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LONGMANS'
SCHOOL GEOGRAPHY
INDIA AND CEYLON

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PREFACE.

This text-book has been prepared on the same lines as *Longmans' School Geography* by the same author, which was published for use in English schools in 1886. That work was based to a large extent on German models, and the principles which guided me in its preparation will be understood from the following extracts from the preface .—

"In a country [like Germany] in which there has long been ample provision both for elementary education* and for all intermediate stages leading up to the universities and to the best equipped commercial and technical schools, the teachers have at least been able to learn what is possible and what is impossible in school-years. Knowing that a limited period must be turned to account for the thorough teaching of a great variety of subjects, they have learned that it is impossible for school-teaching to be both thorough and full of minute detail. They have learned, accordingly, one of the most important of all lessons in educational method—to distinguish between what is indispensable as a ground-work, and what it is better to neglect if the pupils are really to be educated, instead of having their minds overloaded, distracted, embarrassed, and perplexed.

"This, then, is the particular in which the author of the present text-book has most earnestly endeavoured to guide himself by German examples, and he believes that on this feature it is impossible to lay **too** much stress. To those who are familiar with English text-books of geography, the work now submitted to the public will hence perhaps appear more remarkable for what it omits than for what it contains.

"But while this is really the case, while the author has really sought to exclude from the text-book almost all details which the pupils cannot be expected to keep permanently in mind, and can hardly attempt to keep in mind without doing injury in some way to their mental training, he has kept constantly before him the necessity **for** taking care that what the text-book does contain should be **really foundational—should consist of what** is most effective as discipline, most important to know.

"In making this endeavour, he has first of all sought to draw a* mental picture of the different countries and regions of the world, giving due relief to what is most distinctive in each region. . . .

"Secondly, while in order to make the picture of any country coherent, the relation between different features and characteristics is always kept in view, special prominence is given to the relation of cause and effect, so as to enable the pupils to realise that in geography there is something to understand as well as to commit to memory; in other words, so as to make geography a mental discipline as well as a body of instruction. Hence, in selecting the particulars for notice under different headings, special attention has been given to such as illustrate general laws. With this in view, frequent references are made from the body of the book to the Introduction—which deals with the general facts of physical geography—and to other passages of the text which it is instructive to compare with those from which the reference is made. The Introduction, it may here be explained, is designed primarily for teachers, and is not intended to form part of the course for the pupils until they have gone through the whole of the body of the book; though it is expected that the references of which mention has just been made will always be taken advantage of to elucidate the text and heighten its interest.

"The portion of the Introduction to which reference is most frequently made is that which briefly summarises the conditions most favourable to the growth of towns, and these references have been given in the belief that no part of geographical teaching can be made more fruitful and instructive. It is for this reason that while, in accordance with the general plan of the book, the number of towns mentioned is comparatively small, all the more space is devoted to giving geographical descriptions of the principal cities, so that the pupils may grasp the relations of their sites to the surrounding features. It is urged, therefore, upon teachers to cultivate in their pupils the habit of constantly referring to this section of the Introduction, even where no special reference is given in the text. . . .

"With regard to other features of this text-book, it may be noted that it is assumed throughout that no adequate teaching in geography can be given without the aid of maps. From the map alone can be gained a satisfactory knowledge of the position of different places, and from good maps it is possible, in some respects, to acquire a much more accurate idea of the character of the surface of the globe than can be gained from any description. A text-book ought, in fact, to be supplementary to an atlas and other aids to geographical education, and by no means to attempt to supersede them. Hence in the present text* book much is omitted, not as being useless, but as being out of place." . . .

The present edition of this geography is in a large measure a new work. The whole book has been "reset," and for the most part recast and rewritten, so as to adapt it to the tropical as well as the specially Indian point of view. The whole of the section on India and Ceylon, along with the part of the section on Indo-China devoted to Burma, is new. The Appendix, dealing with facts in physics, &c, of most importance in geography, and intended as a supplement to, and for use in the same way as the Introduction, is also new. The whole of the division relating to Europe has been greatly reduced. In the other portions of the work the text of the English edition is more closely followed, though in some places condensed, in others extended, as the special purpose of this edition seemed to require. Everywhere matters of special interest in India have received peculiar attention, and prominence is given to contrasts and correspondences with Indian geography in other parts of the globe.

The commercial aspects of geography have a considerable amount of space devoted to them throughout; and to facilitate the use of this text-book as a Commercial Geography, the more important commodities, and especially those of most interest in India and Ceylon, are entered in the index in italics, with references by name to the countries to which they belong.

I am indebted to Mr. Nash, Registrar of the University of Calcutta, and to Mr. M'Donald, Rector of the Scottish High Schools, Bombay, both of whom read the proofs of the section on India and Ceylon, for numerous corrections and suggestions; but have to regret that Mr. M'Donald's notes reached me too late for me to be able to make full use of them.

In the spelling of Indian names the second edition of Hunter's *Imperial Gazetteer of India* has been followed. Other familiar spellings are occasionally inserted in parentheses.

For permission to use the diagram on p. 29 I am indebted to the kindness of Professor Kirchhoff of the University of Halle, whose admirably compact *Schulgeographie* served in a large measure as my model for the English edition.

GEO. G. CHISHOLM.

LONDON, July 1891.

NOTE.

In the paragraph devoted to latitude and longitude at the head of the principal sections into which the text is divided, a number of places in nearly the same latitude are always given. Those places which do not belong to the country or region with which the section deals are given in parentheses; and where they lie less than 180° to the west of the place named within such country or region, they are printed to the left of that place, otherwise to the right.

The figures given in the text are always more or less round numbers, and especially where they represent variable numbers like populations, or indefinite numbers like the average height of plateaux.

Towns containing 100,000 inhabitants or more are printed in capitals. The population of towns, when given at all, is stated in thousands in parentheses after the name of the town. Thus, "**CALCUTTA** (including: suburbs, 840)," means that Calcutta has in round numbers a population of 840,000.

The population is given in parentheses for all towns in India mentioned in the text, which at the census of 1881 had more than 20,000 inhabitants. In most cases, however, the population is given in accordance with the preliminary returns of the census of 1891. In other countries the population of towns is not usually given unless it exceeds 200,000.

For the sake of convenience a number of figures which are frequently referred to in the text in making rough comparisons are here enumerated. The area given for the Punjab is that of the British territory exclusive of native states, but it will be useful to bear in mind that the more compact area of the North-West Provinces and Oudh, including the native states, is about the same.

	Square miles (round number*)
Area of the Punjab.	111,000
„ „ Ceylon or Mysore	25,000
„ „ Coorg	1,600
„ „ Great Britain (including small islands adjacent)	90,000

	Per square mile
Density of population of Southern Bengal, about . . .	500
„ „ „ Southern Madras, „ . . .	300
„ „ „ Haidarabdd, „ . . .	130
„ „ „ the Indian tableland generally, about	150

Height of the Indian tableland (Haidaribdd) above Sea-level, 1700-2000 feet.

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LONGMANS

SCHOOL GEOGRAPHY

FOR INDIA AND CEYLON.

INTRODUCTION.

