the Eastern, which covers most of Illinois, the south-western corner of Indiana, and a small portion of Kentucky. The output of this field amounts to over 65,000,000 tons, or rather more than one-seventh that of the United States, and the coal from it, besides supplying a large contiguous manufacturing area, makes its way down the Mississippi as far as Louisiana, and westward into

the Dakotas, Nebraska, and other states. The Northern coalfield, which lies in the centre of the lower peninsula of Michigan, has an annual output of over 1,000,000 tons, much of which is used locally, but some of which goes westward into Minnesota and the Dakotas, as a return cargo for the cars bringing wheat eastward. The Western coalfield extends over parts of Iowa, Kansas, Missouri, Oklahoma, and Arkansas, the portion within the region under consideration producing about 20,000,000 tons annually, most of which is used locally, either by the railways or for domestic purposes.

In the North Central Region, as in the Allegheny Plateau, the horizontal nature of the strata has led to the conservation of large supplies of petroleum. The chief fields are those of western Ohio and Indiana, of Illinois, and of Kansas—the latter extending into Oklahoma and northern Texas. The production of the first is decreasing, that of the second is steady, while the third has an output considerably greater than the first and second combined. The production of the whole region amounts to rather less than half that of the United States, which yield two-thirds of the world's supply. Pipe lines convey the oil from Illinois to the Atlantic seaboard, and that from Kansas to the Gulf. Natural gas is obtained in Indiana and Kansas, but the production is decreasing.

The principal localities in North America which at present produce iron ore may be considered as falling within this region, although they really belong to the Laurentian Plateau, of which they form outlying parts. Over 80 per cent. of the iron ore obtained in the United States is mined in the neighbourhood of Lake Superior, where the chief districts in which it is found are the Mesabi Range in Minnesota, to the west of Lake Superior, the Vermilion Range, a little to the north of the Mesabi, the Marquette, in the upper peninsula of Michigan, and the Menominee and Gogebic Ranges further south, on the borders of Michigan and Wisconsin. The total production for 1910 was 40,000,000 tons, of which 30,000,000 came from the Mesabi Range.

As coal is not available for smelting the ore in the localities in which it is mined, it is shipped from Duluth, Superior, Two Harbours, Ashland, and Marquette on Lake Superior, and from Escanaba on Lake Michigan, to various ports on Lakes Michigan and Erie. At Milwaukee and Chicago on the first of these, and at Cleveland, Erie, and Buffalo on the second, the manufacture of pig-iron has

become an important industry; while from Ashtabula, Conneaut and Erie, all on Lake Erie, very large quantities of raw ore are sent to the Pittsburg district, Youngstown, and other places, either on, or in the vicinity of, the coalfields of the Middle Appalachian States. In the North Central Region itself, the production of iron and steel amounts to between one-fourth and one-fifth that of the United States, the chief towns engaged being situated on the lakes to which ore and coal can both be transported at low rates.

In the Lake Superior region of the upper peninsula of Michigan, there is a strip of land about seventy miles long and one mile wide which is at present the most important native copper district of the world. The copper, which occurs in masses varying from small particles to lumps of several hundred tons in weight, is obtained from mines sometimes a mile below the surface of the ground. The output is about one-fifth that of the whole country. Coal for smelting and other purposes is easily obtained by water from Pennsylvania, and a considerable amount of ore goes eastward, by the same route, on its way to the states of New York and New Jersey, where it is smelted at Buffalo, New York, and Jersey City.

Among other industries the manufacture of agricultural implements is perhaps the most characteristic of the North Central Region. The great demand for every kind of field machinery from the prairie states, the proximity of iron and coal, the facilities for obtaining hard timber, and the bulky nature of the finished goods, all account for the fact that here is produced 70 per cent. of the total output of the United States. Chicago and Moline in Illinois, Racine in Wisconsin, and Springfield in Ohio are among the leading towns engaged in the industry.

The lumber industry of the region is located chiefly in the states of Wisconsin, Michigan, and Minnesota, which fall within the northern pine province. The manufacture of wood pulp and paper is also carried on to some extent, especially in Michigan and Wisconsin.

At the census of 1900 it was shown that rather more than one-third of the glass made in the United States came from this region, chiefly from Indiana, but the decreased output of the gas wells in that state has led to a relative decline within recent years.

The economic development of the North Central States is therefore the result of a remarkable combination of geographical factors. The prosperity of the region is based upon the great agricultural

resources due to its flat or undulating surface, its fertile soils, and its favourable but diverse climate. The large supplies of fuel within its borders, and the still larger supplies which can be easily obtained from the Appalachian fields beyond, enable it to export these agricultural products, not as raw materials, but as manufactured goods. The presence of iron ore and timber has facilitated the growth of these and other industries, and the momentum thus obtained has aided the further industrial development of the region. The Great Lakes provide a means of cheap transportation which has been of immense value, while few physical obstacles hinder the construction of railways, nor is communication with the Atlantic and the Gulf a matter of great difficulty. The position of the more important cities indicates the nature of the forces that have been at work. They are primarily collecting and distributing centres, and, because of their position as such, have become manufacturing as well. Chicago is in a sense typical of the whole region. It is situated where the great railroads from the east to the north-west must all converge in order to turn the southern end of Lake Michigan, and it is therefore a great meeting place of land and water routes. To it can easily be brought the wheat of the Dakotas and Minnesota, the live stock of the maize belt and the Great Plateaus, the iron ore of Michigan, the wood of Wisconsin, the coal of Pennsylvania. Thus, being the collecting centre for the varied products of a large and rich area, it has become a great manufacturing town, with special facilities for the export of its manufactures, and with similar facilities for the import of other commodities and for their distribution over the region from which it obtains its raw materials. Chicago, it is well said, "is the epitome and climax of the prairie and lake region."

THE ATLANTIC AND GULF COASTAL PLAIN.—This region is of comparatively recent origin, its elevation nowhere exceeds 500 feet, the rocks of which it is composed are weak and unconsolidated, and it is generally, though not always, covered with a deep and fertile soil. Its southern position, low relief, and proximity to the ocean have given it a climate, moist, warm, and on the whole equable. Only in Virginia and in Tennessee does the mean winter temperature fall below 40° F., while the mean summer temperature over the whole region ranges from 75° F. to 83° F. The precipitation as far west as the ninety-third meridian is from 50 to

55 inches, except in South Carolina and Georgia, where it does not exceed 50 inches. Beyond the ninety-third meridian the rainfall rapidly diminishes in amount, and near the hundredth, that is in the west of the southern prairies, which for convenience are considered along with the Atlantic and Gulf Coastal Plain, it does not exceed 20 inches.

Throughout almost the whole of this region, as well as in parts of the Piedmont Plateau, the cultivation of the cotton plant is the chief pursuit of the agricultural population. Climatic conditions are of the utmost importance in bringing this about. The proximity of the Atlantic and the Gulf of Mexico prevents the great extremes of climate which are characteristic of continental masses, and ensures a sufficiently long growing season. The temperature increases until the maximum is reached in July, after which there is not only a somewhat lower temperature, but a greater diurnal range. In the spring the cyclonic disturbances, originating on the plains of Texas and moving in a north-easterly direction, cause an inflow of warm, moist air from the ocean. As the summer advances, the low-pressure area, developing over the continent, leads to a steady atmospheric inflow from the sea to the land and a heavier rainfall. In August, the land has cooled slightly, while the air temperature over the ocean is at its highest. The temperature gradient is therefore not so steep, and there is that decrease in precipitation, except along the coasts, which tends to check the growth of the cotton plant, and enables it to mature its seed. The region under consideration covers an area of about 600,000 square miles, but it must not be thought of as exclusively devoted to the cultivation of cotton. More than half of it is still forested, only about 60 per cent. is in farms, not more than 30 per cent. has been "improved," and the area under cotton, probably not more than 10 per cent. of the whole, is exceeded by that under maize within the same region.

The figures that appear on the next page indicate the nature of the change which has taken place in the location of the cotton fields within the last sixty years.

The great development within recent years of the cotton-growing area to the west of the Mississippi is due in part to the exhaustion of the soil to the east of it, largely as a result of the wasteful methods of ante-bellum cultivation, and in part to the greater facility with which the virgin lands of Texas can be brought under the plough.

State.	1850. Per cent. of production.	State.	1911. Per cent. of production.
Alabama.. ..	22·9 (564,429 bales)	Texas	27·4 (4,447,648 bales)
Georgia	20·2 (499,091 ..)	Georgia	17·5 (2,845,799 ..)
Mississippi ..	19·6 (484,292 ..)	Alabama	10·8 (1,757,207 ..)
South Carolina	12·2 (300,901 ..)	South Carolina	10·4 (1,684,096 ..)
Tennessee ..	7·9 (194,532 ..)	Mississippi ..	7·7 (1,252,322 ..)
Louisiana ..	7·2 (178,737 ..)	North Carolina	6·8 (1,104,781 ..)
North Carolina	3·0 (73,845 ..)	Oklahoma	6·5 (1,062,922 ..)
Arkansas ..	2·6 (65,344 ..)	Arkansas	6·0 (972,296 ..)
Texas	2·4 (58,072 ..)	Tennessee ..	2·9 (479,145 ..)
Florida	1·8 (45,131 ..)	Louisiana	2·5 (403,482 ..)
Other States..	·2 (4,719 ..)	Missouri	0·6 (101,189 ..)
		Florida	0·5 (85,081 ..)
		Virginia	0·2 (29,891 ..)
		All other States	0·2 (24,417 ..)
	<hr/>		<hr/>
	100 (2,469,093 ..)		100 (16,250,276 ..)

Great although the production of raw cotton in the United States undoubtedly is, it has within recent years only met with difficulty the rapidly increasing demands made upon it by different parts of the world, and it seems unlikely that the future will see any great expansion of the cotton belt beyond its present limits. To the north of the thirty-seventh parallel the temperature is too uncertain, and to the west of the hundredth meridian the rainfall is too low, to afford much prospect of indefinite extension. On the other hand, only a small proportion of the land within the cotton growing area at present bears that crop, and it is believed that part of the remainder might be rendered productive by removing timber, by draining swamps, and by reclaiming impoverished land. But the most fertile areas have already been occupied, and it is probable that, only in exceptional cases, will the new lands, added at considerable cost, fail to prove less remunerative. Influenced by considerations such as these, various members of the Agricultural Service of the United States have expressed the opinion that it is in the adoption of more intensive methods of cultivation that the best hopes of an increased output actually lie. It is said that one seldom comes across a really first-class field of cotton in the States; and this indeed might be inferred from the fact that the average yield there is only about 190 lbs. per acre, while "on large tracts, carefully prepared, as much as 500 to 800 lbs. per acre are frequently obtained." Various causes contribute to this discrepancy between the actual yield of the land and its potential capacity.

The planter too frequently takes his seed from public gins, regardless of whether it is suited to his soil and climatic conditions, or whether it has been bred up to a high degree of productiveness. Outside of the Agricultural Department, seed selection and seed breeding are seldom practised, the application of manure is imperfectly understood, and the due rotation of crops is often neglected. The small farmer, who has in many cases succeeded the slave-owning cultivator, works by primitive methods, and uses antiquated machinery; and when he is a negro working without direction, as is frequently the case, the yield per acre is below the average. But, although it would appear to be possible by more intelligent cultivation to increase the productivity of the land, two further facts have to be borne in mind. The first is that as farming in the south becomes more intelligent it will become more diversified. It is significant that in those parts, which are at present most backward, cotton alone is produced. Its cultivation only takes up part of the farmer's time, and wherever there is a progressive population other crops are also grown. The second fact is that the domestic consumption of cotton is steadily increasing. During the five years 1883-7, 31 per cent. of the production was retained for home manufacture, but, during the five years 1906-10, 36 per cent. of the crop was used in the country itself. For these reasons it would seem that the American export is unlikely to increase very rapidly.

The production of rice in the United States has undergone great changes within the last half-century. Fifty years ago, the three South Atlantic States of North Carolina, South Carolina, and Georgia produced 90 per cent. of the total output, chiefly on the delta lands along the coast. To-day the same proportion, but of an output nearly four times as great, is grown in Louisiana and Texas, chiefly on the wide level prairies in the south-west of the former and the south-east of the latter state. There, the temperature is sufficiently high, and water for purposes of irrigation can be obtained, partly from rivers, and partly by artesian wells from a stratum of gravel between 125 and 200 feet below the surface. The drift soils on which the rice is planted are underlain, moreover, by an impervious clay which retains moisture as long as it is wanted, but facilitates drainage and allows of the use of heavy harvesting machinery instead of the sickle, which can alone be used where the soil is not dry and firm at the time of harvest. The yield has also,

within the last ten years, been greatly improved by the importation of better milling varieties from Kiushiu. It now amounts to 670,000,000 lbs., or considerably more than thrice the amount which has to be imported.

Sugar-cane is raised largely in the river bottoms of the alluvial plains of the Mississippi, Louisiana, the leading state, producing 300,000 out of the 311,000 tons of cane sugar grown in the United States in 1910. In 1906 for the first time the production of beet sugar surpassed that of cane sugar, and the north and west now outstrip the south in the manufacture of this commodity.

The mineral wealth of this region is of much less importance. Within the prairie section of it there lies a part of the south-western coalfield of Arkansas, Oklahoma, and North Texas. It has now an output of about 8,000,000 tons, some of which goes northward, where it comes into competition with the product of the Western field, but the greater part of which finds its market in the south. Petroleum is also obtained in the plains of Louisiana and Texas, and considerable quantities of it are shipped from the various Gulf ports.

The Atlantic and Gulf Plains, and that part of the southern prairie associated with them, are therefore chiefly devoted to agricultural pursuits. Climatic conditions, while not so unfavourable to the white man as was at one time believed, account for the introduction into the south of an alien race unfitted by nature to develop the resources of the country to their fullest extent. On the open prairie lands of Texas, where the negro has never settled in large numbers, economic progress has within recent years been very great. But the whole region is likely to remain agricultural rather than to become manufacturing, and the chief towns will always be the ports which serve not only the region itself, but, in a greater or less degree, the whole of the Mississippi basin. Of these, New Orleans, on the delta of the Mississippi, is the most important. Galveston, Mobile, and Savannah are mainly engaged in the export of raw cotton.

THE SOUTHERN APPALACHIAN REGION.—One of the most striking features in recent American history has been the economic development of the Southern States—a development which, although it has affected all parts of the south, has taken place mainly within the Southern Appalachian Region. The geographical factors upon

which it is based are the agricultural resources of the region, its mineral wealth, and its relation to the remainder of the cotton belt. With regard to the first of these, the conditions vary greatly. The Piedmont Plateau and the Great Valley contain much fertile land; the Appalachian Mountains, though well-wooded, are naturally unsuited for cultivation; and the Cumberland Plateau, likewise wooded, is not only dissected by rivers to such an extent that communication is rendered extremely difficult, but the configuration of the land and the infertility of the soil are such as to render great areas quite useless for the production of large crops. Further to the north-west, in the limestone lowlands, which may be mentioned here, are the Blue Grass Region of Kentucky and the Nashville Basin of Tennessee, both of which are exceedingly fertile. On the Piedmont Plateau, tobacco is the chief crop raised in Virginia, but further south, in the Carolinas and in Georgia, considerable quantities of cotton are grown, though the yield per acre is not so high as in various parts of the coastal and Mississippi plains.

The coalfields of the Southern Appalachians are co-extensive with the Cumberland Plateau and its outliers, and occupy portions of eastern Kentucky, Tennessee, Georgia, and Alabama. They fall within three districts, known respectively as Jellico, Chattanooga, and Birmingham. The first of these lies to the north of the thirty-sixth parallel, the second begins about that line and extends into the northern parts of Georgia and Alabama, and the third, also in Alabama, includes the most southerly part of the great Appalachian coalfield. Of these fields, the most productive is the last mentioned, as it contains the well-known Warrior Basin, which produces nearly 12,000,000 tons, or about 40 per cent. of the output of the whole region. The Middlesboro Basin, in the Jellico district, comes second with about 4,000,000 tons. The coal areas in the south have been greatly handicapped in the past by the inaccessible character of the plateau country. Within recent years, however, railway communications have been much improved, and coal from the fields in question, besides supplying the demands of the immediate neighbourhood, now makes its way to the south-east, the south, and the south-west, coming into competition along the coast and the Mississippi with waterborne anthracite from Pennsylvania.

The amount of iron ore obtained in the Southern Appalachian

region is small, when compared with that which comes from the country round Lake Superior, but the proximity of coal renders it of considerable economic importance. The largest deposits are found in the Great Valley, in Alabama, where limestone can also be obtained; but the ore is smelted at a number of towns which have grown up along the edge of the escarpment, from Virginia southwards, at points to which ore, coal, and limestone can easily be brought. Among the towns engaged in this industry Birmingham comes first, and the others include Knoxville, Chattanooga, and Roanoke. The production of the whole region only amounts to 4 per cent. of that of the United States.

The cotton industry has made remarkable progress in the southern states within recent years, as is shown by the increase of producing spindles from 554,000 in 1880 to 7,500,000, or 32¹ per cent. of the total number in the United States, in 1905. Over 95 per cent. of those in the south are in Virginia, the Carolinas, Georgia, and Alabama, and, although it is impossible to give exact figures, it is safe to say that the most of them are in the Southern Appalachian region; as all the chief cotton towns in these states—Charlotte (N. C.), Columbia, Greenville and Spartanburg (S. C.), and Augusta, Atlanta, and Columbus (Georgia), are either on the Piedmont Plateau or along the Fall Line. Here, raw cotton is at hand (though it is noteworthy that the manufacturing centres are not in the chief producing areas), the climate is favourable, the cost of living is low, and labour is cheap. Coal from the Birmingham district is easily obtained, but it is probable that the growth of the industry will depend largely on the power derived from the Appalachian streams on their way across the Piedmont Plateau and on to the Coastal Plain. In 1905 only 22 per cent. of the power used in cotton factories in this region was water-power, but since then there has been a considerable extension of the use of electricity generated by the rivers. For example, the location of several new mills in North Carolina has been determined by the development at Charlotte of a power company owning extensive hydro-electric plant on the Catawba River.

THE OZARK PLATEAU occupies the south-west of Missouri, the north of Arkansas, and the east of Oklahoma. A gentle uplift of the region, followed by prolonged denudation, led to the removal

¹ 10,494,000 or 36 % in 1910, as against 55 % in New England.

of the more recent formations and the exposure of the older Palæozoic rocks. In the upland districts the soil is frequently somewhat poor, but in the lowlands agriculture is successfully pursued. The mineral wealth of the region has given it its chief claim to economic importance. Iron, which was formerly obtained in the St. François mountains, appears to be exhausted, but lead and zinc are both extensively worked. Of the former, the Ozark Plateau provides between 40 and 45 per cent. of the United States supply, and of the latter, between 55 and 60 per cent.

THE GREAT PLATEAUS.—Although the Prairies merge gradually into the Great Plateaus, yet between the two there are considerable differences in topography, climate, vegetation, and economic development. The latter, which are much more undulating in character, at one time, no doubt, constituted a true plain, but the rivers which descend from the Rocky Mountains have dissected the greater part of it, and converted it into a series of plateaus, which differ greatly from one another according to the nature of the land in each, and the way in which each has been affected by climate and the processes of erosion. The Bad Lands of South Dakota and of parts of Montana consist of unconsolidated clays and soft sandstones, and have been minutely dissected by wet weather streams, while in western Nebraska the precipitation is just sufficient to allow of the growth of a thick sod which has prevented any erosion of the ancient plain.

Over the whole region the range of temperature is very great and the rainfall low. In Montana, notwithstanding the modifying influence of the Chinook winds, the mean winter temperature is always below, and sometimes considerably below, freezing point, while during the blizzards, which here have their full development, the thermometer may fall to -60° F. The mean summer temperature is between 65° F. and 70° F., though occasionally the thermometer rises to 110° F. In the south the mean winter temperature is generally over 40° F. and the summer temperature between 70° F. and 80° F. Over the whole region the rainfall is as a rule between 10 and 20 inches.

Grass is the typical vegetation of this part of the United States ; but, where the ancient plain still survives, in an irregular belt stretching from north to south about midway across the long eastward slope from the Rocky Mountains to the prairies, it is found growing in close formation and is specially suitable both for cattle and sheep.

Over the remainder of the region bunch grass prevails, and, although stock can be raised upon it, a large area per head is necessary. Millions of cattle wander about at all times of the year upon the open ranges, and, the snowfall being light, they are always able to obtain their food. Severe losses occur during the blizzards, and, partly for this reason, Texas, where climatic conditions are more favourable, has become a great ranching state, though, in the north, winter shelter is now being provided. From the whole region, cattle are forwarded to the North Central States. Owing to the low rainfall, very little arable farming is possible on the Great Plateaus without the aid of irrigation; and, as the rivers usually flow at some depth below the level of the land, irrigation is costly except in the valley bottoms, where it is chiefly carried on at present. There is no extensive system in operation, but river and underground water are both used for the growth of crops to supply local needs, for fodder, and for stock, and it is probable that considerable development may take place in the near future.

The mineral wealth of the Great Plateaus is not great. Lignite underlies considerable areas in North Dakota, and from the Black Hills of South Dakota some gold and small quantities of silver and lead are obtained. But the region is essentially a ranching one. The population is small, and is almost entirely confined to the valley bottoms, where live the ranchmen, whose herds graze upon the plateaus. The few towns which exist are situated, like Denver, at the meeting-places of lines of communication.

THE WESTERN CORDILLERA.—The geographical conditions of economic development in the group of natural regions, which make up the Western Cordillera, are on the whole very different from those which affect the life of the inhabitants of the eastern half of the United States. The extremely broken character of the land, the dry climate of many parts of it, and the difficulties of communication prevent alike the cultivation of a wide area and the growth of a large population. In extent the Cordillera covers two-fifths of the United States, but it has only one-twentieth of its inhabitants, about one-twentieth of its output of manufactured goods, and less than one-twentieth of the area under cereals.¹ On the other hand, its mineral wealth is of the utmost

¹ In 1910 the Western Cordillera had over 7 per cent. of the population of the United States, over 4 per cent. of the acreage under cereals and over 5 per cent. of the value of the manufactured products.

importance, the result of the varied physical changes through which it has passed. The exposure of old rocks, due to the erosion of earth folds, makes many minerals accessible. Hence it is that the Western Cordillera constitutes the great store-house for some of the most valuable mineral wealth of the United States. Its importance is indicated by the following figures :—

Production of gold, silver, copper, and lead for 1909-11—

	United States. ¹	Western Cordillera.
Gold	£16,500,000	£15,000,000
Silver	£6,300,000	£5,600,000
Copper	£28,300,000	£21,900,000
Lead	£7,300,000	£3,700,000

¹ Excluding Alaska

THE ROCKY MOUNTAINS, giving to that term the wide extension which is generally applied to it in the United States, occupy a considerable area in Montana, Idaho, Wyoming, Colorado, and New Mexico. Between the various ranges of which they are composed, lie many intermontane valleys and parks that have been covered over by material brought down from the surrounding uplands. In many of these the land is suitable for pastoral purposes, and with the aid of irrigation sufficient fodder can be grown to serve for winter food. A small quantity of cereals (less than 1 per cent. of the United States crop) and a considerable quantity of beet for sugar, are also grown on the irrigated lands, which are gradually being extended. The tendency is therefore towards a somewhat larger and more settled population than there has been in the past.

The mineral wealth is varied and extensive. Coalfields are found at intervals in a belt of country stretching along the eastern base of the Rocky mountains, and in another, but more restricted, belt along the western base, while in the intervening park regions there are numerous isolated basins. The coal, which ranges in character from lignite to anthracite, is worked chiefly in Colorado and Wyoming, but also in Montana and New Mexico. The product which exceeds 20,000,000 tons, is largely used by the railways, and in the mining and smelting industries.

Gold to the annual value of about £6,000,000 is obtained from this region, Colorado (with two-thirds of that amount), Utah, and Montana being the chief producing states. In Colorado, the

famous Cripple Creek district in the western foot-hills of Pike's Peak, a region of great volcanic activity in Tertiary times, produces one-half of the output of the state. On the western slopes of the Wahsatch Mountains in Utah and in Montana, gold is also found, frequently associated with silver, copper, and lead. Nearly two-thirds of the silver produced in the United States comes from the Rocky Mountain region. In Colorado the most important district is that round Leadville in the Mosquito Range, at the headwaters of the Arkansas River ; in Utah silver occurs in copper and lead ores in the Wahsatch Mountains in the vicinity of Great Salt and Utah lakes ; in the north of Idaho it is chiefly associated with lead, and in Montana with copper. Copper is worked chiefly in Montana and Utah. The former supplies about one-fourth of the United States' output of that mineral, the district around Butte producing practically the whole of that amount. The mining district of Utah yields the greater part of the remainder of the Rocky Mountain output. Forty per cent. of the lead mined in the United States is obtained in the north of Idaho and in Utah.

THE COLUMBIA PLATEAUS, built up of great sheets of lava, lie between the Rocky Mountains and the Cascades, and cover the most of Washington, the north and east of Oregon, and the whole of Idaho south-west of the Rocky Mountains. Their altitude varies from 500 feet along the valley of the Columbia River to 4,000 feet, and over, in the more distant parts. The climate is not so extreme as it is farther east within the same parallels of latitude, the temperature being raised in winter by warm winds from the Pacific, and cooled in summer by the high elevation. Over the greater part of the region the mean winter temperature is seldom below 24° F., and in places it is as high as 36° F., while the summer mean varies from 60° F. to 70° F. The rainfall generally occurs during the cooler parts of the year, the summers being almost entirely dry, and the mean annual precipitation is, as a rule, under 15 inches, though in a few places it rises to 20 inches or even more. At the same time the capacity of the soil, like that of the disintegrated Deccan trap, to absorb and retain moisture is so great that, although sage bush, mingled with bunch grass on which cattle graze, is the prevalent type of vegetation, large crops of wheat are grown over considerable areas on the same land every other year without the aid of irrigation. The most important of

these wheat-growing districts are in the south-western part of Washington, where the Palouse valley with the surrounding country has long been noted for its productivity, in the northern parts of Oregon, where the most fertile districts lie just south of the Columbia River, and in the adjoining parts of Idaho. The Columbia Plateaus produce about 8 per cent. of the wheat crop of the United States.

THE BASIN RANGES.—Although this region is divided by the Colorado River into two parts, in one of which the basins are closed, and in the other open, the physical characteristics of the whole area are in other respects so much the same that it may be considered as one. The topography of the country is broken by many short and narrow block ranges, and the arable land is confined to the valleys and to the plains built up by the *débris* washed down from the mountains. Climatic conditions are on the whole unfavourable to agriculture. Except in parts of Utah and Arizona, the rainfall is less than 15 inches per year, and over the greater part of Nevada it is less than 10 inches. Cultivation is therefore at present confined to the river valleys where irrigation is possible, and only an insignificant portion of the whole region is under crops. In the northern and central parts of Utah, where the rainfall is slightly over 15 inches, and where Mormon industry has developed an extensive irrigation system, cereals and alfalfa are grown, but beet is the only plant in the production of which the state takes a prominent part. About 10 per cent. of the United States crop is grown there, and the yield per acre is considerably higher than the average for the whole country (14·54 tons as against 9·71 in 1910). The success of beet-growing in Utah is mainly attributable to the fact that its cultivation requires a considerable amount of labour, and the Mormons, who for religious reasons desire to live in communities, are able to find employment without leaving the vicinity of their towns. Within recent years, also, attempts have been made to cultivate many of the plains, which lie beyond the reach of irrigation, by means of dry farming. The rainfall occurs chiefly during the autumn, winter, and spring months, and a precipitation of 15 inches, or even less, is sufficient to grow good crops of wheat and alfalfa by this method. The agricultural potentialities of the region are, however, not great.

The mineral wealth of the Basin Ranges is of considerable value.

The output of gold in Utah, Nevada, and Arizona amounts to about £5,000,000, and practically the whole of that is mined in the region under consideration, the chief producing area being the Goldfield district on the southern rim of one of the typical basin ranges in Esmeralda county, Nevada. Over one-third of the silver obtained in the United States comes from the Basin ranges, mainly from the Tintic and West Mountain ranges of Utah, and the Tonopah district of Nevada. Arizona is the chief copper-producing state of the Union, and, along with that part of Utah which falls within the Basin Ranges, yields over one-third of the product of the whole country. A considerable amount of lead is also obtained in the latter state.

There are, therefore, within this region several distinct types of economic activity. Arable farming is carried on chiefly by members of the Mormon community, ranching partly by Mormons and partly by "Gentiles," and mining almost entirely by "Gentiles." The region is one in which development beyond this stage will probably be very slow.

THE PACIFIC SLOPE consists of the Sierra Nevada and the Cascades, the Coast Ranges, and the intervening valleys of California and Puget Sound. These valleys have been built up by *débris* carried down from the mountains by rivers in the south, and by glaciers or glacial streams in the north, and they contain much fertile soil. Climatic conditions, though determined to a great extent by the proximity of the Pacific Ocean, are very diversified as a result of the irregular topography of the country. The range between summer and winter temperatures is generally less than elsewhere in the United States, and, along the coast, the mean for the three coldest months of the year varies from about 40° to 43° F. in Washington to between 50° and 55° F. in the more southerly parts of California, while the summer mean over the whole coastal area is generally between 55° and 65° F. In the Puget Sound and California valleys, the winters are usually a little colder than on corresponding parts of the coast, while the summers are considerably warmer, the mean varying from 65° to 80° F. The rainfall is heaviest along the coastal ranges and in higher altitudes on the western slopes of the Sierra Nevada and the Cascades, in the former case varying from 15 inches or less in the south of California to over 100 inches in the north of Washington, and in the latter being

over 40 inches. In the interior valleys, on the other hand, the precipitation is generally much less; in the Puget Sound region it is between 30 and 40 inches, while in California it is less than 20 inches in the Sacramento valley, and less than 10 inches in the San Joaquin valley. Over the whole region the greater part of the rain falls during the autumn, winter, and spring months, and in California the summer months are almost entirely dry. The heavy rainfall on the mountains explains the great Pacific forest, the timber from which amounts to about one-seventh the output of the United States. Washington is at present the leading lumber state in the Union.

Agriculture is a much more important pursuit than formerly. Wheat is grown chiefly in the Willamette, Sacramento, and San Joaquin valleys, and, owing to the greater part of the precipitation occurring during the growing season, large crops can be raised even in districts where the rainfall is light. Within recent years the area under wheat has greatly declined, as the result of the extension of various irrigation schemes, which have led to much land being devoted to fruit-farming. Barley is also an important product, especially of California, which ranks as the second state in the cultivation of that cereal. Among the fruits for which California is famous are peaches, apricots, pears, plums, and cherries. Flour-milling and fruit-preserving are, therefore, important industries of the Pacific Slope.

The mineral wealth of the region is considerable, though mining no longer comes first among the economic activities of the people. Coal, ranging in character from lignitic to bituminous, is found in various places, but chiefly in Washington, in the vicinity of Puget Sound and on the eastern slope of the Cascades. The total production of the Pacific Region is about 3,300,000 tons, practically the whole of which is mined in Washington. But if California is poor in coal it is rich in petroleum, and about one-third of the United States supply comes from that state, chiefly from its more southerly parts. Gold is found in the Sierra Nevada in California, about one-fifth of the whole output of the United States being obtained in that region. Considerable quantities of copper are also mined there.

The Pacific Slope is not, and owing to its great distance from the more densely populated part of the United States is unlikely to

become, a great manufacturing region, and such manufactures as do exist are concerned with preparing the products of the forest, the mine, and the farm for further treatment elsewhere. In the north, around Puget Sound valley, conditions are somewhat more favourable. The more northerly position of Seattle, Tacoma, and Portland, their proximity to the coalfields of Washington and British Columbia, their greater facilities for trade with Alaska and the Far East, and their easier communication with the remainder of the United States, are all tending to give them a more rapid development than is the case with San Francisco.

ALASKA has an area one-fifth that of the United States, and is the largest of its outlying possessions. Four great physical regions may be recognised: the Pacific Mountains, which consist of a number of ranges running, as a general rule, more or less parallel to the coast, the Central Plateau, a rolling upland deeply dissected by the Yukon and its tributaries, the Rocky Mountains, which border the Plateau on the east and north, and the Arctic slope, which is a continuation of the Mackenzie Plains. The geological structure of these different regions is as yet imperfectly known, and the rocks of those districts which have been examined vary in age from Archæan to Quaternary.

In considering the climate of Alaska it has to be noted that the country falls within the same parallels of latitude as the greater part of Scandinavia, and like Scandinavia lies on the western side of a continental land mass. On the other hand, the configuration of the North Pacific is less favourable than that of the North Atlantic for the northerly movement of warm water. Where its influence is experienced on the coastal regions as far as Bering Strait, cool summers and mild winters prevail, while the precipitation is heavy, generally being over 100 inches. In the interior, the range of temperature is much greater, and the comparatively few observations which have as yet been made indicate that the mean temperature for January is considerably below zero, while that of July is between 55° F. and 60° F. The precipitation is light, and probably does not exceed 20 inches. On the upper slopes of the mountains, and on the coast lands beyond Bering Strait, the climatic conditions are generally of an Arctic nature.

The vegetation of the country is also varied. As far west as 152° W. the seaward slopes of the Pacific mountains are clothed

to a considerable height with spruce, hemlock, and cedar ; while in the river valleys of the plateau country there are larger areas covered with spruce and poplar, hemlock and birch. The bulk of the timber, however, seems more suitable for fuel and for temporary use in the mines than for permanent building purposes. Under the climatic conditions which prevail agriculture can never be extensively pursued, and is never likely to do more than supply in part the needs of a mining population. Grain only ripens under the most favourable circumstances, but vegetables and hay are raised in large quantities, and numbers of cattle are reared.

The main incentive to the economic development of Alaska is the abundance of its mineral resources. Of these, the most important is gold, the output of which now amounts in value to nearly one-fifth of the total gold output of the United States. The chief producing areas are Juneau in south-east Alaska, near the lower end of Lynn Canal, where lode-mining is carried on in the Treadwell district, Seward Peninsula, which is in the main a region of placer mining, and Fairbanks, also with placer deposits, in the valley of the Tanana, a tributary of the Yukon, at present the most productive district in the country.

Although the production of other minerals is progressing but slowly, it is known that there are large supplies of copper in the coast region south of the Pacific mountains, notably in the country round the Copper River. Coal, chiefly bituminous and lignitic, is abundant, but, owing partly to its inferior quality, and partly to the difficulty of transport, it has not yet been worked to any considerable extent. The most valuable seams are believed to be those in the vicinity of Controller Bay.

The fisheries of Alaska come next in importance to its minerals. Salmon are most abundant, but halibut, cod, and herring are also obtained. Seals are caught off the Pribilof Islands.

The chief means of communication in the country is the Yukon river, which is on an average open for a period of between four and five months. The railway from Skagway to White Horse offers a good route into Alaska ; and there are several lines of local importance within the country itself.

COMMERCE.—For the five years 1906-10 the average value of the produce of the United States exported abroad was £365,000,000, and of the merchandise imported into the country £280,000,000.

The following figures indicates the general nature of both exports and imports :—

Exports.	Percentage of total value.	Imports.	Percentage of total value.
Cotton (raw)	24·9	Sugar	6·8
Wheat and wheat flour ..	6·7	Hides	6·1
Machinery	6·0	Chemicals	5·9
Iron and steel and manufactures thereof (excluding machinery) ..	5·1	Coffee	5·4
Copper	4·9	Silk (raw)	5·0
Lard	3·6	Cotton goods	4·9
Oil	3·5	Rubber	4·6
Wood	3·5	Flax, hemp and jute (manufactured)	4·1
Bacon and ham	2·7	Wool (raw)	2·9
Leather	2·5	Flax, hemp and jute (raw)	2·8
		Jewellery and precious stones	2·7
		Silk goods	2·5

The following table shows with what countries the foreign trade of the United States is mainly transacted :—

Exports.	Percentage of total value.	Imports	Percentage of total value.
United Kingdom	31·5	United Kingdom	16·7
Germany	14·1	Germany	11·1
British North America ..	9·7	France	8·6
France	6·1	Cuba	7·2
Netherlands	5·4	Brazil	6·8
Mexico	3·2	British North America ..	5·9
Italy	3·1	British East Indies	5·1
Cuba	2·6	Japan	4·8

Over three-fourths of the raw cotton exported goes in the first instance to Great Britain, Germany, and France. The United Kingdom is the chief consumer both of wheat and of wheat-flour, but for the latter there are also important markets in the north of South America and in the Far East. Canada is one of the chief purchasers of iron and steel goods, though these are somewhat widely distributed; and along with Russia, France, and the Argentine it buys large quantities of agricultural machinery. Copper is exported to the countries of Western Europe, oil to various parts of the world, lard to the United Kingdom and Germany, and bacon and ham to the United Kingdom. Timber goes to Great Britain and Canada, and boots and shoes to Great Britain, Germany, and Cuba.

Of the imports, cane sugar comes from Cuba and the Philippines, hides from Germany, Russia, and the Argentine, chemicals from the United Kingdom and Germany, coffee from Brazil, Venezuela,

and Colombia, raw silk from China and Japan, cotton goods from the United Kingdom and Switzerland (lace goods), linen fabrics from the United Kingdom, silk goods from France and Switzerland.

COMMUNICATIONS.—The railways of the United States, which have a length of 250,000 miles, are so numerous and, especially in the east, cover the land with so intricate a network of lines that it is impossible to do more than to describe briefly a few of the more important.

As New York is the great port of entry into the country, it is the point from which diverge some of the principal lines to the interior. The chief obstacle encountered by these lines is the Appalachian system, which offers a considerable barrier to free communication. The New York Central railroad overcomes the difficulty by a flank movement. Striking north along the Hudson as far as Albany, where it is joined by a line from Boston, and then following the Mohawk westward, it reaches Buffalo, and establishes communication with Chicago, either by its own lines which skirt the southern shores of Lake Erie, or by those of the Michigan Central which pass through the Ontario peninsula to the north of that lake. The Erie railway, crossing the outer Appalachian ridges where they are low behind New York, and then following first the Delaware and afterwards the Susquehanna and its tributaries, also runs to Chicago with connections to Buffalo, Cleveland, Pittsburg, and Cincinnati. The Pennsylvania line goes south-west from New York to Philadelphia, passes through the Blue Ridge at the gap formed by the Susquehanna at Harrisburg, and follows that river as far as Williamsport, the junction of lines from Lakes Erie and Ontario. At Harrisburg, a branch breaks off from the main line and runs to Pittsburg by the valleys of the Juniata and Conemaugh. The Baltimore and Ohio railroad runs from New York to Washington along the coastal plain, passes through the Blue Ridge at the gap formed by the Potomac, and ascends the valley of that river as far as Cumberland, where it divides, one line going by the Youghiogheny to Pittsburg, and thence to Chicago, the other striking westwards for Cincinnati and St. Louis.