1. GEOGRAPHY means a description of the Earth. No description can be complete, and the shorter it is, the more necessary is it to have a guiding principle in the description. Now it can scarcely be called in question that the kind of knowledge of the earth that is of most interest and most use to us is that of the earth as the abode of man. Some knowledge of this kind is useful, however imparted; but in order that lessons in Geography should serve the purpose of genuine education, it is requisite that the learners should be taught to understand the facts that they learn so far as they can be understood. In few words, therefore, the aim of a text-book of Geography may be stated to be this : to show the relation of the surface of the earth to its population ; to show where physical conditions favour and where they hinder the growth of a dense and civilised population; where hindrances have been overcome, and where favouring conditions have been counteracted; to show how physical conditions affect the daily life of people all over the globe ; to show where large and where small states have been formed, and why; to show where large and important towns are situated, and what circumstances have promoted their growth. But even this is by no means a small task; to do it fully, or even, it should rather be said, to attempt to do it fully, would occupy volumes.

2. To have even an elementary knowledge of the relation of the surface of the earth to its inhabitants, it is necessary for various reasons to consider the earth as a whole. First, one requires to know something about the form of the earth and its position in space. This is

what is usually included under the term Mathematical Geography; but out of the wide range of topics comprehended under this head we may select one or two as having most bearing on the main subject which we have to keep in view. Secondly, it is needful to know something of the surface of the earth as a whole, and of the changes that take place on the surface. This is what is designated Physical Geography.

I. MATHEMATICAL GEOGRAPHY.

3. Form of the Earth.—The earth is a ball. There are several ways of proving this. (1.) It is found that when we look over a level surface of large extent (such as that of the sea), objects that come in sight from a distance are always seen first at the top, the lower parts coming gradually into view as we approach them, or they us. This shows that the level surface has, in fact, a swelling which hides the lower part of a distant object whose top is visible. In other words, the surface is curved. It is found, too, that objects of the same height come into view at the same distance all round, and that shows that the curve is equal in all directions—that is, the curve of a sphere.¹ (2.) It is observed that the shadow of the earth thrown by the sun on the moon in eclipses of the latter body is always round, which would not be the case unless the earth had the form of a ball. (3.) It is known that different points on the surface of the earth have different points of the sky (determined with reference to the stars) exactly overhead at the same moment, and that the same distance on the surface of the earth makes almost the same angular distance between the points of the sky overhead in all parts of the earth and in all directions.

4. This last method of proving that the earth is round affords the means of making the most exact measurements of the form of the earth, and by this method it is found that the spherical shape is not quite perfect. There is a flattening towards two points on opposite sides, but this flattening is relatively less than we see in an orange, so that the earth may be practically treated as a round body. This enables mathematicians to draw conclusions as to all its dimensions from a single measurement. Thus, if the distance between points on its surface be measured, and means be taken to ascertain what proportion of the whole circumference that distance represents (which can be done with the aid of the stars), then we can tell not only the circumference,² but also the

¹ The circle bounding the view on a level surface is called the *horizon*. In the case of the heavenly bodies, all those belonging to one-half of the sky are above the horizon at one time.

³ The circumference of the earth is the distance round its widest part; the radius, any line from the centre to the surface; the diameter, a line passing from

length of radius and diameter, the area of the entire surface, and the cubic contents.

5. Movements of the Earth.—First Movement: Rotation.—

The earth is not fixed in space. It has two movements, which have very important effects. First, there is a spinning movement of rotation, as it is called, round a line (called the **axis**) passing through the centre of the earth, and having its ends at the points towards which the surface is observed to become flattened. This line always points in the same direction, and the fact of the movement is observed with the aid of the heavenly bodies, the stars and the sun and moon. The movement is from west to east, and as it brings the people on the earth face to face with different parts of the sky, and consequently different stars, it makes it appear as if the stars were revolving from east to west round the earth, or rather round the axis pointing to a fixed spot in the sky. The spots towards which the opposite ends of the axis point are called the poles of the heavens, the North Pole and the South Pole, and the same names are given to the ends of the axis itself. A circle conceived as passing round the earth at an equal distance from either pole is called the Equator because it divides the earth into two equal parts, called the "Northern and Southern Hemispheres. On this line the movement of each part of the earth's surface during rotation is necessarily most rapid.

6. The importance of the movement of rotation to the inhabitants of the earth arises from the fact that it causes the alternation of day and night, by bringing at different times different parts of the earth opposite the sun. The interval of one day and one night, or the time in which the same point on the earth's surface is brought directly opposite the sun twice in succession, is a day in another sense, namely, a day of twenty-four hours.

7. The Points of the Compass.—It is manifest that by this movement four directions on the surface of the earth, north, south, east, and west, are definitely fixed. These can nearly always be determined by looking towards the sun at midday. There is always, indeed, one line on the earth's surface at which the sun is directly overhead at midday,¹ but elsewhere in looking towards the sun at that time we face either due north or due south (or very nearly in one or other direction). Over the greater part of the northern hemisphere we are then facing south; over the great part of the southern hemisphere we are facing north. But there is a considerable area near the equator on both sides of that line (an area including about half of India), in which the midday sun is then at one period of the year to the south, at another period to the

side to side through the centre, and hence twice the length of the radius. In round numbers, the length of the radius is 4000 miles, the circumference accordingly nearly 25,000 miles.

¹ See par. 83.

north, when it is not exactly overhead. When the position of souther north is determined by looking towards the sun, the other directions above mentioned are easily told. When looking south, the north is immediately behind us, and if we turn in that direction, so as to look north, the east is on our right hand, the west on our left. At night the north can always be found in the northern hemisphere by looking towards a star called the Pole Star, because it is very near the spot in the sky towards which the north pole points.

8. The directions between north, south, east, and west are named

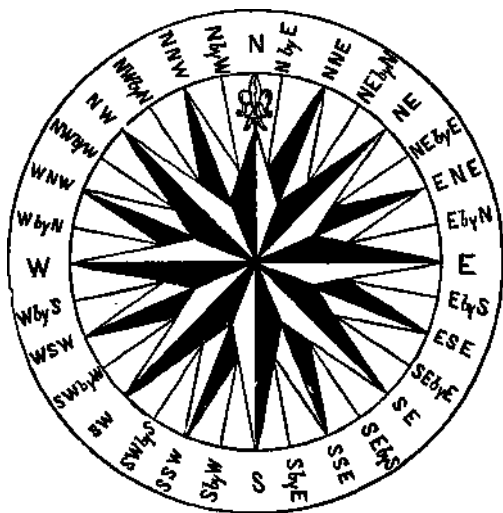


FIG. 1.

as in fig. 1. The letters N, S, E, W, stand for North, South, East, and West.

9. The directions so named are now called the **points of the compass**, because they are written on a card attached to an instrument called a compass, which is used in finding the north and other directions. This is done by means of a **magnetic needle**, which turns horizontally on a small pin or pivot on which it is balanced. The needle always points in India with the same end nearly to the north, and in every part of the world continues to point nearly in one direction, whatever that direction may be.

10. In most parts of the earth, the needle does not point due north, and its direction varies at different places and at different times; but the changes in the direction of the needle at the same place are slow, so that by means of the compass we are always able to tell the true north pretty

nearly, when we know the amount by which it points away from the north in any particular year. Throughout India it points at present very slightly east of north; at Greenwich, in England, about 16½ degrees west of north. As 360 degrees make up the entire circuit of the compass, this amount is less than one-twentieth of the circle, so that the needle at Greenwich points somewhere between north-by-west and north-north-west.