From New York to New Orleans and the south there are several routes. One, followed by the Great Southern and its connections, runs along the Piedmont Plateau by Charlotte and Albany, and turns the southern end of the Appalachians; while another, of which

the Alabama, the Great Southern, and the Norfolk and Western are the principal links, crosses the Blue Ridge at the water-gap of the James, and runs to New Orleans by Knoxville and Chattanooga, in the valley of the Tennessee. Chicago and the more important towns on the Ohio and Mississippi are brought into communication with New Orleans by the Illinois Central Railway, which follows the general direction of these rivers.

The Chicago and North Western, and the Chicago, St. Paul, Minneapolis, and Omaha Railways connect Chicago with Duluth, St. Paul, Omaha, and Kansas City, the starting-points of some of the more important routes to the Pacific coast. The Great Northern has its eastern terminals at Duluth and St. Paul, the lines from which meet at Grand Forks. It then runs westward, following for the greater part of the way the course of the Missouri and Milk rivers, enters the Rocky Mountains by the valleys of tributaries of the Missouri, and descends the Kootenay for some distance on its way to Spokane. From Spokane it strikes across to the coast and terminates at Tacoma. The Northern Pacific railway likewise starts from Duluth and St. Paul, but it follows the course of the Yellowstone River by whose valley it enters the Rocky Mountains, and after passing through the Bozeman Tunnel arrives at Helena. It then crosses the main watershed at Mullan's Pass, descends to Spokane by Hellgate River and Clark's Fork, and runs to Pasco, near the confluence of the Columbia and the Snake, where it bifurcates, one line following the Columbia to Portland and then turning north to Tacoma and Seattle, and the other going direct to Tacoma by the Yakima valley, which opens a way across the Cascades.

The Union Pacific Railway has its eastern terminals at Omaha and Kansas City. From Omaha, the main line runs westward by the Platte River and one of its tributaries to Cheyenne, where it is joined by the line from Kansas City to Denver. The railway then enters the Rocky Mountains by Evans Pass, crosses over the plateau country lying between these mountains and the Wahsatch Range, and descends to Ogden, on the shores of Great Salt Lake. From Ogden several lines, connected with the Union Pacific, run to the coast. One goes to Portland by the old Oregon trail, following first the Snake, and later the Columbia. Another adopts the old California trail to San Francisco by way of the Humboldt River and across the Sierra Nevada by the Truckee Pass, while a third,

pursuing what is practically the old Spanish trail, crosses the Mohave Desert and the San Bernardino Mountains to Los Angeles.

The Denver and Rio Grande Railway, which has one of its eastern terminals at Pueblo, and is there connected with the Atchison, Topeka, and Santa Fe line from Chicago by Kansas and the Arkansas River, and with the Missouri Pacific from St. Louis and Kansas, as well as with other lines, utilises the valleys of the Arkansas and the Grand to carry it through the mountains on its way to Salt Lake City, whence a line runs to San Francisco first to the south and then to the north of that from Ogden by the California trail.

The main line of the Santa Fe system turns southward before Pueblo is reached, crosses the outer ranges of the Rocky Mountains, and enters the valley of the Rio Grande which one line follows to El Paso. Another, however, breaks off at Albuquerque, crosses the southern part of the Colorado Plateau, the Mohave Desert, and the Sierra Nevada, and runs to San Francisco. The Southern Pacific, the last of the trans-continental lines, starts from New Orleans and enters the mountains near El Paso. It then crosses the Arizona and Colorado desert regions on its way to Los Angeles, whence one line follows the California and Puget Sound valleys to Portland, while another runs along the coast to San Francisco.

Of the waterways of the United States, the Panama Canal, although it does not lie within the country itself, is at the present time attracting most attention. By it a shorter route will be opened up from the eastern ports of Canada and the United States to the whole of the western seaboard of North and South America, to China and Japan, and to Australasia. The United Kingdom and other maritime countries of Europe may also benefit as far as trade with the west of America is concerned, but the extent to which existing routes will be affected depends upon a variety of circumstances, not all of which are geographical.

The freight carried along the coasts, or upon the inland waterways of the United States, is rapidly increasing in amount, and at the same time becoming more specialised in character. On the Atlantic seaboard there is a great movement of coal from the New Jersey terminals and other coal ports further south to various parts of the Atlantic coast and the Gulf of Mexico. Ice is sent to the southern cities by boat, while crude petroleum from Texas, and phosphates from Florida and South Carolina, go north to be refined.

On the Great Lakes, traffic is growing fast and the amount of freight shipped from their ports in 1910 was more than three times as great as the amount shipped in 1889, while the net tonnage of vessels passing through the "Soo" Canals is now nearly three times that of the vessels going by Suez. Iron ore moves eastward from Lakes Superior and Michigan to Lake Erie, while coal is sent in the opposite direction. Grain is shipped to ports on the Atlantic seaboard from Duluth, Superior, and Milwaukee, going by way of the Erie Canal. On the Mississippi, the most important article of freight is coal from the Pittsburg region to the cities lower down the river. But, while the movement of coal on the Mississippi has increased, that of all other articles has decreased, and this decrease is true, not only for the Mississippi, but for practically all other rivers and canals in the States. For example, the Erie Canal, which connects the Great Lakes with the magnificent waterway of the Hudson, carried in 1906 only one-half of the freight that it carried twenty-five years previously. This canal is, however, in process of reconstruction. At the present time it can only accommodate barges carrying not more than 240 tons of freight, but, when the works now in process are completed, each lock will hold two 1,000-ton barges coupled tandem. Mechanical power, moreover, will entirely displace animal traction. The route of the new canal, which will follow that of the existing one for the greater part of the way, is up the Hudson from Albany to Waterford, and along the Mohawk to a point just west of Rome, and then by Wood Creek, Oneida Lake and River, and Seneca River to the vicinity of Clyde. Practically the whole course so far consists of canalised river and lake, but beyond Clyde the existing canal will be deepened and improved as far as Tonawanda, whence the course is up the Niagara River to Lake Erie and Buffalo. By this canal, on which the state of New York is spending over £25,000,000, it is hoped to control railway rates by restoring competition by water, and to render the port of New York the outlet of the immense traffic on the Lakes to a much greater extent than it is at present.

Another proposal under consideration is to connect Chicago with the Gulf of Mexico by means of the Chicago Drainage and Ship Canal, which runs from Lake Michigan to the Des Plaines River, the Des Plaines itself, the Illinois, of which it is a tributary, and the Mississippi.

CHAPTER XXXVIII

MEXICO

THE greater part of Mexico lies between the United States frontier and the Isthmus of Tehuantepec, and consists of a plateau rising from an elevation of 4,000 feet in the north to about 8,000 feet in the south. The plateau is bordered on the east by the Sierra Madre Oriental, between which and the Gulf of Mexico there stretches a coastal plain from 10 to 100 miles in width, and on the west by the Sierra Madre Occidental. Between this latter range and the Pacific there is another coastal plain, less fully developed than that on the east.

The geological structure of the country is as yet but imperfectly known. In the eastern mountains, the principal formation is limestone, while, in the western, Archæan rocks, covered in many places by recent volcanic material, predominate. On the plateau itself, the limestone comes to the surface over wide areas, while the remainder of the region consists of débris, either volcanic in origin or derived from the weathering of the surrounding mountains. The coastal plains are also of recent formation. Metamorphic and volcanic action, to both of which the country has been subject in an extraordinary degree, account to a great extent for the richness of its mineral wealth.

As a result of its varied configuration the climate of Mexico presents some striking contrasts. In the low-lying regions tropical conditions prevail, but on the uplands temperature is reduced, and over the greater part of the country the climate ranges from sub-tropical to temperate. Three climatic zones are generally recognised. The *tierra caliente*, which includes all the land from sea level to an altitude of about 3,000 feet, has a mean temperature of about 75° to 80° F., with a small annual range. Between 3,000 feet and 5,000 or 6,000 feet above sea-level lies the *tierra templada*, where the mean temperature is between 62° and 70° F. The annual range here is also small and the region is said to enjoy a perpetual spring. Above 6,000 feet is the *tierra fria*, where the mean annual temperature, except in the mountains, varies from 58° to 62° F., and where the range between day and night is usually greater than

that between summer and winter. The rainfall, which takes place between June and October, is very unevenly distributed. On the coastal plains and the seaward slopes of the mountains, south of the twenty-second parallel, it is generally between 40 and 80 inches, except around the Gulf of Campeche, where it exceeds the latter amount. The remainder of the coastal region and the southern part of the plateau have, as a rule, from 20 to 40 inches, while in the north there is never more than 20 inches, and in some places there is less than 10.

Climatic conditions afford the best basis for a division of the country into natural regions. The *tierra caliente* is suitable for the cultivation of tropical plants of all kinds, although in places where the rainfall is deficient recourse must be had to irrigation. Sugar-cane is extensively grown, and forms a valuable crop, but the methods pursued, both in regard to cultivation and manufacture, are defective. The production is now sufficient to meet the home demand, and in some years to allow of a considerable export. A rubber-producing plant (*Castilloa elastica*) is found growing wild in the forests and is also cultivated in plantations, the most favourable conditions for which are found south of latitude 20° N., at an elevation of not more than 1,000 feet, and in districts where the rainfall is at least 100 inches. The success of these plantations does not yet appear to be assured. Recent chemical discoveries also seem to have proved the feasibility of extracting rubber from the guayule shrub, which grows extensively on the northern plains. Among other plants of the *tierra caliente* are vanilla, which thrives best in damp districts, tobacco, for which the sandy coastal plains with their abundance of decaying organic matter are most suitable, cacao, and various kinds of fruit. Mexican tobacco is becoming an important article of export as it is rapidly growing in favour in the United States. Coffee is also cultivated in this region, but it finds its most favourable environment at a greater elevation.

On the mountain slopes the *tierra templada* rises to a height of at least 5,000 feet. In places where the amount of rainfall is deficient, irrigation is necessary for the cultivation of maize and coffee, the characteristic crops of the region. The former is the chief agricultural product of the country, and the staple article of diet of the people in years of drought, but it is still found necessary to import some from abroad. Coffee grows in Mexico on the

hill slopes south of the twenty-second parallel, at an elevation of from 1,000 to 5,000 feet, but the most favourable districts for its cultivation are found between 2,000 and 4,500 feet, that is, in the upper part of the *tierra caliente* and the lower part of the *tierra templada*, and it is there that the best quality is obtained. The state of Vera Cruz, with a rainfall high but not excessive, is specially adapted to the growth of the plant. The industry appears to be in a healthy condition, more especially in the neighbourhood of large towns, where cheap labour can easily be obtained, and new land is being brought under cultivation.

The *tierra fria* includes the greater part of the Mexican plateau as well as the higher slopes of the mountain ranges. Much of the land is deficient in moisture, but, with the aid of irrigation, both cotton and wheat can be successfully cultivated. The former has hitherto been chiefly grown in the district known as the Laguna, where the waters of the Nazas can be utilised, but within the last few years it has spread to several other parts of the plateau, and, if the water difficulty could be solved, might become a crop of considerable importance. Wheat is also cultivated more extensively than formerly, but the value of the product is still much less than that of maize.

Pastoral farming is pursued both on the central plateau and on the upper mountain slopes. In the latter regions, owing to the heavier rainfall, the grass is more suitable for cattle than for sheep; while, in the former, both cattle and sheep are reared, although the land is not capable of fattening all the cattle bred upon it. When the existing water-supply has been augmented from artesian wells, it is probable that the stock-raising industry will be greatly increased.

Although the mineral wealth of Mexico is diffused throughout the whole country, the chief mining districts occur in the region under consideration, where they occupy a wide stretch of country lying along the western slope of the eastern sierra. The silver ore deposits have hitherto proved the most valuable, and Mexico now produces about one-third of the world's supply of silver. Gold was formerly obtained almost entirely from silver ores, but within recent years gold-bearing quartz lodes have been worked, and the total production is rapidly increasing. The chief centre of activity is in the state of Mexico. Iron is found in various places, the most

noteworthy deposits being in the state of Durango, which contains the Cerro de Mercado—a hill said to be capable of producing 300,000,000 tons of pure iron. Copper mines have also been developed within the last few years, and Mexico now holds second place among copper-producing countries. The most valuable coal deposits which have yet been discovered lie in the state of Coahuila, in the north, but others exist in various places where their development is but slow. Petroleum occurs in and near the coastal districts, especially to the west and south of Tampico, where the annual production is rapidly increasing.

Manufacturing industry has not as yet made great progress. The poverty of the bulk of the people and their low standard of requirements, the comparatively undeveloped state of communications, the want of skilled labour, and the frequently disturbed political condition of the country, all tend to account for the backward state of Mexico in this respect. The cotton industry is at present the most advanced, and the product, which is manufactured partly from native and partly from imported cotton, consists chiefly of coarse unbleached fabrics, but finer goods are also produced. Many of the factories are situated upon the southern part of the central plateau, but the most modern and best organised are at Orizaba, a town of Vera Cruz, at a height of about 4,000 feet above sea-level. Hydraulic and electric power is extensively used.

Iron is smelted in various parts of the country, but the most important iron and steel works are at Monterey, where iron and coal deposits occur together. Among other industries, situated mainly in the southern plateau region, are the manufacture of pulque and mezcal (the national drinks) from the agave, the making of hammocks from henequén, and flour-milling.

Of the peninsular parts of Mexico, Yucatan is low-lying and has a heavy rainfall. It is chiefly noted for the extensive growth of *Agave sisalana*, from which the fibre known as henequén or sisal hemp is obtained. Lower California, on the other hand, is mountainous, has little rainfall, and is chiefly of importance for its large deposits of gold, silver, and copper.

RAILWAYS.—Along with the economic development of Mexico there has been a rapid extension of the railway system, and the Republic has now over 15,000 miles of railroad. Among the principal lines are the Mexican Central and the National Railways, which

traverse the plateau, from the United States frontier at El Paso and Laredo respectively, to the city of Mexico. The capital is connected with the Gulf coast at Vera Cruz—the chief port of the country—by two lines, the Mexican and the Interoceanic, both of which have had to overcome great engineering difficulties. One branch of the Mexican Central runs to Tampico, also on the Gulf, while another goes to Manzanillo on the Pacific. The Tehuantepec Railway, which is connected with the Mexican by the Vera Cruz and Pacific, is the shortest and easiest trans-continental line in North America. The distance from Coatzacoalcos on the Gulf to Salina Cruz on the Pacific is less than 200 miles, and the highest elevation reached does not exceed 730 feet.

CHAPTER XXXIX

CENTRAL AMERICA

CENTRAL AMERICA contains the colony of British Honduras, and the six republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, and Panama. The greater part of the region is occupied by mountains, which have a general trend from west to east, and rise in Guatemala to a height of nearly 14,000 feet. On the Pacific coast there has been great volcanic activity, and volcanic débris has done much to increase the fertility of the soil. The climate varies greatly with position and altitude, but, as in Mexico, three zones are generally recognised, the *tierra caliente*, the *tierra templada*, and the *tierra fria*. On the Atlantic slope, exposed to the trade winds, the rainfall is heavier than it is on the Pacific, where it is partly due to monsoonal influences. Consequently, in the former region much of the land is covered by wet evergreen forest, which passes into temperate forest at higher altitudes, while in the latter monsoon forest and savanna predominate. It follows that it is on the Pacific, rather than on the Atlantic slope, that the majority of the inhabitants live. They are either pure Indians, or of mixed Indian and Spanish ancestry.

GUATEMALA

Guatemala has an area of 48,290 square miles, and a population of about 2,000,000. Except along the coast, the land has generally an elevation of over 4,000 feet. Maize, rice, and wheat are grown to meet the home demand. Coffee accounts for over 85 per cent. of the total exports, Guatemala providing over 3 per cent. of the world's supply of that commodity. Other exports include hides, wood, rubber, bananas, and sugar.

SALVADOR

Salvador has an area little more than one-seventh that of Guatemala, but its population is over 1,000,000. The cultivation of coffee is the staple industry of the people, but gold, silver, and sugar are also exported. Perhaps the most characteristic product is balsam, obtained from *Myroxylon Pereirae*, which seems to be confined to a narrow strip along the Pacific coast.

HONDURAS

Honduras, with an area of 46,250 square miles, has a population of over 500,000. Bananas, which are cultivated in the hot lands along the north coast, and gold, which is obtained mainly from the Rosario mine at San Juancito, together constitute over 75 per cent. of the exports. Truxillo is the chief port.

BRITISH HONDURAS

British Honduras has an area of 8,598 square miles, and a population of about 44,000. The chief exports are chicle gum (obtained from *Achras sapota*), which within the last few years has rapidly advanced to the first place, mahogany, coconuts, and bananas. Belize, the chief port, formerly had a considerable entrepôt trade, some of which it still retains.

NICARAGUA

Nicaragua is the largest of the Central American states, and has an area of 49,000 square miles, but its population numbers only 600,000. Coffee and minerals constitute about two-thirds of the exports, and wood, rubber, and bananas make up the bulk of the remainder. The ports of Nicaragua are Bluefields and Greytown.

COSTA RICA

Costa Rica has an area of 23,000 square miles, and a population of 380,000. The chief products grown for export are bananas and coffee, the former going to the United States, and the latter to Great Britain. A railway now runs from Port Limon on the Atlantic to Punta Arenas on the Pacific.

PANAMA

Panama has an area of 32,000 square miles, and a population of 420,000. Among its chief exports are bananas, rubber, and coconuts. A trans-continental line runs from Colon on the Atlantic to Panama on the Pacific, taking advantage of a break in the mountain system of Central America. The Panama Canal, which is now nearly completed, follows the same route from the one ocean to the other.

CHAPTER XL

THE WEST INDIES

THE West Indies are generally divided into the Greater and the Lesser Antilles. The different islands of which these two groups are composed vary in size from Cuba, which has an area of 44,000 square miles, to small rocks which just appear above the surface of the sea. The whole region lies within the tropics, and the temperature ranges from over 70° F. in winter to over 80° F. in summer. The rainfall, which is well distributed throughout the year, is heaviest on the slopes of the islands facing the sea.

CUBA

The interior of the island contains several groups of mountains, and it is on low plateaus and in the river valleys that the most fertile districts are found. Within recent years a considerable amount of American capital has been invested in the sugar industry; the methods both of cultivation and manufacture have been improved; and Cuba now produces nearly one-fifth of the world's supply of cane sugar, the bulk of that which is exported going to the United States. Tobacco is grown in the Vuelta Abajo district, in the west of the island, where the soil seems to be peculiarly adapted to the cultivation of certain varieties held in high repute. Hæmatite and magnetite have hitherto been worked near Santiago in Oriente, but brown iron deposits have recently been exploited in other districts; and the total annual output of iron ore, which goes mainly to the United States, now exceeds 1,000,000 tons. Sugar supplies two-thirds of the exports of the country, and tobacco, much of which is made into cigars at Havana, one-fourth. The external trade is mainly with the United States. Havana is the chief port.

JAMAICA

Jamaica, which has an area of over 4,000 square miles, is the largest of the British possessions in the West Indies. Sugar was formerly the principal product of the island, but within recent years its place has been taken by fruits, especially bananas, which now contribute between 50 and 60 per cent. to the total value of the

exports. Sugar and rum, coffee, and cacao make up the bulk of the remainder.

HISPANIOLA

Hispaniola is divided between the two mulatto republics of Haiti and Santo Domingo. Both are in an undeveloped condition. Cacao, coffee, and logwood are among the chief exports.

PORTO RICO

Porto Rico belongs to the United States, and considerable attention is being paid to its development. Irrigation has been introduced where necessary, and the island appears to be in a prosperous condition. Sugar-cane, tobacco, and coffee are all exported, mainly to the United States.

LESSER ANTILLES

The Lesser Antilles are divided among Britain, France, Holland, and Denmark. The British possessions include Barbados, the Windward Islands, the Leeward Islands, Trinidad, and Tobago. From Barbados the principal exports are molasses and rum. In the Leeward Islands, Dominica and Montserrat produce limes, and Antigua and St. Kitts, sugar. St. Vincent, in the Windward group, exports the best sea-island cotton grown in the West Indies. Cacao is cultivated in St. Lucia and Grenada, and sugar in St. Lucia. Trinidad, in addition to the usual tropical products, exports asphalt obtained from a pitch lake found in the island. Of the French possessions, Martinique, the most important, is actively engaged in the cultivation of sugar. The Bahamas, also a British possession, export sponges, sisal hemp, and lumber.

SOUTH AMERICA

CHAPTER XLI

SOUTH AMERICA

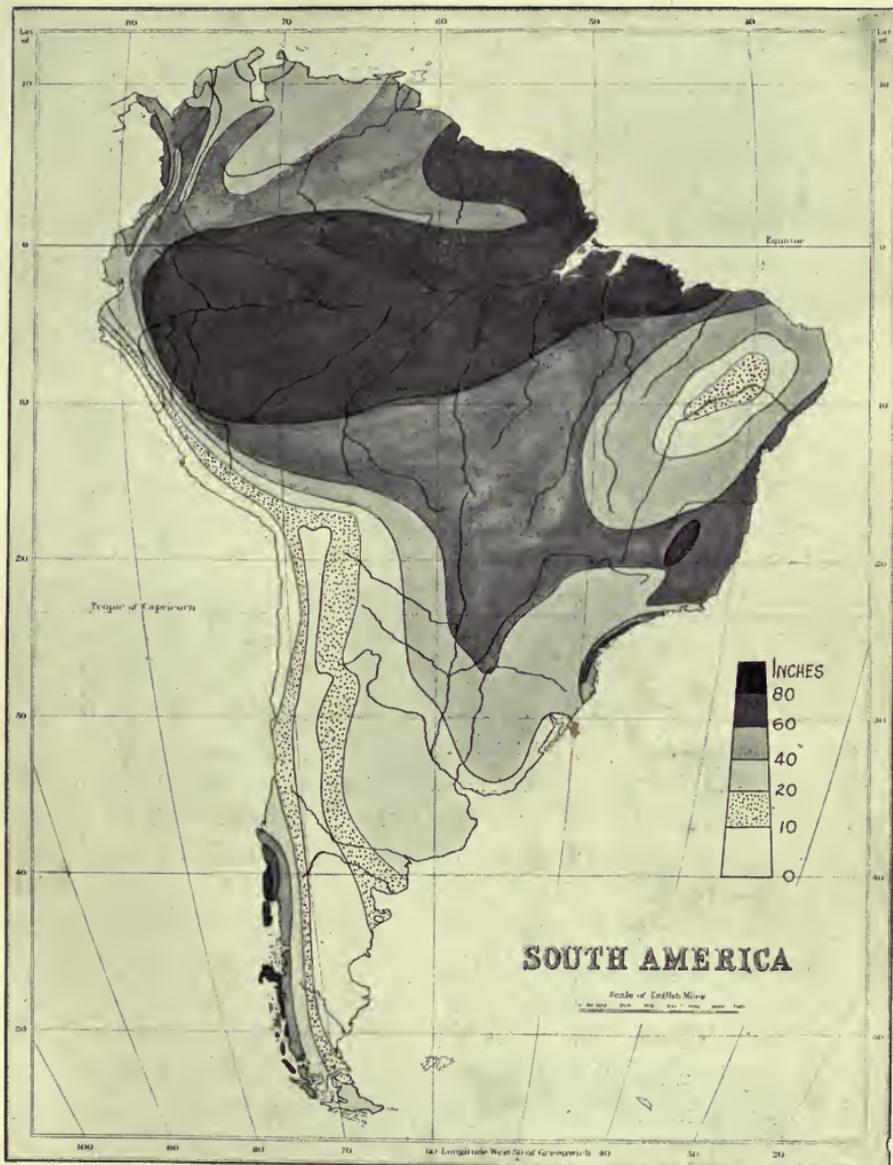
SOUTH AMERICA, with an area of over 7,200,000 square miles, comes fourth in size among the continents, being somewhat smaller than North America. It may, in a preliminary survey, be divided into three great physical regions: the Eastern Highlands of Guiana and Brazil, the Central Lowlands, and the Western Cordillera. The Eastern Highlands, which are cut in two by the valley of the Amazon, constitute the oldest part of the continent. They are the remains of a great mountain system which was worn down and covered, over large areas, with sandstone of different ages. These sandstones lie in horizontal strata, and the land, though much faulted, has the general appearance of a plateau in which the rivers have cut deep valleys. The whole region, therefore, is divided up into a number of tablelands, the steep escarpments of which, when seen from below, present the appearance of mountain ranges; but the only highlands to which that term can properly be applied lie in the east, where the Serra do Mar, the Serra da Mantiqueira, and the Serra do Espinhaço rise to heights considerably above the level of the massif, which varies in elevation from 1,000 to 4,000 feet, the average height being probably about 3,000 feet. The Guiana massif is also divided into two parts by the Essequibo, the eastern one being an Archæan peneplain, while the western one is covered with sandstone in the more elevated districts.

The Central Lowlands may be divided into two regions, the first lying in the basins of the great rivers and the second being the Pampa-Patagonian area. The land surface of the former is generally flat and low, and is largely composed of sediment deposited by the rivers in the great arms of the sea, which, at one time or another, covered much of the area now occupied by the Central Lowlands. The basin of the Orinoco was occupied by a Tertiary sea which was gradually filled up during Quaternary times by the river and its tributaries; and the land formed in this way now constitutes the llanos, or great plains, which lie to the north and west of the Orinoco. These llanos, which are cut up into mesas or tablelands, slope down gently towards the river and have nowhere

a height of over 800 feet. The Carboniferous sea covered the whole of the lowlands from the mouth of the Amazon to that of La Plata, and during Tertiary times the valley of the Amazon was also under water, Tertiary rocks now being found in different parts of it. Since then, the remainder of the depression has been filled up by more recent deposits, and the slope of the river is now so gradual that, at a distance of 1,250 miles from its mouth, its level is only 260 feet above that of the sea. The lowland in the basin of La Plata was within quite recent geological times occupied by the Pampean Sea. It extends southwards from the Madeira-Paraguay divide in the Llanos de Chiquitos, and includes the Gran Chaco, an immense plain varying in height from 300 to 1,000 feet. Further south, the plains on the right bank of the River Salado and around the lower course of the Parana and Uruguay also fall within the La Plata Lowland.

The Pampa, which reaches to the Colorado, forms a plain sloping down gently towards the east, and consists of rocks of Tertiary age covered with glacial débris, clay, and loess. Only a small part of the drainage of this region reaches the sea, the river basins being generally closed. Further south lies the Patagonian Plateau, which has a height in the west of about 2,000 feet, and slopes gently in terraces towards the Atlantic. Like the Pampa, the land is built up of Tertiary deposits in which, however, there appear, here and there, the remains of an earlier mountain system. Glacial débris, and in places volcanic ash, cover the surface.

The Western Cordillera is the third great physical region into which the continent may be divided, and south of about the thirty-second parallel its formation is comparatively simple. Along the coast runs a range with a lower elevation than the main Cordillera further inland, while between the two there is a great valley. The coastal range is represented south of latitude 42° by a chain of islands, the trend of which is parallel to the mainland, while the central valley, which has been subject to great glaciation, is submerged. North of Aconcagua the main Cordillera consists of two ranges, an eastern and a western, between which lie elevated plateaus. These ranges run more or less in the same direction as the meridian as far north as the nineteenth parallel, where they turn towards the north-west, and finally coalesce in the Cerro de Pasco. The enclosed plateau falls into three divisions: that of the Argentine,



After the Oxford Wall Maps,

by permission

RAINFALL OF SOUTH AMERICA

which belongs to the Pampa area of inland drainage, that of Bolivia, whose waters make their way to Lake Titicaca, and that of Peru, which is in the basin of the Amazon. The desert of Atacama, between the western and the coastal ranges, continues to the north the central valley of Chile. Beyond the Cerro de Pasco these ranges run in a north-westerly direction almost to the Gulf of Guayaquil, where the western one disappears. The Northern Andes begin at Loja, south-east of the Gulf of Guayaquil, and between Loja and the Knot of Pasto two ranges enclose the elevated plateau of Ecuador, which is much broken up by transverse ridges. From the Knot of Pasto three ranges diverge and traverse Colombia, the most easterly entering Venezuela and finally running eastward along the coast of the Caribbean Sea.

The geological structure of the whole Cordilleran system varies greatly and is still very imperfectly known. South of the fortieth parallel granitic rocks prevail, and the coast ranges are believed to be Archæan; north of the latitude mentioned, the western range of the Cordillera consists chiefly of rocks of Jurassic and Cretaceous age on an Archæan base, with eruptive materials interbedded, while the eastern range is built up of Archæan and Palæozoic rocks with Cretaceous deposits in places. Volcanic rocks lie between the eastern and western ranges. The Northern Andes consist chiefly of Archæan and Cretaceous rocks.

CLIMATE OF SOUTH AMERICA.—For various reasons the climate of South America differs greatly from that of North America. Both continents taper to the south, with the result that of the latter only a small part lies within the tropics, while of the former less than one-fifth falls beyond them. North America, moreover, extends well within the Arctic Circle, while the extreme point of South America is distant by almost eight hundred miles from the Antarctic Circle. The result is that, whereas in the northern continent only a small area has a mean temperature above 60° F. during the coldest months of the year, the mean temperature of more than two-thirds of the southern continent does not fall below that point during the corresponding season. The range of temperature is, therefore, much less in South America than in North America, and the typical continental climate is developed to a much less extent.

During the southern summer the region of highest temperature lies in the north-eastern part of the continent, south of the equator,

and the isotherms over a greater part of north-eastern South America are therefore convex to the south. Over the remainder of the continent, they run from north-west to south-east as the result of the cold current along the Pacific coast, winds from which tend to lower the temperature of the adjacent lands. During the northern summer, when the region of greatest heat lies north of the equator and east of the Andes, the isotherms run from north-west to south-east in that part of the continent, but south of the equator they run from east to west, except on the Pacific coast, where for the same reasons as before they turn towards the north. Over the greater part of South America the heaviest rainfall takes place during the warmest months of the year. An area of low pressure is developed to the south of the equator during the southern summer; the trade winds of the northern hemisphere are sucked into the basin of the Amazon, and these winds, blowing from the north-east, north, and further south from the north-west, bring much rain to the lowland regions over which they blow. At the same time, the south-east trade winds are drawn into the Paraguay-Parana basin, so that the whole of the lowland area from the mouth of the Amazon to that of La Plata, and westward towards the Andes, has a heavy precipitation. Along the north-east of the Brazilian highland the rainfall is less, as the south-east trade winds are blowing parallel to the coast; while along the south-east coast of the upland the rainfall is heavier, but does not extend far inland. The west coast of the continent is without rainfall from the equator as far south as Valdivia, beyond which point much moisture is brought to the coast by the westerly winds. That part of South America which lies north of the equator receives its heaviest rainfall during the northern summer, the winter precipitation of that region being reduced by the fact that the trade winds from the North Atlantic are pulled onwards to the area of low pressure south of the equator. There is also, during this season, a monsoonal rainfall on the west coast of the northern part of the continent. South of the equator, where winter conditions prevail, the amount of moisture deposited is generally much less than during the summer months. The south-eastern trade winds are pulled northwards, and, except along the coast, more especially between Rio de Janeiro and Buenos Aires, the rainfall is low. On the west coast, the strip which now receives rain extends almost as far north as La Serena.

To sum up, the greater part of the Amazon lowlands has a mean annual rainfall of over 80 inches, and this amount is also received along part of the north-east coast north of the mouth of the Amazon. The remainder of the region which, roughly speaking, lies east of a line drawn from Quito to Buenos Aires, has between 40 and 80 inches, with the exception of the central part of that district which is east of the longitude of Para, where it is much less. To the south-west of the line already indicated, precipitation rapidly decreases and a dry belt stretches across the continent from Peru to south-east Patagonia. South of Concepcion the rainfall along the west is heavy, rising in places to over 80 inches.

VEGETATION.—The forest vegetation of a great part of South America is extremely rich and varied, and this is accounted for by the high temperature of the intertropical region, the abundance of moisture resulting from large areas having either no dry season or but a short one, and the fact that many of the rivers overflow their banks during a considerable part of the year.

The most luxuriant tropical rain and monsoon forest covers a great part of the Andes in Colombia and Venezuela, and stretches along the north-east coast of the continent to beyond the mouth of the Amazon; it extends up that river and its tributaries, and southward along the eastern slope of the Cordillera for a considerable distance. Throughout the whole of this region the general characteristics of the forest are the same. There is a great variety and constant intermixture of species, and among the more important products are rubber, dyewoods, cabinet woods, medicinal plants, and fruit trees, which are bound together by lianes and covered with epiphytes. Hence the forest is gloomy, and in the continual struggle for light the trees grow to a great height. This type of vegetation reappears along the south-east coast of Brazil between the fifteenth and thirtieth parallels, where, as already mentioned, there is considerable rainfall.

The greater part of the Guiana Highland, and of the llanos which lie to the west and north of the Orinoco, is typical savanna—grassland scantily dotted with trees. The Brazilian upland also, with the exception of the valleys of the larger rivers and the coast regions, is to a large extent covered with savanna. The dry season lasts for over three months, and it is only in districts where a supply of water can be obtained during that period that trees are found. Elsewhere

grass, shrubs, and arboreal cacti cover the ground, and this intermixture of woodland and grassland is characteristic of the Matto Grosso. In the north of eastern Brazil, where the rainfall is low, occur the caatingas, which are light forests consisting of thorny shrubs, while in the south the campos are covered with long grass intermingled with araucaria thickets. The Gran Chaco, a region of summer rainfall, is characterised by thorny scrub, palm groves, and in places even by dense arboreal vegetation.

Further south, in the Argentine, especially around La Plata estuary, come the great undulating grassy plains called the pampas. Here the rainfall is well distributed throughout the year, the vegetative season warm, and the desiccating winds unfavourable to tree growth. In the slight depressions or cañados, where water tends to collect, the grass grows in close formation, but on the intervening ridges an open formation prevails. West of the pampas there stretches towards the Andes a woodland region, the trees of which are very varied, but, with few exceptions, are characterised by "stunted growth, scraggy ramification, light crowns, and rich formation of thorns." In the west and in the south, this thorn forest passes into poor steppe.

Along the west coast of the continent from about the thirtieth parallel southward, the lower slopes of the mountains are covered in the north, where Mediterranean conditions prevail, with sclerophyllous woodland, in the centre with temperate rain forest, of which laurels and beeches and a very dense undergrowth are the characteristic features, and in the south with summer forest consisting largely of beech.

The desert regions of South America extend along the western coast from the Gulf of Guayaquil to Northern Chile, the vegetation everywhere being exceedingly poor. On the Cordilleran Plateau, within the tropics, is the puna, covered with a stiff xerophilous grass, while further south Alpine plants and shrubs prevail.

CHAPTER XLII

THE CORDILLERAN STATES

VENEZUELA

VENEZUELA, with an area of about 394,000 square miles, is the sixth in size among the states of South America. The country falls naturally into four physical regions. The eastern range of the Colombian Cordillera enters Venezuela as the Cordillera de Merida, and is continued eastward by the Caribbean coast ranges. To the north lies a lowland region made up of débris brought down by the rivers into the Lake of Maracaibo, which is gradually being filled up. Between the mountains and the Orinoco lie the great plains known as llanos, also built up by the denudation of the surrounding mountains, and cut up by the rivers into tablelands called mesas. Lastly, beyond the Orinoco lies the Guiana Highland.

The whole country falls within the isothermal line of 80° F. of mean annual temperature, but actual temperature of course varies with altitude. The rainfall is heaviest on the slopes of the Cordillera de Merida and on the Guiana Highland, where it is between 60 and 80 inches. Elsewhere it is from 40 to 60 inches.

THE TROPICAL LOWLANDS.—The coastal districts and the lower slopes of the mountains, to a height of about 1,500 feet, yield tropical products, and constitute the first natural region. Cacao is one of the principal crops, as it requires a temperature of over 80° F. for a considerable part of the year and a moist humid climate. Irrigation from the mountain streams can also be practised when necessary. Cacao is next to coffee the most valuable export of Venezuela. France takes more than half of the total output, while the United Kingdom and the United States take a considerable part of the remainder. Sugar is grown in the same region, but more especially to the west of the Gulf of Maracaibo. The exports of this article are, however, inconsiderable. Tobacco is cultivated in various places, and a small amount is exported.

THE SUB-TROPICAL UPLANDS.—Coffee, which is the chief export of the country, and on which most of its prosperity depends, is grown mainly in the sub-tropical uplands, which lie between 1,500 and 6,000 feet above sea level, the most suitable districts being between 1,500

and 3,000 feet. Venezuela now comes second in the list of coffee-producing states, and accounts for 4 per cent. of the world's output. The exports go mainly to the United States, but a considerable quantity is also sent to European countries. Maize, which is grown in many parts of Venezuela, thrives best in this region; and wheat, which is the staple food-stuff of the country, is cultivated, although the production is not sufficient to meet the demand, and importation is necessary.

In the lower part of the sub-tropical region is settled the greater part of the population, which is largely derived from an intermixture of Spanish and Indian blood. On the coastal plains much of the work is done by negroes, while, in the upper parts of the sub-tropical zone, Indians form the bulk of the inhabitants.

THE LLANOS, which are great savanna regions, are devoted chiefly to stock-raising, and it is estimated that Venezuela has over 2,000,000 cattle. Oxen are exported mostly to Cuba, and hides to the United States. There is little doubt but that this part of the country is capable of considerable development.

THE GUIANA HIGHLAND.—Lastly, there is the savanna region to the south of the Orinoco, on the Guiana Highland, from which the chief export at present is rubber. Balata is obtained from the so-called Bullet tree (*Mimusops balata*), which grows in the valleys of the Orinoco and its tributaries, and forms the bulk of its exports.

MINERALS.—The mineral wealth of the country is but vaguely known. Gold occurs in many places but seems only to be worked in the territory of Yuruari, in the Guiana Highland. Iron is found in the Cordillera, but the most important deposits are believed to be near the confluence of the Imataca River and the Orinoco, where it is said that inexhaustible quantities of magnetic ore of high grade occur within reach of deep water. Coal of a lignitic character is reported from a number of places along the Caribbean coast and elsewhere, but the deposits do not seem to possess much value except, perhaps, in the neighbourhood of the Gulf of Maracaibo, where the Coro mines are worked, mainly for the benefit of the Government.

COMMUNICATIONS.—The communications of the country are very poor, partly as a result of its generally backward condition, and partly because of the serious physical obstacles which exist. There are not 600 miles of railway in the state, and their small importance

may be illustrated by the fact that in 1910 their total earnings did not exceed £500,000. The chief line is that which runs from Carácas to Valencia, and connects these two towns with their respective ports—La Guaira and Puerto Cabello. In the llanos and the forest region, the Orinoco with its tributaries forms the only highway; and of this part of the country Ciudad Bolivar, situated about 370 miles from the mouth of the river, is the principal port. For the five years 1906-10 the annual value of exports and imports averaged £5,500,000.

COLOMBIA

Colombia, with an area of 461,000 square miles, comes fifth in size among the states of South America. The country belongs partly to the Cordilleran upland, partly to the lowlands of the Orinoco and Amazon. From the Knot of Pasto three great ranges diverge and traverse Colombia, while a fourth runs along the west coast, and is separated from the Cordillera proper by the Rio San Juan and the Atrato. The western and central ranges are separated by the valley of the Cauca, and the central and eastern by that of the Magdalena.

THE TROPICAL LOWLANDS.—Temperature varies with altitude, and suggests the best method of marking the country off into groups of natural regions. Along the west and north-west coasts, in the river valleys, and on the eastern plains, tropical conditions prevail. The precipitation is heavy, especially on the Pacific coast, where a monsoon rainfall occurs, and south of the Guaviare, where much moisture is brought by the winds which blow over the Amazonian lowlands. Below an altitude of about 3,000 feet the products are of a purely tropical nature. Sugar is grown in the valleys of the Cauca and Magdalena, and along the Caribbean coast. At present it only satisfies the home demand, but it is claimed that there are large areas which might profitably grow it for export. Cacao might likewise be cultivated to a greater extent than at present, as only a small amount seems available for shipment abroad. The raising of bananas for export, chiefly to the United States, has made considerable progress in the north within recent years. Cotton is produced along the coast and to a certain extent in the interior, and vigorous measures have recently been taken to encourage its cultivation. Rubber is found both in the inter-Andine valleys and in the basin of the

Amazon, and here also are great and practically untouched supplies of valuable timber. There are rich cattle-raising districts along the Caribbean coast, in the valleys of the lower Magdalena and the Sinu rivers, and in the llanos of the Orinoco basin. This last region is, however, handicapped by want of good communications. Rice and tobacco are also grown, the latter partly for export to Germany.

THE SUB-TROPICAL AND WARM TEMPERATE REGION lies on the slopes of the mountains at an elevation of between 3,000 and 6,500 feet above sea-level, and grows coffee and maize. The former is the main agricultural export of the country, and the best quality generally commands a ready market in the United States, where it is preferred to that from Brazil.

THE COOL TEMPERATE REGION which extends to a height of about 10,000 feet, produces wheat and other cereals for home consumption. Higher up lie the bleak, uninhabited regions called the paramas.

THE MINERAL RESOURCES of Colombia are known to be extensive, and in Spanish times great quantities of gold and silver were obtained from the country. The present production is small. Gold and silver are generally found in the central and western ranges of the Cordillera, where volcanic rocks have forced their way through the crystalline schists of which the ranges are composed; the eastern range, formed mainly of Cretaceous and Tertiary strata, is much poorer in these minerals. The department of Antioquia in the central Cordillera, and the department of Cauca in the western—more especially the southern part known as the Choco—are the chief districts producing gold, which is found both in quartz lodes and in alluvial deposits, but is worked mainly in the latter. The department of Tolima in the upper Magdalena is pre-eminent for silver. Platinum is obtained from various rivers and streams in the southern part of the western Cordillera. Iron and coal are found in many parts of the country, frequently in close proximity to one another. The latter is mined chiefly at Bogotá, but the former has only been worked to a very slight extent as yet. There appear to be large supplies of petroleum in the north-west.

COMMUNICATIONS.—The means of communication are exceedingly bad. The roads are seldom better than mule-tracks, and yet much of the trade of the country has to be carried on over them. The great highway is the Magdalena, which is navigable as far as La

Dorada, nearly 600 miles from the coast, and again from above the rapids at Honda to Girardot, 100 miles, and sometimes to Neiva, 200 miles, further up. The Cauca is navigable from Caceres, about 200 miles above its confluence with the Magdalena. As the mouth of the latter river is obstructed by a sandbank, two railways connect it with the coast, one running from Barranquilla to Puerto Colombia, the other from Calmar to Cartagena. These, with the line from La Dorada below, to Beltran above, the Honda rapids, and the line from Girardot to Bogotá are the most important in the country.

COMMERCE.—The export and import trade of Colombia is carried on chiefly through its Caribbean ports—Barranquilla and Cartagena—which account for over 80 per cent. of the whole. Much of the export trade is with the United States, while cotton goods, mining machinery, and rails are supplied by Great Britain, agricultural machinery and locomotives by the United States, and many miscellaneous articles by Germany. For the years 1906-10 the average annual value of the trade of Colombia was £5,600,000.

Although the geographical conditions of Colombia in some ways favour economic development, in others they retard it. The obstacles to communication between different parts of the country have not only hindered the exploitation of its resources, but they have led to the growth of particularism, and so encouraged those revolutionary movements which have been the curse of the nation. Climatic conditions have tended to concentrate population in the upper valleys of the rivers, away from the coast, and out of touch with the world. Within the last few years the government seems to have been more stable and somewhat more energetic than usual, and attempts are being made to open up the country, but the scarcity of labour will prevent rapid progress being made.

ECUADOR

Ecuador has an area of 116,000 square miles. Physically the country may be divided into three regions: the west coast plains and the lower mountain slopes, the main Cordillera, and the Montaña. From Loja, south of the Gulf of Guayaquil, to the Knot of Pasto, the Cordillera forms two distinct chains connected by mountain knots which cut the high and narrow plateau between the chains into a number of basins. The coast region, about eighty miles wide, contains numerous spurs from the Andes, and an isolated range

running parallel to the coast for about sixty miles. The Montaña, as elsewhere, consists of the forested lands in the basin of the Amazon.

Ecuador, lying across the equator, has a warm tropical climate in the lowlands, modified by altitude at higher levels. Thus, while Guayaquil has a mean annual temperature of about 82° F., that of Quito, on the plateau, 9,000 feet above sea-level, is only 55.5° F. During the early part of the year, the rainfall is heavy on the western slopes except in the south; while the Montaña is watered by the winds which blow over the basin of the Amazon.

The population is estimated at 1,300,000. Of these the greater number are Indians, or people of mixed Indian and Spanish blood. The inhabitants of pure European descent are not numerous.

THE WEST COAST REGION has products of a tropical character. Of these the most important is cacao which is the only crop of Ecuador that plays a leading part in the world's markets. In 1911, 40,000 tons, or 17 per cent. of the world's production, were exported from this country to the United States and to European markets. Vegetable ivory, derived from *Phytelephas macrocarpa*, a species of palm also grown in Peru and Colombia, and used in the manufacture of buttons and various kinds of electrical apparatus, forms an important export of this region. Among other crops coffee is exported, but only to a slight extent, and some tropical fruits are grown.

THE CORDILLERA.—On the higher slopes of the Andes and in the inter-montane regions, cereals are grown for home consumption. Cattle and sheep are raised, and hides are exported.

THE MONTAÑA produces rubber and various kinds of hardwood, but the development of this region progresses very slowly, owing to the undeveloped state of communications.

The weaving of "Panama" hats is carried on as a domestic industry in all parts of Ecuador, which is now the chief producer of this class of goods. The toquilla straw, from which the hats are made, is obtained from the shrub *Carludovica palmata*, which grows wild in the hot and humid regions of the Pacific coast and the Amazon basin.

Ecuador seems to contain considerable mineral resources, but so far mining operations have not met with much success.

The railway from Guayaquil, the port of Ecuador, to Quito, its

capital, recently completed, will probably bring about considerable changes in the economy of the country. It will be possible to send cereals from the inter-Andine regions to the coast lands and the heavy imports of food-stuffs from the United States will probably be diminished. At the same time it ought to be possible to distribute textile goods, which come chiefly from Great Britain, at a much lower rate than formerly. The annual value of exports and imports combined amounts to about £4,000,000.

BOLIVIA

Bolivia, one of the largest and least developed of South American States, has an estimated area of 708,000 square miles, and therefore comes next in size to Brazil and the Argentine. Its south-western part lies within the Cordillera, where, between the eastern and western Andine chains, lies the Bolivian tableland, which has an elevation of over 12,000 feet, and on which are the two large connected lakes, Titicaca and Aullagas. Many of the surrounding mountains are covered with perpetual snow.

THE PUNA.—At an elevation of 9,000 feet and over, climatic conditions become unfavourable to much cultivation, and stock-raising and mining are the main pursuits of the puna region. Large numbers of sheep, alpacas, and llamas are raised, while the vicuña, in its wild state, is also common. More important, however, is the mineral production of the region. Tin, which is found in large quantities along the eastern belt of the plateau from Lake Titicaca to the southern frontier, is the principal export of the country. With the development of communications, more especially of the Antofagasta-Oruro line and its branches, the output has more than doubled within the last ten years, and now amounts to over 18 per cent. of the world's production. Bismuth is generally found closely associated with the deposits of tin. Silver is worked chiefly in the department of Potosi, and copper is mined along the eastern range of the Andes.

THE MONTAÑA.—To the east of the Cordillera, the land in the north of Bolivia consists of wide river valleys draining to the Amazon, and in the south of great rolling plains broken up by isolated remnants of the Brazilian massif, and draining partly to inland basins and partly to the Paraguay. The districts with an elevation of less than 5,000 feet are known as the yungus (or hot valleys),

and possess a tropical climate. In the deep inner valleys, from which the region gets its name, rubber is the chief product, and is, after tin, the most valuable of Bolivian exports. The hardwoods of the Amazon forest extend into the lowlands of the Montaña; while in its higher parts excellent coffee and cacao, as well as rice, maize, sugar, and tobacco, can be grown, and large numbers of cattle are raised. The upper belt of the yungus, and the lower belt of the next region, known as the valles (from 5,000 to 9,000 feet above sea-level), are the most fertile in Bolivia, and only require cultivation to enable them to carry a dense population. On the upper parts of the valles, cereals are grown for home consumption.

The economic development of Bolivia has been, and is likely to continue to be, slow. The total population is less than 2,300,000, of whom one-half are Indians, and over one-fourth Mestizos. In a country over three times the size of the German Empire there are only about 230,000 people of unmixed European descent. The mining industry is handicapped by the difficulty of obtaining labour. Immigration presents no remedy, as the altitude at which work is carried on is frequently so great that only the native born can undertake it.

The difficulties of communication are also very great, and they are increased by the fact that Bolivia has now no port of its own. The railway which runs from the Peruvian port of Mollendo to Lake Titicaca is connected by ferry with, and will eventually be linked up to, the line from Huaqui, on the other side of the lake, to La Paz. From Viacha, near La Paz, a line runs to Oruro, where it is connected with that from Antofagasta. Mollendo and Antofagasta have, therefore, at present the bulk of Bolivia's foreign trade, but a third line, just finished, from Viacha to Arica will enable that port to participate in it. Among other routes, projected or under construction, is one from La Quiaca on the Argentine frontier to Uyuni on the Antofagasta-Oruro line, which, when completed, will make Buenos Aires one of the ports of Bolivia. A line is also being constructed by a German company from Puerto Suarez, on the western bank of the Paraguay, to Santa Cruz, and will probably be continued eventually by way of Sucre to the Oruro line. Lastly, the Brazilian railway which is being made from Puerto Velho, at the lower end of the series of falls on the Madeira, to Guajara-Mirim, on the Mamoré, will also be of advantage to Bolivia. Good river

navigation exists both below and above the rapids on these rivers, which affect a stretch of water 229 miles long ; and the effect of the railway will be to move the trade divide between the ports of the Amazon and those of the Pacific from somewhere in the falls zone, where it at present lies, well westward towards the foot of the Andes. This will certainly tend to develop the Montaña and plains of Bolivia, some parts of which at present both import and export across the trans-Andine routes. The total trade averages £7,800,000 annually.

PERU

Peru, the fourth in size among the states of South America, has an area of 695,700 square miles. In it three natural regions stand out in marked contrast to one another. The first of these is the COASTAL REGION. Between the sea and the foothills of the Andes, there stretches for 1,400 miles a belt of lowland with a breadth of less than 100 miles. Here, little or no rain falls, as the winds over the southern Pacific either blow parallel to the coast, or are drawn inland without precipitating moisture until they reach the mountain slopes. This region is, therefore, without vegetation except in the vicinity of the rivers which rush down from the Andes. The temperature is not extreme, the mean for Lima being 66° F. with a maximum of 78° F. in summer and a minimum of 59° F. in winter. Hence tropical and sub-tropical products can be obtained with the aid of irrigation, which is, as yet, imperfectly developed. Sugar is the principal crop, and is grown chiefly in the north, where the land is flatter than in the south, and the heat is greater. The annual yield amounts to about 150,000 tons. Cotton is cultivated on various parts of the coastal plain, but the greatest production takes place in the north, where climate and soil are particularly favourable. The output within recent years has steadily increased, and in 1910 amounted to 133,000 bales. Egyptian cotton has been introduced, and is proving very successful. Among other products of this region are maize, rice, vines, and tobacco, which are generally grown for home consumption.

Notwithstanding the disadvantages under which it labours, the coastal region is at the present time the most highly developed in Peru. This is largely the result of the proximity of the sea, which provides the one good highway that the country possesses. The

governing classes, either of pure European—chiefly Spanish—stock, or with only a very slight intermixture of Indian blood, are almost exclusively settled here, although much of the labour on the sugar and cotton plantations is performed by negroes and Chinese. Here, too, are the principal towns in which is centred the commercial, intellectual, and social activity of the country. There are few manufactures, and economic development has been much retarded by bad government in the past, though present conditions seem somewhat more hopeful. Of the 50,000,000 acres, which it has been estimated may be rendered fertile by means of irrigation, only 1,250,000 are as yet under cultivation, but it is probable that this area will be gradually extended.

THE ANDINE ZONE forms the second great natural region of Peru. On the western slopes of the Cordillera, the rainfall becomes greater and the vegetation improves with increasing altitude. Wheat, maize, alfalfa, oats, and barley are all cultivated to a height of 11,500 feet in the more sheltered valleys, both on the western slopes of the mountains and on the tablelands between the Cordilleran ranges. Above 12,000 feet, the quinoa (the grain of which is about the size of mustard seed) is the staple food of man, and the land is generally covered with coarse, high grass. Throughout the whole of this region crops are grown chiefly to meet local needs, and stock-raising and mining are the two pursuits of more general importance. On the tablelands, frequently at an elevation of 13,000 feet, there are great herds of cattle and sheep, llamas, alpacas, and vicuñas. The llama is prized both for its wool and as a means of transport; the alpaca for its wool alone. Of the Peruvian exports of wool, that obtained from the alpaca is by far the most valuable, and Peru contributes three-fourths of the world's supply of this commodity.

The Andine region is still more noted for its mineral wealth, which is found chiefly, but by no means exclusively, in the eastern Cordillera. Gold is obtained here both in alluvial deposits and in quartz-veins, and in the latter form it also occurs in the western foothills. Silver and copper are widespread, but are mainly worked upon the high plateaus and in some of the valleys of the inter-Andine country. These two minerals at present constitute over two-thirds of the value of the product of Peruvian mines. The great producing district is in the Cerro de Pasco, where a United

States company is operating at an elevation of 14,400 feet above sea-level. Quicksilver is worked, as it has been for over three centuries, at Huancavelica, in the Western Cordillera. Lead, zinc, and iron are found in various places. Coal is widely distributed, but much of that used in the country is imported from abroad. The undeveloped state of the mineral industry in Peru is evidenced by the fact that in 1910 the total output was valued at little over £3,000,000. The difficulties in the way of good communications by which machinery and fuel may be brought to the mines, the want of capital, and the hitherto unsettled political conditions have all contributed to this result. The mestizo, who is the chief inhabitant of the Andine zone, makes a good miner, but it is very doubtful whether sufficient labour is obtainable to allow of a rapid expansion.

THE MONTAÑA, the third natural region of Peru, occupies about two-thirds of the whole country. It consists of the lower slopes and foothills on the east of the Andes, great open valleys free of timber and covered with grass, and wide areas of virgin forest. The rainfall is much greater than in either of the two preceding regions and the temperature is higher. The chief inhabitants are Indians, although there are a number of mestizos and a few white men. Economic development is just beginning, and rubber is the most important product, though coffee, cacao, coca, and tobacco can all be grown. Iquitos, situated on the River Marañon below its confluence with the Ucayali, is the commercial centre and port of the region. It is accessible to ocean going steamers, though 2,500 miles from the ocean.

COMMUNICATIONS.—The lack of good means of communication is a great hindrance to the economic development of Peru. In the whole country there are not 1,660 miles of railroad, and most of the lines are short, running from the coast inland to the foot of the Andes. Only two penetrate the mountains—the Central which has a maximum elevation of 15,645 feet, and runs from Callao on the coast to Huancayo, by way of Oroya, where it joins a line to Cerro de Pasco; and the Southern from Mollendo to Puno, on Lake Titicaca, with a maximum elevation of 14,660 feet. Near Puno a branch breaks off and runs to Cuzco. With these exceptions, the only means of transport on the Sierra is by mules or llamas, as good roads can hardly be said to exist. In the Montaña,

the rivers provide from 5,000 to 10,000 miles of navigable waterway, according to the season, but the communications between these and their hinterlands are exceedingly bad.

The chief exports, as already indicated, are sugar, rubber, copper, wool, cotton, and silver, while the chief imports are textiles and machinery. The average value of the former in the years 1906-10 was estimated at £4,900,000, of which 33 per cent. was from the United Kingdom, 20 per cent. from the United States, and 15 per cent. from Germany. Within recent years British imports into Peru have declined, while those from the United States and Germany have shown a steady and marked increase. Of the exports, valued at £6,000,000 in 1906-10, 40 per cent. went to Great Britain, 25 per cent. to the United States, and 12 per cent. to Chile.

The chief ports are Callao, one of the most important on the whole Pacific coast, and the maritime centre of Peru; and Mollendo, through which much of the Bolivian trade is carried on by the Southern railway.

CHILE

The Republic of Chile, which extends from the nineteenth parallel of south latitude along the west coast of South America to the extremity of the continent, has a length of 2,625 miles, a breadth varying from 65 to 185 miles, and an area of 292,500 square miles. It therefore occupies about one-twenty-fifth of the southern half of the New World, and ranks seventh in size among its states.

The physical features, climate, and, to some extent, the vegetation of the country, mark out distinctly its major natural regions. To the north of the twenty-seventh parallel, the western and main ranges of the Cordillera are separated by a great desert region of considerable altitude, in many places traversed by mountain ridges. Here, there is practically no rainfall, the valleys are narrow, and few rivers reach the sea. Desert conditions prevail, and, except in the immediate vicinity of the streams, the land is without vegetation. Further south, between the twenty-seventh and thirty-third parallels, the land intervening between the two ranges of the Cordillera, which in this region approach more closely to one another, is more mountainous in character; the rainfall increases

beyond the thirtieth parallel, and in the south it exceeds 10 inches ; the rivers are more numerous ; the valleys in which they flow are wider ; and the vegetation, though scanty and generally confined to the watercourses, is of a sclerophyllous type. From the thirty-third parallel, the great Central Valley of Chile runs south between the coast range and the main axis of the Cordillera, the valley itself being submerged and the coast range broken up into a series of islands beyond latitude 42° S. This last region may be further subdivided. As far south as about 39° S, the Mediterranean type of climate and vegetation is found. Beyond this, the country lies within the westerly wind belt all the year round ; and the heavy precipitation, combined with a fairly high temperature, induces the growth of a temperate rain forest, which gradually passes into the summer forest of Southern Chile.

THE NORTHERN DESERT OF CHILE, which extends as far south as latitude 30° , is the scene of considerable economic activity. Great deposits of nitrate of soda lie in a narrow strip of land, running from north to south for about 500 miles, at a distance from the coast varying from fifteen miles in the north to ninety in the south. The origin of these deposits has not yet been finally determined, but they appear to be due to the chemical combination of nitric acid, derived from great quantities of decaying seaweed in a basin frequently refilled by the tide, with the sodium salts which remained after the evaporation of the water from the basin. The aridity of the climate has been the all-important factor in the preservation of the nitrate, as even a moderate rainfall would have led to its destruction. The exports of nitrate of soda, mainly for use as a fertiliser, but also for the manufacture of nitric acid and other substances, have increased very largely within recent years, and for a time it seemed that the end of the Chilean industry was in sight. Lately, however, large deposits have been found in Antofagasta and Atacama, and it is now believed that the resources of the country are sufficient to meet the demands upon it for a considerable time to come. The chief purchasers of Chilean nitrate are Germany, which uses it largely in the cultivation of beet, Britain, the United States, and France ; and it is exported to these countries mainly through the ports of Iquique, Caleta Buena, Tocopilla, Antofagasta, and Taltal. Formerly the trade was almost entirely in British hands, but

Germany has now acquired a considerable share in it. The total export of nitrate in 1910 amounted to over 5,000,000 tons.

The metalliferous deposits of the country are chiefly found in this arid northern region, and in the less arid one immediately to the south, which lies between the thirtieth and thirty-third parallels, and may be called the SEMI-DESERT REGION. Gold, silver, and copper exist, as in several other parts of the world, more especially where rocks of volcanic or plutonic origin come into contact with metamorphosed sedimentary strata. In the coast range, gold and silver are obtained; while further inland there are many silver veins, which it does not pay to work, as that metal is not associated with copper. Still further east, in the main range of the Andes, there are numerous veins of silver and copper, which are worked mainly on account of the latter metal. Copper is, after nitrate, the most valuable export of Chile. The average output (1909-11) is about 38,000 tons, or a little over 4 per cent. of the world's production.

Agriculture is all but impossible in the Northern Desert, but in the Semi-desert Region it is carried on to a considerable extent in those districts in which the land can be made productive by irrigation. The provinces of Coquimbo and Aconcagua are able to supply their own needs, and even to export a certain amount to the north, where everything required by the great mining population has to be imported. Until recently, even water had to be brought by ship, but now most of the mining towns are supplied from the Andes.

CENTRAL CHILE.—The third region of Chile, that part of the Great Valley with a Mediterranean type of climate, is the most important from an agricultural point of view. On the coastal range and on the slopes of the Andes, there is much good grazing ground, while the chief products of the valley itself are vines and wheat, which are generally grown under irrigation, the water being supplied by streams from the mountains. It is only in the extreme south of this part of the country that irrigation is unnecessary, and there the vine ceases to grow. The existence of the large mining population in Northern Chile creates a considerable demand for agricultural produce, and the amount of wheat exported abroad is less than formerly. The manufacture of wine is also an important national industry, and Chilean wines

are much in demand both at home and in the neighbouring States. Among other products of this region are all varieties of warm temperate and sub-tropical fruits.

Industrial development, apart from mining, has been slow in Chile, and manufacturing pursuits are not engaged in to any great extent. The population of the country is small, and mainly occupied in mining and agriculture; and there is a want both of the capital and labour necessary for manufactures. In and around Valparaiso and Santiago, there are numerous establishments engaged in weaving, tanning, brewing, sugar refining, etc. Water-power is abundant, and coal is obtained from the province of Concepcion—chiefly from the district around Coronel. As much of this coal is lignitic and not suited for all purposes, while British and Australian coal is imported very cheaply by nitrate ships, less than 1,000,000 tons per year is produced.

This part of Chile is the most highly developed and the most densely populated. Along the valley lie a series of towns, of which Santiago is the most important; while along the coast, opposite gaps in the coastal range, are such ports as Valparaiso, Constitucion, Talcahuano, and Coronel.

SOUTHERN CHILE.—The last of the natural regions of Chile, that which lies within the belt of westerly winds, is, except in the north, unfavourable to the cultivation of cereals. The heavily forested slopes facing the Pacific are believed to contain much valuable timber, which has as yet been little exploited, while many of the sheltered valleys and inland districts are suitable for grazing cattle and sheep. The territory of Magallanes has nearly 2,000,000 sheep, the wool and mutton of which are exported from Punta Arenas, the most southerly town of the world. Valdivia is the port for the agricultural and pastoral products of the northern part of this region.

COMMUNICATIONS.—In Chile there are over 4,000 miles of railway, partly owned by the State, partly by private companies. Of the former, the most important is that which runs from Puerto Montt, by Santiago, along the Great Valley to La Serena. This railway, which has branches to the various ports on the coast, already mentioned, is being continued northward to Copiapo. It will eventually join the northern part of the "longitudinal railway" which runs from Pueblo Hundido to Pintados. The

trans-Andine line from Valparaiso by Uspallata has been constructed partly by the Government, partly by private companies. The most important of the wholly private lines is that from Antofagasta to Oruro in Bolivia ; but the chief railways connecting the mining districts of Northern Chile with the coast are also owned by private companies.

COMMERCE.—The principal exports of the country have already been indicated. In 1906-10 they were valued at £22,000,000 per annum, nearly one-half of which went to the United Kingdom ; Germany, the United States, and France coming next in the order given. In the same years the imports were estimated at £20,000,000, and consisted largely of textiles, iron and steel goods, coal and machinery. Over one-third of the imports were from the United Kingdom, and Germany and the United States between them sent a similar amount. The bulk of the imports come to Valparaiso, whence they are distributed throughout the country.

CHAPTER XLIII

BRAZIL

THE United States of Brazil, which have an area over two-fifths that of the whole continent of South America, include the greater part of the Amazonian lowlands and the Brazilian massif, as well as adjacent portions of the Guiana Highland, the Andes, and the plains of the Paraguay-Parana basin. The knowledge at present existing regarding the geology, climate, and economic potentialities of these different areas is not sufficient to permit of a final division into natural regions, and the one attempted here must be regarded as provisional.

THE AMAZONIAN LOWLANDS, which comprise the states of Amazonas, Para, and part of Maranhão, consist in the main of Tertiary and Quaternary material. The rainfall is heavy, and the rivers overflow their banks and flood the surrounding country for a considerable period each year. Owing to the great precipitation and subsequent evaporation the heat never becomes excessive, the summer and winter means for Manaos being 82° F. and 80° F. respectively. The soil of the whole region is generally fertile, and the vegetation, both in the vicinity of the rivers and on the intervening lands, is dense.

Under such conditions agriculture is practically impossible, and the chief products are those of the tropical forest. Caoutchouc, or rubber, which holds the first place, is obtained from several varieties of *Hevea*, *Hevea brasiliensis* producing the best quality when it is grown under the most favourable conditions, that is, on land which is flooded for a considerable part of each year. As rubber trees do not grow in close formation, but are scattered throughout the forest, there are no plantations in the proper care and development of which the owners take a genuine interest. The result is that reckless destruction is indulged in by the *seringueiros*, whose sole object is to obtain the maximum amount of rubber; and every year they are compelled to go further and further from the main streams, where the trees have ceased to be productive, and to enter the smaller tributaries, where the rubber is obtained at greater cost and greater risk. At present the amount which is obtained

from plantations in the Amazon lowlands is negligible, and the prospects of a substantial increase in this respect are not bright. The population is small—less than one to the square mile—and consists largely of Indians, or of immigrants of mixed white and Indian blood from Ceará, while the climatic conditions of the region are such as to deter European peoples from engaging in manual labour within it. In addition to the product of *Hevea brasiliensis*, known on the market as Para rubber, caoutchouc is extracted from several other trees in the Brazilian forest. Of these, the most important are Manihot, from which Ceará rubber, next in quality to Para, is obtained, and Mangabeira, which yields an inferior article used for covering cables and similar purposes.

Manaos, at the confluence of the Amazon and the Rio Negro, is the collecting point for rubber in the interior, and Para, on the Tocantins, the port from which it is sent abroad. The production of rubber in the basin of the Amazon during the years 1907-8-9-10, averaged 38,000 metric tons per year, or over 55 per cent. of the world's supply. Of this, about 35,000 tons came from the Amazonian lowlands in Brazil.

Among other important products of this region are Brazil nuts, cacao, and timber. Cacao has, with the development of the rubber industry, become of less importance than formerly. The trees grow wild, and only a few plantations exist; but one-seventh of the whole Brazilian crop of cacao comes from this region. It is remarkable that towns like Manaos and Para, situated in the great selvas of South America, should import more timber than they export, but it is explained by the great diversity of trees in the forest, the enormous amount of undergrowth, the scarcity of labour, and the hardness of the wood which renders it unsuitable for many purposes. Cedar forms the principal export.

THE ATLANTIC MARGINS.—The coastal regions of the Brazilian massif, from the State of San Maranhão to that of Rio de Janeiro, may be considered under this title, although several subdivisions must be recognised. The north-eastern part, as far as the mouth of the São Francisco, consists of a number of river basins, which have the same general character as regards slope and soil, and, to some extent, climate. The temperature throughout is tropical, but the rainfall of Ceará ranges from about 20 to 60 inches, while further west it increases to 80 inches and over. From the

mouth of the São Francisco southwards, the slope from the massif to the coastland is steeper ; the rivers are shorter ; the temperature is generally tropical on the lowlands (except in the south where it is sub-tropical), but somewhat cooler on the uplands ; and the rainfall is heavy. The region of heavy rainfall does not, as a rule, extend far inland, and its limits may, except in the south, be considered as determining the limits of the coastal margins. Throughout the whole region the products are similar, but the north-eastern states, with the exception of Ceará, are the most fertile, and yield large quantities of cotton, sugar, and rubber. Cotton is grown, both in its herbaceous and arborescent forms, on the coastal plains as well as in the interior. On the plains, the plants are more productive, but suffer in wet seasons from an excess of moisture. To the world's supply of raw cotton, Brazil contributes nearly 300,000 bales, and of that, the greater part is grown in the region under consideration. The fibre of the arborescent varieties is longer than, but not so strong as, sea island ; the cultivation of the herbaceous plant is, however, not so difficult, and consequently it predominates. Sugar-cane is grown on the plains where the climate is moist and warm, while Manihot and Mangabeira are both cultivated, and at present give better returns than almost any other agricultural product. Cacao, also a cultivated plant in this region, which supplies about six-sevenths of the Brazilian crop, is grown on the coast lands of Bahia, and is exported from San Salvador. Brazil produces altogether about one-sixth of the world's supply of cacao. Coffee is grown throughout the greater part of this area, but not extensively, except in the south where Rio de Janeiro produces a considerable amount.

The most important mineral deposits of this region are monazite sands, from which thorium, used in the manufacture of gas mantles, is obtained. These sands occur along the coast of Bahia and Espiritu Santo, and, in the interior, on lands formerly occupied by the sea, or even upon the banks of rivers.

Manufactures are as yet of little importance in the region, except in the extreme south, where the state, and more especially the Federal District, of Rio de Janeiro, is the seat of considerable industrial activity. Encouraged by a high protective tariff, the cotton industry has assumed considerable proportions in and around the capital, where there are also numerous woollen, jute, and felt



NATURAL REGIONS OF BRAZIL

factories, establishments for the preparation of food-stuffs, sugar refineries, iron foundries, etc. Rio de Janeiro and the Federal District together have one-third of the workmen engaged in manufacturing industry, and two-thirds of the capital invested therein, in the whole of Brazil. Elsewhere on the coastal margins, the extraction of sugar, the preparation of brandy, and a little spinning and weaving are the chief non-agricultural pursuits of the people.

THE VOLCANIC SOILS OF SÃO PAULO.—From the state of São Paulo southwards, the escarpment becomes much steeper, and separates a narrow strip of coast from the plateau regions behind. In the east the rocks are Archæan, while, in the west, sandstones, associated in many places with eruptive rocks, probably of Tertiary age, prevail. These eruptive rocks are rich in phosphorus and iron, and weather down into a dark-red clay soil, which is peculiarly adapted to the growth of the coffee plant when climatic conditions are favourable, as is the case in the southern part of Minas Geraes, and in at least the eastern half of São Paulo. In these districts, at an altitude varying from 1,500 or 1,800 feet to 2,500 feet, has been concentrated within recent years the greater part of the Brazilian coffee industry, which now provides nearly four-fifths of the world's supply. But the rapid development of coffee-planting in this region, largely by means of imported Italian labour, has not been without its drawbacks. On the one hand, there has been the neglect of various crops for which the country is suitable, and, on the other, there has been over-production of coffee to such an extent that the government of São Paulo has been compelled, in years of abundant crop, to buy and withhold from sale no inconsiderable part of the output, in order to prevent too great a depression of price in the world's markets. This policy, aided by a diminution of production elsewhere, appears to have met, so far, with a certain amount of success. At the same time, fresh plantations have been prohibited by the government.

During the American Civil War cotton was extensively grown in São Paulo. Since then its cultivation has been neglected until recently, when, with the decline in the price of coffee, new and apparently successful attempts to grow it once more on a large scale have been made. The state now supplies the cotton industry of São Paulo with a considerable amount of its raw material, though much has still to be imported from Pernambuco.

The town of São Paulo, situated on the route from the coast to the plateau, is the centre of the manufacturing district in Brazil, next in importance to that situated in and around the capital. In addition to cotton and food-stuffs, machinery employed in the preparation of coffee is manufactured on a considerable scale.

THE TEMPERATE SOUTH.—Climatic conditions, more temperate than further north, mark off the country south of the state of São Paulo as a separate region. The land is generally fertile and is covered with forests in which clearings have been made by colonies of Germans, Italians, Poles, and others. In these clearings, agriculture of a somewhat improvident character is carried on, but the most important product of the region is yerba maté, which grows wild in the woods. The profits derived from the maté harvest have done something to compensate the colonists for the drawbacks caused by their isolation from the rest of the country. The forests of this region gradually merge in the south and west into the grasslands, or campos, which are as yet devoted entirely to stock-farming, a pursuit carried on by the race of the Guanchos. Much of the forested area will, when cleared and properly cultivated, prove to be excellent agricultural land suitable for the growth of wheat, but there is still uncertainty whether the depth of the soil on the campos is sufficient to permit of a similar result. The tanning of leather, which is the chief industry of the region, has assumed considerable proportions.

The principal coalfields of Brazil occur in the upper Carboniferous and Permian rocks extending from the state of São Paulo to that of Rio Grande do Sul. The coal contains a large proportion of moisture and ash, and seems to be of most value when converted into gas for use in gas-engines.

THE CENTRAL REGION lies on the Brazilian massif, and consists of the states of Matto Grosso, Goyaz, and Minas Geraes, together with parts of the adjacent states. Much of the region is still unexplored, and its geographical features are but imperfectly known. The nucleus consists of Archæan rocks, though over large areas these are covered by metamorphosed and unaltered sedimentary rocks of Palæozoic age. The temperature is high at all seasons of the year except in the south, where the winters are mild. Over the greater part of the region the rainfall varies from 60 to 80 inches, but in the north-east it is considerably less. On

the lower lands and in the river valleys there are forests ; the uplands are generally covered with grass ; and in the area of low rainfall, caatinga prevails. The population is small, and there is as yet little economic development. Matto Grosso is practically uninhabited ; in Goyaz cattle are raised on the campos ; and the south-east of Minas Geraes is devoted to agricultural and pastoral pursuits for the benefit of Rio de Janeiro. Maté grows extensively in the south of Goyaz.

When this region has been more fully developed, its chief source of wealth will probably be found in its great mineral deposits. For long, gold and diamonds have been found in alluvial formations in the neighbourhood of the ancient crystalline rocks which form the backbone of the country, and they still are a valuable export. Within recent years large deposits of iron have been located, but the difficulties of transport have hitherto prevented their proper exploitation. The best known district is in Minas Geraes, in that section of the Espinhaço range which forms the divide between the Rio Doce and the São Francisco. In the metamorphosed sedimentary beds, which here overlie the crystalline schists, occurs the iron-bearing quartzite known as "itabirite." In places, also, there are hills of iron ore which is almost pure. The total resources of this district alone, appear from all accounts to be enormous, and would seem to indicate that Brazil may one day be the greatest producer of iron ore in the world. Among other minerals found in the Central region are manganese, cinnabar, platinum, graphite, etc.

COMMUNICATIONS are still in a very undeveloped state. The mountainous nature of much of the country, the steep escarpment between the sea and the interior, the heavy rains, and the luxuriant vegetation, are all hostile to roads. In the north, the Amazon acts as a great highway, and is navigable to beyond Iquitos in Peru by ocean-going steamers. In the south, around Porto Alegre, there are also numerous navigable waterways, but elsewhere the rivers are obstructed by falls, and the traffic upon them is only of local importance. Of railways, there are now about 14,000 miles, chiefly in the south where they provide but an imperfect service. The most important line in this part of the country is that which runs from Rio de Janeiro, by São Paulo and through the states of Parana, Sta. Catharina, and Rio Grande, to Rivera on the frontier, whence

there is connection with the Uruguayan system and Montevideo. This line, which has just been completed, has communication with the coast at various points. Another important line runs from the city of São Paulo to Itapura on the Parana, whence it is being continued to the Bolivian frontier at Corumbá on the Paraguay. The states of São Paulo and Rio de Janeiro are well provided with railways as a result of the growth of the coffee industry. From the capital, a line goes north-west to Minas Geraes, and will eventually be carried to Goyaz in the state of that name. In the northern part of the country, the railways run directly inland from the coast, and are seldom connected with one another. One of the most important connects San Salvador with the São Francisco. In the basin of the Amazon, the Madeira-Mamoré railway, 210 miles in length, is being constructed round the cataracts and rapids of the Madeira and Mamoré rivers.