11. At the same time of day the sun is always to be seen very nearly in the same direction. Hence, when we know the time of day and can see the sun, we can tell the points of the compass from it; and when we know the points of the compass, we can in the same manner tell the time of day. A **sundial** is an instrument which was often used for telling the hours before watches and clocks were invented.

12. Latitude and Longitude.—The earth's movement of rotation has also the practical advantage of giving us two fixed points, with reference to which we can determine and describe the position of other points on the surface.

13. Circles called circles of **longitude** are imagined as passing round the earth through both poles. These, of course, all cross the equator twice, and as it is an ancient practice to divide circles into 360 degrees, the equator is so divided for the sake of numbering the half-circles by which it is thus crossed. These degrees represent the interval through which the earth turns in ¼ part of a day (four minutes of time). As each half-circle indicates the line on which the sun is to be seen at midday at every place through which it passes, every such half-circle is called a **meridian** (from the Latin *meridies*, midday). Meridians are named by numbers. Any one of them might be taken as that from which to start in numbering, but the meridian most generally adopted is that which passes through the Royal Observatory at Greenwich, which is, therefore, numbered 0°—° being the sign used for degree. From it 180 degrees are counted east and 180 west. The number of degrees that a place lies east or west of the meridian of Greenwich is called its longitude. E. and W. after a number indicate whether the longitude is east or west.

14. All the circles of longitude are likewise divided into degrees, and these are numbered from the equator to the poles. The equator is numbered 0°, and there are 90 degrees on each meridian to either pole, making 360 in all. The circles passing through the points marking corresponding degrees on the meridians are called circles of latitude, or, because they are all parallel to each other and the equator, **parallels of latitude**. The circles are necessarily smaller the nearer they are to the poles, and the 90th degree (at either pole) is a point. The number of degrees that a place lies north or south of the equator is called its latitude. N. and S. after a number indicate whether the latitude is north or south of the equator.

15. A degree of longitude at the equator is about 691/10 miles in length, but it becomes smaller towards the poles in proportion as the parallels of latitude on which they are measured become smaller. At the latitude of 13° N, which is about that of Madras, a degree of longitude is equal to about 671/5 miles in length ; at 50° N., which is about that of the southernmost point of England, it is about 44J miles. Since a parallel of latitude represents the daily motion of any point on it, the velocity due to rotation is less the higher the latitude; that is, the farther from the equator. Degrees of latitude are everywhere nearly of the same length as degrees of longitude at the equator. If the earth were a perfect sphere (which it is not—par. 4) they would be exactly of the same length.

16. Degrees, both of latitude and longitude, are each divided into 60 **minutes**, indicated by the sign ' after the number, and every minute is divided into 60 **seconds**, indicated by the sign ".

17. It thus appears that we can define the position of any spot on the earth's surface by determining its longitude and latitude. A town which is $13^{\circ} 4'$ N. latitude and $80^{\circ} 15'$ E. longitude (the position of Madras) is at the point where the parallel and meridian named meet.

18. Determination of Longitude and Latitude.—As degrees of longitude correspond to intervals of time (par. 13), the time at Greenwich may also be taken as the standard in comparing times at different longitudes. The rotation of the earth being from west to east, midday must be four minutes earlier than at Greenwich for every degree east of Greenwich, and the same time later for every degree west of Greenwich. At Greenwich noon, accordingly, the time of day must be some time past noon (P.M.) for all E. longitudes, some time before noon (A.M.) for all W. longitudes, and the exact difference is found by allowing four minutes of time for every degree, one hour, accordingly, for every 15° , one minute of time for every $15'$ of longitude. When the difference of time between places east and west of Greenwich is sought, the longitudes of both must, of course, first be added to find the whole difference of longitude. Thus the difference in longitude between New York ($73^{\circ} 59'$ W.) and Madras ($80^{\circ} 15'$ E.) is $154^{\circ} 14'$; the difference in time, accordingly, 10 hours 17 minutes.

19. The longitude of a place is found by ascertaining the difference in time between that place and Greenwich, or some other place whose longitude is already known. Various methods are employed for this purpose. Sometimes the difference in time is ascertained directly by telegraph. In other cases the time at the place whose longitude has to be determined is ascertained by means of astronomical observations, and is compared with Greenwich time as shown by a very accurate kind of watch called a chronometer. Comparatively simple astronomical observations serve to determine latitude.

20. Determination of Date.—In travelling round the world from

west to east, however slowly one travels, the sujajs seen at midday four minutes earlier for every degree than it would have been seen if one had never set out. Accordingly, after travelling 360 degrees, or all round the world in this direction, it is seen at midday twenty-four hours earlier than it would otherwise have been seen. One thus appears to have lost a day. Similarly, one appears to gain a day in travelling round the world from east to west. In naming the day of the week or month, differences of a day may seem to occur at shorter intervals. A place 100° east of Madras is rather more than 180° east of Greenwich ; in other words, rather less than 180° west of Greenwich. Accordingly, if the date is determined at Madras, the time of that place is 6 hours 40 minutes P.M. at Madras noon of the same day, but if the date is determined at Greenwich, the time is 17 hours 20 minutes earlier than at Madras, or 6.40 P.M. on the previous day. Differences of date, according to the usage of Europeans, have sometimes arisen from the direction in which discoverers or settlers happened to be travelling at the time of discovery or settlement, or have been brought about in other ways.

21. **Second Motion of the Earth : Revolution.**—The second motion of the earth is also detected by means of the heavenly bodies. When we observe the sun at rising or setting all through the year, we find that the stars last seen near the point of rising or first seen near the point of setting are not always the same. The sun appears to describe a circle in the heavens in the course of a year, constantly moving towards stars farther east. The path in which the sun thus appears to move is called the ecliptic, because it is that tract of the sky in or near which eclipses take place. We now know that it is not a movement of the sun itself, but a movement of the earth round the sun causing the latter body to come in succession opposite different parts of the sky. The earth is, in fact, only one of several bodies called planets which move round the sun, and form with it the solar system; the other planets being stars which are observed to change their position in comparatively short periods among the other stars. The moon is an attendant on the earth or satellite, which moves in the same way round our globe at a distance of about 240,000 miles (sometimes greater, sometimes less). The distance of the earth from the sun also varies a little.¹ The average distance is about 93 millions of miles, or nearly 400 times that of the moon.²

¹ The path or orbit in which the earth moves is not an exact circle but an ellipse, so nearly a true circle that if its precise form were drawn on paper it could scarcely be distinguished from a circle by the eye. The sun is in one of the foci of the ellipse, consequently nearer one end of it than the other: hence the variations in distance spoken of in the text. The moon has a similar orbit.

³ Seeing that the sun and moon appear nearly equal to the eye, while the distance of the former body from the earth is so enormously greater than that of the latter, it follows that the sun must be enormously larger than the moon. The

22. **The Seasons.**—This motion of the earth round the sun is the cause of the seasons. It is so because the axis of the earth always points to the same spot in the heavens, and is not at right angles to the plane of the earth's orbit, but is inclined to that plane at an angle of $23\frac{1}{2}^{\circ}$. The effect of the tilt of the axis away from the perpendicular is at once apparent on comparing figs. 2 and 3. Fig. 2 shows the position of the



FIG. 2.—(L indicates the latitude of London.)

axis in which the sun would be always overhead at the equator, and in which there would be an alternation of equal days and nights all over the globe all the year round. Fig. 3 shows the actual position of the axis at two opposite points of the orbit, in one of which the sun is overhead at a parallel of latitude as far as possible to the north of the equator ($23\frac{1}{2}^{\circ}$), and in the other of which it is overhead at the corresponding parallel south of the equator. The former is the mid-



FIG. 3.—(L indicates the latitude of London.)

summer position for the northern hemisphere (June 21), the latter that of midwinter for the same hemisphere (Dec. 21). Now it will be observed that in both positions there is a circle round one pole within which no light can reach the earth from the sun during an entire rotation, and at the opposite pole another circle which will remain constantly in daylight. The distance of each of these latter circles from the respective poles is again $23\frac{1}{2}^{\circ}$. The parallel of latitude at which

diameter of the sun is, in fact, more than a hundred times as great as that of the earth; that of the moon not much more than one-fourth as great. Within the body of the sun there would be room enough for both earth and moon at the distance by which they are actually separated from each other, and even for the moon to revolve round the earth without passing far beyond the centre of the sun, if it touched the outer edge in one part of its orbit.

the sun is directly overhead in its midsummer position for the northern hemisphere is called the **Tropic of Cancer**, that in which the same thing happens at midwinter, the **Tropic of Capricorn**, and the circles which lie at the same distance from either pole are called respectively the **Arctic**

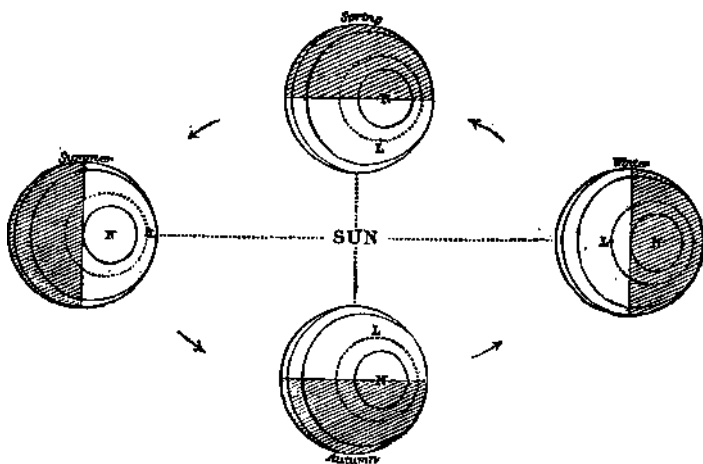


FIG. 4.—(L indicates the latitude of London.)

Circle (in the northern hemisphere) and the **Antarctic** (in the southern). Fig. 4 illustrates the gradual passage of the earth from one position to another, and shows that in passing from the midsummer to the midwinter position of the northern hemisphere, and again from the latter

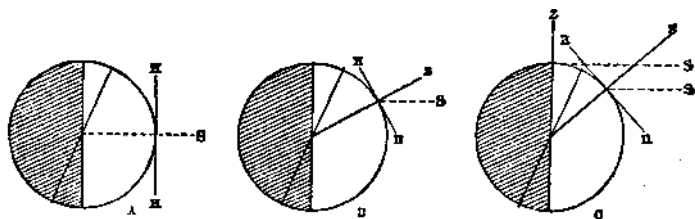


FIG. 5.—Illustrating the altitude of the sun at midsummer in the northern hemisphere, A at the Tropic of Cancer, B at the latitude of London, C at opposite points on the Arctic Circle. Z the zenith.

to the former, the earth reaches two positions, the **vernal** and **autumnal equinoxes** (March 21, September 23), in which the sun is directly overhead at the equator, and in which day and night are equal all over the world, Between the vernal and autumnal equinoxes the sun is

overhead at some point or other in the belt between the equator and the Tropic of Cancer, and the nearer it is to the latter the larger is the circle of perpetual light round the North and of perpetual darkness round the South Pole. Hence, too, within the Arctic Circle, the nearer a place is to the North Pole the longer will be its period of light in our summer and darkness in our winter. The reverse holds good during the other half of the year. At either pole the periods of light and darkness last about six months. The diagram thus also makes it plain that winter and summer occur at opposite periods of the year in the northern and southern hemispheres.

23. The areas of the earth bounded by the circles just mentioned are called zones or belts, and receive special names from the general effect of the heat of the sun within them. The strength of the sun's rays on the surface of the earth increases with the height of the sun—first, because the higher the sun is in the sky the smaller is the surface on

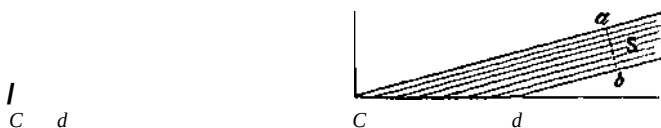


FIG. 0.—Showing the difference in the distribution of the sun's rays at London at midsummer (A), and at midwinter (B).

which its rays are expended, and, secondly, because the higher it is the less is the thickness of the atmosphere through which the rays pass, and the less heat therefore is intercepted in the passage. An examination of figs. 5 and 6 will make these facts plainer. In fig. 5 it is seen that the altitude of the sun, or the angle which the line pointing to S makes with the horizon (H), steadily diminishes from the Tropic of Cancer to the farthest limit of the Arctic Circle, on one point of which the sun is just on the horizon. Fig. 6 shows the effect of differences in the height of the sun on the distribution of an equal band of rays (*a b*) on the surface of the earth (*c d*).

24. From the facts above stated, it follows that the part of the earth within the tropics, where the sun is always overhead at some part, is the hottest as a whole, and is for that reason called the **torrid zone**; the parts round the poles are called the **north and south frigid zones**, as being the coldest; and the intervening zones are called the **north and south temperate zones**. But we shall afterwards see that there are other circumstances besides the height of the sun which have an im-

important effect on climate, and that these consequently are not true zones of climate, but merely zones of illumination.