COMMERCE.—The chief exports of Brazil consist of coffee, rubber, cacao, maté, and hides; coffee and rubber together account for from 75 to 80 per cent., and coffee alone for about 50 per cent., of the total value of the exports. The chief markets for Brazilian coffee are in the United States, which takes from 40 to 45 per cent. of the total output, and Germany, which takes from 15 to 20 per cent. Rubber ranks next in importance. Nearly one-half of the Hevea rubber exported goes to the United States, while of the remainder Great Britain takes a large share. Manicoba finds its chief market in the United Kingdom. Cacao goes in the main to France, the United States, and Germany; while maté is sold to the Argentine, Uruguay, Chile, and the countries of Central Europe.

The imports consist largely of manufactured goods and food-stuffs. In the first of these Great Britain has the lion's share, and supplies the bulk of the textiles and much of the iron and steel goods imported into the country. The natural expansion of her trade in textiles has, however, been seriously checked by the development of the Brazilian cotton industry, and, in regard to iron and steel goods, she is beginning to feel the pressure of her great rivals in Brazil—Germany and the United States. Food supplies come in the main from the United States and Argentina, flour from Argentina but also from the United States, dried beef from Uruguay and Argentina, cod from Newfoundland, and

macaroni from Italy. The import of food-stuffs is showing little sign of expansion, and will, indeed, probably tend to decrease in the future, as the southern part of Minas Geraes becomes better equipped for supplying the demands of the capital. During the five years 1906–10 the annual value of the exports was £55,000,000, and of the imports £39,000,000.

CONCLUSION.—Brazil, with its great natural resources—mineral wealth, water-power, productive climate, and valuable forests—would appear to have an assured future, but economic development will be slow. Tropical climate renders a great part of the country unsuitable for white labour, the topography of the land makes communication difficult, the population is small and composed of diverse elements, and unstable political conditions have affected the investment of capital. These are obstacles to progress which can only slowly be overcome.

THE GUIANA COLONIES

The Guiana Colonies lie upon the north-east slope of the Guiana Highland. Along the seaboard of British and Dutch Guiana, there is a low-lying coastal plain, which is subject to flooding, but parts of which have been embanked and converted into good agricultural land. The lower slopes of the Highland are covered by dense forests, which in the interior give place to savannas. The whole region is yet in a very undeveloped condition. British Guiana, which has a mixed population of about 300,000, produces sugar, rubber, and tobacco. The chief exports of Dutch Guiana are somewhat similar, but gold is also obtained. In French Guiana gold is the main object of economic activity.

CHAPTER XLIV

PARAGUAY AND URUGUAY

PARAGUAY

PARAGUAY, with an area of 172,000 square miles, belongs to two very different regions. EASTERN PARAGUAY, which lies between the Parana and Paraguay rivers, is part of the western slope of the Brazilian Highland, but the hills seldom reach a height of over 2,000 feet, and the general elevation of the country is probably between 500 and 600 feet. The climate has been described as three months of summer, during which the mean temperature is over 80° F., and nine months of spring, during which it is between 60° F. and 80° F. The rainfall is heaviest in the summer months, when the south-east trade winds make their way up the estuary of La Plata. In the north of the region over 60 inches of rain fall, and in the south over 40 inches. Much of the land is covered with dense forest, but there are extensive tracts of country covered with grass.

It is in Eastern Paraguay that the majority of the 800,000 inhabitants of the country are found. These are generally people of mixed Indian and Spanish blood, the native Indians, of whom it is estimated that there are 100,000, being chiefly in the Chaco.

Cattle-raising, which has made great progress within recent years, is the most important industry in the country, which probably contains about 3,000,000 head; and over 40 per cent. of Paraguay's exports consist of meat, hides, and tallow. Salting works, packing establishments, and extract factories, have all sprung up within recent years. Sheep farming is also carried on, and an increasing amount of wool from Paraguay is exported each year through the Uruguayan port of Montevideo. When the native sheep are crossed with better strains from Europe, it is probable that this industry will become of considerable importance.

Yerba maté, or Paraguayan tea, is obtained by drying and grinding into a kind of coarse powder the leaves and twigs of an evergreen shrub known as *Ilex paraguensis*. When infused, it yields a drink used as a tonic and stimulant, which is much in request throughout South America, and which is beginning to make its

way into Europe. The yerba plant is found in a wild condition especially in the north and east of Eastern Paraguay, but attempts are now being made to cultivate it on a large scale. Maté ranks next to the products of the cattle ranches among the exports of the country.

WESTERN PARAGUAY, which lies between the Paraguay and the Pilcomayo, belongs to the bed of the ancient Pampean Sea, and really forms part of the Gran Chaco. Its climate is moister than that of the previous region, and, as the drainage is bad, many swamps are formed. Elsewhere, the land is covered with forest and jungle. The whole region is as yet in a state of nature, quebracho, used for tanning purposes, and timber (which is also exported from Eastern Paraguay) being its chief products at present. It is believed to be capable of considerable development.

The backward condition of Paraguay is due, in part to the devastating wars waged against its neighbours, in part to its distance from the great lines of communication. A railway now runs from Asuncion, the capital, to Villa Encarnación, on the Parana. Opposite Villa Encarnación is Posadas the terminus of the Argentine North-Eastern railway, so that Asuncion is now within fifty hours of Buenos Aires by rail instead of five days by boat, as hitherto.

URUGUAY

Uruguay has an area of 72,000 square miles, and is the smallest of the South American states. Physically it belongs to the southern slope of the Brazilian Highland, but the relief of the country is slight, the hills are of low elevation, and wide rolling plains constitute the greater part of the surface. The climate is cooler than in Paraguay, the mean summer temperature being between 70° F. and 80° F., while the mean winter temperature over the greater part of the country is from 50° F. to 55° F. Rain falls at all seasons of the year, but especially in summer, and the mean annual precipitation is from 40 to 60 inches. The prevailing type of vegetation is grassland, trees being found chiefly in the vicinity of the river courses.

The land is pre-eminently suitable for grazing purposes; and pastoral pursuits, and subsidiary industries connected with them, occupy the great majority of the population. In 1908, the last year for which there are official statistics, it was estimated that

there were 8,000,000 cattle, 26,000,000 sheep, and large numbers of horses and pigs in the country. The cattle and sheep form the basis of the export trade, consisting of chilled meat, beef extract, hides, and wool. The firm of Liebig has large works at Paysandu and Fray Bentos, on the Uruguay. For a time it seemed as if these would be transferred to Colon, on the other side of the Uruguay in the Argentine, owing to the high export duty on beef extract levied by the Uruguayan government. This, fortunately, has recently been considerably reduced.

Arable farming is only followed to a slight extent at present, but within the last few years wheat and flour, maize and linseed, have all been exported.

Montevideo is the centre of the railway system ; the main lines run to Fray Bentos, to Paysandu, and to the Brazilian frontier, whence there is communication with Rio de Janeiro.

The exports (wool, hides, meat, and beef-extract) go mainly to France, Argentina, Belgium, and Germany, while the imports come from the United Kingdom, Germany, and France. The total trade had an average value of £16,000,000 during the years 1906-10.

CHAPTER XLV

THE ARGENTINE REPUBLIC

THE Argentine Republic has an area of 1,153,000 square miles, or a little less than one-sixth that of the continent of South America. The physical and climatic conditions of the country render it especially suitable for economic development, and it is one of the most important, and perhaps the most progressive, of South American states.

THE FOREST REGION.—Several natural regions are marked out by differences in physical and geological structure, climate, and vegetation. In the north is the Forest Region, comprising the territories of Formosa and Chaco, along with the neighbouring parts of the provinces of Santa Fé, Salta, Santiago del Estero, and Entre Rios. This region presents the appearance of a vast plain of low elevation, sloping on the whole from west to east, and forming part of the ancient bed of the Pampean Sea. With it may be included for present purposes the territory of Misiones, a volcanic spur of somewhat greater elevation, extending from the Brazilian massif. The mean summer temperature ranges from about 77° F. to 85° F., and that of winter does not fall below 58° F. The precipitation, except in Misiones where it is somewhat greater, decreases from about 45 inches in the east to between 20 and 25 inches in the west.

The whole region is covered with forest to a greater or less extent, and, although much of this forest is inaccessible, its products are valuable. Two species of quebracho are found in it, and from one of these—*Aspidosperma quebracho*—tannin, used in the manufacture of leather, is obtained; large quantities both of tannin and quebracho wood are exported annually, and the timber itself is much in demand for railway construction and other purposes. Quebracho is in fact at the present time the chief basis of industry over a great part of the forested area. Other trees producing hard timber are also found in abundance. Yerba maté flourishes on the volcanic soils of Misiones, but there seems no reason why its cultivation should not be extended into the territory of Chaco and elsewhere, as at present large quantities of it have to be imported into Argentina from Paraguay.



NATURAL REGIONS OF THE ARGENTINE

The Forest Region is inhabited chiefly by Indians ; the facilities for communication are limited ; and economic development has been slow. It is said that much land in the less densely forested parts, away from the rivers, is suitable for grazing purposes ; and it is not impossible, therefore, that the future may see a considerable movement of white settlers from the south, when the vacant places there have been filled up.

THE GRASSLAND REGION, which includes the province of Buenos Aires, the neighbouring parts of Entre Rios, Santa Fé, Cordoba, and the territory of La Pampa, and the more distant province of Corrientes, is the most important in the Republic. The land, like that of the previous region, belonged to the bed of the Pampean Sea ; in the centre and west it is generally flat, while in the north and south it tends to be undulating. The soil, which consists in great part of alluvial deposits derived from granitic and volcanic rocks, is very fertile and easily tilled. The climate is temperate, the whole region lying in summer between the isotherms of 68° F. and 80° F., and in winter between those of 46° F. and 57° F. The mean annual rainfall varies from about 15 inches in the west and south to over 45 inches in the north-east. In the vicinity of the rivers, hygrophilous grasses grow on the river alluvium, but elsewhere the Pampas grasses constitute the prevailing type of natural vegetation.

On the whole these geographical conditions are favourable to agriculture, but other factors have contributed to the development of this region. Its climate is extremely well suited to South European races ; while the Indians are few, as the products of the region were never such as to encourage a great increase in their numbers. The rivers, the natural highways of the country, converge on the estuary of La Plata, to which the best agricultural lands are contiguous, and the progress of these has been rapid with the growing demand from Europe for wheat and meat. It is not surprising, therefore, that this region, which contains the greater part of the cultivable soil of the republic, has over two-thirds of its population and is the centre of its economic development.

Within the last fifteen years, the area under wheat has been trebled, and at the same time there has been a considerable movement southwards of the centre of production. In 1898, Santa Fé and

Cordoba produced about two-thirds of the whole crop, while in 1911 the relative production was as follows : Buenos Aires, 40 per cent. ; Cordoba, 32 per cent. ; Santa Fé, 13 per cent. ; Entre Rios, 3 per cent. ; La Pampa, 7 per cent. ; other districts, 5 per cent.

The area, within which fertility of the soil, favourable climate, and facilities for cultivation render possible the growth of wheat, is limited on the north and north-west by increasing heat and moisture, and on the west and south by decreasing precipitation. These limits have not yet been exactly determined, but in Santa Fé and Cordoba the best wheat land lies south of a line connecting the towns of Rosario and Cordoba ; while on the south and south-west it seems possible to extend the cultivation of wheat to the borders of the region under consideration. No accurate data yet exist to enable a correct estimate of the potential extent of the wheat-growing lands of the Argentine to be made, but that the present area of 15,000,000 acres could easily be trebled seems beyond a doubt.

The average yield for the last ten years does not much exceed ten bushels per acre. Various circumstances tend to account for this. It is only gradually that wheat is leaving the less suitable north for the more suitable south ; great losses are occasionally sustained from prolonged droughts or locust invasions ; above all the South European is slovenly and unintelligent in his methods of agriculture, and, until he realises the necessity of deeper ploughing and more careful selection of seed, the yield per acre is likely to remain low.

Maize, which has also made considerable progress within recent years, is grown chiefly to the east of the wheat region, on the alluvial soils of the Parana, where the rainfall is heavier than further west, and cultivation easier than in the north. In 1911, the area under this crop amounted to over seven and a half million acres, of which about three-fourths were situated in the two provinces of Buenos Aires and Santa Fé. A comparatively small portion of the product is used for feeding stock, and the greater part of it is exported. Flax is grown for the sake of its seed in the same region as maize, but it does not, at the outside, occupy more than one-half of the area taken up by that cereal. Argentina is nevertheless the leading exporter of flax seed in the world.

Improved methods in breeding and in raising cattle, the

increasing demand from foreign countries for meat, and the development of communications, including the use of refrigerating apparatus, have entirely altered the character of the stock-raising industry of the Argentine, and cattle are no longer reared for their hides and tallow alone. Of the 30,000,000, or thereabouts, in the Republic, more than three-fourths are found in this region, where climatic conditions allow them to live out of doors throughout the year. In the north, large numbers feed upon the thick annual grass of the well-watered provinces of Corrientes and Entre Rios. Elsewhere, as in the province of Buenos Aires, the carrying capacity of the land has been considerably raised, either by sowing alfalfa, the roots of which draw moisture from the subsoil, or by steady grazing, which has the effect of greatly improving the Pampas grasses. The native cattle have also been much improved within recent years by a careful and liberal importation by the government of prize animals selected from the best of the British breeds. The preparation for export of frozen meat and hides, and the manufacture of various extracts of beef, are among the most important pursuits based upon the stock-raising industry, but a beginning has also been made in scientific dairying, and considerable quantities of butter are exported.

Sheep-raising has recently begun to show a serious decline in this region. This is due to the fact that in the state of Buenos Aires, in which a large proportion of the Argentine sheep are found, the moister lands further north being unsuitable to them, the laying down of alfalfa, on which cattle pay better than sheep, has led to the expulsion of the latter from much of the more favoured land. At the same time, the production of mutton has become much more important than that of wool, and there has been a considerable diminution in the export of the latter commodity.

THE SUB-ANDINE REGION.—Beyond the grassland regions there lies to the north-west, west, and south, a country of thorn scrub, which passes gradually into one where poor steppe or semi-desert conditions prevail. The whole of this region, which may be called the sub-Andine Region, can be divided into two parts—a northern and a southern. To the north of the thirty-fifth parallel the land generally exceeds 1,500 feet in height; in winter it lies between the isotherms of 43° and 68° F., and in summer between those of 71° F. and 82° F., the actual temperature varying with altitude;

and the rainfall is low, rarely exceeding 10 or 12 inches. Notwithstanding these apparently unfavourable climatic conditions, this region is far from being undeveloped. The rivers from the Andes are utilised for irrigation, and, besides alfalfa and maize, many sub-tropical fruits are grown in the valleys of those districts which lie near the Andes or on the east of the Sierra de Cordoba. The cultivation of sugar is the chief industry of Tucuman, and Mendoza has long been noted for its vineyards. Tobacco, cotton, and hemp are also grown in this region.

The southern part of the sub-Andine region stretches from the thirty-fifth parallel to the extremity of the continent. The elevation of the land is less than in the north, the temperature much lower, and the rainfall, except along the foot of the Andes, no greater. In the territories of the Chubut and Rio Negro, especially in the valleys, where irrigation is possible and where there is a fertile soil, good wheat crops have recently been raised. These districts are, however, too remote from the main lines of communication to possess much importance at the present time. Stock-raising is gradually becoming a considerable industry in the region. Sheep are able to stand the cold of winter, and it is probable that one-fifth of the total number of sheep in the Argentine are south of the Rio Colorado. Cattle are found chiefly in the west along the foothills of the Andes, where much good grazing land is believed to exist.

MANUFACTURES.—So far, economic development has been of an agricultural rather than of an industrial nature. The only important manufactures are those which prepare for the market the raw material produced at home, flour-milling, sugar-refining, wine-making, meat-freezing, dairying, the extraction of quebracho, etc. The extent of the mineral resources of the country are only partially known, but as yet they have proved of no great value. Gold, iron, copper, and lead occur in various places, and small quantities of coal are obtained, but borax, from the northern part of the sub-Andine region, is the only mineral at present noteworthy.

COMMUNICATIONS.—The communications of the country are as yet only partially developed. The waterways are of considerable importance, more especially in the woodland region, where they still constitute the chief means of transport. The Paraguay and the Parana are navigable throughout the whole of their course

within the Argentine, while the Uruguay may be ascended as far as Salto. Rosario is the present head of navigation for sea-going vessels on the Parana, and Paysandu occupies a similar position on the Uruguay. When plans for dredging the bed of the Paraguay-Parana have been carried out, ocean-going steamers will be able to load at Asuncion, 1,000 miles from the Atlantic; and that town, at the confluence of the Paraguay and Pilcomayo, and Corrientes, at the confluence of the Paraguay and Parana, will become important river ports. By removing some rocks and gravel from the Uruguay, that river might be ascended from the sea as far as Concordia.

There are now in the Argentine 19,000 miles of railway, constructed largely by British capital, and situated chiefly in the valley of the Parana and in the wheat-growing districts. Among the most important lines are the Buenos Aires Great Southern, which serves the province of Buenos Aires, and goes to Neuquen, but has the greater part of its system within 200 miles of the capital or Bahia Blanca; the Central Argentine, which runs from Rosario to Cordoba and Tucuman; a government line from San Cristobal by Tucuman and Jujuy to La Quiaca on the frontier of Bolivia; the Entre Rios and Argentine North Eastern, which serves the country to the east of the Parana; and last, but not least, the Buenos Aires and Pacific, which connects with the Chilean railway to Valparaiso by means of the tunnel under the Uspallata Pass. The heavy gradients on the Andine sections of this line, the break of gauge at Mendoza and again at Los Andes on the Chilean side of the frontier, and the difficulty of keeping the line open in the mountains during the winter months, will all tend to prevent much heavy traffic on this route, though it will probably become very popular for the conveyance of passengers.

It will be noticed that these railways are all connected with one or other of the chief ports of the country: Buenos Aires and La Plata, Rosario, and Bahia Blanca. Through the first of these pass the greater part of the imports and no inconsiderable share of the exports of the whole country. La Plata, connected by rail with the capital, is principally used by ships unable, on account of their size, to ascend higher up the river. Rosario, which comes second to Buenos Aires in respect to tonnage, is the agricultural port of the Parana valley and of all that northern region the trade

of which is chiefly carried by the rivers. With the improvement of its harbour, now in progress, and the deepening of the Parana, it will become of even greater importance. Bahia Blanca, in the south of the province of Buenos Aires, is the terminus of those lines which are opening up the more southerly parts of the sub-Andine Region. Much wool is exported here, as also is wheat from Central Pampa.

Agricultural and pastoral products, along with quebracho, constitute practically the whole of the exports, the annual value of which, in the years 1906-10, was estimated at £69,000,000. Of this amount the United Kingdom took one-fifth, Germany one-ninth, and France and Belgium about one-tenth each. The imports, valued in 1906-10 at £60,000,000, consist chiefly of coal and manufactured goods (textiles, rolling stock, iron and steel goods, food, and agricultural implements). From the United Kingdom came 33 per cent. of the total, from Germany, 15 per cent., and from the United States 14 per cent.

The rapid development of the country within the last thirty years is shown by the increase in the amount of exports and imports, from £20,000,000 in 1880 to £145,000,000 in 1910, an increase due to the favourable conditions of soil and climate, the growing demand from Europe for agricultural and pastoral products, the improved means of communication, and the steady flow of immigrants, especially from South European countries. Between 1857 and 1880, 400,000 immigrants entered the country. Since the latter date there have been 2,470,000, many of whom, however, have not remained in the Argentine for more than a few years.

[The text on this page is extremely faint and illegible. It appears to be a list or a series of entries, possibly related to a collection or inventory. The text is too light to transcribe accurately.]

AUSTRALASIA

432

CHAPTER XLVI

AUSTRALIA

THE Commonwealth of Australia, which includes Tasmania, has an area of 2,974,581 square miles, and is just over three-fourths the size of Europe. In its general form the island continent consists of a plateau, with an average elevation of about 1,000 feet, but a number of distinct physical regions may be recognised. The Eastern Highlands extend from Cape York southwards, and occupy the eastern parts of Queensland, New South Wales, and Victoria, and the whole of Tasmania. They do not form a true mountain range, but represent the dissected escarpment of a fractured peneplain, the eastern part of which has sunk below the level of the ocean. In the north of the range there is a great block of Archæan age; in the centre Carboniferous rocks predominate, though others, ranging from Archæan to Triassic, are also found; while in the south the strata belong to lower Palæozoic times with Archæan outcrops.

Between the Eastern Highlands and the sea, there stretches a series of coastal plains composed of materials washed down from the uplands and recently uplifted above sea-level. These plains vary in breadth, but seldom exceed fifty miles and are frequently much less.

The Eastern Highlands present their steep sides towards the east coast, and slope gently westwards towards the Great Plains, which form an area of depression stretching across Australia from the Gulf of Carpentaria to the west coast of Victoria. In the north and centre this region consists of Cretaceous rocks, but in the south it is covered with silt brought down by the Darling, Murrumbidgee, and other rivers during Tertiary times. Of the Cretaceous rocks the Rolling Downs formation, as will be shown later, is of great importance because of its influence upon the development of irrigation. The northern part of the Great Plains drains to the Gulf of Carpentaria, the southern part to the Murray, and the western, which is an area of inland drainage, to Lake Eyre. West of the Great Plains, and of the South Australian Highlands which lie to the south of Lake Eyre, the Western Plateau covers

the greater part of the remainder of the continent. It consists, in the main, of a block of Archæan age which does not appear to have been under water since early geological times. In the north-east, however, considerable tracts are covered with lower Palæozoic rocks, while, in the south, the Nullabor plains, which make a great indentation in the plateau, belong to the Tertiary period. Along the west and north-west coasts there are narrow plains, also of Tertiary formation.

CLIMATE.—The climatic factor exercises a very important control upon the economic development of Australia. The continent lies between the tenth and the fortieth parallels, and from one-third to two-fifths of it falls within the tropics. During summer the heat of the continental interior is very great, and in some districts the maximum shade temperature may be above 100° F. for days, or even weeks, continuously. In January, the hottest month, the isotherms range from 64° F., in the south, to over 90° F., in the northern part of the Western Plateau. Variations of temperature are naturally greatest in the interior, and, south of the tropic, ground frosts occasionally occur at night. On the lowlands, and more especially around the coast, these are rare, and snow, though it occasionally falls in the south-east, never lies. In the highlands it is otherwise, and in the Australian Alps of New South Wales and Victoria the ground is white for several months each year. In July, the coldest month, the continent lies between the isotherms of 45° F. and 80° F.

The distribution of rainfall is determined by several factors. In summer, when the equatorial low pressure belt has moved southwards, and when the area of minimum pressure lies over the northern part of the Western Plateau, the trade winds of the northern hemisphere are pulled across the equator and blow as north and north-west monsoons. These bring much moisture, especially to the northern shores of the continent, though their influence is felt far to the south. At the same time, the east coast of Australia receives a considerable amount of rain from the south-east trade winds which blow upon it. On the west coast, on the other hand, the precipitation at this time of the year is very slight, as the winds, which blow towards it from the high-pressure area over the sea, are either turning round into the trade-wind system, and therefore away from the land; or, as they have previously crossed



by permission

RAINFALL OF AUSTRALIA

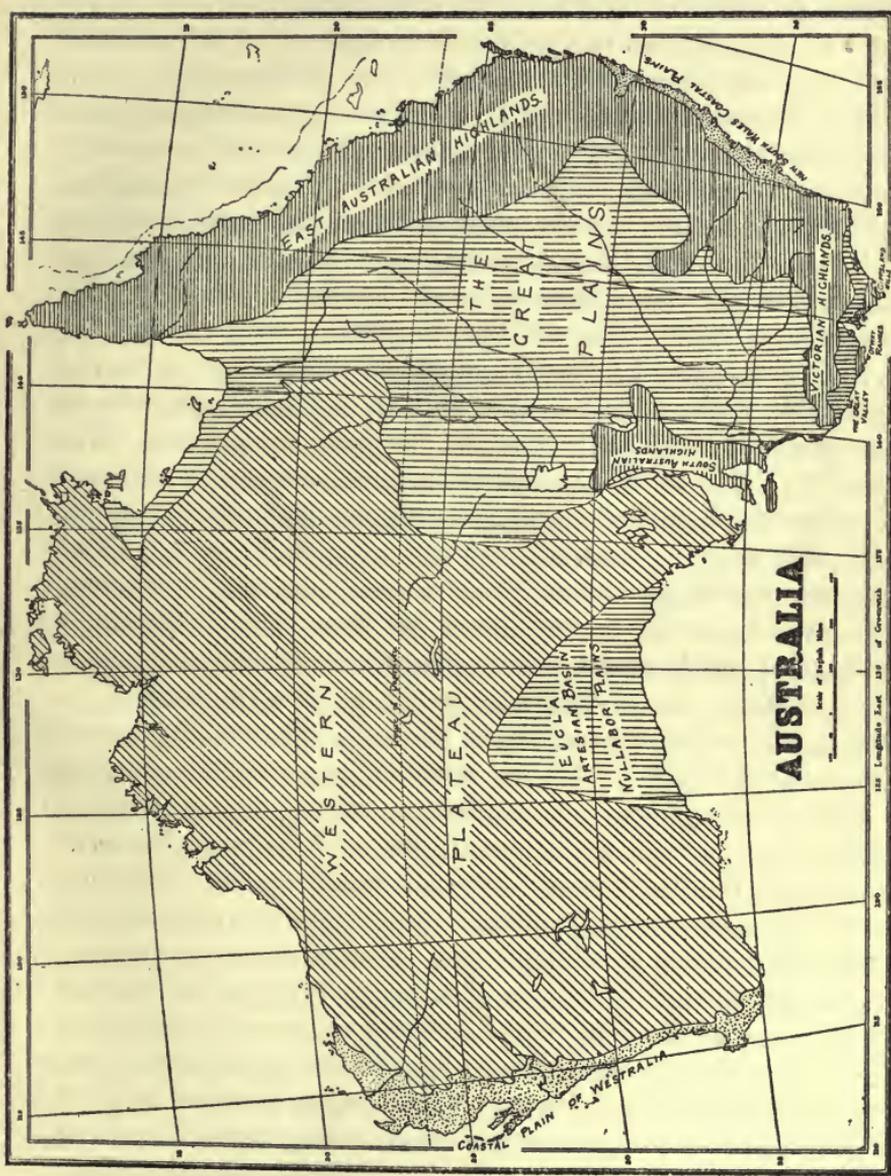
After the Oxford Wall Maps,

the cold current flowing along the west coast of Australia, they are heated by their contact with the land, and therefore do not deposit the moisture they contain.

In the winter months, conditions are greatly changed. There is no longer a heavy rainfall in the north, and, while the trade winds still bring a certain amount of moisture to the east coast, they do not penetrate far inland. But, as the whole wind system has moved northwards, the south-west of Western Australia, the southern part of South Australia, and the west and south of Victoria now lie within the belt of westerly winds, and receive their rainfall from the various cyclonic disturbances which move across the continent from west to east.

As a result of these conditions, the north and east coasts of Australia receive an average annual rainfall of at least 40 inches. This amount rapidly decreases inland, both towards the south and the west; and over part of the Great Plains and most of the Western Plateau the precipitation does not exceed 10 inches per year. In the region of winter rainfall, the south-west corner of Western Australia and part of Victoria have over 20 inches; but elsewhere, less than that amount falls.

IRRIGATION.—On considering these facts it is obvious that a large part of the continent is destitute of sufficient supplies of moisture to permit of its settlement; and that other parts, which receive in years of average rainfall the minimum amount necessary for this purpose, are in years of low rainfall subject to great disaster. Efforts have therefore been made to augment, by irrigation, the water supply of the marginal districts. The rivers offer no adequate means of so doing. On the north and east coasts they are perennial, but in the interior the only one which does not fail in times of drought is the Murray-Darling, which is snow-fed, and, although its waters are being utilised, it can never provide for more than a mere fraction of the waterless area. Another source of supply from which much has been hoped lies in the artesian basin of the Great Plains. In the Cretaceous system of that region an important series of rocks is composed of marine clays, and is known as the Rolling Downs formation. In the underlying sandstones, great supplies of water at high pressure are prevented from reaching the surface by the impermeable nature of the Rolling Downs, but when these are bored through, as has been done in Queensland, New South Wales,



Prof. J. W. Gregory, F.R.S.

THE MAIN GEOGRAPHICAL DIVISIONS OF AUSTRALIA

By kind permission of

and South Australia, the water rushes upwards with great force. Concerning the origin of this water, there still is much dispute. Professor Gregory maintains "that much of this water is not rain-water which has worked its way downwards; but it is plutonic water, which has risen from the deeper layers of the earth's crust; and that the water rushes up the wells owing to the tension of its included gases and the pressure of the overlying sheets of rocks." This view is vigorously opposed by most Australian geologists, who hold that much of the rain which falls on the Queensland hills finds its way to the south coast of Australia by great subterranean channels, and that it is these channels which have been tapped by the artesian bores. The practical importance of the dispute is, that, if the first theory be true, the supply of water is not necessarily inexhaustible, while, if the second be true, there would seem to be no reason why steps should be taken to conserve the outflow. Unfortunately, owing to its mineralised character, the water obtained from many of the wells is unsuitable for the irrigation of crops, and its chief use is for the watering of stock, the keeping open of stock routes across the interior, wool-scouring, domestic purposes, and in some cases the cultivation of lucerne. On the Western Plateau, many shallow wells which collect rain-water have proved of great value to the development of the pastoral industry.

VEGETATION.—The distribution of plant life follows that of rainfall in a marked degree. On the exposed slopes of Victoria and New South Wales grows the temperate rain forest, among the most important trees of which are numerous species of the genus *Eucalyptus*, including iron-bark, black-butt, and various gums. Over the remainder of the north and east coasts of Australia and for a varying distance inland, the prevailing type of vegetation is savanna forest, distinguished alike by the gigantic eucalypti of which it is composed, and by the rich growth of grass between the trunks of the open wood. In the north there are, in addition to the eucalypti, various palms, bamboos, and other trees belonging to a more tropical climate. Further inland, including, and extending beyond, the area with a rainfall of ten to twenty inches, lies a great grassland region. Here the trees generally occur only as an edaphic formation, while the grass is xerophilous in character. In some places the grass gives place to scrub, such as mallee and wattle, and in others to salt-bush, a herb on which sheep manage to thrive. Over a great

part of the remainder of Australia, desert or semi-desert conditions prevail. The Western Plateau is covered in places with mulga scrub, but the characteristic vegetation over wide areas is spinifex : "spinifex in low straggling tussocks, or in high round compact stools . . everywhere in loathsome profusion grows that most useless and unattractive plant." The region of winter rains in south-west Australia has an evergreen sclerophyllous forest in which jarrah is an important tree, but from there eastwards to the similar forest in Victoria the south coast is bordered by scrubland except on the Nullabor plains where savanna prevails.

GENERAL CONSIDERATIONS.—The economic development of Australia has been, and is likely to be, controlled in a remarkable degree by its geographical position and conditions. The great distance of the continent from Europe, and from lands occupied by people of European stock, naturally tended to restrict immigration, especially at a time when the fertile wheat-fields of North America offered superior advantages in virtue of their easy cultivation and quick returns. If it had not been for the discovery of gold, which to a certain extent acted as a corrective, the process of occupation would have been even slower than was the case. But the mineral wealth of Australia, besides attracting a considerable number of people to its shores, gave it a supply of capital which was of great advantage to its development, when, on the decline of gold production in the eastern states, the inhabitants began to settle down to agriculture and pastoral farming.

The remoteness of Australia, too, from the area of European conflicts has hitherto kept it untouched by the hand of war, the aborigines never having proved more than a passing annoyance. On the other hand, the fact that some of its most fertile regions, lying well within the tropics, are still practically unoccupied, constitutes a serious menace in these days when many people in the East are beginning to look for new homes. The Australians are, no doubt, right in attempting to make the whole of their country a white man's land ; but, if they eventually find the tropical districts incapable of close settlement by people of their own race, they would do well to consider the suggestion of Professor Gregory that, in such a case, Indian immigration might be promoted under restrictions that would confine it to regions which would otherwise be vacant. Australia, with its comparatively small population

distributed along several thousand miles of coast, already has a strategic position sufficiently weak without offering to alien peoples the inducement of large and fertile unoccupied areas.

QUEENSLAND

Queensland, with an area of 670,500 square miles, ranks second in size among the states of the Commonwealth, but for several reasons it is less fully developed than the others, and its population is not quite one to the square mile. Four distinct natural regions may be recognised: the agricultural coast lands, the mineral highlands (*a*) in the east, (*b*) in the west, and the pastoral plains.

THE WESTERN HIGHLANDS consist of an area of old rocks along the boundary between Queensland and the Northern Territory, where the Barklay Tableland and the surrounding country form an eastern extension of the Western Plateau. The economic importance of the country is due mainly to its mineral resources, and Cloncurry has a considerable output of copper.

THE WESTERN PLAINS may be divided into two parts, according to the amount of moisture which each receives. In the north, the country, owing to its heavier rainfall, is more suitable for cattle than for sheep, and the former are therefore much in excess of the latter. In the south conditions are reversed, and sheep-rearing is the chief pastoral pursuit, except in the extreme west where cattle are more numerous, as the distance from good lines of communication renders sheep-farming unprofitable. Queensland possesses over one-fifth of the Australian flocks, and it is mainly in the plains that her share is to be found. The whole of the region lies within the artesian basin, and over 1,000 wells have been sunk, but there is very little agriculture, and the water is mostly used for stock.

THE EASTERN HIGHLANDS are important mainly because of the mineral wealth which they contain. There is a certain amount of agriculture in the south, especially on the western slope, where within recent years the Darling Downs have become noted both for arable and pastoral farming. Wheat and other cereals are grown, and large numbers of sheep are grazed. Elsewhere in the Eastern Highlands, the conditions of climate and soil are more favourable to cattle than to sheep.

The mineral output includes gold, copper, coal, and tin. Metals occur chiefly in the older rocks, and the most important gold-mining

district in Queensland at the present time is in the Archæan region in the north-east of the state. Its centre is Charters Towers, situated about eighty miles from Townsville, with which it is connected by rail. Mount Morgan, twenty-six miles south-west of Rockhampton, and Gympie, about sixty miles from Maryborough, occupy the second and third places respectively, and the three fields taken together account for over 80 per cent. of the gold output of Queensland. Copper is produced at Mount Morgan, which is becoming more noted for that mineral than for gold, and at Chillagoe, between the Tate and Walsh rivers. Tin is obtained in the latter district, and at Herberton in the north.

Large deposits of coal are known to exist in various localities, but, as they are generally at some distance from the coast, and do not have the facilities for export possessed by the fields of New South Wales, their development is comparatively slow. The chief mines worked at present are those round Ipswich, which is twenty-three miles south-west of Brisbane, and has the advantage of being connected with the coast by the river Bremer. The coal is largely used for railways, shipping, and manufacturing industry in the coast towns.

THE COASTAL PLAINS, with which may be included the lower valleys of the rivers, have a rich soil and a warm and moist climate, and are fertile and productive. Though cattle-raising and dairying are pursued to some extent, agriculture is the principal occupation of the people. Maize, the most important cereal of Queensland, is grown in the south. Further north, and more especially in the country round Mackay, sugar-cane is extensively cultivated. Formerly, the plantations were worked mainly by Kanakas, but, in pursuance of the "White Australia" policy, they are being dispensed with, and, in 1910-11, over 90 per cent. of the sugar crop of Queensland was produced by white labour. As the output of sugar has greatly increased since the change was inaugurated, it may reasonably be claimed to have been a success. Whether or not the tropical climate will permit the growth of a white agricultural population, not constantly recruited from temperate regions, is a more debatable matter, and the attempts in this direction must still be regarded as being in the nature of an experiment.

The cultivation of cotton has been attempted, but, although soil and climate seem favourable, the results so far have not been

satisfactory. It is probable that the want of a supply of cheap labour is the chief cause of failure, and whether the difficulty can be overcome still remains to be seen. Coffee and tobacco are both grown, but in each case the production is less than it was several years ago. Fruit-growing is more prosperous, and bananas, oranges, pineapples, mangoes, and plums are all raised.

TOWNS AND COMMUNICATIONS.—The towns of the coastal plain are situated, either on the coast, or on navigable rivers; and their main function is to act as collecting and distributing centres, though in some cases they prepare raw material for export. Brisbane, the capital, is situated in the more temperate south, on the Brisbane river, twenty-five miles from Moreton Bay and at the head of navigation for large vessels. It is connected with the interior by a railway which runs through Toowoomba (where it joins a line from Sydney) to Charleville and Cunnamulla. Thus it taps some of the trade of the Darling Downs (though much of this goes by Sydney), and of the great pastoral districts beyond. It also receives the products of the coastal plain by a line which runs northward, through the mining town of Gympie, to Rockhampton. The latter is situated on the navigable Fitzroy river, forty-three miles from its mouth, and, besides being the port for a rich agricultural area along the coast, and the outlet of the Mount Morgan mining district, is connected by rail with the pastoral regions of central Queensland. Mackay is the centre and port of the chief sugar-producing district. Townsville is connected by rail with the mining areas of Charters Towers and Cloncurry, and serves as a port for a considerable part of northern Queensland. Cairns is surrounded by sugar plantations and orchards, and is connected by rail with Herberton.

NEW SOUTH WALES

The main physical regions of Queensland—coastal plains, highlands, and western plains—are continued in New South Wales. The coastal plain, indeed, is more fully developed there than in any other part of the east coast, and has, as a rule, a breadth of 35 to 45 miles. The Eastern Highlands continue to present their steep escarpment to the Pacific, and for some purposes a distinction may be drawn between the tableland itself and the long gentle slope to the west. The Western Plains consist in the north of the Rolling Downs formation, and in the south of Tertiary silts deposited

by the Murray and Murrumbidgee, while a large area of lower Palæozoic rock lies between the Darling and the Bogan. In the extreme west a small region of Archæan rocks, including the Barrier range, falls within the state and may be treated separately.

THE WESTERN ARCHÆAN REGION contains in the Broken Hills one of the most important silver-lead mines in the world. Silver, lead, and zinc are all obtained, and the annual output of the whole region is valued at over £2,400,000. The state of New South Wales derives comparatively little benefit from the exploitation of these mines, as they lie far from its coasts and are worked from Adelaide, with which they are connected by rail.