25. Though the temperate zones have a regular alternation of day and night all the year round, it must be borne in mind that there is no sudden increase in the length of daylight as we cross the Arctic or Antarctic Circle. The days of summer become longer, those of winter shorter, the nearer we advance to either pole. This will be at once plain from fig. 7, which shows the extent of daylight on the earth when the sun is in its midsummer position for the northern hemisphere (directly overhead at the Tropic of Cancer), and when it is midday at London. It is clear that all places in latitude 50° N. are then in day-

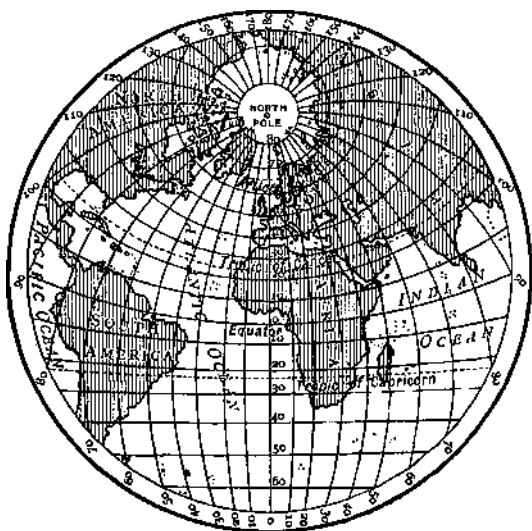


FIG. 7.

light from rather more than 120° W., where the sun is just rising, to rather more than 120° E., where it is just setting. There are therefore more than 240° of this parallel in light, and since the earth turns through 15° in an hour, a place in latitude 50° will have more than 16 hours of daylight. Similarly, a place in latitude 20° N. will have $13\frac{1}{2}$ hours of daylight. It follows that, though latitude is no sure indication of climate, places in the same latitude agree with one another at all periods of the year in the length of the day—a fact of importance with reference to the habitability and civilisation of the earth in more ways than one. It is the long days of summer which enable grain to be grown in the short time available in one or two parts of the

world near the northern limit of the temperate zone (in Norway even beyond it) ; and it is at least worthy of note that all the oldest civilisations, both in the Old World and the New (in the Old World, those of China, India, Assyria, Egypt, Greece, Rome ; in the New World, those of Mexico and Peru), rose in latitudes where the shortest day is nearly ten hours long, or longer.¹

II. PHYSICAL GEOGRAPHY.

Land and Water.

26. The total area of the water surface of the earth is about 144J millions of square miles, that of the land surface about 55j millions ; the ratio of the one to the other consequently about 11:4. Three-fourths of the land surface of the earth lies in the northern hemisphere ; and, what is still more important, the two great land masses of the northern hemisphere, North America with Greenland and the Eurasian² continent, spread out in the east and west so as to leave only narrow communications with the Arctic Ocean, while the two great continents of the south, South America and Africa, taper to narrow peninsulas, leaving wide stretches of ocean between each other. The freedom of communication between the Arctic Ocean and the south is found to be still further diminished when we take the depth into consideration. Bering Strait has an average depth of less than 60 fathoms, and a submerged bank at a depth of under 500 fathoms connects Iceland with Europe. Less is known about the depth of the Antarctic Ocean ; but, so far as it has been explored, the depth would appear to decrease gradually southwards.

27. When the eastern and western hemispheres are compared, the greater proportion of land is found in the former ; and when we divide the earth into two hemispheres, one containing the greatest possible amount of land and the other the same of water, it is found that the British Isles, as a whole, occupy nearly the centre of the former. The average depth of the ocean is enormously greater than the average height of the land. The former is estimated at about 2,000 fathoms or 12,000 feet ; the latter at about 2,200 feet. The continents must therefore be conceived as vast plateaux,³ rising to so great a height above the ocean-bed that the mountains on their surface are in respect of their mass relatively insignificant

¹ This advantage enables artificial light to be more easily dispensed with—a matter of no little consequence where artificial light is dear, or before the advance of civilisation made it cheap.

² Eurasia is a name frequently applied to the combined continents of Europe and Asia.

³ A plateau or table-land is a legion or district with a uniformly high or moderately high level (above the sea or above the surrounding country).

Changes and Agents of Change.

28. The outlines of the continents are not permanent. There is the clearest evidence to show that sea and land are constantly, though slowly, changing places to a certain extent. On the other hand, it has now been shown to be extremely probable that the great oceans, as a whole, have occupied the present great troughs from a period incalculably remote, and that the continents, though submerged now at one place, now at another, have remained similarly, as a whole, pretty much in their present positions. The margins of the sea and land have been mostly subject to change, and the whole of what may be called the unstable area (liable to be at one time sea, at another land) has been estimated at equal to about one-fourth of the entire surface of the earth. The unstable area of the ocean is generally indicated by its comparative shallowness.

29. **Modelling of the Land.**—Various agents are constantly at work reducing the harder parts of the crust of the earth¹ to small particles, and even to powder, and others in carrying this crumbled material from higher to lower levels. There are three chief crumbling agents :—(1.) In dry countries, which are all liable to extremes of heat and cold within short periods,² these **variations of temperature**, causing alternate expansion and contraction of the surface of the rocks, lead to the splitting off of scales and fragments, which become strewn at the base. In the absence of water, wind is the principal agent in carrying these fragments to still lower levels ; for though the dust may be whirled high in the air, and may even settle on higher levels after a particular gust, the tendency on the whole is downwards. By this means vast areas in the interior of Africa and North America have got covered with loose matter brought from a distance of thousands of miles; in Asia great cities (Babylon and Nineveh) have been buried, and wide and deep valleys are said to have been filled by the same process.³ In distributing the loose matter which they carry, the winds act differently in different circumstances. In some cases, where they blow with constancy over vast plains or level plateaux, they build up **sand-dunes** or mounds of sand, with a gentle slope on the side turned towards the wind, and a steeper slope on the opposite side. Sand-dunes so formed are not fixed in position, but travel slowly along in the direction of the wind, the change in place being due to the same process as that by which they are formed. The loose sand from the

¹ The term crust of the earth is applied to the few thousand feet beneath the surface which can be brought within the reach of our observation, and is not intended to imply that the outer part of the earth is a hard coat of armour surrounding a fluid interior.

² See par. 95 (3).

³ See the account of loess in China, p. 174.

gentle slope on the wind side is blown over the top and falls down the steeper slope on the other side, while fresh sand is constantly raised from the plain. In other places where the winds are less constant the loose sand may be distributed pretty equally over the surface, and hence in dry regions mountains are often seen to rise with remarkable abruptness from very level plains at their base.¹ (2.) In moist countries, with a vigorous vegetation but with little frost, the work of disintegration is principally performed by the **roots of plants**, which, as they thicken, act as powerful wedges, and open the cracks even in hard rocks, and in some cases by their juices dissolve the rock ; but (3.) **frost** is probably the most powerful crumbling agent of all, and attacks the rocks all the more fiercely the more they are ramified by fissures and



FIG. 8.—SAND-DUNES, DESRET OF SAHARA.

permeated by pores. Rain fills the cracks and enters the pores, and, as water in freezing expands with great force,² large masses or small particles are burst off, and ultimately fall down through their own weight, or are easily washed off by subsequent rains. Every muddy drop that we see trickling down a hill slope after a shower of rain is a sign and an illustration of the processes just described, and thus enables us to see how the valleys are widened and the mountains carved. At the bottom of the valley the action of the rain is continued by the rills and larger streams which are ultimately formed.

30. Rivers.—The area from which the water of a river is collected is called its **basin**, and the boundary of a river-basin, except where it borders the sea, is likewise the boundary of adjoining basins, and thus

i See cut, p. 273.

² See Appendix, par. 52.

forms a Water-parting, or line from which the water flows in different directions on opposite sides. Frequently a water-parting is the crest of a chain of mountains, but in many other cases it is only a slight swelling in a valley,¹ and it is by no means an uncommon thing for rivers to have cut a channel right across mountain chains.² A few instances are known in which bifurcations³ take place where there is no proper water-parting, but part of the same channel of water flows in one direction, part in another. More frequently the same lake has outlets in different directions.