THE WESTERN PLAINS really consist of two distinct regions. In the western two-thirds, the rainfall as a rule does not exceed 15 inches, while in the eastern third it is generally above that amount. The difference between the two districts is indicated fairly well by the amount of stock carried by each at the present time. In the western division, there is one sheep to eleven acres, and in the eastern, one sheep to two-and-a-half acres. In the western division, again, only an insignificant part of the land is under agriculture, while in the extreme east arable farming has made rapid progress, more especially in the Riverina (the district between the Murray and the Murrumbidgee), where the Tertiary soils are particularly fertile and the rainfall adequate. The eastern region, as a whole, contains one-third of the sheep of New South Wales, and two-fifths of its wheatfields. Minerals are found in those areas where the lower Palæozoic rocks occur. The centre of the mining industry is the district round Cobar, which contains the most important gold and copper fields at present worked in the state. Gold is also found at Wyalong, further to the south-east.

THE EASTERN HIGHLANDS include two different agricultural regions—the tableland and the western slope. The latter is the more productive and contains over one-half of the wheat acreage of the whole state, while barley is extensively grown in the northern districts. On the tableland, wheat, oats, and potatoes are the chief crops, but the area under cultivation is much less than on the western slope. The highlands, as a whole, are extensively used for grazing purposes, and nearly one-half of the sheep, and over one-half the cattle, of New South Wales are fed upon its pastures. The more favourable climatic conditions of this region, as compared

with those further west, are shown by the fact that the land can support one sheep on an acre and a half.

Deposits of the precious metals are widespread. Gold is found in various places, copper in the north and in the south, and tin in the north. Iron ore occurs in the Blue Mountains and elsewhere, but the output is as yet small, although the proximity of the western coalfield, the chief mines of which are also in the Blue Mountains, has made possible a certain amount of iron smelting at Lithgow and other towns.

THE COASTAL REGION, with its fertile soil, favourable climate, great coal resources, valuable hinterland, and facilities for commerce, is one of the most important on the whole continent. The area under crops is not very great. Sugar-cane is cultivated in the valleys of the northern rivers, but the amount of sugar produced is much less than in Queensland, and is steadily decreasing. Maize is also grown, more especially in the south, where it surpasses wheat in importance. The district is more suited to cattle than to sheep, and an important dairying industry has sprung up within recent years. The mineral wealth of the region consists chiefly of coal, and two important coalfields lie within it. The northern, or Hunter River district, of which Newcastle is the centre, produces about 66 per cent. of the total output of the state. The coal is of good quality, and the ease with which it can be exported from Newcastle makes the field of special value. The Illawarra field, some distance south of Sydney, has an output of about one-third that of the northern, but, as the coal from it is much in demand for steam purposes, it has made considerable progress within recent years, and a harbour has been built at Port Kemble to facilitate export.

TOWNS AND COMMUNICATIONS.—Sydney, with its magnificent harbour, is the largest town and chief port of New South Wales, and may also be regarded as the centre of its railway system. From it, a line runs along the coastal plain to Newcastle, and is continued by way of the northern tableland to the Queensland frontier, where it joins the line to Brisbane; while a branch breaks off and connects with several points on the Barwon river, thus serving the agricultural areas in the north-eastern part of the plains. On the south, Sydney is connected with the Victorian railway system at Albury, on the Murray, by a line which crosses the tableland and runs along the south-western slope of the highlands. From this line there

breaks off at Goulburn, the centre of an agricultural district on the southern tableland, another which runs southward by Queanbeyan to Nimmitabel, and serves the agricultural and mining districts, of which these are the chief towns. Other branches go to Wyalong, engaged in gold mining, and to Hay, in the pastoral section of the Riverina. From Sydney, a railway runs by Bathurst, formerly a mining but now an agricultural centre on the tableland, to Bourke, on the Darling, in the midst of a great pastoral region. Branches from this line go to the mining town of Cobar and various agricultural towns in the east central part of the great plains. The Murray, Darling, and Murrumbidgee, all afford navigable waterways, the only ones in Australia.

VICTORIA

Victoria, with an area of almost 88,000 square miles, is the fifth in size among the states of the Commonwealth. It falls into several distinct physical regions. The highlands run from east to west, being much broader in the east than in the west, and are generally built up of Archæan and primary rocks. To the north the land slopes down to the Great Plains, overlain by silt deposited in Tertiary times; and in the south to the Great Valley, covered by volcanic material in the west and by Tertiary soils in the east. Beyond the valley lie the Otway and Gippsland Hills, formed of Jurassic rocks, but of no great height or extent.

The distribution of moisture throughout the state is very irregular. In the highlands, and on the upper slopes of the Otway and Gippsland Hills, the mean annual rainfall is generally over 40, and in some places over 50 inches, while in the Great Valley it does not exceed 30 inches. On the plains, it has a range of from 10 to 20 inches, being as a rule over 15 inches, except in the Mallee country of the north-west, where it is below the latter amount. It ought to be noted, however, that the actual precipitation varies considerably from one year to another, and that, in districts where the average rainfall is just sufficient for successful cultivation, any reduction from it may entail disastrous consequences.

Physical and climatic conditions determine four main natural regions: the Great Plains, the Highlands, the Great Valley, and the Otway and Gippsland Hills.

THE GREAT PLAINS form an important agricultural and pastoral area, and contain, notwithstanding their unfavourable climatic

conditions, three-fourths of the cultivated land of Victoria. Wheat is the chief crop raised, and nine-tenths of the total wheat production of the state is from the Wimmera, Mallee, and Northern districts of the Great Plains. The yield per acre is low, and in the Mallee frequently falls below six bushels. Recently, the practice of allowing the wheat lands to lie fallow in alternate years has been more generally adopted, and with beneficial results, the yield per acre on fallowed land being at least twice as great as that on unfallowed.

Pastoral pursuits are also extensively followed, and over one-third of the sheep in Victoria are in the region under consideration. These are generally found in the north and west of the plains, the Mallee country being as a rule unsuitable. Cattle are also reared in the north. The stock equivalent varies from one sheep to one and a third acres in the northern districts to one sheep to five acres in the Mallee.

Victoria lies outside of the artesian basin proper, but sufficient water for stock and domestic purposes is usually found in the plains at shallow depths. In addition, irrigation works have been constructed, especially in the north, where water can be obtained from the Murray and its tributaries—the Goulburn and the Loddon. Among the most important of these irrigation settlements are the districts round Rodney and Echuca, watered by the Goulburn; Tragowel Plains, watered by the Loddon; and the lands about Kow Swamp, Cohuna, and Mildura, watered by the Murray. Mildura, in the north of the Mallee, has become an important fruit-producing region, and exports considerable quantities of raisins and tinned fruits. In all, about a quarter of a million acres can now be cultivated by means of irrigation in the Great Plains.

THE HIGHLANDS are as a rule unsuited for cultivation except in the river valleys, and pastoral rather than arable farming prevails. On the southern slopes there are vast supplies of timber which have as yet been exploited only to a limited extent. Mining is the main industry of the region, and gold, the most important product, is found both in alluvial deposits and in quartz veins, the latter being the chief source of supply. Bendigo, Ballarat, and Beechworth are the centres of the gold-producing districts, but the output has declined within recent years.

THE OTWAY AND GIPPSLAND HILLS lie to the south of the Great Valley. As a result of the heavy rainfall the slopes are covered with timber. In the Jurassic rocks of the Gippsland Hills the chief coal deposits of the state are found; but the amount produced is not large, and considerable quantities have to be imported.

THE GREAT VALLEY is primarily a pastoral and dairying country, and contains nearly one-half of the total number of cattle and sheep in the whole state. The western district, which consists largely of soils of volcanic origin, is in many places fertile and covered with rich grass. Formerly, it was almost entirely devoted to the raising of sheep, and it still contains over one-third of those in Victoria, although large areas have recently been diverted to arable farming and dairying. The rainfall is heavier than on the Great Plains, and the stock equivalent is over one sheep to the acre. The central district has good soil and is well watered. Its position, round the most densely populated part of the state, has made it important for the cultivation of orchard and garden produce, and dairying is also carried on. The eastern district is in a much less developed condition, and stock-raising is the chief occupation of its inhabitants, though vigorous attempts are being made to revive and extend the cultivation of sugar-beet in the country round Maffra.

Having access to the sea on the one hand, and lying between it and the interior regions on the other, the Great Valley contains the ports through which the trade of Victoria passes. Of these the first is Melbourne, the second largest city in Australia, occupying a central position on the Yarra-Yarra a few miles above the point at which it enters Port Phillip. To it ships drawing twenty-two feet of water can now make their way, but larger boats do not go beyond Williamstown or Port Melbourne at the mouth of the river. Geelong, on a western extension of Port Phillip, is the port of the western district, and is noted for its manufactures of woollen goods. Among minor ports are Portland and Belfast in the west, and Cunninghame in the east.

RAILWAYS.—As Melbourne is the chief outlet of the state, the more important lines of communication naturally converge upon it. In the south-east, the eastern district of the Great Valley and the coal mines of Gippsland are connected with the capital by the South

Eastern Railway. The North-Eastern runs north and north-east to Albury on the frontier of New South Wales, where it connects with the line for Sydney, but unfortunately the two systems are not on the same gauge. Branches from the North-Eastern line reach the Murray at Yarrawonga, Echuca, and elsewhere. The Northern Railway runs north-east to Bendigo, from which point lines diverge to Echuca, Swan Hill, and other points on the Murray. It is through those river ports of the Murray, from Yarrawonga downwards, that most of the trade of the Western Riverina passes, as that district is nearer to Melbourne than to Sydney. The North-Western line goes by Ballarat (where a branch diverges to Mildura) to Serviceton on the frontier of South Australia, where it connects with the railway for Adelaide. The ports in the south-west are connected by a line which runs from Melbourne by Geelong to Portland.

SOUTH AUSTRALIA AND NORTHERN TERRITORY

South Australia, along with Northern Territory now administered by the Commonwealth Government, extends across the continent from south to north. Three great climatic regions may be recognised: the temperate south, the arid interior, and the tropical north, and these may be taken as a basis for the further division of the country into natural regions.

The temperate south, which contains nearly the whole population, falls into several distinct physical regions: the lower part of the Murray Basin, the South Australian Highlands, the Great Valley, and the Western Plateau. Over the whole area the rainfall is generally from 10 to 20 inches, except in the highlands and in the extreme south-east, where it is as a rule between 20 and 30 inches.

THE MURRAY BASIN, with its low rainfall, is mainly devoted to pastoral farming, and about one-fourth of the sheep of South Australia are raised within it. Dairy farming is carried on, more especially in the south-eastern part of the region, where the rainfall is heavier, and the volcanic soils around Mount Gambier more fertile. At the present time, the land supports on an average the equivalent of one sheep to three acres, but this varies from place to place according to local conditions. Near Mount Gambier is the chief potato-growing district in the state, and large quantities of barley and oats are also raised. An irrigation colony has been

established at Renmark, at an elbow of the Murray about fifty miles below the point at which it enters the state, and here are grown the vines from which sultana raisins and Zante currants are obtained, while apricots, oranges, and various other fruits also flourish. It is probable that the future will see a considerable development of irrigation works in this region.

THE HIGHLANDS are built up of lower Palæozoic rocks, and form a plateau rather than a mountain system. In many places the soil is fertile, and the rainfall is sufficient for the cultivation of cereals. Probably two-thirds, at least, of the wheat crop of South Australia is grown in this region, which also contains numerous areas suitable for the cultivation of fruit. Sheep and cattle are reared in large numbers. In the highlands, too, are situated the Kapunda and Burra-Burra copper districts, formerly the most productive in the state, but now lying idle. Gold is worked in various places, chiefly in the north, and considerable deposits of silver-lead are known to exist. In the Archæan rocks of Yorke Peninsula, which may be considered as an outlying part of the Highland region, are the rich copper mines and important smelting works of Wallaroo and Moonta.

THE GREAT VALLEY, which consists of Spencer and St. Vincent Gulfs, the coastal plains lying about these, and the swampy country of Lake Torrens, varies greatly from one part to another. In the south it contains fertile fields about Adelaide and Gawler; further north much of it is suitable only for pastoral purposes; while in the vicinity of Lake Torrens the land is generally useless. The Great Valley naturally contains the chief outlets of the state. Of these the most important are Port Adelaide, the port of the capital and of much of the agricultural region; Port Pirie, which smelts and exports the products of the Broken Hill mining district of New South Wales; and Port Augusta, which serves the northern part of South Australia.

THE WESTERN PLATEAU—EYRE PENINSULA.—In the coastal districts considerable development has taken place within recent years. The cultivation of wheat is rapidly extending, and about one-sixth of the wheat acreage of the state lies within the region. The scanty rainfall, however, results in a low yield, and the average for the last five years does not amount to six bushels per acre. Pastoral farms are also increasing in number, and on the occupied

lands the stock equivalent at the present time is about one sheep to nine acres.

THE ARID INTERIOR can only be developed to a slight extent. Part of the region lies within the artesian basin, and there a certain amount of pastoral farming is carried on with the aid of irrigation. Gold is found in the Arltunga district, situated among the ancient rocks of the plateau crossed by the Macdonnell ranges. Further north, there are stretches of grassland which may yet be utilised. A trans-continental line would do much for the development of this region; at present the railway does not go beyond Oodnadatta, from which point camel transport is necessary.

THE TROPICAL AND HUMID NORTH may be defined as that part of the Northern Territory which has a mean annual rainfall of over 20 inches. Two regions may be distinguished: the plateau and the coastal plain. On the first of these, savanna and, in the north, savanna forest prevail, and much land is suitable for cattle-raising. Minerals, including gold and tin, are found in various districts. On the coastal plain, which has a width of from 30 to 100 miles and a rainfall in places of 60 inches, sisal hemp, rice, and arrowroot are grown. Both soil and climate are believed to be adapted to the growth of cotton, but the same difficulties as in Queensland prevent its cultivation.

Cattle-raising and mining are the leading industries of these regions, which are as yet in an extremely undeveloped condition, and only contain about 3,000 inhabitants, two-thirds of whom are Chinese. The chief town is Palmerston, on Port Darwin, one of the best harbours in Australia.

COMMUNICATIONS.—Adelaide may be regarded as the railway centre of South Australia. One line runs eastward from the capital across the highlands, and south-eastwards across the plains of the Murray Basin to Serviceton, where it connects with the Victorian railway system and sends off a branch to Mount Gambier. Another line going northwards from Adelaide has connections with Morgan, at the great bend of the Murray, Wallaroo, Port Pirie, Broken Hill, and Port Augusta, and finally comes to an end at Oodnadatta, north-west of Lake Eyre. In the Northern Territory, a railway runs from Port Darwin south-eastward to Pine Creek, distant over 1,000 miles from Oodnadatta, with which it is proposed to connect it.

WESTERN AUSTRALIA

Western Australia, sometimes called Westralia, contains one-third of the area of the whole Commonwealth, and is the largest of the states of which it is composed. The country consists in the main of a plateau of Archæan rock, varying from 1,000 to 2,000 feet in height. In the west there is a coastal plain built up of Carboniferous, Jurassic, and Tertiary deposits; in the north-east are wide areas of lower Palæozoic age; and in the south the greater part of the Nullabor limestone plains. Two natural regions are marked off by climatic conditions, the south-western and the northern, in each of which there is a mean annual rainfall of over 20 inches. The remainder of the state is less easy to divide as its conditions and potentialities are as yet imperfectly known. To the east of long. 122° or 123° E., however, much of the land is desert, while to the west are considerable areas of savanna and scrub capable of a certain amount of development. In the latter region also are situated all the gold-producing districts which have as yet been discovered.

THE EASTERN DESERT, which also contains scrub-land in places, is inhabited only by a few aborigines, and the scarcity of water is so great that its future development is unlikely unless rich mineral areas are discovered within it.

THE WESTERN SAVANNA AND SCRUB-LAND REGION has made considerable progress in recent years, mainly as a result of the exploitation of its mineral wealth. This occurs in two auriferous belts, one of which starts from Phillips River on the south coast, and runs, with a breadth of over 100 miles, in a north and north-westerly direction, almost to the mouth of the Ashburton; while the other, the breadth of which is still unknown, lies about 100 miles further west, and runs in a similar direction to the first from the Dundas Hills in the south to Pilbara on the north-west coast. Of these two belts the richer and more productive is the second, which contains the East Coolgardie, Mount Margaret, and East Murchison goldfields. From the district round Kalgoorlie, on the first of these fields, is obtained more than half of the annual output of gold in the state, and from it has come more than half the total amount produced in Westralia. The annual output, which for the years 1901-6 averaged over £8,000,000, has lately fallen below £6,000,000, and, unless further discoveries are reported,

it would appear that the best days of Westralian gold mining are past. Copper is found along with gold, more especially on the Phillips River, Mount Margaret, and West Pilbara fields, while tin occurs in the Marble Bar district of Pilbara.

The arid climate renders the land unsuitable for cultivation, but there has recently been a considerable extension of the pastoral area. This is in part due to the discovery that, underlying the sands and silts which have accumulated over the Archæan rocks, a sufficient supply of water may be obtained for stock and domestic purposes. Over one-half of the sheep in the state are now grazed in this region, the more favourable districts of which, on the west and north-west coasts, have a stock equivalent of one sheep to two acres. The limestone region of the Nullabor Plains contains large areas of pasture land suitable for sheep, but it is practically uninhabited with the exception of a narrow strip along the coast where water can easily be obtained.

THE NORTHERN DISTRICTS have a heavier rainfall than the previous regions, and are on the whole more suited to cattle than to sheep. Hence it is that over 60 per cent. of the cattle of West-ralia, but only 6 per cent. of its sheep are raised there. Arable farming is as yet of no importance. A little gold is obtained in places.

THE SOUTH-WEST REGION is agriculturally the most valuable in the state, and contains practically the whole of its cultivated land. Wheat is the staple crop, but other cereals are also grown. The pastoral industry is important, and over two-fifths of the sheep in the state, and most of the cattle kept for dairy purposes, are in this region. Timber is a source of considerable wealth, and the chief trees include the jarrah, the kauri, and the white gum. The most important minerals are coal, which is found at Collie, in a shallow basin on the Archæan plateau, and tin, obtained mainly from alluvial deposits at Greenbushes, some distance further south.

TOWNS AND COMMUNICATIONS.—The capital of the state is Perth, which is situated on the Swan River, about twelve miles from its mouth at Fremantle, the leading port of Western Australia. From Perth, the Great Southern railway runs to Albany, the port of the south coast ; while the South-Western railway connects the capital with the mining districts of Collie and Greenbushes, and with their port at Bunbury. The Eastern railway runs from Perth to Kalgoorlie,

with one branch southwards to Norseman, in the Dundas mining district, and another northwards to Laverton, on the Mount Margaret goldfields. It has been proposed to connect Norseman with Port Augusta in South Australia by a great line running along the south coast. Geraldton, the port of the Murchison goldfields, is connected with them by the Northern railway, and with Perth by the Midland. Broome, on Roebuck Bay, is the chief port on the north-west coast.

TASMANIA

Tasmania, an island lying to the south of Victoria, from which it is separated by Bass Strait, is the smallest of the Australian states. It consists in part of a much dissected plateau, the average height of which is about 3,500 feet, though in places it rises to over 5,000 feet; and in part of plains which surround the plateau and are broken up by numerous mountain ranges. The whole of the west and north-west of the island consists of lower Palæozoic rocks, through which various eruptive masses have in later times made their way and frequently weathered down into fertile soil. In the east and south-east Carboniferous rocks prevail.

Tasmania, lying further to the south than the continent to which it belongs, is exposed to the full force of the westerly winds. The west coast and the plateau, accordingly, have a heavy rainfall, which varies from 40 to 60 inches and even more; while in the more sheltered eastern part of the island the precipitation does not, as a rule, exceed 30 inches, except along the coast, where it is somewhat greater. In the wetter districts the land is covered with warm temperate rain-forest, but in the drier parts vegetation is of the savanna type.

Agriculture, pastoral farming, and mining are the chief occupations of the inhabitants. The most important agricultural areas lie, either immediately to the east of the plateau, or in the north-west, the former being more important for wheat, and the latter for oats. Fruit-growing is carried on mainly in the south and south-east. Sheep are pastured on the drier lands of the eastern half of the island, more especially in the midlands, while cattle are reared in all the settled districts.

Mining operations are carried on principally in the west. Copper is obtained at Mount Lyell, north of Macquarie Harbour, and elsewhere; silver-lead ores at Zeehan, Dundas, and other places

north of Mount Lyell ; and tin at Mount Bischoff in the north-west. The chief coal deposits are found in the Carboniferous region in the east, the most productive area at the present time being around Fingal, in the valley of the South Esk.

The two largest towns are Hobart, the capital, on the Derwent, twelve miles from its mouth, and Launceston, the chief commercial centre, on the Tamar, not far from the head of its estuary. These towns are connected by rail with one another, and with the coal-fields of the east and the mineral districts of the west and north-west.

COMMERCE.—The overseas trade of Australia, which is of growing importance, is mainly, though not to the same extent as formerly, with the United Kingdom. During the years 1887–91, 75 per cent. of the exports of Australia were sent to, and 70 per cent. of the imports came from, the mother country. These figures had fallen to 48 per cent. and 60 per cent. respectively for the period 1906–10. On the other hand, both Germany and the United States had considerably improved their position. There are several reasons for this relative decline in the share of the trade belonging to the United Kingdom. With the development of American and German shipping in the Pacific, it is probable that much of the trade of these countries with the Commonwealth, which was formerly indirect, is now direct, and only natural that it should be considerably augmented in amount. Again, the decline in the exports of Australia to Great Britain is largely due to the fact that wool, which formerly went to London for distribution to France, Belgium, and Germany, is now exported to these countries without the intervention of London.

Of the exports of Australia the most important are wool and minerals, including gold, silver, copper, and tin, while dairy produce, frozen and preserved meats, wheat, and fruit make up the bulk of the remainder. The first place among the imports is held by textiles and wearing apparel, in the supply of which Great Britain has the lead. This is also the case with regard to machinery and manufactured metals, which come next in the list of imports. In both classes of goods, however, there is considerable competition from Germany and the United States. Among other imports are tropical and sub-tropical products, paper, wood, and liquors (alcoholic and non-alcoholic).

The following table indicates the average value of the exports and imports for the five years 1906-10.

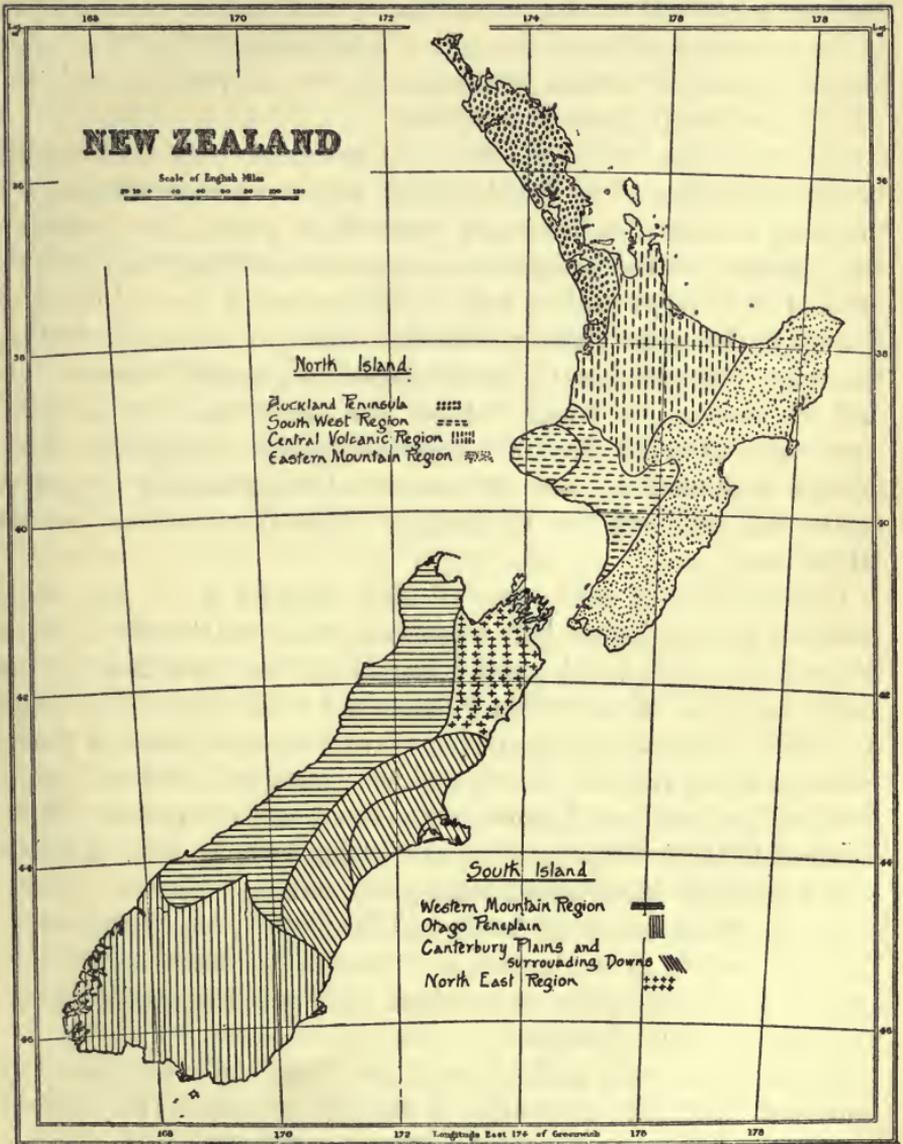
					Value in million £	Percen- tage.
EXPORTS						
Wool	..	..	..	..	25·73	38·8
Bullion and Specie	..	..	..	..	11·09	16·7
Wheat	..	..	..	..	7·20	10·8
Butter	..	..	..	..	2·96	4·5
Frozen meat	..	..	..	..	2·08	3·1
Other articles	..	..	..	..	17·31	26·1
					66·37	100
IMPORTS						
Textiles and apparel	..	..	..	..	14·97	28·2
Manufactured metals and machinery	..	..	..	..	10·21	19·2
Wood	..	..	..	..	2·15	4·1
Paper, books, etc.	..	..	..	..	2·13	4·0
Chemicals and drugs	..	..	..	..	1·80	3·5
Alcoholic liquors, etc.	..	..	..	..	1·53	2·8
Beverages (non-alcoholic)	..	..	..	..	1·40	2·6
Other articles	..	..	..	..	18·91	35·6
					53·10	100

CHAPTER XLVII

NEW ZEALAND

THE Dominion of New Zealand includes North Island, South Island (sometimes called Middle Island), and Stewart Island, along with the Chatham Islands and several other groups in the surrounding seas. The total area amounts to 104,751 square miles, which is rather more than five-sixths of the area of the British Isles. New Zealand proper lies between the 34th and 48th parallels of south latitude, with a general trend from south-west to north-east. South Island, the largest of the group, contains the Southern Alps, which run parallel to the west coast from Cook Strait to lat. $45^{\circ} 60' S$. These are fold mountains, mainly of Palæozoic strata lying on a foundation of Archæan and plutonic rocks, which separate a narrow west coast district traversed by spurs projecting from the main chain, and a much broken eastern district consisting largely of Mesozoic and Tertiary material. The Tertiary lands lie along the middle part of the east coast, and form the well-known Canterbury Plains. To the north of these, Palæozoic rocks reappear in the Kaikoura Chain, which runs in a north-easterly direction parallel to the Southern Alps. The southern part of the island is an ancient and elevated peneplain which has been much dissected by rivers flowing in a south-easterly direction, and it therefore consists in part of valleys and in part of residual ranges, all having the same general trend. The Kaikoura mountains are continued along the east of North Island as the Ruahine Chain, which is bordered on the coast by Secondary and Tertiary formations, while to the west is the extensive volcanic region of Lake Taupo with the volcanic cones of Tongariro and Ruapehu. The most westerly part of the island consists of another great volcanic cone, Mount Egmont; while the north-west is built up of ancient rocks and recent volcanoes, connected the one with the other by Tertiary deposits and volcanic tuffs and lavas.

CLIMATE.—The temperature and rainfall of New Zealand are mainly controlled by the fact that the greater part of the Dominion lies within the influence of the strong westerly winds. Hence its temperature is lower than its latitude, when compared with corresponding latitudes in the northern hemisphere, would appear to



NATURAL REGIONS OF NEW ZEALAND

warrant. On the other hand, the sea exercises a modifying influence, and the range of temperature between summer and winter, and between north and south, is never great. Auckland, for example, has a January mean of 66·6° F., and a July mean of 51·4° F., while Dunedin, over 600 miles further south, has a January mean of 57·2° F. and a July mean of 40·5° F.

The rainfall is on the whole well distributed, both with regard to time and place. In North Island, and more especially in the northern part of it, autumn and winter rains prevail, but, owing to the influence of the surrounding seas, summer droughts are not so marked as in other regions with a Mediterranean type of climate. Except in the more elevated districts, where it is over 60 inches, the mean precipitation of North Island is generally between 40 and 60 inches. In South Island, the mountains of the west coast receive the full force of the westerly gales and obtain in consequence a rainfall of over 80 inches. This gradually decreases eastwards, and over the Canterbury Plains it does not exceed 30 inches.

VEGETATION.—A great part of New Zealand is, or has been, forested, but the higher hills frequently stand well above the tree line and are covered with grass, which is also the prevailing type of vegetation upon the Canterbury Plains and over much of the Otago peneplain. Among the trees of the warm temperate forest of North Island are the valuable kauri, which is, however, confined to the Auckland peninsula, and pines such as the totara and matai. These reappear in the mild temperate forest along the west coast of South Island, together with various other pines, cedars, and yews. On the east coast such trees as the beech and the birch are more abundant. The wiry native grass, known as "tussock," covers considerable areas, but in many places it has been supplanted or supplemented by various English grasses.

POPULATION.—The population of the Dominion is estimated at 1,058,000, the majority being of British descent. The original inhabitants of the land were the Maoris, a Polynesian race with a fairly high standard of development. During the period of warfare between the Maori and the white man, the number of the former rapidly decreased, but, since the adjustment of the existing relations between the two races, this movement has been first checked and then reversed. In the last twenty years the Maoris have increased

their numbers by about 20 per cent. Considerable areas of land have been left in their possession, and they are represented in the Dominion Parliament by four of their number. The future of their race is, however, still somewhat uncertain. Although some of its members have adopted modern methods of agriculture, while others have engaged successfully in industry and trade, a great many still live in the same way as their fathers did. If they are to make secure their position in the future history of the state, it will be necessary for them to develop to a greater extent than at present the resources, and more especially the land, which they possess.

SOUTH ISLAND—NATURAL REGIONS.—The west coast area with its high mountains, narrow coastal plain, heavy rainfall, and dense forests, stands by itself. In the east, the flat, generally treeless Canterbury Plains, with the rolling downs which surround them, may be marked off, alike from the more mountainous and wooded country in the north-east traversed by the Kaikoura and other ranges, and from the grass-covered Otago peneplain in the south.

THE CANTERBURY PLAINS, with the surrounding downs, contain considerable areas of fertile soil which constitute the chief agricultural districts of New Zealand. With the aid of irrigation from the rivers, large returns can be obtained, and over two-thirds of the wheat and more than one-half of the total grain crop of the Dominion are produced here. The wheat is softer than that of Australia, and not so suitable for milling purposes; but the yield per acre is much higher and averages about thirty bushels, while it is said that one hundred bushels can sometimes be obtained under the most favourable conditions.

Pastoral farming is of great importance and large areas are kept under grass, but much of the native tussock has been mixed with, or replaced by, English forage plants. Until the early 'eighties, the production of wool was here, as elsewhere in New Zealand, the chief object of the pastoralist, but about that time the development of refrigerating apparatus brought into existence the trade in frozen mutton. This has led to an important change in the character of the flocks. The merino sheep, which had hitherto been almost exclusively raised, proved unacceptable on the British market, and its place was taken, on the richer lowlying hills and

plains, by crosses between it and Leicesters, Lincolns, Romney Marshes, and other breeds, to serve the double object of producing a good wool and providing fat mutton. On the higher lands, where the native grass is not suitable for fattening purposes, the merino is still supreme.

Banks Peninsula, a volcanic region with rich fertile soil, is devoted to dairy-farming, and produces large quantities of butter and cheese. Christchurch is the chief town on the Canterbury Plains, and Lyttelton, eight miles distant, is its port.

THE NORTH-EASTERN REGION does not possess much land suitable for cultivation. What there is occurs mainly in the Wairau Plain, in the lower part of the basin of the river of that name. Here stands Blenheim, the capital of Marlborough, and here live over one-half of the inhabitants of the whole region. Elsewhere sheep farming is the principal occupation of the people. The tussock grass of the uplands carries less than one merino sheep to the acre, but where the forest has been cleared the land is richer and carries two to four cross breeds. Among other industries the most important is saw-milling.

THE OTAGO PENEPLAIN is much dissected by rivers, and it is in the valleys of these rivers, and in the beds of old lakes which they have drained, that the best agricultural land occurs. Oats is the main crop cultivated, and about one-half of the New Zealand crop is raised in this region, which also comes next to, though a long way behind, the Canterbury Plains in the production of wheat. Pastoral farming is, however, a much more important pursuit at the present time, and in South Island the Otago peneplain ranks next to the Canterbury Plains in the size of its flocks. Sheep are fed upon the mountain pastures in summer, while in winter they are driven down to the lower slopes of the hills, sufficient fodder being grown in the flat valley bottoms to maintain them in seasons of exceptional severity. A number of freezing establishments have been set up here and in the Canterbury Plains, and both wool and mutton are exported. Dairying is of growing importance in the lowland areas.

The chief minerals of the region are gold and coal. The former occurs mainly in the débris of the older rock, and is obtained either by sluicing or dredging; while the latter, which generally consists of brown coal and lignite, is found in the Cretaceous and Tertiary

districts in the extreme south. Other industries include the manufacture of woollen goods on a fairly large scale, the preparation of New Zealand flax (*Phormium tenax*), and saw-milling.

Dunedin is the principal town, and is situated upon Otago Harbour. Ocean-going steamers can reach its wharves, but the larger vessels are berthed at Port Chalmers. Invercargill is the chief town of the southerly districts along Foveaux Strait, and is situated on New River Harbour. The Bluff, the port of Invercargill for vessels too large to make their way up the estuary, is the most southerly in New Zealand.

THE WEST COAST, on account of its mountainous character and dense forest vegetation, is but slightly developed. A small proportion of the land is cultivated, and some cattle and sheep are reared; but the greater part of the region is as yet unoccupied, though large areas of fertile soil are believed to exist. The geological nature of the country accounts for the variety and extent of its mineral resources. Gold is obtained, by the same means as in the Otago peneplain, from alluvial deposits along rivers and beaches, and the whole of Westland is a proclaimed goldfield in which numerous quartz veins have also been discovered. Good bituminous coal is found in the Cretaceous rocks along the northern part of the west coast, and is worked in the vicinity of Westport and Greymouth, from which places it is exported to other parts of New Zealand. Among other minerals, occurring to a greater or less extent, are copper, iron ore, petroleum, and greenstone. The chief towns are the ports of Hokitika, Greymouth, and Westport, all of which serve the mineral industries of the region.

NORTH ISLAND.—As a result of the geological formation of North Island there is much diversity in its soils, and it is impossible to give a systematic account of the country without entering into great detail. Several distinct regions may, however, be recognised.

THE AUCKLAND PENINSULA stands by itself for several reasons. The proximity of the sea to every part of the land reduces the range of temperature between summer and winter, while the rainfall is of the Mediterranean type. The forests include the valuable kauri, and, in districts from which that tree itself has disappeared, a resinous gum, used as an ingredient in the manufacture of lac and varnish, is obtained in a fossil state. Mediterranean

fruits, such as the vine, the orange, and the lemon, can be cultivated successfully where the soil is favourable ; but arable farming has made comparatively little progress, as is indeed the case in the whole of North Island, and pastoral farming is the more important pursuit, both sheep and cattle being raised. The mineral wealth of the region is considerable. Gold is obtained from quartz veins found in a district which stretches from Great Barrier Island, north of Auckland, southwards for a distance of over 200 miles ; and from the mines of this area comes more than half of the gold output of New Zealand. Coal, the most of which is consumed locally, occurs in various localities. Among manufactures, the preparation of New Zealand flax is more important than in any other part of the Dominion.

The chief town is Auckland, the largest city in New Zealand. It owes its importance to the fact that it is situated upon a narrow isthmus, and is thus able to communicate by sea both with the east and west coasts of North Island. It is a calling place for vessels on the route from San Francisco to Sydney, and is the centre of the gum collecting and gold mining industries.

THE SOUTH WEST REGION differs in some respects from the Auckland Peninsula. About Mount Egmont the volcanic rocks have weathered down into rich fertile soils which, being well watered, constitute a valuable dairying district. Between Mount Egmont and the Ruahine range there is a large area covered with "papa" soils, derived from the decomposition of blue calcareous clays. These form good pasture lands, suitable for sheep rather than cattle, and, in the more sheltered districts away from the coasts, are of special value for rearing lambs for the frozen meat trade. South of the Rangitikei River, alluvial soils stretch in a gradually narrowing strip along the coast, and on them dairying is again the most important pursuit.

The minerals of the region are inconsiderable. Brown coal, used for domestic and steam purposes, occurs along the Mokau River, and ironsands, which so far have not proved of commercial value, lie along the coast north of New Plymouth.

THE VOLCANIC REGION occupies a large part of the centre of the island, and here again the soils vary greatly in quality. In many places heavy clays prevail, some of which can only be rendered fertile by much cultivation, while others are believed to be

undrainable. On the other hand, around the Hot Lakes, considerable areas are covered with pumice sand which is too porous to be fertile. The population of the whole of this region is small, and the pastoral industry nowhere attains much importance.

THE EASTERN MOUNTAIN REGION, between the Ruahine range and the coast, contains over one-fourth of the sheep in New Zealand. Here, as elsewhere, the character of the land changes rapidly from place to place. The great alluvial plain in the basin of the Wairarapa is suitable both for sheep and cattle. Elsewhere the land, consisting partly of rolling downs and partly of alluvial flats, is devoted almost exclusively to sheep. In the north the "papa" soils reappear, but are almost entirely in the possession of the Maoris.