31. As an agent of change, a river wears away the land at one part, and deposits material in another part. The course of a typical river is divided into three parts—an upper or mountain track, a middle or valley track, and a lower or plain track. In the upper part of its course the fall or slope of the bed is steepest, and hence the wearing or eroding action is most rapid and predominates over deposition, the energy of the action being due not only to the swiftness of the current,⁴ but still more, probably, to the gritty matter which it carries along with it. The upper part of a river thus tends to recede higher and higher up a valley ; or, to use the phrase frequently employed, a river eats back its head. In the middle course of the river erosion and deposition are more equally balanced, the river eroding where its current is swiftest (on the concave or hollow side of winding banks,⁶ &c), and depositing where it is slowest (on the convex side of winding banks, &c). The convex side thus tends to grow more and more outwards, the concave side to become more and more hollowed out. At last the river may burst through the neck on the inner side of the convex protuberance. In the lower course of the river deposition predominates over erosion, and most of the matter still retained by a river in suspension is deposited at the mouth, where the flow is checked by the sea or lake into which the river empties itself. Frequently from this cause there is formed at the mouth of a river a bar or submarine ridge which prevents the entrance of vessels drawing above a certain depth

32. When the matter laid down at the mouth of a river rises above the surface, it forms a delta. Usually a delta is traversed by several branches of the river, whence the name, which was first applied to the delta of the Nile, the outer branches of which, along with the seaboard, form a Δ (the Greek letter for D, called *delta*). But in some cases the river remains undivided, and traverses in a single stream a true delta or deposit of matter accumulated by the action of the river itself.

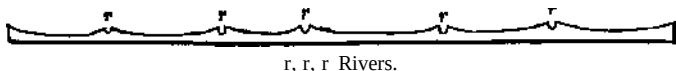
¹ Like the water-parting between the Indus and the Ganges on the great Indian plain (p. 87). * See pp. 61 (3), 84, 86.

³ The most noted example is that of the Casiquiare, which belongs both to the basin of the Amazon and that of the Orinoco.

⁴ See Appendix, par. 17.

⁵ The banks of a river are known as *right* and *left*, according as they are on the right or left hand of a person looking in the direction in which the river flows.

33. From the mode of their formation, deltas, as well as other* alluvial tracts¹ seamed by numerous rivers, are frequently flooded, and as every flood tends to raise the river-banks, while the bed of the river is also being constantly raised, it follows that the river branches in a delta almost always run along natural embankments above the level of the surrounding surface, as shown in the accompanying diagram. In the end, however, such natural embankments, unless artificially strengthened, are apt to be broken through and new channels formed along other lines.



34. Altogether, the course of a river is a scene of constant change. Only where a stream has worn for itself a deep gorge in hard rock does its channel become a permanent one, and in such places the changes are chiefly in the swiftness and depth of the current. Such gorges are specially characteristic in dry regions, where the river derives little assistance from rain, frost, and vegetation in widening its valley; and the most remarkable examples of the kind are the canons of the Rocky Mountains in western North America,² the rivers of which are fed chiefly by melting snow near the source, and have their own erosive action assisted by the rapid fall of the bed.

35. The action of a river is variously modified by the tributaries which it receives on both its banks. Each tributary, with the assistance of its feeders and trickling waters, tends to form a valley of its own, and when it joins the main stream, it not only adds to its volume, but has other effects according to circumstances. It generally aids more or less in eating away the bank of the main stream opposite to the influx, and thus to shift the course of the latter in that direction. This effect is greatest when the tributary is impetuous, and its course at right angles to that of the main stream, as in the case of some of the tributaries of the Ganges and Brahmaputra. But at the point of junction the course of a tributary hardly ever has such a direction, for, as its current is more or less checked at the confluence, alluvial matter is always laid down at the inner angle between the main stream and its feeder, so that a wedge of such deposits tends to grow longer and longer in that situation, pushing the mouth of the tributary along more or less in the direction of the course of the main stream.³ By the continuation of this process the tributary may ultimately get wedged off altogether, and finally enter the sea as an independent stream.

36. The services that rivers render to man are various and important. They may supply water for the use of the towns built on their banks, and they carry away the refuse of the towns. When rapid in

¹ That is, tracts composed of matter deposited by the action of water.

² See p. 290.

* See any map showing the rivers of the Ganges basin.

their flow, they are sometimes important as **sources of power** for driving machinery.¹ This purpose accordingly they serve most commonly in their mountain track (par. 31). In many cases they are of great value through furnishing water for irrigation, as they do in so many parts of India.² The facility with which they can be so used depends on the physical features of the country through which they flow. It is greatest where broad plains adjoin the river-banks at only a slight elevation above the river itself. Where, on the contrary, rivers flow in narrow beds at a great depth below the general level of the country, this use of their waters may be practically impossible.³ Finally, the navigability of a river is a circumstance of high importance, having, like the facilities afforded for irrigation, a great effect on the distribution of population on its banks. The navigability of a river depends not only on the depth of its water, but also on the rate of its flow, and its freedom from waterfalls and shallow rapids ; and the advantage of a river for navigation is in many cases greatly diminished by the length of its windings.

37. The Dissolving Action of Rain-water.—The action of water in wearing away the land drained by rivers is not confined to the surface. Rain-water sinks into the ground sometimes to an enormous depth, the depth depending on the thickness of porous rocks. In doing so it may become muddy from the washing away of solid particles, just as when it trickles down a hill slope, but it exercises a much more powerful action in many cases in another way. There are many substances which rain-water can dissolve,⁴ as water dissolves salt or sugar, causing them to disappear wholly from sight. Various soluble salts are always present in the ground, and hence rivers always contain a certain proportion of salt, though seldom enough to impart a salt taste. Carbonate of lime, which is one of the most widely diffused substances in nature,⁶ is easily acted on by rain-water in this way; where such rocks abound, caves are apt to be formed by the continual action of rain-water filtering in through pores and fissures, and further consequences ensue from this process. Sometimes the hollows in limestone rock and the openings into them are so enlarged that considerable streams may precipitate themselves into them and continue their course for a time underground. Underground rivers are consequently a frequent characteristic of limestone regions. Generally these rivers re-emerge at some point on the surface of the land, but sometimes they find their outlet under the sea. Sometimes the overlying crust of the earth is left by the process of cave-making without support and falls

¹ See Appendix, par. 19. ² See pp. 102-3. ³ See pp. 103, 246.

⁴ This dissolving power rain-water owes chiefly to the fact that it always contains a certain proportion of carbonic acid derived from the atmosphere. See Appendix, par. 84.

⁶ See below, par. 45, and Appendix, pars, 73, 76, and 78.

in, so that basin-shaped hollows take the place of subterranean caves. Very frequently floor and roof in a cave are connected by a magnificent array of picturesque or fantastic pillars, which are themselves the result of the process by which the caves are made. For the process of cave-making is a slow one. It is carried on by the water, drop by drop. Each drop dissolves a little of the limestone; but where the "percolation of the water is very slow, each drop as it hangs on the roof of the cave partly evaporates, and the carbonate of lime that had been dissolved in the evaporated water is left as a thin crust on the roof.¹ Sub-



FIG. 9.—THE UNDERGROUND PASSAGE OF THE MASK BETWEEN LOUGHS MASK AND CORRIB IN THE WEST OF IRELAND: STALACTITES HANGING FROM THE ROOF.²

sequent drops enlarge and elongate this crust till what is called a **stalactite** is formed. The same process goes on beneath on the floor of the cave where the drop falls, and so, in course of time, a column of carbonate of lime, to which the name of **stalagmite** is given, is built up from the floor, and the meeting of the two forms a pillar, which the continuation of the process thickens and models.