Wellington, the principal town of the region and the capital of the Dominion, is situated on Port Nicholson, an inlet of Cook Strait, and is the meeting place of the coastal routes of both islands. Hence it is the most important collecting and distributing centre of the country, and transacts a great part of its trans-oceanic trade.

COMMUNICATIONS.—New Zealand has over 2,800 miles of railway, much of which, owing to the physical structure of the country, has been laid down at great expense. In North Island, the main trunk line runs from Wellington to Auckland and beyond, with branches to Mount Egmont, Hawke Bay, and Coromandel districts. The principal line of South Island follows the east coast from Christchurch to Dunedin with extensions to the north and south, and with numerous branches across the Canterbury Plains and into the Otago peneplain. In the north-west of the island, the mineral districts are in railway communication with their ports, but there is as yet no connection with the main trunk line on the eastern side of the mountain range.

COMMERCE.—The trade of New Zealand is conducted mainly with the mother country. In early days, when wool was practically the only export, it naturally went to London, which was then the world's market for that commodity. Frozen mutton and dairy produce, which have been subsequently added to the list of exports, also find their chief outlet in the more densely populated parts of the United Kingdom. The figures shown on the next page indicate the average value of the exports during the years 1906 to 1910 (both inclusive).

	Value (in million £'s)	Per- centage
Wool	6·65	35·0
Frozen Mutton	3·38	17·8
Gold	2·03	12·5
Dairy Produce	2·37	10·8
Miscellaneous (including hemp and kauri gum)	4·55	23·9
	<hr/>	<hr/>
	£18·98	100
	<hr/>	<hr/>

The distribution of exports during the same period was as follows:—

United Kingdom	82·7 per cent.
British Possessions (chiefly Australia) ..	13·6 „ „
Foreign Countries	3·7 „ „

The imports consist in the main of various kinds of manufactured goods, and tropical and sub-tropical products. They may be classed as follows:—

Average value, 1906–10 (both years inclusive):—

	Value (in million £'s)	Per- centage
Textiles and apparel	3·67	22·2
Iron and steel goods.. .. .	3·37	20·4
Sugar and tea	·83	5·0
Alcohol and tobacco	·80	4·8
Paper and printed books	·65	3·9
Miscellaneous	7·21	43·7
	<hr/>	<hr/>
	£16·53	100
	<hr/>	<hr/>

Of this amount the United Kingdom contributed the largest share, even when allowance is made for the fact that probably 10 per cent. of the goods credited to her were of foreign origin, and were shipped through British ports in order to secure the advantages of the preferential tariff on imports of New Zealand coming from the mother country. The following figures indicate for the five years 1906–10 the average percentage of goods shipped from the United Kingdom, British Dominions, and Foreign States:—

United Kingdom	59·8
British Dominions	25·4
Foreign States	14·8

The imports from foreign countries are mainly from Germany and the United States. The latter sends tobacco, kerosene oil, leather, and electrical machinery, and the former manures, musical instruments, and fancy goods.

STATISTICAL ABSTRACT FOR AUSTRALASIA—1910

	Sheep	Cattle	Wheat (acres)	Gold (fine oz.)
Queensland ..	20,331,000	5,131,000	106,000	441,402
New South Wales	45,560,000	3,140,000	2,128,000	188,857
Victoria	12,882,000	1,547,000	2,398,000	570,362
South Australia ..	6,267,000	384,000	2,104,000	6,592
Western Australia	5,158,000	825,000	581,000	1,470,633
Tasmania ..	1,788,000	201,000	52,000	37,048
Northern Territory	57,000	513,000	—	5,111
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Total for Australia	92,043,000	11,741,000	7,369,000	2,720,005
New Zealand	23,480,000	1,773,000	311,000	506,371

ISLANDS IN THE PACIFIC

Of the islands in the Pacific only a few need be mentioned here. New Caledonia, which belongs to France, is noted for its supplies of nickel. The Fiji Islands are British, and export sugar, copra, and other tropical products. The Hawaiian group was annexed by the United States in 1898, and sends large quantities of cane-sugar to that country.

LIST OF WORKS CONSULTED

IN preparing this book I have drawn upon many sources of information, but the following is a list of the works to which I am more particularly indebted.

GENERAL

- H. R. MILL, *International Geography*.
E. SUSS, *The Face of the Earth*.
A. DE LAPPARENT, *Leçons de Géographie Physique*.
J. HANN, *Klimatologie*.
H. N. DICKSON, *Climate and Weather*.
A. J. HERBERTSON, *The Distribution of Rainfall over the Lands*.
E. W. HILYARD, *Soils*.
A. F. W. SCHIMPER, *Plant Geography*.
G. G. CHISHOLM, *Handbook of Commercial Geography*.
M. DUBOIS, *Précis de Géographie Economique*.
The Geographical Journal.
The Scottish Geographical Magazine.
The Bulletin of the American Geographical Society.
Petermanns Mitteilungen.
Diplomatic and Consular Reports.
The Statesman's Year Book.
Statistical Abstract.

EUROPE

- H. J. MACKINDER, *Britain and the British Seas*.
G. G. CHISHOLM, *Europe* (in *Stanford's Compendium*).
J. COSSAR, *The Distribution of the Towns and Villages of Scotland*
(in *Scottish Geographical Magazine*).
Ireland, Industrial and Agricultural.
The Victoria County History.
Report of the Royal Commission on Coal Supplies.
Norway—(Official publication for Paris Exhibition).
Sweden—(" " " " " ").
R. HAGGARD, *Rural Denmark*.
E. LEVASSEUR, *La France*.
VIDAL DE LA BLACHE, *Tableau de la Géographie de la France*.
M. DUBOIS, *Précis de Géographie Economique* (for France).
F. BERNARD, *La Hollande*.
J. PARTSCH, *Central Europe*.
A. ZWECK, *Deutschland*.
W. H. LINDLEY, *Report on the Waterways of France, Germany, Belgium, and Holland*.
G. DRAGE, *Austria-Hungary*.
" " *Russian Affairs*.
M. DE KOVALEVSKY, *La Russie à la fin du 19e siècle*.
Russian Year Book.
Industries of Russia (official).

- W. DEECKE, Italy.
 S. L. BESSO, The Cotton Industry in Switzerland and Northern Italy.
 C. ELIOT, Turkey in Europe.
 Bulgaria of To-day. (Official publication.)
 La Roumanie. (Official publication.)
 D. G. HOGARTH, The Nearer East.
 J. DE JEKELFALUSSY, The Millennium of Hungary.
 T. S. DYMOND, Agricultural Industry and Education in Hungary.

ASIA

- C. AULAGNON, La Sibérie Economique.
 G. DRAGE, Russian Affairs.
 BOARD OF TRADE, British Trade in Siberia.
 " " British Trade in Syria.
 D. G. HOGARTH, The Nearer East.
 " " The Penetration of Arabia.
 W. R. DUNSTAN, Agriculture in Asia Minor.
 W. WILLCOCKS, Irrigation of Mesopotamia.
 LORD CURZON, Persia.
 Imperial Gazetteer of India.
 Report on the Census of India.
 T. HOLDICH, India.
 H. W. SMYTH, Five Years in Siam.
 A. LITTLE, The Far East.
 L. RICHARD, Geography of the Chinese Empire.
 B. WILLIS AND OTHERS, Research in China.
 Reports of the Chinese Imperial Maritime Customs.
 A. J. SARGENT, Anglo-Chinese Trade and Diplomacy.
 H. B. MORSE, The Trade and Administration of the Chinese Empire.
 A. HOSIE, Manchuria.
 China Year-Book.
 H. DYER, Dai Nippon.
 H. YAMAWAKI, Japan in the Beginning of the Twentieth Century.
 United States' Commission in the Philippines.
 J. C. WILLIS, Agriculture in the Tropics.

AFRICA

- A. KNOX, The Climate of the Continent of Africa.
 A. G. OGILVIE, Morocco (in Geographical Journal).
 H. G. LYONS, Physiography of the River Nile.
 F. C. ROUX, Le Coton en Egypte.
 COUNT GLEICHEN, Anglo-Egyptian Sudan.
 J. W. GREGORY, Foundation of British East Africa.
 LORD CARNWORTH, A Colony in the Making.
 Science in South Africa. (British Association Handbook.)
 CORSTORPHINE AND HATCH, Geology of South Africa.
 T. G. TREVOR, Physical Features of Transvaal (in Geographical Journal).
 F. W. MENNELL, Rhodesian Miner's Handbook.
 R. WALLACE, Farming Industries of Cape Colony.

- J. D. FALCONER, The Geology and Geography of Northern Nigeria.
 G. C. DUDGEON, The Agricultural and Forest Products of British West Africa.
 C. P. LUCAS, Historical Geography of the British Colonies.

NORTH AMERICA

- I. C. RUSSELL, North America.
 C. S. SARGENT, Forests of North America.
 A. J. HENRY, Climatology of United States.
 DEPARTMENT OF MINES, CANADA—Report on Mining and Metallurgical Industries of Canada.
 J. MAVOR, Report on the North-west of Canada.
 A. G. BRADLEY, Canada in the Twentieth Century.
 Dominion and Provincial Reports on Agriculture.
 Reports of the United States' Geological Survey.
 Reports of the United States' Census Office.
 Year-book of United States' Department of Agriculture.
 A. P. BRIGHAM, Commercial Geography.
 R. R. ENOCK, Mexico.
 PRINCE BONAPARTE AND OTHERS, Le Mexique, au début du XXe siècle.

SOUTH AMERICA

- BUREAU OF AMERICAN REPUBLICS, Monographs on South American States.
 DEPARTMENT OF COMMERCE OF UNITED STATES, Special Reports on Trade Conditions in South American States.
 R. R. ENOCK, Peru.
 " " The Andes and the Amazon.
 G. F. SCOTT-ELLIOT, Chile.
 W. A. HIRST, Argentina.
 P. DENIS, Brazil.
 CENTRO INDUSTRIAL DO BRASIL, Le Brésil.

AUSTRALASIA

- J. W. GREGORY, Australasia (in Stanford's Compendium).
 — SCHOFIELD, New Zealand.
 Publications of the Commonwealth and States of Australia and of the Dominion of New Zealand.

INDEX

- AACHEN, 96, 112
 Aar Valley, 110
 Aargau, 134
 Aberdeen, 43
 Abo, 185, 191
 Abruzzi, 163, 168
 Abu Hamed, 317
 Abyssinia, 300, 301, 302, 319
Acacia vereh, 316
 Accrington, 54
Achras sapota, 442
 Aconcagua, 467
 Acre, 213
 Adamsthal, 139
 Adda, Valley of, 164
 Addis Abbeba, 319
 Adelaide, 508, 509, 510
 Adige, Valley of, 139, 149, 171
 Adrianople, 158, 159, 161
 Ægean Islands, 208
 Afghanistan 219-220
 Afon, Valley of, 60
 Africa, 299-357; physical features, 299; climate, 299-302; vegetation, 302-303; peoples, 303-304; countries of, 305-357
 —, British East, 320-322
 —, British West, 341-346
 —, French West, 346-349
 —, German East, 323-324
 —, German South-west, 339-340
 —, Portuguese East, 338-339
 —, Union of South, 325-333
 Agadir, 306
 Agassiz, Lake, 383, 411
Agave sisalana, 439
 Agra, 231, 243
 Agram, 149
 Aguilas, 178, 182
 Ahmadabad, 236
 Ahwaz, 218
 Aidin, 209
 Aintab, 211
 Airdrie, 46
 Aisne, 89, 96
 Akmolinsk, 200
 Alabama, 421
 Alais, 80
 Alaska, wheat, 24
 —, 429-430
 Albacete, 182
 Alban Hills, 163, 169
 Albania, 154, 157, 161
 Albany (N.Y.), 432, 435
 — (W.A.), 512
 Alberta, 388
 Albert Nyanza, 299, 311
 Albuquerque, 433
 Albury, 504, 508
 Aleppo, 211, 213
 Alessandria, 171
 Alexandretta, 210, 213
 Alexandria, 313, 315
 Alfa, Algeria, 308
 Alföld, 143, 144
 Algeria, 305, 307-309; physical features, 307; climate, 307; Tell, 307-309; high plateaus, 308, 309; Sahara, 309; commerce, 308-309; trade, 309
 Algiers, 307, 309
 Alicante, 177, 182
 Aljustrel, 181
 Allahabad, 231, 243
 Allegheny plateau, 362, 403-409
 —, R., 407
 Allentown, 408
 Allier, Valley of, 78
 Alloa, 47
 Almelo, 101
 Almeria, 177, 178, 182
 Alpaca, 463
 Alps, 30, 77, 84, 105, 132-133, 139-140, 162
 Alsace, 107
 Altai, Mts., 196, 200, 202
 Altena, 112
 Amazon, Lowlands of, 448, 470-471
 Ambala, 243
 Ambassadors' Route, 269
 Amber, 117
 Amberg, 108
 Amboise, 86
 Amiens, 86, 87
 Amoy, 271
 Amritsar, 232, 233
 Amsterdam, 96, 100, 101, 102, 121
 Amu-Daria, R., 207
 Amur, R., 204, 205, 206
 — plain of, 274
 Anatolia, 208-210; physical features, 208; climate, 208; coastal districts, 208-209; plateau, 209; minerals, 209-210; railways, 213

- Ancona, 172
 Andalusia, 175, 177
 Andaman Islands, 196
 Andijan, 207
 Anglesey, 59
 Angola, 353-355
 Anhwei, 256, 265-270
 Aniene R., 169
 Annam, 252, 254
 Annapolis Valley, 380
 Anping, 289
 Ansichow, 277
 Antigua, 444
 Anti-Lebanon, 210
 Antilles, Greater, 443
 —, Lesser, 443, 444
 Antisquia, 457
 Antofagasta, 461, 466, 469
 Antrim plateau, 65
 Antung, 276, 280
 Antwerp, 96, 97, 98, 101
 Anzin, 85
 Aomori, 290
 Apennines, 31, 162, 163
 Appalachian System, 361-362, 373,
 403-410, 419-421
 Appenzell, 134
 Apuan Hills, 168
 Apulia, 163, 164, 169
 Arabia, 199, 212-213; railways, 213
 Arabistan, 214, 216
 Arabs, 303
 Arakan Hills, 222, 238
 Arakan Toma Hills, 196, 238
 Aral Sea, 198
 Aravalli Range, 222
 Archangel, 186, 191, 205
 Ardennes, 29, 84, 92-3
 Ardrossan, 44
 Argentine Republic, 482-489; forest
 region, 482-484; grassland region,
 484-6; sub-andine region, 486-7;
 manufactures, 487; communica-
 tions, 487-9; commerce, 489
 Argyll, 42
 Arica, 461
 Arizona, 426-7
 Arkansas, 421-2
 Arlberg Tunnel, 149
 Arles, 89
 Arltunga, 510
 Armenian Knot, 195, 214
 Armorian Range, 29
 Arnheim, 101
 Arno Basin, 163
 Artesian Basin of Australia, 496
 Aryo-Dravidian Peoples, 226
 Aschaffenburg, 108, 125
 Ashabad, 218
 Ashanti, 342-343
 Ashland, 413
 Ashtabula, 414
 Asia, 195-295; physical structure,
 195-198; climate, 198-199; coun-
 tries of, 200-295
 Asia Minor, 195, 199, 208-210
 Asmara, 320
Aspidosperma quelvacho, 482
 Assam, 223, 230, 240, 242
 Assiniboine, R., 397
 Assiut, 313
 Assuan, 313, 315
 Astara, 218
 Astrakhan, 188
 Asturias, 176
 Asuncion, 480, 488
 Atacama Desert, 450, 466
 Atbara, R., 311, 312
 Atchinsk, 204
 Athabasca Valley, 391
 Athens, 32, 161
 Atlanta, 421
 Atlantic and Gulf Coastal Plain, 362,
 374, 415-9
 Atlas Region, 299, 300, 305-310
 Atrek, 216
 Attar of Roses, Bulgaria, 155
 —, Turkey, 158
 Auckland, 522, 523
 Augsburg, 106, 121
 Augusta, 421
 Aussig, 137
 Australia, 493-515; physical fea-
 tures, 493-4; climate, 494-5;
 irrigation, 496-7; vegetation,
 497-9; general considerations,
 499-500; Queensland, 500-2;
 New South Wales, 502-5; Vic-
 toria, 505-8; South Australia
 and Northern Territory, 508-510;
 Western Australia, 510-3; Tas-
 mania, 513-4; commerce, 514-5;
 statistics, 525
 Austria-Hungary, 136-150; Austria,
 136-143; Bohemia, 136-138; Mor-
 avia, 138-139; Austrian Silesia,
 139; Alpine provinces, 139-140;
 Danubian districts, 141; Karst,
 141-142; Bosnia, 142; Galicia and
 Bukovina, 142-143; Hungary, 143-
 150; physical features, 143-4;
 climate, 144; Carpathians, 144-
 5; plains, 145-7; Croatia-
 Slavonia, 147-8; communica-
 tions, 148-150; commerce, 150
 Aveyron, 80
 Avon, R., 65
 Avonmouth, 65

- Axim, 342
 Ayr, 44
 Azerbaijan, 214
 BADEN, 107, 108
 Bad Lands (Dapota), 422
 Bagdad, 211, 212, 213, 218
 Bagshot Sands, 64
 Bahamas, 444
 Bahia, province, 472
 — Blanca, 488, 489
 Bahr-el-Ghazal, 311; basin, 299, 316
 Bahr-el-Jebel, 311
 Bájra, 23
 Bakony Forest, 143
 Baku, 190
 Bálata, 455
 Bali, 292, 294¹
 Balkan Mts., 30
 — States, 154-161, physical features, 154; Bulgaria, 154-6; Serbia, 156-7; Turkey-in-Europe, 157-159; Greece, 159-160; communications, 160-1
 Ballachulish, 43
 Ballarat, 506, 508
 Balsam, 441
 Baltimore, 405, 407, 409
 Baluchistan, 220, 228-229, 242
 Bamberg, 108, 109
 Bangkok, 250, 251, 252
 Banka, 294
 Banks Peninsula, 520
 Bantus, 303
 Baraba Steppe, 202
 Barawa, 320
 Barbados, 444
 Barcelona, 178
 Barfurush, 215
 Bari, 170
 Barklay Tableland, 500
 Barley 25, 33; Anatolia, 209; Syria, 210
 Barmen, 112, 125
 Barnaul, 203
 Baroda, 243
 Barranquilla, 458
 Barrow, 56
 Barry Dock, 60
 Bartsch, 115
 Baruth, 115
 Barwon R., 504
 Basel, 121, 122, 134, 135
 Basilicata, 168
 Basra, 212, 218
 Bassein, 240
 Basutoland, 333
 Batang, 277
 Batavia, 293
 Bathurst (Gambia), 341
 — (N.S.W.), 505
 Batley, 51
 Batum, 190
 Bauchi plateau, 345
 Bavaria, 105-6
 Bavarian Forest, 105, 106, 109, 136
 Bay of Fundy, 378
 Bayonne, 82, 88
 Bechuanaland Protectorate, 333-334
 Bechuanas, 304
 Bedawins, 212
 Beechworth, 506
 Beet, 25
 Beira, 336, 338, 339
 Beirut, 213
 Belfast, 66,
 —, Transvaal, 332
 —, Vict., 507
 Belfort, 84
 Belgium, 30, 92-98; physical features, 92; climate, 92; Ardennes plateau, 92-93; Carboniferous area, 93-94; Central Belgium and Flanders, 94-95; Campine, 95-6; railways, 96; waterways, 96-7
 Belgrade, 161
 Bell Island, 380, 399
 Beltran, 458
 Benares, 231
 Bender-Gez, 215
 Bendigo, 506, 508
 Bengal, 222, 229-231, 232, 243
 —, Eastern, 230
 Benha, 315
 Beni-Saf, 308
 Benkulen, 293
 Bennisch, 139
 Benue, 343
 Berar, 235
 Berber, 316, 318
 Berbera, 320
 Berbers, 303
 Bergamo, 166
 Bergen, 74
 Berkshire Hills, 362
 Berlin, 32, 117, 123, 125
 Bern, 135
 Berwickshire, 48
 Beskides, 139
 Bethlehem (S. Africa), 337
 Beuthen 120
 Bezwada, 244
 Bhamo, 239
 Bhusawal, 244
 Bielefeld, 113
 Bielitz, 139
 Biella, 167

- Bihar, 243
 Büsk, 205
 Bilbao, 176, 182
 Billiton, 294
 Birjand, 218
 Birmingham, 58
 —, U.S., 421
 Biskra, 307, 309
 Bizerta, 310
 Blackburn, 54
 Black Earth, Russian, 183
 Black Elster, 115
 Black Forest, 103, 107
 Blansko, 139
 Blantyre (Nyasaland), 338
 Blanz, 80
 Bleiberg, 140
 Blenheim, 520
 Bloemfontein, 329, 337
 Bloomington (Ill.), 409
 Bluefields, 442
 Blue Grass Region, 420
 — Mts. (N.S.W.), 504
 — Ridge, 362, 432
 Bluff, The, 521
 "Bocage Normand," 81
 " — Vendeen," 81
 Bockum, 112
Boehmeria nivea, 267
 Bœotia, 160
 Bogotá, 457, 458
 Bohemia, 136-138
 Bohemian Block, 29
 Bokhara, 206, 207
 Boksburg, 332
 Bolivia, 460-462; physical features, 460; Puna, 460; Montaña 460-461; communications, 461-462
 Bologna, 167, 172
 Bolton, 54
 Bombay, 234, 241
 Bona, 309
 Boom, 95
 Bordeaux, 81, 82, 88, 89, 91
 Borghat, 243, 244
 Borneo, 292, 294
 Boryslaw, 142
 Bosnia, 141, 149
 Boston, 380, 402, 403, 405
 Botosani, 152
 Bougie, 309
 Boulder Clay, 63
 Boureynsky, 205
 Bourke, 505
 Bow, R., 387, 394
 Bozeman Tunnel, 433
 Brabant, North, 99
 Bradford, 51
 Bradford-on-Avon, 62
 Brahmaputra plain, 227, 230, 277
 Braila, 152
 Brandenburg, 115
 Brazil, 470; Amazonial lowlands, 470-471; Atlantic margins, 471-474; São Paulo, 474-475; Temperate South, 475; Central region, 475-476; communications, 476-477; commerce, 477-478
 Brecon, 59, 60
 Breda, 101
 Bremen, 118, 121, 122, 127, 150
 Bremenhaven, 127
 Bremer, R., 501
 Brenner Pass, 149, 171
 Breslau, 122
 Brest, 81, 88
 Brewing, England, 59
 —, Ireland, 67, 68
 —, Germany, 106, 109
 —, Austria, 138, 141
 Brig, 135
 Brindisi, 170,
 Brisbane, 501, 502
 Bristol, 71
 — and Somerset coalfield, 65
 British Columbia, 363, 373, 389-393
 — Honduras, 441, 442
 Brittany, 29, 77, 80-81
 Broach, 236
 Brockton, 403
 Broken Hill (North Rohd.), 336, 353
 — Hills (N.S.W.), 503, 509, 510
 Bromberg, 123
 Broome, 513
 Broxburn, 47
 Bruck, 149
 Bruges, 96
 Brünn, 138, 139
 Brusio, R., 166
 Brussels, 96
 Buckingham, 377
 Buckwheat, 25
 Budapest, 147, 148, 149
 Budweis, 137
 Buenos Aires, 461, 480, 484-486, 488
 Buffalo, 408, 409, 413, 414, 432, 435
 Bukarest, 149, 152
 Bukovina, 142, 149
 Bulawayo, 334, 335, 336, 337
 Bulgaria, 154-156, agriculture, 155; railways 161
 Bulhar, 320
 Bunbury, 512
 Bunder Abbas, 217, 218
 Burgas, 161
 Burgos, 182
 Burgundy Canal, 89

- Burma, 196, 220, 223, 225, 238-240 ; physical features, 238 ; climate, 238-239 ; natural regions, 239 ; Littoral districts, 239 ; Upper Burma (wet), 239 ; Upper Burma (dry), 239 ; Sub-deltaic and deltaic tracts, 240 ; minerals, 242 ; railways, 243 ; rice export, 245
- Burtonisland, 45
- Burra-Burra, 509
- Burton, 59
- Bury, 54
- Bushire, 217, 218
- Bushmen, 303
- Buxtehude, 117
- Buzi Valley, 339
- Bwana M'Kubwa, 336
- Bzura, 115
- CAATINGA, 17
- Cacao, 19 ; W. Africa, 342, 344, 349, 350, 351, 352 ; São Thomé, 355 ; West Indies, 443 ; Venezuela, 454 ; Ecuador, 459 ; Brazil, 471, 473
- Caceres, Spain, 182
- , Colombia, 458
- Cadiz, 178, 182
- Caen, 87
- Cagayan Valley, 295
- Cairo, 312, 313
- Cairns, 502
- Calabria, 163
- Calais, 87, 89
- Calcium Carbide, (manufacture of), Norway, 74 ; Italy, 167
- Calcutta, 231, 241, 244
- Caledon, Basin, 330
- Caleta Buena, 466
- Calgary, 383, 387
- Calicut, 238
- California, 364, 428-430 ; Lower, 440
- Callao, 464, 465
- Calmar, 458
- Cambodia, 252, 253
- Cambridge, 32, 63
- Campagna, 169
- Campania, 163, 169
- Camphor, China, 270
- , Formosa, 289
- Campine, 92, 95-96
- Campocologno, 166
- Canada ; physical features, 361-364 ; climate 364-368 ; vegetation, 368-371 ; natural regions, 371-373 ; Laurentian, plateau, 376-378 ; Maritime provinces, 378-381 ; St. Lawrence lowlands, 381-383 ; Winnipeg Basin, 383-388 ; Athabasa Mackenzie plains, 388-389 ;
- Canada (*cont.*)—
- British Columbia, 389-393 ; Yukon 393-394 ; communications, 394-397 ; commerce, 397-399
- Canal de Briare, 89
- de Jonction, 96
- de l'Est, 89
- de St. Quentin, 89
- du Centre, 89
- du Loing, 89
- du Midi, 89
- Cannock Chase, 56
- Cannstadt, 109
- Cantabrian Mts., 175
- Canterbury plains, 516, 518, 519-520
- Canton, 272, 273 [520]
- Caoutchouc, 17-18, *see* Rubber
- Cape Breton Island, 378-381
- Cape Colony, 300, 302, 326-328 ; physical features, 326 ; climate, 326 ; natural regions, 326-328
- Capetown, 336
- Carboniferous Limestone, 45
- Cardiff, 60, 71
- Cariboo, 391
- Carinthia, 139-140
- Carludovica palmata*, 459
- Carluke, 44
- Carmarthen, 59, 60
- Carniola, 139-140, 141
- Carolina, South, 415-421, 434
- Carpathians, 30, 143, 151
- Carpets, Asiatic Turkey, 209 ; Persia, 216, 217 ; India, 232
- Carrara, 163
- Carse of Gowrie, 47
- Cartagena ; Spain, 178, 182 ; Colombia, 458
- Casablanca, 306
- Cascades, Northern, 363
- , Southern, 363
- Caspian Sea, 195, 198
- Cassel, 121, 123
- Castile, New, 177
- , Old, 174, 176, 178
- Castilloa elastica*, 18, 437
- Castlecomer, 68
- Catalonia, 178
- Catania, 32, 170
- Catawba, R., 421
- Cattle. U.S., 423 ; Paraguay, 479 ; Uruguay, 481 ; Argentine, 485-486 ; Australia, 500, 504, 512 ; New Zealand, 523
- Cauca Valley, 456
- Caucasus, 30, 190
- Cayster, 209
- Cebu, 294
- Celebes, 292, 294

- Central America, 441-444
 Cephalonia, 160
 Cerro de Mercado, 439
 Cerro de Pasco, 463, 464
 Cette, 88
 Ceylon, 247-248
 Chaco, 482
 Chad, Lake, Basin, 343
 Châlons, 89
 Chaman, 243
 Champagne, 85
 Champlain, Lake, 362
 Changchun, 276
 Changtehfu, 263
 Charente, R., 82
 Charleroi, 93, 94, 96
 Charleroi-Brussels Canal, 96
 Charleville, 502
 Charlotte, 421, 432
 Charlottenburg, 125
 Charlottetown, 378
 Charters Towers, 501, 502
 Chartres, 89
 Château Salins, 110
 Chatham Island, 516
 Chattanooga, 421, 433
 Chaumont, 88
 Chaux-de-Fondes, 134
 Chefoo, 263, 264
 Chekiang, 270-271
 Cheliabinsk, 191, 206
 Chélif, R., 308
 Cheling Pass, 269
 Chemicals. England, 50, 55, 58;
 Belgium, 93-94; Germany, 107
 Chemnitz, 118, 119, 125
 Chemulpo, 280
 Chengtu, 264, 269, 273, 277
 — plateau, 265, 269
 Chenkiang, 268, 270
 Chenting-fu, 263
 Cherbourg, 81, 87
 Cheremkovo, 204
 Cherry Bluff, 392
 Cheyenne, 433
 Chianti wine, 168
 Chicago, 394, 411, 412, 413, 414,
 415, 432, 433, 434
 — Drainage and Ship Canal, 435
 Chicle gum, 442
 Chicoutimi, 377
 Chieng-mai, 251, 252
 Chile, 465-469; physical features,
 465-466; Northern desert, 466-
 467; Semi-desert region, 467;
 Central Chile, 467-468; Southern
 Chile, 468; communications, 468-
 469; commerce, 469
 Chili, 256, 260
 Chillagoe, 501
 Chillies, 20
 Chilterns, 36
 China Proper, 256-274, 278-279;
 physical features, 256; climate,
 256-258; vegetation, 258; general
 considerations, 258-259; natural
 regions, 259-260; Hwang-ho basin,
 260-265; Hwang-ho basin, com-
 munications of, 263-265; Yangtse
 basin, 265-270; Yangtse basin,
 communications of, 268-270;
 Chekiang and Fokien, 270-271;
 Si-Kiang basin, 271-274; Si-Kiang
 basin, communications of, 272-274;
 commerce, 278-279
 Chinchow-fu, 275
 Chinde, 338-339
 Chindwin, R., 238, 239
 Chinese Empire, 256-279
 Chinese Plateau, 256
 Chinghsing, 262
 Chinghuachen, 264
 Chinsok Winds, 384, 422
 Chios, 208
 Chipewyan, 388
 Chittagong, 244
 Chiwonga, 337
 Cholon, 250
 Chorley, 54
 Chota Nagpur, 236
 Chumbi Valley, 277
 Chumpawn, 251
 Chungking, 269
 Christchurch, 520, 523
 Christiania, 74, 76
 Chubut, 487
 Cilicia, 208, 209
 Cinchona, 20
 Cinninati, 431
Cinnamomum Camphora, 270
 Cindad Bolivar, 456
 Clanwilliam, 326
 Clark's Fork, 433
 Clansthal, 125
 Clermont-Ferrand, 80
 Cleve, 101
 Cleveland, 408, 413, 432
 Cleveland Hills, 50
 Climate, 6-14
 Cloncurry, 502
 Clyde, Scotland, 47
 —, United States, 435
 Clydebank, 47
 Clydesdale, 44
 Coal. Scotland, 44-45; England,
 49, 50-51, 53, 56, 57, 58, 59, 60, 64-
 65; France, 80, 85; Belgium, 93,
 95; Holland, 101; Germany, 111,

- Coal (*cont.*)—
 118, 119, 120; Austria, 137, 138, 139; Hungary, 145; Spain, 176; Russia, 186, 187, 189; Siberia, 204, 205; Persia, 215; India, 242; Tongking, 254-255; China, 262, 267, 272; Japan, 284, 287; Natal, 329; S. Rhodesia, 335; Canada, 380, 388, 392; U.S., 404, 405, 412, 413, 419, 420, 429, 430; Venezuela, 455; Chile, 468; Australia, 500-501, 504, 507, 512, 514; New Zealand, 520, 521, 522
- Coatbridge, 46
 Coatzacoalcos, 440
 Cobalt, 377
 Cobar, 503, 505
 Coblentz, 121
 Cochín, 238, 244
 Cochín-China, 252, 253, 254
 Coccus Pela, 267
 Coffee, 18, 19; Arabia, 213; India, 234; Java, 292; British E. Africa, 322; Mexico, 437, 438; Central America, 441, 442; West Indies, 444; Venezuela, 454-455; Colombia, 457; Brazil, 473, 474
 Cognac, 82
 Cogon Grass, 294
 Cohuna, 506
 Collie, 512
 Collo dell' Altare, 162
 Colmar, 107
 Colne, 54
 Cologne, 96, 111, 112, 121
 Colombia, 456-458; physical features, 456; tropical lowlands, 456-457; sub-tropical region, 457; cool temperate region, 457; minerals, 457; communications, 457-458; commerce, 458
 Colombo, 247, 248
 Colon, 481
 Colorado State, 424-425
 — plateau, 363, 374
 Columbia, 421
 — plateaus, 363, 374, 425-426
 — river, 389, 433
 Columbus, 408, 410, 421
 Commentry, 80
 Como, 166, 171
 Comox, 392
 Concordia, 488
 Conemaugh, R., 432
 Congested Districts Board, 67
 Congo basin, 302, 350-354
 —, Belgian, 351; physical features, 351; climate, 351; natural regions, 351-353; communications, 353
 Congo, French, 350-351
 Conneaut, 414
 Connecticut, 400-403
 Connellsville, 405
 Constanta, 152
 Constantine, 309
 Constantinople, 150, 159, 161
 Constitucion, 468
 Continental shelf, 5, 30
 Controller Bay, 430
 Copenhagen, 130
 Copper. Spain, 178; Japan, 287; Belgian Congo, 352; Canada, 377, 392; U.S., 416, 424, 425, 427, 429; Chile, 467; Australia, 500-501, 503, 509, 513
 Copper, R., 430
 Coquimbo, 467
 Cordillera de Merida, 454
 Cordoba, Spain, 178, 182
 —, Argentine State, 484-486
 — City, 485, 488
 Corfu, 160
 Cork, 68
 —, Portugal, 181
 —, Morocco, 306
 —, Algeria, 308
 Cornwall, 61
 Cornwallis Valley, 380
 Coromandel (N.Z.), 523
 — coast, 225
 Coromines, 455
 Coronel, 468
 Corrientes, 484-486, 488
 Corumbá, 478
 Corunna, 182
 Costa Rica, 441, 442
 Cotswold, 35
 Cotton Manufactures. Scotland, 47; England, 53-55; Sweden, 76; France, 84, 86; Belgium, 95; Holland, 101; Germany, 106, 107, 109, 112, 118, 120; Switzerland, 134; Austria, 133, 140, 141; Italy, 166-167; Spain, 179; Russia, 185, 187; India, 232, 234-235, 236, 240-241; China, 263, 268, 272; Japan, 288; U.S., 402, 421; Mexico, 439; Brazil, 473
 — (Raw), 21-22; Russian Central Asia, 207; Anatolia, 209; Syria, 211; Persia, 215; India, 232, 235-236; Cambodia, 253; China, 261, 266-267, 270; Egypt, 314-315; Anglo-Egyptian Sudan, 317; Uganda, 318; Nyasaland, 338; Nigeria, 345; U.S., 416-418; West Indies, 444; Colombia, 456; Peru, 462; Brazil, 473, 474; Australia, 501-502, 510

- Courland, 185
 Courtrai, 95
 Coventry, 59
 Cracow, 122, 142, 149
 Cradley, 58
 Craiova, 152
 Crefeld, 112, 125
 Cremona, 171
 Creusot, 80
 Crimea, 183
 Crimmitschau, 118
 Cripple Creek, 425
 Croatia, 141, 143
 Cronstadt, 185
 Crownest coalfield, 392
 — Pass, 394
 Cserna, 145
 Cua-cam, 255
 Cuba, 22, 179, 443
 Cumberland, 432
 —, Coalfield, 56; U.S., 380
 — Plateau, 362, 420
 Cunnamulla, 502
 Cunninghame, 507
 Currants, 160
 Cuxhaven, 127
 Cuzco, 464
 Cypress Hills, 388
 Cyrenaica, 310
 Czenstochowa, 186
- DAIREN, 275, 276
 Dairy Produce. Ireland, 68; Hol-
 land, 100; Denmark, 129-130;
 Switzerland, 133; Siberia, 203;
 Canada, 381-382
 Dalmatia, 141
 Dalmuir, 47
 Dalry, 46
 Daltonganj, 242
 Damanama Plateau, 325, 339
 Damascus, 211, 213
 Damietta, 315
 Damodar, coalfield, 237, 242
 Dannemora ore field, 75
 Danube, 123, 148, 161
 Danzig, 118, 122, 128
 Dar-es-Salaam, 324
 Darfur, 316
 — Plateau, 299
 Darjeeling, 228
 Darling Downs, 500, 502
 —, R., 505
 Darlington, 50
 Darnétal, 86
 Darwen, 54
 Date Palm, 20, 309, 310
 Dauphin, Lake, 395
 Day Degrees, 24
- De Aar, 337
 Dead Sea, 210
 Deccan, 221, 223, 228, 235-237
 Dega, 319
 Deister, 104, 112
 Delaware, 403-404
 —, R., 406, 432
 Delft, 101
 Delhi, 231, 243
 Denbigh coalfield, 59
 Dendre, 96
 Denmark, 129-131; physical features,
 129; climate, 129; agriculture,
 129-130; manufactures, 130;
 commerce, 130-131
 Denver, 433
 Deraa, 213
 Des Plains R., 435
 Detroit, 394
 Deventer, 101
 Devonport, 61
 Dewsbury, 51, 52
 Diamonds, 328, 330, 332, 340
 Dieppe, 87
 Dieuze, 110
 Dijon, 88
 Dinaric Mts., 154
 Dire Dawa, 319
 Djerid oases, 310
 Dnieper, 191
 Doab, Lower, 229
 —, Upper, 229
 Dobrudja, 151, 152
Dolichos soja, 25-26
 Dombrowa coalfield, 187
 Dominica, 444
 Don, 191
 Donegal, 65, 66
 Donetz Basin, 186, 189
 Donkyr, 277
 Donnai, 253
 Dora Baltea, 164
 Dora Riparia, 171
 Dordrecht, 101
 Dornbirn, 140
 Dorset Downs, 36
 Dortmund, 112, 122
 Dortmund-Ems canal, 122
 Douro Valley, 182
 Dover, 63
 Dowlais, 60
 Drama, 158
 Drave, R., 148
 — Valley, 139, 149
 Dravidian peoples, 225
 Drenthe, 99
 Dresden, 118, 122
 Droitwich, 58
 Drömling, 115