38, Springs.—Even where the rocks are less easily acted on than limestone and its allies, the action of underground water is important.

¹ See Appendix, par. 59.

² Limestone rocks prevail over a large part of Ireland.

It is to this water that springs owe their origin. Deep as water may sink in certain kinds of rock, whether porous or traversed by numerous inter-ramifying fissures, it is stopped by other kinds which are practically impermeable to water. So stopped, it creeps along the junction between the permeable and impermeable rock till it finds an issue on the surface of the ground in the form of a spring, which drains so much of the porous rock as lies above its own level (fig. 10). Such being their origin, springs always contain some substances in solution derived from the rocks through which the water that feeds them has percolated. Hence many are known as mineral springs, and among these not a few

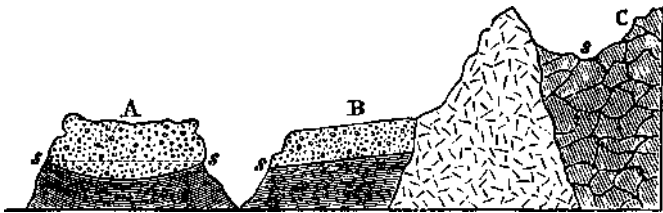


FIG. 10.—A, B, porous rocks; c, a rock with inter-ramifying fissures; s, s, springs.

have a repute on account of their medicinal action. Where the water comes from a great depth below the surface it is always warm,¹ and, as warm water is capable of dissolving many substances which cold water (even rain-water) cannot dissolve, hot springs are always richer in dissolved minerals, and more frequently than cold ones have a medicinal reputation. One widely diffused substance, silica,² is as readily dissolved by very hot underground water as carbonate of lime is by cold, and hence deposits of silica (known as **siliceous sinter**) are very often found round the mouths of hot springs.

39. In many parts of the world springs can be made artificially by deep borings. These are called **Artesian Wells**, from having first been made in Europe³ in the French province of Artois. A peculiar form and structure of ground are required to render the sinking of such wells possible. (1.) The surface must be depressed (basin- or saucer-shaped), so that the mouth of the well is lower than the areas on which the water destined to feed it is collected. (2.) A bed of porous rock must form a similar hollow beneath the surface, emerging at the surface only at certain places where the rain-water can soak into it. (3.) Above and below this porous bed must be beds of impermeable rock, the lower bed to keep the water from sinking still deeper and so escaping, the upper to prevent it from oozing to the surface at all

¹ See par. 57.

² See Appendix, pars. 70, 80

³ Long previously elsewhere.

parts and so forming a marsh. When these conditions are fulfilled a boring in the hollow down to the porous bed will enable the water,



Fig. 11.—a, artesian well; b, 6, impermeable strata; c, c, porous stratum; d, d, collecting surfaces.

to well forth at the top (fig. 11). Such borings are often of great importance in and countries.¹

40. Lakes. -The action of running water is frequently modified by the presence of lakes. Lakes may occur either at the head of a river, when they are fed by a number of small streams, none of which can be identified with that which forms its outlet, by springs, or by rains and trickling water; or they may occur in the course of a river (forming expansions in its bed); or they may be the final recipients of the waters of one or more rivers having themselves no outlet; or they may stand quite isolated, fed by rains and springs and kept within limits by evaporation. The last two classes of lakes are for the most part salt, from the gradual accumulation of the salt conveyed by the rivers or other waters that feed them. Lakes with underground outlets are only apparent exceptions, and it is probable that most of the examples of fresh-water lakes which have no outlet above ground are to be explained in this way.²

41. All lakes, whether fresh or salt, tend to be filled up and disappear in course of ages. Where they are, as it were, expansions in the bed of a river, their obliteration goes on rapidly by a double process. At the upper end of the lake the river deposits almost all its sediment in the still water which checks its flow on its entry;³ at the lower end it constantly saws its outlet deeper, and thus keeps reducing the level of the entire lake. So long, however, as lakes exist, they have an important effect on the lower course of the stream, an effect which often has a great influence on the habitability of the country on its banks. They serve to regulate the volume of the river below, gradually rising in level when floods swell the upper reaches, and thus making the flow of the lower parts of the river more constant, and protecting the neighbouring country from inundation.

42. In the case of salt lakes the process of obliteration is a more gradual one. The sediment carried into them by the feeders slowly

¹ See pp. 267, 309.

² Lob Nor, in Eastern Turkistan, is a peculiar oase. Its waters are fresh, though there is no outlet, but it is described by Przhevalsky as in reality merely the expansion of a river, and as flowing on like a river till its waters evaporate its salts then forming an incrustation on the surface of the ground.

³ Lakes are thus filterera of rivers.

raises the level of the lake, causes it to have a smaller depth but a greater extent of surface. The extension of the surface is, however, retarded by the fact that evaporation is accelerated when the area of the surface is enlarged. But it is only a retardation. The level of the lake tends to rise, the surface to spread, until in the end one of two results is bound to happen. Either the level is so much raised that an outlet is formed to the sea, or the surface becomes so extended that the lake dries up from the rapidity of evaporation. Hence there are large areas of the earth which are constantly dry at least in summer, but have the surface strongly impregnated with salt.¹

43. From this account the conclusion may be drawn that all lakes must be regarded as recent formations in the history of the earth, and the hollows which they fill are due to various changes in the crust.

44. General Result of the Action of Water.—Since, then, it is the destiny of lakes to be filled up and disappear, and of matter at higher levels to be carried down to lower levels, it follows that the ultimate tendency of running water is to carry all the higher land of the earth into the sea. But in doing so it acts unequally—here eating away the land with great energy, there enfeebled or even temporarily checked in its action; and hence the general effect of the process is in the first instance to exaggerate the inequalities on the surface of the earth instead of removing them. Table-lands are thus sculptured into mountains and valleys, and mountain chains and peaks are rendered more and more rugged and precipitous. Many of the mountains of the world are due as such to no other cause.

45. Marine Deposits.—The sea, being the ultimate receptacle of the matters worn away from the land, sorts them out according to their weight and fineness, and by means of its waves, tides, and currents, spreads them out in vast flat sheets, layers, or strata. The heavier matters sink to the bottom first and form sands, which ultimately get consolidated into sandstones. The finer matters are carried farther out, but sink in the end likewise, forming a muddy bottom which ultimately gets hardened into fine-grained rocks like shale, mudstone, or slate.² The soluble substances are carried out farthest of all, and amongst them the carbonate of lime is transported in great quantity into deep waters, there to

"Suffer a sea change
Into something rich and strange."

Myriads of living creatures take hold of it, and "by some strange alchemy" build it up into an infinite variety of beautiful skeletons,

¹ Changes in climate and physical features may modify these processes.