Dublin, 67
 Dudley, 58
 Duisburg-Ruhrort, 112
 Duluth, 413, 433, 435
 Dumbarton, 44, 45, 47
 Dumfries, 48
 Dundas, 513
 Dundee, 47
 —, Natal, 329
 Dunedin, 521, 523
 Dunfermline, 47
 Dunkirk, 86, 87, 89, 91
 Duquesne, 408
 Dunvegan, 388
 Durban, 328, 337
 Düsseldorf, 112, 121
 Dutch East Indies, 292-294
 Dwina, R., 191, 205
 Dzungaria, 276

EARTHENWARE. England, 57; Belgium, 94, 95; Holland, 101; Germany, 109, 119; Austria, 138; China, 268

East Coolgardie, 511
 East London, 337
 Easton, 408
 East St. Louis, 412
 Eastern Townships, 383
 Ebbw Valley, 60
 Eberswalde, 125
 Ebony, 20
 Embro basin, 174, 175
 Echigo, 287
 — plain, 281
 Echuca, 506, 508
 Economic Geography, definition of, 1
 Ecsed, 143
 Ecuador, 458-460; physical features, 458-459; climate, 459; West coast, 459; Cordillera, 459; Montaña, 459; communications, 459-460
 Edinburgh, 47
 — coalfield, 45
 Edmonton, 383, 388, 395
 Edward Nyanza, 299, 311
 Egypt, 312-315; climate, 313; valley and delta of Nile, 313-315; deserts, 315; communications, 315; trade, 315
 Egyptians, 303
 Eibiswald, 140
 Eifel, 103, 110
 Eisak, 149, 171
 Eisenerz, 140
 Ekaterinburg, 191
 Ekaterinoslav, 188, 189
 Ekibastuz, coalfield, 204

Elba, 163
 Elbe, R., 123, 124
 — Trave canal, 123
 Elberfeld, 112
 Elbeuf, 86
 Elburz Mts., 195, 214, 215
 Elisabethville, 336, 353
 Elk, R. coalfield, 392
 El Obeid, 318
 — Paso, 433, 439
 Emden, 121, 122, 127
 Emmerich, 101
 Ems, R., 122
 Emscher, R., 112
 Engelsberg, 139
 England, 29, 30, 35-36, 41-42, 48-65; Pennine Chain, 35, 41, 48-49; North-east Industrial Region, 49-50; Yorkshire, Derbyshire and Nottingham Coalfields, 41, 50-52; Lancashire Industrial Region, 41, 53-56; Lake District, 35, 41, 56; Central Plain, 35, 41, 56-57; Cheshire Salt District, 57; North Staffordshire Coalfield, 57; Black Country, 57-58; Warwickshire Coalfield, 58-59; Wales, 35, 59-61; Peninsula of Devon and Cornwall, 35, 61; Scarplands and Tertiary Formations, 35, 61-66; Jurassic Area; 35, 41, 62; Cretaceous Region, 36, 41, 63; London and Hampshire Basins, 36, 42, 63, 64; Severn Estuary, 42, 64-65
 Ennepe, R., 112
 Enns Valley, 139, 149
 Enschede, 101
 Entebbe, 318
 Entre Rios, 482, 484-486
 Enzeli, 215, 218
 Épernay, 88
 Épinac, 80
 Épinal, 84
 Erfurt, 114, 121
 Erie, 408, 413, 414,
 — Canal, 435
 — Lake, 409
 Eritrea, 320
 Erzberg, 141
 Erzgebirge, 104, 118, 136
 Escanaba, 413
 Esino, 172
 Eskdale, 56
 Esneh, 314
 Espiritu Santo, 472
 Esseg, 148
 Essen, 112
 Essex, 63
 Esslingen, 109

- Esthonia, 185
 Estremadura, 176, 177
 Etna, 170
 Etsch, *see* Adige
 Etomami, 395
 Euboea, 160
 Euphrates, 198, 210, 211
 Europe, 29-191; physical features, 29-30; climate, 30-33; Rainfall map, 31; Vegetation, 33; Countries of, 34-192
 Evans Pass, 433
 Evesham, Vale of, 56
 Evreux, 86
 Eydtkuhnen, 191

 FAENZA, 172
 Fairbanks, 430
 Falkirk, 46
 Fall, R., 402
 Falster, 129
 Fangtze, 262
 Faro, 182
 Fatshan, 272
 Feldkirch, 135
 Fengtien, 275
 Fens, 63
 Ferghana, 206, 207
 Fernie, 392
 Fez, 306
 Fezzan oases, 310
 Fibres, 25
Ficus elastica, 18
 Fifeshire coalfield, 44, 45
 Figig, 309
 Fiji Islands, 525
 Fingal, 514
 Finland, 29, 183, 185
 Finow Canal, 123
 Fisheries. Scotland, 43; England, 61, 63; Norway, 73-74; France, 81; Siberia, 205; Japan, 286; Canada, 391; Newfoundland, 399; U.S., 401
 Fitzroy, R., 502
 Fiume, 141, 149, 150
 Fläming, 115
 Flanders, 92, 94-95
 Flax, 25; Ireland, 66; Belgium, 94-95; Russia, 185-186
 Flint coalfield, 59
 Florence, 169, 172
 Florida, 417, 434
 Flushing, 101, 121
 Föhn Winds, 132
 Fokien, 270-271
 Folkestone, 63, 71
 Foochow, 271
 Forest of Arden, 58
 Forest of Dean coalfield, 64
 Formosa, Japanese Empire, 271, 282, 283, 289, 290
 —, Argentine, 482
 Fort Jameson, 336
 — Johnston, 337
 — Providence, 389
 — Simpson, 388, 389
 Fourmies, 86
 Fourteen Springs, 337
 Foyers, 43
 France, 30, 77-91; physical features, 77; Central Massif, 29, 77, 78-80; Armorican Massif, 77, 80-82; Brittany, 77; Ardennes 77; Vosges, 77; Aquitaine, 77, 81-83; Basin of Paris, 77, 78; Rhorn Valley, 77, 78, 82-84; Climate, 77-78; Mediterranean Region, 82-84; Alpine Region, 84; Eastern Border, 84; Basin of Paris, 84-86; General résumé, 86-87; railways, 87-89; waterways, 89; commerce, 90-91
 Franconia, 108-109
 Franconian Jura, 103
 Frankfurt-on-Main, 107, 121, 122
 Fraser, R., 391
 Frauenfeld, 134
Fraxinus Chinensis, 267
 Fray Bentos, 481
 Fredericton, 378
 Freemantle, 512
 Freewaldau, 139
 Freiberg, 125
 Freitown, 342
 French Indo-China, 252-255; physical features, 252; climate, 252-253; Cambodia, 253; Cochinchina, 253; Laos Territory, 253; Annam, 254; Tongking, 254-255; communications, 255; commerce, 255
 —, R., 397
 Freudenthal, 139
 Friedek, 139
 Friesland, 99
 Frome, 62
 Fruit. Cape Colony, 327; Canada, 380, 391; U.S., 400; West Indies, 443-444; Australia, 506; New Zealand, 506
 Fukui, 288
 Fulani, 303
 Fünen, 129
 Funiu-shan, 256
Funtumia elastica, 18
 Fusan, 276, 280
 Fushun, 275

- Futa Jallon Mts., 299
- GABES, 310
- Galashiels, 48
- Galatz, 152
- Galicja, Austria, 142-143, 149
—, Spain, 174, 175-176
- Gallarate, 166
- Galveston, 419
- Gambia, 341
- Ganges, Canals, 229
- Gangetic Plain, 198, 224, 227, 229-231
- Gap of Belfort, 88, 89, 122
— of Saverue, 88, 121, 122
- Garonne, R., 89
- Garrucha, 178
- Gate of Furth, 149
- Gawler, 509
- Gazaland, 339
- Gebweiler, 107
- Geelong, 507, 508
- Geestemünde, 127
- Geislingen, 109
- Gelderland, 99
- Gellivara, 75
- Gelsenkirchen, 111, 112
- Geneva, 134, 135
- Genoa, 168, 171
- Georgia, 415-421
- Georgian Bay Canal, 397
- Geraldton, 513
- Germany, 29, 30, 103-128; physical features, 103-104; Alpine Foreland, 105-106; German Alps, 105; Rift Valley of Rhine, 106-107; Swabian and Franconian Jura, 107; South-Central Scarplands, 108-110; Lorraine, 110; Rhine Massif, 110-113; Saar Coalfield, 111; Ruhr Coalfield, 111; North-Central Uplands, 113-114; North German Lowlands, 114-118; Vogtland and Saxon Erzgebirge, 118-119; Sudetes, 119-120; Upper Silesia, 120; railways, 120-122; waterways, 122-123; general considerations, 123-125; foreign trade, 125-127
- Gezira, 316, 317
- Ghats, Eastern, 220
— Western, 220, 222, 233-235
- Ghent, 95, 96, 97
- Ghent-Bruges Canal, 96
- Ghevgheli, 158
- Giaour, Dagh, 210
- Gibraltar, 182
- Gida, 161
- Gijon, 176, 182
- Gilan, 215
- Gileppe dam, 94
- Ginger, 20
- Ginseng, 275, 280
- Girardot, 458
- Giridih, 242
- Gisors, 86
- Glamorgan, 60, 61
- Glarus, 134
- Glasgow, 46, 47, 71
- Glass. Belgium, 93; Germany, 109; Austria, 138; U.S., 414
- Glauchau, 118, 119
- Gleiwitz, 120
- Glommen Valley, 76
- Gloucester, 401
- Goa, 244
- Goats. Cape Colony, 327; Orange Free State, 330; Transvaal, 331
- Gobi Desert, 197, 277
- Gogebic Range, 412
- Gold. Siberia, 204, 205; India, 241; Transvaal, 332; S. Rhodesia, 335; Canada, 391, 393; U.S., 424, 428, 430; Mexico, 438; Colombia, 457; Bolivia, 463-464; Australia, 500-501, 503, 504, 506, 509, 511-512; New Zealand, 520, 521, 522
— Coast, 342-343
- Goldfield, (Nev.), 427
— Range, 363, 389
- Gömör, 145
- Gondokoro, 318
- Goole, 63, 71
- Gossypium, 21
- Gotha, 121
- Goulburn, 505
—, R., 506
- Goyaz, 475
- Goz Abu Guma, 318
- Graaf Reinets, 327
- Grabow, 117
- Granada, 177
- Gran Chaco, 448, 480
- Grand Falls, 377
— Forks, 391, 410, 432
- Grängesberg ore field, 75
- Grantham, 62
- Graphite, 248
- Grassland, 16
- Great Basin, 363, 374, 426-427
— Lakes, 394, 407, 435
— Plain of China, 256, 260
— Plateaus (U.S.), 363, 374, 422-423
— Valleys. Tone of, in Germany, 115
— Appalachian Valley, 362, 404, 407, 420, 421

- Greece, 159-160; Plains of Thessaly, 159; Central Greece, 160; Morea, 160; Ionian Isles, 160; Cyclades, 160; commerce, 160
- Greenbushes, 512
- Green Hills, 362
- Greenock, 47
- Greenville, 421
- Grenada, 444
- Grenoble, 84
- Greymouth, 521
- Greytown, 442
- Grimsby, 43, 63, 71
- Griqualand West, 326, 328
- Groningen, 99
- Grozny, 190
- Guadalquivir basin, 174, 175
- Guajara-Mirim, 461
- Guatemala, 440
- Guayaquil, 459
- Guiana Colonies, 478
- Highland, 454, 470
- (Upper) Plateau 299
- French, 347
- Guipuzcoa, 176
- Gurgan, 216
- Gyantse, 277
- Gympie, 501, 502
- HAARDT, 103, 107
- Haarlem, 100
- Habichts-Wald, 113
- Haddington coalfield, 45
- Hagen, 112
- Hague, The, 101
- Haida, 138
- Haidar Pasha, 213
- Haifa, 211, 213
- Hainaut, 95
- Haiphong, 255, 273
- Haiti, 444
- Hakodate, 284
- Halifax, 51, 52
- , Nova Scotia, 378, 381, 394, 398
- Hall, 109
- Halle, 121
- Hama, 211
- Hamada-el-Homra plateau, 310
- Hamadan, 217, 218
- Hamburg, 118, 121, 127, 150
- Hameln, 123
- Hami, 277
- Hamilton, Orange Free State, 337; Ontario, 383; river, 377
- Hamites, 303
- Hamm, 121
- Hampshire Basin, 64
- Han, R., 269; Basin, 265
- Hanau, 109
- Hancornia speciosa*, 18
- Hangchow, 271
- Hankow, 264, 266, 268, 269
- Hanoi, 255
- Hanover, 32, 121
- Hanyang, 268; ironworks, 268
- Harbin, 206, 276
- Harirud, 219
- Harrisburg, 432
- Hartlepool, 50
- Harwich, 71
- Harz Mts., 105
- Hashab, 316
- Havana, 443
- Havel Canal, 123
- Haverhill, 403
- Havre, 86, 87, 88, 91
- Hawaiian Islands, 525
- Hawick, 48
- Hawke Bay, 523
- Hay, 505
- Hebrides, 34
- Heckmondwike, 52
- Heilbronn, 109, 122
- Hejaz, 213
- Helena, 433
- Hellgate, R., 433
- Helmand, R., 219
- Helsingfors, 185, 191
- Hemp, 25
- Henequén, 439
- Hengelo, 101
- Herat, 219
- Herberton, 502
- Hereford, 59
- Herne, 122
- Hertford, 63
- Herzegovina, 141
- Hesbaye, loam of, 92
- Hessian Uplands, 105, 113
- Hevea, 17, 18, 248, 293, 344, 470
- High Wycombe, 62
- Himalayas, 196, 220, 224, 227, 228
- Hindu Kush, 195, 219
- Hirson, 87, 96
- Hispaniola, 444
- Hit, 211
- Hobart, 514
- Hodeida, 213
- Hohenheim, 125
- Hohe Tauern, 149
- Hokitika, 521
- Hokkaido, 281, 283, 284-285
- Holcus Sorghum*, 274
- Holland, 30, 99-102; physical features, 99; climate, 99-100; Alluvial Region, 100-101; Diluvial Region, 101; railways, 101

Homburg, 110
 Homestead, 408
 Homs, 213
 Honan, 256, 260
 Honda, 458; rapids, 458
 Honduras, 441, 442
 Hongay, 254
 Honshiu, 281, 283, 285-289
 Hook of Holland, 101, 121
 Horgen, 134
 Hottentots, 303
 Howrah, 243
 Hrastnig, 140
 Hua Hin, 252
 Huancavelica, 464
 Huancayo, 464
 Huaqui, 461
 Huddersfield, 51
 Hudson Bay Railway, 396
 —, R., 362, 407, 432 435; Valley, 409
 Hué, 254
 Huelva, 178, 182
 Hull, 63, 71
 —, Canada, 377
 Humboldt, R., 433
 Humidity, 13
 Hunan, 265-270
 Hungshan, 262
 Hunsrück, 103, 110
 Hunter, R., 504
 Hupeh, 265-270
 Hwai, R., 270
 Hwaiyang-shan, 264
 Hwang-ho Basin, 256-258, 260-265
 Hyderabad, 233, 235, 236, 237, 243
 Hygrophytes, 15

IBERIAN Peninsula, 29, 174-182;
 physical features, 174; climate, 174-175; natural regions, 175;
 Spain, 175-180; Portugal, 180-181; communications, 182

Ibrahimieh Canal, 315
 Ichang, 268, 269
 Ichim Steppes, 202
 Idaho, 424-426
 Idria, 140
Ilex paraguensis, 479
 Ili, R., 206; valley, 276
 Illawarra coalfield, 504
 Illinois, 409-415, 435
 Imaichi, 290
 Immingham, 63
 India, 220-248; physical features, 220-221; climate, 221-224; vegetation, 224-225; people, 225-226; natural regions, 227-228;

India (*cont.*)—

Himalayan Region, 228; North-West borderland, 228-229; Ganges Plain, 229-231; Indus Plain, 231-233; West-coast Region, 233-235; Black soil Region, 235-236; North-East Deccan, 236-237; Southern Deccan, 237; East-coast, Region, 237-238; Burma, 238-240; manufactures, 240-241; minerals, 241-243; communications, 243-244; commerce, 244-247

Indiana, 409-415
 Indianapolis, 412
 Indo-Aryan people, 225
 Indo-China, 249-255
 Indo-Gangetic Plain, 220, 227; soil, 221
 Indus Plain, 198, 224, 227, 231-233
 Inshan Mts., 196, 256
 Inn, R., 106; Valley, 139, 149
 Innerleithen, 48
 Innsbruck, 149
 Insterburg, 122
 Invercargill, 521
 Inverness, 42
 —, Nova Scotia, coalfield, 380
 Ionian Isles, 159
 Iowa, 409-415
 Ipswich (Queensland), 501
 Iquique, 466
 Iquitos, 464, 476
 Iran Plateau, 195
 Ireland, 29, 36, 42, 65-68; Northern Region, 36, 42, 65-67; Central Plain, 36, 42, 67; Southern Region, 36, 42, 67-68
 Irkutsk, 206
 Iron and Steel Manufactures. Scotland, 46; England, 50, 52, 55, 58, 60-61; France, 80, 84, 85, 86; Belgium, 93; Germany, 110, 111, 112, 120; Austria, 138, 139, 140; Italy, 167; Spain, 176; Russia, 187, 190, 191; China, 268; Japan, 285, 288; Canada, 383; U.S., 403, 407, 413-414, 421
 — ore. Scotland, 46; England, 50, 56, 62; Norway, 74; Sweden, 75-76; France, 80, 84; Germany, 108, 110, 120; Austria, 137, 139, 140; Hungary, 145; Italy, 164; Spain, 52, 176, 178; Russia, 187, 189-190, 191; Siberia, 204; China, 267; Canada, 377, 380; Newfoundland, 399; U.S., 413, 420-421; Mexico, 439; West Indies, 443; Venezuela, 455; Brazil, 476

- Iron Gates, 143
 Irrawaddy, 238, 239
 Irrigation. Italy, 165; Spain, 177; Messopotamia, 211-212; Persia, 216; India, 229, 231-232; China, 265; Algeria, 308; Egypt, 313-314; Anglo-Egyptian Sudan, 317; Australia, 496, 506, 509
 Irtysh, R., 205; Basin, 198
 Irvine, 44
 Isar, R., 106
 Iserlohn, 112
 Isfahan, 216, 217, 218
 Ishikari Valley, 284
 Isker Valley, 161
 Ismailia, 315
 Isonzo, 149
 Istria, 141
 Itabirite, 476
 Italy, 162-173; physical features, 162-163; climate, 163-164; Alpine Zone, 164; Plains of Po, 164-167; Peninsular Italy, 167-170; Sicily, 170; Elba, 170; Sardinia, 170; communications, 171-172; commerce, 172-173
 Itapura, 477
 Ivory coast, French, 347

 JAFFA, 210, 211, 213
 Jägerndorf, 139
 Jagersfontein, 330
 Jamaica, 443-444
 James, R., 362, 433
 Japan, 281-291; physical features, 281-282; climate, 282-283; vegetation, 283; natural regions, 283; general considerations, 284; Norkaido, 284-285; Honshiu, Shikoku and Kiushiu, 285-289; Industry, 287-289; Formosa, 289; communications, 289-290; commerce, 290-291; ports, 291
 Jassy, 152
 Java, 196, 292-293
 Jedburgh, 48
 Jefâra, 310
 Jellico coalfield, 420
 Jemsa, 315
 Jerez, 177
 Jersey City, 409, 414
 Jerusalem, 213
 Jherria, 242
 Jibuti, 319, 320
 Jidda, 213
 Jinja, 319
 Johannesburg, 331, 337
 Johor, 249
 Jönköping, 77

 Jordan, R., 210
 Juar, 23
 Jubaland, 322
 Jubbulpore, 236, 243
 Judæa, 210
 Jujuy, 488
 Julfa, 218
 Julian Alps, 149
 Juneau, 430
 Juniata Valley, 432
 Jute, 20; India, 230, 241

 KABUL, 219
 Kabylia, 308
 Kachin Hills, 238
 Kaffirs, 304
 Kaffyfontein, 330
 Kafue Valley, 336
 Kagera, R., 311
 Kaikowra Chain, 516
 Kailan Mining Administration, 262
 Kainit, 114
 Kaiping, 262
 Kaiser-Wilhelm Ship Canal, 123
 Kakindu, 319
 Kalahari desert, 333
 Kalgan, 206, 263, 264, 278
 Kalgoorlie, 511, 512
 Kalkid Plains, 208
 Kamaishi Mines, 287
 Kamchatka, 205
 Kamloops, 390, 392
 Kanawha, R., 405
 Kanazawa, 288
 Kanchow, 267
 Kandahar, 219
 Kan-kiang, 269
 Kansas, 409-415
 — City, 412, 433, 434
 Kansu, 260
 Kapunda, 509
 Karachi, 233, 243, 245
 Karalik-Derven, 161
 Karawanken Alps, 149
 Karibib, 340
 Karlsbad, 138
 Karlsruhe, 121, 125
 Karroo, 326
 Karun, R., 217
 Kasan, 183
 Kashan, 216, 217
 Kashgar, 264, 276, 277
 Kashgaria, 276
 Kashnür, 228, 241
 Kassaba, 209
 Katanga, 335, 336, 351, 352-353
 Kathiawar, 235
 Kattowitz, 120
 Kauri, 521

- Kavalla, 158
 Kawamata, 288
 Kazungula, 336
 Keda, 249
 Keetmanshoop, 340
 Keighley, 52
 Kelantan, 249
 Kelung, 289, 290
 Kent, 63
 Kentucky, 418-420
 Kerkrade coalfield, 101
 Kerman, 217, 218
 Kermanshah, 218
 Kerry, 68
 Kertch, 189
 Keshef-rud, 216
 Kettering, 62
 Kharkov, 189
 Khartum, 316, 318
 Khasi Hills, 244
 Kherson, 188
 Khewra, 242
 Khingan Mts., 196
 Khiva, 206, 207
 Khorasan, 216
 Khotan, 276
 Kiakhta, 206, 263, 278
 Kiangsi, 265-270
 Kiangsu, 256, 265-270
 Kiaochow Bay, 264
 Kicking Horse Pass, 394
 Kidderminster, 58
 Kiel, 123
 Kiev, 183
 Kii Peninsula, 281
 Kilimanjaro Mts., 323
 Kilkenny, 68
 Kimberley, 328, 336, 337
 Kinai Plain, 281
 Kingtehchen, 268
 Kioga Lake, 319
 Kirghiz Tribes, 203
 Kirkcaldy, 47
 Kirkcudbright, 48
 Kirk-Kilisse, 158
 Kirthar Range, 220
 Kirunavara, 75
 Kitakami Plain, 281
 Kiushiu, 281, 283, 285-289
 Kizil Plain, 208
 Kladno, 137, 138
 Klagenfurt, 140
 Knoxville, 421, 433
 Kobe, 288, 290, 291
 Kochendorf, 109
 Kochiu, 272
 Koflach, 140
 Kolar Goldfield, 242
 Komati Poort, 332
 Kongmoon, 273
 Kongsberg, 74
 Konia, 213
 Königsberg, 122, 128
 Königshof, 138
 Königshütte, 120
 Kootenay District, 391, 393; river, 389, 433
 Kopais, Lake, 160
 Kopet Dagh, 195, 214, 215
 Korat, 250, 251, 252
 Kordofan, 317
 Kurdistan, 214, 216; highlands, 195
 Korea, 199, 279-280
 Kosel, 123
 Kotlas, 205
 Kowloon, 273
 Kow Swamp, 506
 Krasnovodsk, 207
 Krivoi Rog, 189
 Kroonstad, 337
 Krusnavora, 137
 Kuban, 188
 Kuldja, 277
 Kumasi, 343
 Kura, 195
 Kurgan, 203
 Kuriles, 282
 Kuro Siwo, 282
 Kushiro, 285
 Kushk, 207
 Kusnetz, 204
 Kwangchow-wan, 273
 Kwangsi, 271
 Kwangtung, 271
 Kwanto Plain, 281
 Kweichow, 271
 Kweihwacheng, 263
 Kwen-lun Mts., 196
 Kwitta, 342
 Kwolla, 319
 Kyoto, 281, 290
 LAALAND, 129
 Lachute, 377
 La Dorada, 458
 Ladysmith, 337
 Lagos, 343, 344
 La Guaira, 456
 Laguna, 438
 Lahore, 233, 243
 Lamone, 172
 Lanarkshire coalfield, 44
 Lancashire, Industrial Region, 53-
 6; coalfield, 35, 53; iron ore, 52
 Lanchow, 262, 263, 264, 277
 Landes, 81, 82
 Landeshut, 119
 Landolphia, 18

- Langebergen, 326
 Langenbielau, 119, 120
 Langson, 255
 Laokai, 255
 Laos Territory, 252, 253
 La Pampa, 484-6
 La Paz, 462
 La Plata, 488
 La Quiaca, 461, 488
 Laraiche, 306
 Larissa, 161
 Laristan, 214, 216
 La Rochelle, 89
 La Serena, 468
 Lashio, 244
 Lauderdale, 337
 Launceston, 514
 Laurentian Plateau, 361, 372, 376-8
 Laurium, 160
 Lausanne, 135
 Laval, 81, 88
 Laverton, 513
 Lawrence, 402
 Lead. Austria, 140; Spain, 178;
 United States, 422, 424, 425,
 427
 Leadville, 425
 Lealui, 336
 Lebanon, 210
 Leeds, 51, 52
 Leeward Islands, 444
 Leghorn, 169
 Leicester, 52, 59; coalfield, 59
 Leipzig, 117, 121
 Leith, 71
 Leixoes, 181
 Lek, 102
 Lemberg, 149
 Lena R., 205
 Leoben, 140
 Leon, 176, 182
 Lesitz, 138
 Lethbridge, 387
 Leyte, 294
 Lhasa, 264, 277
 Liao R., 274, 275
 Libau, 186
 Liberia, 349
 Liège, 93, 96
 Likiang, 269
 Lille, 86, 87, 96
 Lillooet, 391
 Limburg, 99
 Limerick, 68
 Limoges, 80
 Linares, 178, 182
 Lincoln, 52, 62, 63
 Lincolnshire and Yorkshire Wolds, 36
 Linen Manufacture. Scotland, 47;
 Ireland, 66; Belgium, 95; Ger-
 many, 113, 119; Austria, 139
 Lingah, 217
 Lin Kong How, 273
 Linlithgow coalfield, 44
 Linseed, 25
 Linz, 121
 Lisbon, 181, 182
 Lithgow, 504
 Lithographic Stones, 108
 Liverpool, 55, 71
 Livonia, 185
 Llama, 463
 Llanelly, 60
 Loangwa Valley, 336
 Lacle, 134
 Loddon R., 506
 Lodz, 187
 Lofoten Islands, 74
 Logwood, 20
 Lohne, 121
 Loire R., 89
 Lombardy, 165, 166
 Lombok, 292
 London, 64, 71; Basin, 63, 64;
 clay, 64
 Londonderry, 66; Nova Scotia, 380
 Longwy, 84
 Lo Basin, 261
 Loess, 260-261
 Loredó, 440
 Lorient, 81
 Lorraine, 86, 97, 110
 Los Andes, 488
 Los Angeles, 434
 Lötschberg Tunnel, 135
 Louisbourg, 380
 Louisiana, 415-419
 Lourenço Marques, 332, 337, 338
 Louvain, 96
 Louviers, 86
 Low Countries, 29, 100-2
 Lowell, 402
 Luang Prabang, 252
 Lübeck, 118, 122, 123
 Lüderitzort, 340
 Ludwigshafen, 107
 Lugano, 171
 Lugau, 118
 Lugo, 176
 Lulea, 76
 Lüneburg Heath, 115
 Luxemburg, Duchy of, 93; province
 of, 93; town, 96
 Luzon, 294, 295
 Lye, 58
 Lynn, 403
 — Canal, 393
 Lyons, 83, 88

- Lys R., 89, 95, 96
 Lyttelton, 520

 MAAS R., 102
 Maastricht, 101
 Macao, 273
 Macassar, 294
 Macedonia, 154, 157-9
 Machakos, 321
 Mackay, 501, 502
 McKeesport, 408
 Mâcon, 88
 Madeira-Mamoré railway, 477
 Madras, 238, 243, 244
 Madrid, 175, 177
 Madura, 292
 Maeander R., 209
 Mafeking, 337
 Mafira, 507
 Magallanes, 468
 Magdalena Valley, 456, 457; river, 457
 Magdeburg, 121
 Maggiore, Lake, 171
 Mahogany, 20
 Mährisch-Ostrau, 138
 Main R., 122; basin, 105; valley, 109
 Main-Rhine Canal, 111
 Maine, 400-403
 Maize, 33; France, 81; Hungary, 146; Italy, 165; Roumania, 152; Servia, 156; Tongking, 254; United States, 411-412, 416; Argentine, 485; Australia, 501
 Majerda Valley, 309
 Makran, 228
 Malabar, 222
 Malacca, 249
 Malaga, 177, 178, 182
 Malay Peninsula, 249; States (Siam), 251; Archipelago, 292-295
 Mallee, 506
 Malmö, 76
 Malwa Plateau, 235, 236
 Manaos, 471
 Manchester, 55, 71; New England, 402
 Manchuria, 26, 274-276
 Mandalay, 239, 244
 Mangabeira, 18, 471, 472
 Mangalore, 244
 "Manicoba," 18
Manihot Glaziovii, 18, 471, 472
 Manila, 295
 — hemp, 20, 294
 Manipur Hills, 238
 Manitoba, 383-388
 Mannheim, 107, 122
 Mantua, 171

 Manzanillo, 440
 Maoris, 517
 Marches, 163, 168
 Maremma, 168
 Maritime Provinces, 372, 378-381
 Maritza Valley, 159, 161
 Mariupol, 190
 Mark Waterways, 123
 Marlborough Downs, 36
 Marne R., 89, 96; valley, 86
 Maromme, 86
 Marostica, 167
 Marquette, 413
 Marrakesh, 306
 Marseilles, 80, 83, 84, 88, 91
 Martinique, 444
 Maryport, 56
 Mashonaland, 334-335
 Massachusetts, 400-403
 Massowa, 320
 Matabililand, 334-335
 Matabili-Mashona plateau, 325
 Matto Grosso, 475-6
 Maryland, 403-10
 Maubeuge, 87, 96
 Mauritius, 356-357
 Mazanderan, 215
 Meadow, 17
 Meat Products United States, 412; Paraguay, 479; Uruguay, 481; New Zealand, 520
 Mecca, 213
 Mecklin, 96
 Mecklenburg, 114, 116
 Medicine Hat, 383, 394
 Medina, 213
 Mediterranean States (Africa), 300, 302, 305-10
 Meerane, 118, 119
 Meiling Pass, 269
 Meissen, 119
 Meissner, 113
 Mekong R., 255
 Melbourne, 507, 508
 Melnik, 148
 Memel, 128
 Menam Basin, 250, 251
 Mendoza, 486, 487
 Mengtze, 273
 Menominee Range, 413
 Meppen, 122
 Merrimac R., 402
 Merthyr-Tydfil, 60
 Meru Forts, 323
 Merv, 207
 Merwede R., 102
 Mesabi Range, 413
 Meshed, 216, 218
 Meshediser, 215

- Mesopotamia, 211-212; railways, 213
 Messina, 170
 Methil, 45
 Metz, 96, 121
 Meurthe-et-Moselle, 84
 Meuse, 84, 89, 96
 Mexico, 436-440; physical features, 364, 436; climate, 364-368, 436-437; Tierra caliente, 437; Tierra templada, 437-438; Tierra fria, 438-439; manufactures, 439; railways, 439-440
 — City, 440
 Michigan, 409-415
 Michipicoten, 377
 Middleburg, 337
 Middlesboro Coal Basin, 420
 Middlesbrough, 50
 Middlewich, 57
 Milan, 166, 167, 171
 Mildura, 506, 508
 Milk R., 387, 433
 Millet, 23
 Millom, 56
 Milwaukee, 411, 413, 435
 Mimusops Balata, 455
 Min R., 270; valley, 182
 Minas Gerdes, 474, 475-476
 Mindañao, 294
 Minden, 113
 Minerals, 2-3
 Minneapolis, 394, 411
 Minnesota, 409-415
 Mino-Owari Plain, 281
 Minussinsk, 204, 205
 Mir, 188
 Miranda de Ebro, 182
 Misiones, 482
 Mississippi, 415-419; river, 435
 Missouri, 409-415, 417, 421-422;
 Côteau, 383; river, 433
 Mistek, 139
 Mistral, 78
 Mitrovica, 150, 161
 Mittelgebirge, 136
 Mitylene, 208, 209
 Miye, 288
 Mlanje, 337
 Mobile, 419
 Mochi, 323
 Mogadishu, 320
 Mogador, 306
 Mohair, 209
 Mohammerah, 218
 Mohave Desert, 434
 Mohawk R., 407, 432, 435
 Moji, 291
 Moldau-Elbe, 148
 Moldavian Plateau, 151, 152
 Moline, 414
 Mollendo, 461, 464
 Moluccas, 292, 294
 Mombasa, 319, 321, 322
 Mombo, 323
 Monastir, 154, 158, 161
 Monazite Sands, 473
 Moncton, 395
 Mongalla, 316
 Mongolia, 277-278, 279; plateau, 196
 Mongol Peoples, 226
 Mongolo-Dravidian People, 226
 Monmouth, 59, 60
 Monongahela R., 407
 Mons, 93, 94, 96
 Monsoons, 11
 Montana, 422, 424-425
 Mont Cenis tunnel, 88, 171
 Monte Ferru, 170
 Montenegro, 154
 Monterey, 439
 Montevideo, 477
 Montluçon, 80
 Montmorency Falls, 382
 Montreal, 380, 381, 382, 383, 395,
 396, 397, 399
 Montserrat, 444
 Monza, 166
 Moonta, 509
 Morava Valley, 156, 161
 —, Western, 156
 Moravian Gate, 149
 Morea, 159
 Morgan, 510
 Morley, 51
 Mormugao Harbour, 244
 Morocco, 305-307; physical features,
 305; climate, 306; coastal plains,
 306; Meseta, 306; communica-
 tions, 307; trade, 307
 Morphological processes, 4-5
 Morvan, 80
 Moscow, 186, 187; industrial region,
 186-187
 Moselle R., 84, 89, 122; valley, 110
 Mosul, 212, 213
 Motherwell, 46
 Moulmein, 240, 250
 Mount Bischoff, 514
 — Egmont, 522, 523
 — Gambier, 508, 510
 — Lyell, 513
 — Margaret goldfield, 511, 512
 — Morgan, 501, 502
 Mozambique, 339; company, 339
 Muirkirk, 46
 Mukden, 263, 264, 275, 276
 Mülhausen, 88, 107

- Mülheim, 112
 Mullan's Pass, 433
 Multan, 233, 243, 257
 Munich, 106, 121
 München-Gladbach, 112
 Münster, 115, 117
 — "Bay," 117
 Murchison (East) goldfields, 511
 Murcia, 53
 Murghab R., 207
 Murgie, 163, 170
 Murooran, 285
 Murray R., 505, 506, 508
 Murrumbidgee R., 505
 Mur-thal, 149
 Mürz-thal, 149
 Musa Textilis, 294
 Muschelkalk, 108
 Myitkyina, 239, 244
 Myrotylon Pereirae, 441
 Myslowitz, 120
 Mysore, 237, 242, 244
 Mytho, 255
- NAAUWPOORT, 337
 Naga Hills, 196, 238
 Nagasaki, 288, 291
 Nagpur, 236, 244
 Nakon Sritamarat, 251
 Namur, 88, 93, 96
 Nanaimo, 392, 393
 Nancy, 84, 88, 121
 Nanking, 265, 269, 270
 Nankou Pass, 263
 Nantes, 81, 88, 89
 Naples, 169
 Narbonne, 88
 Narva, 185
 Narvik, 76
 Nashville Basin, 420
 Natal, 325, 328-329; physical features, 328; climate, 328; natural regions, 328-329
 Naurouse, 88
 Naxos, 160
 Nazas R., 438
 Neath, 60
 Nebraska, 409-415, 422
 Necker R., 122; basin, 104, 108-10
 Nedd Valley, 60
 Negapatam, 238
 Negri Sembilan, 249
 Negros, 294, 295
 Nejd, 212
 Nelson, 54; B.C., 393
 Ner R., 115
 Nera R., 168, 172
 Netze R., 115, 123; valley, 116
 Neuquen, 488
- Neva R., 191
 Nevada, 426-7
 Newark, 408, 409
 New Brunswick, 378-381
 New Caledonia, 158, 525
 Newcastle, 50, 71; Natal, 329; N.S.W., 504
 Newchwang, 264, 275, 276
 New England, 273, 362, 400-3
 Newfoundland, 380, 399
 Newhaven, 63, 71
 New Jersey, 403-410
 New Mexico, 424-5
 New Orleans, 419, 432, 433, 434
 New Plymouth, 522
 Newport, 60
 New South Wales, 497, 502-5
 New Westminster, 391, 393
 New York City, 405, 407, 408, 409, 412, 414, 432; State, 403-410
 New Zealand, 516-525; physical features, 516; climate, 516-518; vegetation, 518; population, 518-9; South Island, 519-21; North Island, 521-3; communications, 523; commerce, 523-5; statistics, 525
 — — flax, 521
 Niagara R., 435
 Nicaragua, 442
 Nice, 78
 Nickel, 377
 Nicobar Islands, 196
 Niemen R., 191
 "Nieuwe Waterweg," 102
 Nieuwveld, 326
 Niger R., 343, 344, 346, 348
 Nigeria, 343-346; physical features, 343; climate, 343-344; natural regions, 344-346; communications, 346; trade, 346
 Nügata, 290
 Nikolaiev, 190
 Nikopol, 190
 Nile Basin, 311-319; valley and delta, 312-315
 Nilgiris, 234
 Nîmes, 88
 Nimmitabel, 505
 Ningpo, 271
 Niort, 89
 Nipissing, Lake, 397
 Niriz, 216
 Nish R., 161
 Nishava Valley, 161
 Nitrate of soda, Chile, 466-467
 Nivelles, 95
 Norberg ore field, 75
 Norfolk, 63; United States, 405

- Norrköping, 76
 Norrland, 75
 Norseman, 513
 North America, 361-441; physical features, 361-364; climate, 364-368; vegetation, 368-371; natural regions, 371-375; Canada, 376-399; Newfoundland, 399; United States, 400-435; Mexico, 436-440
 Northampton, 52, 62
 North Carolina, 415-9
 — Dakota, 409-15, 422
 Northern Territory of Australia, 508-10
 North Sea Canal (Neth.), 102
 Northumberland and Durham coal-field, 35, 49
 Northwich, 57
 Norway, 72, 73-4
 Norwich, 63
 Notodden, 74
 Novara, 171
 Nova Scotia, 378-381
 Novgorod, 185
 Novi-Bazar, 149, 150
 Nucic, 137
 Nullabor Plains, 494, 512
 Nuremberg, 109, 121
 Nushki, 218
 Nyasa Company, 339; Lake, 299, 337-338
 Nyasaland, 337-338
 Nyika, 320, 322, 337
 Nymphenburg, 106

 OATS, 33
 Ob R., 205; basin, 198
 Oberhausen, 121
 Obra R., 115
 Ocean currents, 11-12
 Odenwald, 107
 Oder R., 115, 123
 Oder-Spree canal, 123
 Oder Swamp, 116
 Odessa, 190, 191
 Ogden, 433, 434
 Ohio, 409-15
 Okanagan, 391
 Okayama, 288
 Oklahoma, 417-419, 421-2
 Ölsnitz, 118
 Oil Shale, 45
 Oise R., 89, 96
 Oissel, 86
 Oka R., 186
 Oldenzaal, 101
 Oldham, 54
 Olekminsk, 205

 Olives, 33; France, 82-3; Italy, 164, 168-70; Anatolia, 209; Algeria, 308
 Olonetz, 185
 Omaha, 433
 Ombrone R., 172
 Omdurman, 319
 Omsk, 192, 203, 206
 Oneida R., 435; Lake, 435
 Ontario, 381-383
 Oodnadatta, 508, 510
 Ookiep Mines, 328
 Oolitic Escarpment, 35
 Opium, Persia, 216; India, 236; China, 261, 266, 272; Manchuria, 275
 Oporto, 180, 181, 182
 Oppeln, 120
 Oran, 309
 Orange Free State, 325, 329-330
 Ordos Plateau, 256
 Oregon, 425-6
 Orenburg, 188, 192, 207
 Orinoco Basin, 447
 Orissa, 236
 Orizaba, 439
 Orleans, 86
 Oroya, 464
 Oruro, 461, 469
 Osaka, 281, 288, 291
 Oslawan, 138
 Osnabrück, 113
 Ostend, 96, 97, 121
 Osterwald, 113
 Ostriches, 327
 Otago Peneplain, 516, 517, 520-21
 Otaru, 285
 Ottawa, 381, 382; river, 397
 Oudtshoorn, 327
 Overijssel, 99, 101
 Oviedo, 176
 Oxus, 219
 Ozark Uplift, 363, 421-2

 PACIFIC, Islands of, 525
 Padang, 293
 Paderno, 166
 Padua, 171
 Pahang, 249
 Paisley, 47
 Paknampo, 250
 Palatinate, Upper, 109
 Palembang, 293
 Palermo, 170
 Palghat, 244
 Palmerston, 510
 Palm Oil, W. Africa, 342, 344, 347, 349, 350, 352, 354
 Pamirs, 195
 Pampa, 448, 484-6

- Pamphylia, 208
 Panama, 441, 442; canal, 434, 442
Panax ginseng, 275
 Panay, 294, 295
 Pancorbo Pass, 182
 Panjnad, 228
 Para, 471
 Paraguay, 479-480; river, 487
 Parana R., 487
 Paris, 87, 88, 89; basin of, 84-6
 Pas, The, 395
 Pasco, 433
 Pasqua, 394
 Passaic R., 408
 Passau, 148
 Patagonia, 447, 448, 486
 Patani, 251
 Paterson, 408
 Patna, 231
 Pauillac, 82
 Paunglaung Range, 238
 Paysandu, 481, 488
 Peace Basin, 391
 Peebles, 48
 Pegu Toma Mts., 238
 Pei-ho, 263
 Pei-kiang, 269
 Peilau, 120
 Pekin, 263, 264
 ——— Syndicate, 262, 264
 Pemba, 324
 Pembroke, 59, 60, 61
 Penang, 249
Pennisetum typhoideum, 23
 Pennsylvania, 403-10
 Pentelikon, 160
 Pepper, 20
 Perak, 249
 Perm, 191
 Pernambuco, 474
 Pernau, 186
 Pernik, 156
 Perpignan, 88, 182
 Persia, 214-219; physical features, 195, 214; climate, 199, 214; natural regions, 214; Armenian Knot, 214-215; Northern Provinces, 215; North Khorasan, 215-216; South-western mountains, 216; Central Plain, 216-217; Central Ranges, 217; Eastern districts, 217; Gulf Coast, 217; communications, 217-218; commerce, 218-219
 Perth, 512, 513
 Peru, 462-465; coastal region, 462-463; Andine zone, 463-464; Montana, 464; communications, 464-465; commerce, 465
 Peshawar, 243
 Peterswaldau, 120
 Peterwardein, 149
 Petroleum. Austria, 142; Roumania, 151; Russia, 190; India, 239, 242; Egypt, 315; United States, 413, 428; Colombia, 457
 Petropavlovsk, 203
 Pforzheim, 109
 Phantiet, 255
 Philadelphia, 405, 406, 407, 408, 432
 Philippeville, 309
 Philippine Islands, 292, 294-295
 Philippopolis, 155, 161, 179
 Philistia Plain, 210
 Phillips River goldfield, 512
 Phlegraean Fields, 163
Phormium tenax, 521
 Phre, 252
 Phylloxera, 82, 144
 Piacenza, 171
Phytelephas macrocarpa, 459
 Pictou coalfield, 380
 Piedmont, 165, 166
 ——— Plateau, 361, 404, 420-21
 Pietermaritzburg, 328
 Pietersburg, 337
 Pilbara, West, goldfield, 512
 Pilgrim's Rest, 331
 Pillau, 128
 Pilsen, 137, 138
 Pine Creek, 410
 Pinghsiang, 267
 Ping 'ting 'chou, 262
 Pintados, 468
 Piræus, 160
 Pisa, 172
 Pistoja, 172
 Pitsani, 331
 Pittsburg, 408, 409, 432; coalfield, 405
 Plasencia, 182
 Platinum, 191
 Plauer Canal, 123
 Plymouth, 61
 Pnom-penh, 253
 Po R., 160; plains, 162, 164-167
 Pocahontas coalfield, 405
 Poitiers, 88
 Polnisch-Ostrau, 139
 Polye, 141
 Pomerania, 116
 Pont-à-Mousson, 84
 Pontarlier, 88
 Pont-Saint-Martin, 167
 Pontus range, 195
 Poona, 244
 Poplin, 67
 Porman, 178

- Port Adelaide, 509
 Port Arthur, Canada, 394, 395, 396,
 397; Manchuria, 276
 — Augusta, 509, 510, 513
 — Chalmers, 521
 — Darwin, 510
 — Elizabeth, 326, 337
 — Florence, 321, 322
 — Herald, 338
 — Kemble, 504
 — Nelson, 396
 — Pirie, 509, 510
 — Said, 315
 — Sudan, 318
 — Talbot, 60
 Portland, Maine, 394, 401; Oregon,
 429, 433; Victoria, 507, 508;
 island, 35
 Portferraio, 170
 Porto Alegre, 476
 Porto Rico, 444
 Portugal, 175, 180, 182; Northern
 Portugal, 180-181; Southern Por-
 tugal, 181; commerce, 181; com-
 munications, 182
 Posadas, 480
 Posen, 32, 116, 122
 Poshan, 262
 Potato, 25
 Potomac R., 405, 407, 432
 Potosi, 460
 Powindas, 219
 Poyang Lake, 265
 Prague, 123, 138, 148
 Prahova, 151
 Precipitation, 13-14
 Pressburg, 148
 Preston, 54
 Pretoria, 332, 337
 Pribilov Islands, 430
 Prince Albert, 383, 395
 — Edward Island, 378
 — Rupert, 395
 Providence, 402
 Prussia, 114-118
 Pskov, 185
 Pueblo, 434
 — Hundido, 468
 Puerto Cabello, 456
 — Colombia, 458
 — Montt, 468
 — Suarez, 461
 — Velho, 461
 Puget Sound valley, 364, 427
 Puket, 251
 Pukow, 265
 Pulses, 25-26
 Punjab, 231-233, 241, 242
 Puno, 464
 Puster-thal, 149
 Pyrenees, 30, 175

 QUANTRI, 255
 Qu'Appelle, 383
 Queanbeyan, 505
 Quebec, 381-3, 395, 399
 Quebracho, 482
 Queensland, 498-500
 Quelimane, 339
 Quetta, 243
 Quicksilver. Austria, 140; Bolivia,
 464
 Quinoa, 463
 Quito, 459

 RABAT, 306
 Racine, 414
 Raibl, 140
 Raichur, 244
 Rajputana, 223, 231-233, 237-238,
 242
 Rakonitz, 137
 Rangoon, 240, 244
 Raniganj, 242
 Ratisbon, 106, 121
 Ratsikowitz, 138
 Rayak, 213
 Red Basin of Szechwan, 265
 Red Brazil Wood, 20
 Redditch, 58
 Red River, N. America, 397; Tong-
 king, 252
 Regina, 395
 Reichenbach, 119, 120
 Reichenberg, 138
 Reims, 86, 88
 Remiremont, 84
 Remscheid, 112
 Renfrew, 44, 45
 Renmark, 509
 Rennes, 81, 88
 Reno, 172
 Resht, 215
 Reutlingen, 109
 Reval, 186
 Rheydt, 112
 Rhine, 101-102; rift valley, 106-
 108; massif, 110-113; naviga-
 tion, 122-124
 Rhine-Marne canal, 122
 Rhine-Rhone canal, 89, 111, 122
 Rhode Island, 400-403
 Rhodes, 208
 Rhodesia, Northern, 336
 —, Southern, 334-336; physical
 features, 334; climate, 334-335;
 minerals, 335; agriculture, 335
 Rhöngebirge, 104, 113

- Rhymney R., 60
 Rice, 19; Italy, 165; India, 230, 234, 237, 238, 240; Siam, 251; Cambodia, 253; Annam, 254; China, 258; Japan, 285; United States, 418-9
 Richthofen, 260, 261
 Riesengebirge, 136
 Riff, 305, 306, 307
 Rift valleys, African, 299, 318, 319, 322
 Riga, 185
 Rikuchiu, 287
 Rimini, 171
 Rio de Janeiro, 472, 476
 Rio Negro, 487
 Rio Tinto mines, 178
 Risley, Sir H. H., 225
 Rivera, 476
 Riverina, 503
 Rjukanfos, 74
 Roanne, 80, 89
 Roanoke, 421
 Rochefort, 89
 Rockhampton, 502
 Rocks, Classification of, 2-3
 Rocky Mts., 363, 374, 424-5
 Rodney, 506
 Roggeveld, 326
 Rome, 169; Plain of, 163
 Rörös, 74
 Rosario, 485-8
 Rosewood, 20
 Ross and Cromarty, 42
 Rossitz, 138, 139
 Rossland, 391, 393
 Rostov-on-Don, 190
 Rotterdam, 100, 101, 102, 121
 Rôubaix, 86
 Rouen, 86, 87, 89, 91
 Roumania, 151-153; physical features, 151; climate, 151; Carpathians, 151; Moldavian plateau, 152; Wallachian plain, 152; Dobrudja, 152; general considerations, 152-153
 Roumelia (Eastern), 155
 Ruahine Chain, 516
 Rubber. Ceylon, 248; Malay Peninsula, 249; Java, 293; W. Africa, 342, 344, 347, 348, 349, 352, 354; Colombia, 456-7; Bolivia, 461; Brazil, 470, 472
 Ruby Hills, 239
 Rudolf, Lake, 299
 Ruhr Coal Basin, 103, 111; valley, 112
 Ruhrort, 122, 123
 Rumburg, 138
 Runcorn, 55
 Rupel R., 95, 96
 Russia, 183-192; physical features, 30, 183; climate, 183-184; natural regions, 184; Tundra, 185; Finland, 185; Lake Region, 185; Baltic provinces, 185-6; Northern Forest, 186; Southern Forest, 186; Moscow Industrial Region, 186; South-West Poland, 187; Black Soil region, 187-189; South Russia Industrial region, 189-190; Caucasus, 190; Urals, 191; waterways, 191; railways, 191-2; commerce, 192
 —, Asiatic, 200-207; Siberia, 200-206; Russian Central Asia, 206-207
 Rustenburg, 332
 Rütli, 134
 Rye, 25, 33; France, 78; Germany, 116; Bohemia, 137; Russia, 186
 SAALE Valley, 114
 Saarbrücken, St. Johann, 111
 Saar coalfield, 84, 110, 111; river, 122
 Saaz, 137
 Sabi Valley, 339
 Sacramento Valley, 428
 Safaga, 315
 Safi, 306
 Sahara, 302, 307
 Sahel, 309
 Saigon, 253, 255
 Saint-Die, 84
 Saintes, 89
 St. Etienne, 80
 St. François Mts., 422
 St. Gallen, 134
 St. Gertraud, 140
 St. Gothard tunnel, 135, 171
 St. Helens, 55
 St. John, 381, 394, 398
 St. Joseph, 412
 St. Kitts, 444
 St. Lawrence R., 394, 396; lowlands, 372, 381-383
 St. Leonhard, 140
 St. Louis, 411, 432, 434
 St. Lucia, 444
 St. Mary's R., 387
 St. Nazaire, 81, 88
 St. Paul, 394, 433
 St. Petersburg, 185, 191
 St. Quentin, 86
 Sakhalin, 205, 281
 Salamaņa, 182

- Salina Cruz, 440
 Salisbury, 334, 335, 336
 Saloniki, 150, 158, 161
 Salta, 482
 Salto, 488
 Salt Range, 242
 Salvador, 441
 Salwen R., 238
 Salzach, 149
 Salzburg, 106, 139-140, 149
 Samara, Russia, 188, 192, 207 ;
 Mesopotamia, 211
 Samaria, 210
 Samarkand, 206, 207
 Sambhar, Lake, 242
 Sambre R., 89, 96
 Samos, 208
 Samshui, 273
 San Bernardino Mts., 434
 San Cristobal, 488
 San Francisco, 429, 433, 434
 San Joaquin Valley, 428
 San Juancito, 442
 San Salvador, 472
 San Sebastian, 182
 Santa Cruz, 461
 — Fê, 482, 484-6
 Santander, 176, 182
 Santiago, Spain, 182 ; Cuba, 443 ;
 Chile, 468
 — del Estero, 482
 Santo Domingo, 444
 Santorin, 160
 São Domingos, 181
 Saône R., 89
 São Paulo, 474, 475, 476
 São Thomé, 355
 Saragossa, 178, 182
 Sarajevo, 149, 150
 Sardinia, 163, 164
 Sarret, 144
 Saskatchewan, 383-388 ; river, 397
 Saskatoon, 394, 395
 Saualpe, 140
 Sauerland, 103, 110
 Sault Ste. Marie, 377, 394 ; canal,
 396, 435
 Saumur, 89
 Savanna, 16
 Savannah, 419
 Save R., 148, 161
 Savona, 168, 171
 Saxony, 115
 Sayan Mts., 196, 200, 202
 Scandinavia, 29, 72-76 ; physical
 features, 72 ; climate, 72 ; flora,
 72-3 ; railways, 76
 Scania, 72, 75
 Schantung Bergbau Gesellschaft, 262
 Scheldt R., 89, 96, 97
 Schiedam, 101
 Schlan, 137
 Schleswig, 114
 Schneidemühl, 122
 Schweidnitz, 120
 Scotland, 29, 34, 41, 42-48 ; North-
 ern Highlands, 34, 41, 42-43 ;
 Central Lowlands, 34, 41, 43-48 ;
 Southern Uplands, 34, 41, 48
 Scytho-Dravidian Peoples, 226
 Seattle, 429, 433
 Sebu Plain, 305, 306
 Seistan, 195
 Seine R., 89
 Sekondi, 343
 Selangor, 249
 Selkirk, 48
 — Range, 363, 389
 Selmezbánya, 145
 Semarang, 293
 Semipalatinsk, 200
 Semirechensk, 206
 Semliki R., 311
 Semlin, 148
 Semmering Pass, 149
 Seneca R., 435
 Senegal, 346-347
 — and Niger, Upper, 348-349
 Sennar, 317, 318
 Senones, 84
 Seoul, 280
 Seriphos, 160
 Serra da Caveira, 181
 — do Mantiqueira, 447
 — do Espinhaço, 447
 — do Mar, 447
 Serres, 158
 Servia, 156-158, 161 ; Old, 154, 157
 Serviceton, 508, 510
 Setubal, 181
 Seville, 178, 182
 Seward Peninsula, 430
 Sfax, 310
 Shanghai, 257, 268, 270
 Shanhaikwan, 263, 264
 Shan Plateau, 238
 Shansi, 256, 260-263
 Shan States, 239
 Shantung, 256, 260-263
 Shaochow-fu, 272
 Shardagh, 154
 Sharon Plain, 210
 Shasi, 269
 Sheep. Scotland, 42, 48 ; England,
 49 ; Spain, 177 ; Cape Colony,
 327 ; Orange Free State, 330 ;
 Transvaal, 331 ; Chile, 468 ;
 Paraguay, 479 ; Uruguay, 481 ;

- Sheep (*cont.*)—
 Argentine, 486, 487; Australia,
 500, 503, 506, 507, 508, 512; New
 Zealand, 519–21
 Sheffield, 52
 Shenandoah R., 362
 Shensi, 260–263
 Shikoku, 281, 283
 Shilka R., 206
 Shimonoseki, 290
 Shipbuilding. Scotland, 46–47;
 England, 50, 56; Ireland, 66;
 Germany, 118; Austria, 141;
 Spain, 176; Japan, 288.
 Shiraz, 216, 217, 218
 Shire R., 337
 Shotts Plateau, 305, 306
 Shropshire coalfield, 59
 Siam, 249–252; physical features,
 249–250; climate, 250; Upper
 Siam, 250–251; Lower Siam, 251;
 Plateau of Korat, 251; Malay
 States, 251; communications, 251–
 252; commerce, 252
 Sianfu, 263
 Siang-kiang Basin, 265, 269
 Siberia, 199, 200–206; physical
 features, 200; climate, 200; vege-
 tation, 200; natural regions, 200–
 202; forest region of west, 202;
 Park steppe, 202–203; steppe,
 203–204; Altai and Sayan region,
 204; Eastern Siberia, 204–205;
 communications, 205–206
 Sicily, 163, 170
 Siegerland, 111
 Sierra de Gredos, 174
 — de Guadarrama, 174, 182
 — Leone, 341–342
 — Madre Occidental, 364, 436
 — — Oriental, 364, 436
 — Morena, 174, 175, 178
 — Nevada, 174, 175, 178
 Sikkim, 277
 Silesia, 114–118; Upper, 120
 Silk (manufactured). France, 80,
 83; Switzerland, 134; Italy, 166,
 170; India, 241; China, 263, 272;
 Japan, 288; United States, 408,
 — (raw). France, 82; Austria,
 141; Turkey, 158–9; Italy, 165,
 170; Syria, 210; Persia, 215;
 China, 262, 266, 272; Japan, 286
 Sil Valley, 182
 Silver. Canada, 377; United States,
 424, 425, 427; Mexico, 438;
 Colombia, 457; Bolivia, 463–4
 Simplon tunnel, 135, 171
 Sind, 232, 242
 Singapore, 249
 Singareni, 242
 Sining-fu, 277
 Sinkiang, 276–7
 Sinope, 209
 Sinu Valley, 457
 Sisal Hemp, 439
 Sissek, 148
 Sittang R., 238
 Siwaliks, 228
 Skagway, 393, 430
 Skeena basin, 395
 Skjaergaard, 73
 Slavonia, 143
 Smyrna, 32, 208, 209, 213
 Sobat R., 311, 312, 319
 Soest, 121
 Sofia, 155, 161
 Soils, 4
 Solingen, 112
 Solnhofen, 108
 Somaliland, 320
 Song-Koi Basin, 252, 254, 255
Sorghum vulgare, 23
 Sosnowice, 187
 Sotteville, 86
 South America, 447–488; physical
 features, 447–449; climate, 450–
 452; vegetation, 452–453; coun-
 tries of, 454–489
 Southampton, 64, 71
 South Australia, 508–510
 — Carolina, 415–419
 — Dakota, 409–415, 422
 — Omaha, 412
 — William's Canal, 102
 Soya beans, 25–26, 274
 Spain, 175–180; north-west coast,
 174–176; Meseta, 176–177; South-
 ern Spain, 177–8; Mediterranean
 region, 178; Ebro basin, 179;
 Pyrenean region, 179; commerce,
 179–180; communications, 182
 Spartanburg, 421
 Sperenberg, 117
 Spessart, 107, 108
 Spezia, 168
 Spree R., 115
 Springfontein, 337
 Spokane, 433
 Springfield, 414
 Springs, 332
 Staffordshire coalfields, 57, 58
 Stalybridge, 54
 Stanovoi Mts., 196, 200
 Stara-Zagora, 155
 Stassfurt, 114; salts, 117, 125
 Stavropol, 188
 Stefanau, 139

- Steinschönau, 138
 Stendal, 121
 Steppe, 17
 Sternberg, 139
 Stettin, 118, 122, 127
 Stewart Island, 516
 Steyr, 141
Stillingia sebifera, 267
Stipa tenacissima, 308
 Stirling coalfield, 44, 45
 Stockholm, 76
 Stockton, 50
 Stonehouse, 44
 Stormberg, 326
 Stourbridge, 58
 Straits Settlements, 249
 Stralsund, 122
 Strassburg, 88, 107, 122
 Strathcona, 394
 Strathmore, 44
 Stroud, 62
 Struma R., 154
 Sturgeon Falls, 377
 Stuttgart, 109, 121
 Styria, 139-140
 Snakin, 318
 Subiaco, 169
 Sucre, 461
 Sudan, Anglo-Egyptian, 18, 302, 316-318
 Sudbury, 394; mines, 377
 Sudetes, 105, 136, 139
 Suez Canal, 315
 Suffolk, 63
 Sugar. Holland, 100; Germany, 117; Austria, 137; Spain, 177; Russia, 189; Formosa, 289; Natal, 329; United States, 419, 426; West Indies, 443, 444; Colombia, 456; Peru, 462; Australia, 501, 504
 Sugar-cane, 19-20
 Suláiman Mts., 195, 220
 Sulphur, 170
 Sumatra, 196, 292, 293
 Sunda Islands, 292, 294
 Sunderland, 50
 Sungari R., 274
 Süntel, 105
 Superior, 413, 435
 Surabaya, 293
 Surat, 234
 Surma R., 230; valley, 244
 Susquehanna R., 407, 432
 Sutherland, 42
 Swabian Jura, 103, 108
 Swakopmund, 340
 Swan Hill, 508
 Swan R., 512
 Swansea, 60, 61
 Sweden. Physical features, 72; climate, 72; economic activities, 74-76
 Switzerland, 132-135; physical features, 132; climate, 132-133; Alpine region, 133; Central plateau, 133-134; Jura, 134; communications, 134-135; commerce, 135
 Sydney. N.S., 380, 399; coalfield, 380; N.S.W., 504, 505, 508
 Syr-Daria, 206, 207
 Syria, 210-211; railways, 213
 Szechwan, 256, 265-270
 TABBAS, 216
 Table Bay, 326
 Tabora, 324
 Tabriz, 215, 218
 Tacoma, 429, 433
 Taff R., 60
 Taganrog, 190
 Tagus R., 181
 Taiyuen, 261, 263, 264
 Takau, 289, 290
 Talcahuano, 468
 Tali-fu, 273
 Tallow Tree, 267
 Taltal, 466
 Tampico, 439, 440
 Tamsui, 289
 Tanana Valley, 430
 Tanga, 323
 Tanganyika, Lake, 299
 Tangla Pass, 277
 Tanjong Priok, 293
 Taokow, 264
 Taranto, 170
 Tarchendo, 277
 Tarim basin, 196, 276
 Tarnowitz Plateau, 120
 Tarragona, 182
 Tasili Plateau, 299
 Tasmania, 513-514
 Tatra, 143
 Taunus, 103, 110
 Taurus Range, 195
 Tayibai, 317
 Tea, 20-21; India, 230, 234; Ceylon, 247-8; China, 266, 270, 272; Japan, 286; Java, 292-3; Natal, 329
 Teak, 20; India, 239; Siam, 250
 Tebessa, 307
 Teheran, 216, 217, 218
 Tell, Algerian, 307-309
 Temperature, Inversions of, 12
 Tenasserim, 223
 Tennessee, 415-421; river, 362

- Tengyueh, 273
 Terneuzen Canal, 95, 97
 Terni, 168
 Teschen, 139
 Teutoburger Range, 105, 113
 Texada Island, 392
 Texas, 415-419, 434
 Thalghat, 243
 Thann, 107
 Thar desert, 228, 233
 Thessaly, 154
 Thiers, 80
 Thorn, 122
 Thrace, 154, 157
 Thraco-Macedonian Region, 154
 Thuringian Basin, 105; Forest, 108
 Tian Shan, 196, 277
 Tiber R., 172; basin, 163
 Tibesti Hills, 299
 Tibet, 196, 277
 Ticino R., 166, 171
 Tiehshanpu, 267
 Tientsin, 262, 263, 264, 276
 Tientsin-Pukow Railway, 265
Tierra caliente, 436, 441
 — *fria*, 436, 441
 — *templada*, 436, 441
 Tifis, 218
 Tigris, 198, 211
 Timber. Norway, 73; Sweden, 75;
 Germany, 107; Siberia, 205;
 N. America, 368-70; Canada,
 376-7, 390; United States, 414,
 428
 Timor, 292
 Tin. Malay Peninsula, 249; Siam,
 251; China, 272; Nigeria, 345-6;
 Australia, 500-2
 Tin-plate, 60
 Tintic Range, 427
 Tiumen, 191, 205
 Tivoli, 168
 Tobacco, 22-23; Austria, 141; Bul-
 garia, 155; Turkey, 158-9; Greece,
 159; Persia, 216; S. Rhodesia,
 335; United States, 420; West
 Indies, 443
 Tobago, 444
 Tobol R., 205
 Toce R., 171
 Tocopilla, 466
 Tokachi Valley, 284, 285
 Tokar, 316
 Tokay, 143
 Tokio, 288, 290
 Tolima, 457
 Tom R., 204
 Tomaszow, 187
 Tongking, 254-255
 Tonopah, 427
 Toowomba, 502
 Topeka, 410
 Topino, 172
 Toronto, 381, 382, 383, 394
 Torrens, Lake, 509
 Toule-Sap, Lake, 253
 Toulouse, 88
 Tourcoing, 86
 Tournai, 95, 96
 Tours, 88
 Townsville, 501, 502
 Tragowel Plains, 506
 Trail Creek, 391
 Trans-Caspia, 207
 Transkei Territories, 327
 Transvaal, 325, 330-332; physical
 features, 330; natural regions,
 331-332
 Transylvania, 143, 144, 145
 Trautenau, 138
 Treadwell District, 430
 Trebizond, 209, 218
 Trengganu, 249
 Trèves, 121
 Trieste, 141, 149, 150
 Trifail, 140
 Trinidad, 444
 Tripoli, 213, 310
 Trofaiach, 140
 Trondhjem, 74, 76
 Troon, 44
 Tropophytes, 15
 Troppau, 139
 Troyes, 88
 Truckee Pass, 433
 Truxillo, 442
 Tse-kiang Basin, 265
 Tsientang, 271
 Tsinau-fu, 264, 265
 Tsingtau, 263, 264
 Tsin-ling Mts., 196, 256
 Tsukushi Plain, 281
 Tsumeb, 340
 Tuaregs, 303
 Tucuman, 487, 488
 Tungting, Lake, 265
 Tunis, 305, 309-310
 Tura, 205
 Turan, 254, 255
 Turfan, 277
 Turin, 167, 171
 Turkestan, Eastern, 276-277
 Turkey in Asia, 208-13
 — in Europe, 157-159; political
 divisions, 157; Albania, 158;
 Thraco-Macedonian region, 158;
 Basin of Adrianople, 158
 Turko-Iranian Peoples, 226

- Turtle Mountain, 388
 Tuscany, 163, 168
 Tuticorin, 238
 Twenthe, 101
 Two Harbours, 413
 Tyrol, 139-40
 Tyrone, 65, 66
 Tyrrhenia, 163, 170

 UDINE, 167
 Uganda, 318-319; railway, 319, 322
 Ulm, 106, 121
 Ulster, 65, 66
 Umbria, 163, 168
 Ungava, 377
 United Kingdom, 34-71; physical features, 34-36; climate, 36-39; general considerations, 39-41; natural regions, 41-68; foreign trade, 68-71; ports, 71
 — Provinces, 229, 231, 232
 — States, 361-375, 400-435; physical features, 361-364; climate, 364-368; vegetation, 368-371; natural regions, 373-375; New England, 400-403; Middle Appalachian states, 403-409; north central region, 409-415; Atlantic and Gulf coastal plain, 415-419; Southern Appalachian region, 419-421; Ozark plateau, 421-2; Great plateaus, 422-3; Western Cordillera, 423; Rocky Mountain region, 424-5; Columbia plateau, 425-6; Basin Ranges, 426-7; Pacific slope, 426-428; Alaska, 429-30; commerce, 430-432; communications, 432-435
 Unstrut, 114
 Unzmarkt, 149
 Ural Mountains, 183, 191
 Urga, 206, 263, 278
 Urmia, Lake, 215
 Uruguay, 480-481; river, 488
 Urumtsi, 277
 Usagara Mts., 323
 Usambara Mts., 323
 Uskub, 158, 161
 Uspallata, 469, 487
 Ussuri R., 204, 205, 206
 Ustron, 139
 Utah, 426-427
 Utrecht, 32, 99, 101, 102
 Uvac, 149, 150
 Uyuni, 461

 VALAIS, 133
 Valdivia, 468
 Valencia, 174, 178, 179, 182

 Valenciennes, 86
 Valladolid, 177, 182
 Val Leventine, 171
 Valparaiso, 468
 Valtellina, 164
 Val Trompia, 164
 Vancouver, City, 393, 394, 399; Island, 389-393
 Vardar R., 154; valley, 161
 Variscan Range, 29
 Varna, 161
 Vegetable ivory, 459
 Vegetation, 13-26
 Veld, High, 300, 325, 326, 329-332
 Veluwe, 99
 Venern, Lake, 76
 Venezuela, 454-456; physical features, 454; climate, 454; tropical lowlands, 454; sub-tropical uplands, 454-455; Llanos, 455; Guiana Highlands, 455; minerals, 455; communications, 455-456
 Venice, 167, 171
 Vera Cruz, 440
 Vereeniging, 330
 Verkhoyansk, 198
 Vermilion Range, 413
 Vermont, 400-403
 Verona, 149, 171
 Verviers, 94, 96
 Viacha, 461
 Viborg, 191
 Vichy, 80
 Victoria, Australia, 505-8
 —, British Columbia, 390, 393, 399, 497
 — Falls, 336; Nyanza, 311
 Vieille Montagne, 94
 Vienna, 122, 141, 148
 Vigo, 182
 Villach, 149
 Villa Bocage, 338
 — Encarnación, 480
 Vilna, 191
 Vine, 33; France, 81-2, 85; Germany, 107, 108, 110; Austria, 140, 141; Hungary, 144; Turkey, 158; Italy, 164, 168-170; Spain, 177, 178, 179; Portugal, 180, 181; Anatolia, 209; Syria, 211; Cape Colony, 327
 Vinh, 255
 Virginia, 415-419
 Vistula R., 115, 123, 191
 Vitebsk, 185
 Vitimsk, 205
 Vitry, 88
 Vizagapatam, 244
 Vizcayo, 176

- Vizzola, 166
 Vladivostok, 206, 276
 Vogelsgebirge, 105, 113
 Vogtland, 118
 Voitsberg, 140
 Volcano Bay, 285
 Volga, 191
 Volo, 160
 Volta R., 343
 Vorarlberg, 139-140
 Vordernberg, 140
 Vosges, 29, 84, 103, 107
 Vuelta Abajo, 443
- WAAL, 102
 Wabana Mines, 380, 399
 Wady Halfa, 312, 317
 Wahsatch Mts., 363, 425
 Wairau Plain, 520
 Wakamatsu, 288
 Wakkerstroom, 331
 Wald, 134
 Waldenburg coalfield, 119
 Wales, 34-41; rainfall, 38; natural regions, 59-61; coalfields, 59, 60
 Walfish Bay, 340
 Wallachian Plain, 151, 152
 Wallaroo, 509, 510
 Walsall, 58
 Wanhsien, 269
 Wankie coalfield, 335
 Warora, 242
 Warrington, 55
 Warrior coalfield, 420
 Warsaw, 32, 122, 187, 191
 Warthe R., 115, 121; valley, 116
 Warwickshire coalfield, 58
 Washington, 425-426, 427-428; D.C., 432
 Watch-making, Switzerland, 134
 Waterbury, Transvaal, 330, 331
 —, Conn., 403
 Waterford, 68
 —, N.Y., 435
 Wattle, British East Africa, 322
 —, Natal, 329
 Wax Tree, 267
 Weald, 63
 Weardale, 56
 Wei R., 264; valley, 261
 Weihsien, 262
 Weissenfels, 114
 Welland Canal, 396
 Wellingborough, 62
 Wellington, 523
 Werdau, 118
 Werfen, 140
 Wesel, 101
 Weser R., 122
- West Bromwich, 58
 West Calder, 46
 Westerwald, 103, 110, 111
 West Indies, 443-444
 — River, 272
 — Virginia, 403-410
 Western Australia, 510-513
 Wetterau, 113
 Whangpoo R., 270
 Whampoa, 273
 Wheat, 23-25, 33; Scotland, 42-43; England, 63; France, 81, 85; Germany, 116; Austria, 137; Hungary, 145-146; Roumania, 152; Italy, 169-170; Spain, 177; Russia, 188-9; Siberia, 202; India, 232, 235; Algeria, 308; Egypt, 315; Orange Free State, 330; Canada, 384-7, 389, 391; United States, 410-11, 426, 428; Argentine, 484-5; Australia, 500, 506, 509, 512
 Whitehaven, 56
 White Horse, 393, 430
 — Pass, 393
 Widnes, 55
 Wiehen Gebirge, 113
 Wieliczka, 142
 Wiesbaden, 110
 Wigtown, 48
 Willcocks, Sir William, 212
 Willamette Valley, 428
 Williamsport, 432
 Williamstown, 507
 Windau, 186
 Winds, 7-11
 Windward Islands, 444
 Winnipeg, 383, 388, 394, 395, 396
 — Basin, 372-3, 383-388
 Winterthur, 134
 Wipp-thal, 149
 Wisconsin, 409-415
 Wishaw, 46
 Witbank, 332
 Witkowitz, 138, 139
 Witney, 62
 Witwatersrand, 332
 Woina Dega, 319
 Wolfram, 181
 Wolverhampton, 58
 Wood Creek, 435
 Woodland, 16
 Wood Mts., 388
 — pulp. Norway, 73; Canada, 377, 382; Newfoundland, 399
 Woollen manufactures. Scotland, 47; England, 51-52, 62; Sweden, 76; France, 86; Germany, 119, 120; Austria, 138, 140, 141;

Woollen manufactures (*cont.*)—

Italy, 167; Spain, 179; Russia,
187; India, 241; China, 262;
United States, 402, 408

Worcester, 58, 59

Workington, 56

Wuchang, 268

Wuchow, 272, 273

Wuhu, 269

Wupperthal, 114

Württemberg, 108

Würzburg, 108, 109, 121, 122

Wyalong, 503, 505

Wyoming, 424-425

XANTHI, 159

Xerophytes, 15

YABLONOI Mts., 196, 200

Yakima Valley, 432

Yale, 391

Yarkand, 276

Yarrowonga, 508

Yellowhead Pass, 395

Yellowstone R., 433

Yemen, 213

Yangtse Engineering Works, 268

Yerba Maté. Brazil, 475; Paraguay,
479-80; Argentine, 482

Yezd, 217, 218

Yezo, 281

Ymuiden, 102

Yokohama, 291

Yonne R., 89

York, Derby, and Nottingham coal-
field, 35, 50, 51

—, East Riding, 63

Yorke Peninsula, 509

Yorkshire Moors, 35

Youghiogheny R., 432

Youngstown, 408, 414

Yuan-kiang Basin, 265

Yucatan, 439

Yukon Basin, 363, 373

Yunnan, 256, 271-4

Yunnanfu, 255, 273

Yvetot, 86

ZACCAR, 308

Zagazig, 315

Zagros Mts., 195

Zambesi Valley, 336

Zante, 160

Zanzibar Protectorate, 324

Zealand, 129

Zeehan, 513

Zeeland, 99

Zeerust, 337

Zeiski, 205

Zeitz, 114

Zemstvos, 189

Zerafshan, 206

Zero-point, 16

Zeyla, 320

Zinc. Germany, 120; Spain, 178;
United States, 422

Zöptau, 139

Zoutpansberg, 330, 331, 332

Zugspitze, 105

Zuider Zee, 102

Zulus, 304

Zungeru, 344

Zurich, 134, 135

Zwartebergen, 326

Zwickau, 118

THE END

Geog

M

135163

Author McFarlane, John

Title Economic geography.

University of Toronto
Library

DO NOT
REMOVE
THE
CARD
FROM
THIS
POCKET

Acme Library Card Pocket
Under Pat. "Ref. Index File"
Made by LIBRARY BUREAU