² All these rocks may be described as hardened mud; but while mudstones are compact and homogeneous, shales easily split into thin layers parallel to the plane of stratification, and slates can be split into leaves more or less inclined to that plane.

which during the life of the animals seive as their means of support and protection, and after their death sink to the bottom and form the material out of which new limestones arise similar to those from which the substance was originally derived.¹ Other limestones are formed by precipitation or the deposition of carbonate of lime from water, into which more of this substance is introduced in a state of solution than can be so retained.²

46. The insoluble substances derived from the land are never carried far out to sea. Even the largest rivers and strongest currents never transport them farther than 200 or 300 miles from the shore. If the sea-bed keeps stable, the shore-line is gradually extended seawards where deposits are abundant, as at the mouths of rivers and on coasts where currents are arrested. But if the sea-bed happens to be sinking, the deposits grow thicker and thicker in the same place, and changes in depth or in the currents may lead to deposits of one kind being laid down immediately above those of another kind. Thus are built up whole series of strata, limestones, sandstones, shales, &c, and from the strata so foimed the land is renewed.

47. **Emergence of Marine Deposits.**—The changes of level already referred to raise sea-formed strata in many cases high into the air. This has taken place at different times in the world's history, and the strata themselves often furnish an indication of the period when this has taken place, or, if not that, at least of the relative order in which they have themselves been formed. They do so by means of the fossils which they enclose. Fossils are remains of living things, whether animals or plants (generally animals), which have been preserved in a recognisable form from the time when they got imbedded in the rocks as these were forming; and an examination of these remains, collected in regions where we can tell the order in which strata have been laid down from the order in which they still lie one above the other, has brought to light the fact that in the course of ages there has been a gradual change in the character of the living things on the globe, and hence in the fossils. By the character of the fossils geologists are thus

¹ Of the animals which acquire skeletons of carbonate of lime, the most important geographically are minute creatures called *coral polyps*, the skeletons of which have formed reefs and barriers in the neighbourhood of coasts in warm seas, and an almost innumerable crowd of small islands in mid-ocean. When wholly composed of coral remains, these islands are generally ring-shaped, and are then known as *atolls*. They are necessarily always flat and low, the animals being unable to live out of water. The part of the island above the surface is due to the afloat of drifting matter, by the coral beneath the surface, the heaping of broken fragments of coral on the top of the reefs by the waves, and the subsequent accumulation of vegetable remains—the plant-life itself being either brought originally with drifted material, or derived from seeds dropped by birds. See pp. 156, 159, 162, and 308.

² See Appendix, par. 09.

able to tell the relative age of the rocks in which they are found, and hence we may speak of rocks being in a geological sense older and newer.

48. Folding of Strata.—Though originally, for the most part, spread out level at the sea-bottom, the strata are scarcely ever found to be level, or nearly level, when raised to form dry land. They are folded and crumpled as layers of cloth might be when squeezed from side to side, while at the same time under pressure from above. There can be no doubt that the rocks forming the crust of the earth have been subjected to a similar squeezing, a squeezing of such tremendous force as to bend immense thicknesses of the hardest rocks into greater or smaller wrinkles, sometimes forming gentle undulations, sometimes close-set folds.

49. Mountain-building.—Along certain lines the crust of the earth seems to have been peculiarly weak, so as to be less able than other parts to resist the enormous upward pressure resulting from this lateral squeezing. In such situations great masses of matter have been forced high into the air, forming mountain chains like the Himalayas, the Andes, and the Alps. The formation of deep seas like the Mediterranean seems to have been part of the same process, a great hollow corresponding to a great swelling. The greatness of the force exercised during this process is evidenced by the abruptness of the folds of the strata, which often in mountainous regions stand upright, and sometimes are tilted over, so that older rocks come to lie above newer. (See Fig. 12.)

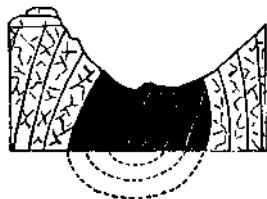


FIG. 12.—SECTION SHOWING THE FOLDING OF STRATA IN THE ALPS AT THE BASE OF MONT BLANC.

50. But, tremendous as the forces are which give rise to upheavals of this kind, the process is generally an extremely slow one, a striking proof of which is furnished by the fact already mentioned,¹ that rivers often cut right across mountain chains. For there is often the clearest evidence to show that the rivers were there before the mountains, and have deepened their beds as the mountains rose, forming by their own action the gorges by which the chains are broken.

51. Earthquakes.—There is strong reason to believe that earthquakes also are, in many cases, among the consequences of the enormous lateral pressure which crumples the strata of the earth's crust and builds up mountain chains. We can imagine that the snapping of a part of the crust deep below the surface, in consequence of the intense strain which that pressure causes, is the origin of the shock which sometimes destroys whole cities along with thousands of human beings.

¹ See par. 80, and the passages referred to in n. 2, p. 15.

52. Many earthquakes are, however, due to volcanic outbursts, and still more, in all probability, to subterranean movements of the same nature as those which lead to such outbursts. The localities in which earthquakes most frequently occur are such as might be expected in accordance with these two surmises as to their cause ; for these are, in the first place, regions where active volcanoes are most abundant (see next paragraphs); and, secondly, mountainous countries, and above all the neighbourhood of mountain chains. Besides the shores of the Pacific Ocean and the islands of the Eastern Archipelago, the parts of the world most frequently visited by earthquakes are the Mediterranean Peninsulas (including Asia Minor), the Caucasus, Elburz, Hind-layas, Tian-Shan, and Appalachian Mountains, and the districts in their vicinity.

53. Minor shocks may be due to various other causes, and careful observations with instruments in different parts of the world have made it likely that the whole surface of the earth is in a constant state of tremor.

54. Volcanoes.—All mountains are not due to the processes already described, nor are all parts of the earth's crust composed of rocks originally laid down in water. Volcanoes are built up of material ejected from beneath the surface of the earth, and their generally conical form is due to the mode in which that matter has been deposited round the opening from which it is ejected (the crater).¹ The matter thrown out is sometimes molten (lava), and pours forth in a glowing stream, which may flow to a distance of scores of miles. Sometimes the molten matter is sent forth with such violence as to be torn into spray, which solidifies in the air into dust, mingled with larger and smaller rounded² stones (bombs and lapilli). Sometimes the matter ejected is solid, even when blown from the crater, but there is always gas along with the vapour of water present, and occasionally there is nothing else. In former geological ages wide sheets of molten lava appear to have issued in certain places from cracks in the earth's crust, and to have covered extensive plains.³ Solidified matter (previously molten) filling a fissure in the crust is known as a dyke.

55. Many volcanoes are extinct, and have not undergone eruption in historical times, and some such volcanoes are remarkable for still preserving their characteristic form with well-marked craters (see fig. 13). Others are dormant, not having undergone eruption since a remote period. Others are said to be active, being still subject to eruption from time to time.⁴ Almost all active volcanoes are situated near the sea, and this

¹ Greek, "a cup." Usually there are many secondary craters in a volcano in addition to the principal one.

² The rounded form due to whirling in the air. ⁸ See Appendix, par. 72.

⁴ The number of active volcanoes distributed over the globe is upwards of 300, but it is impossible to state the precise number, since it cannot always be

fast would appear to have a great deal to do with the occurrence of volcanic outbursts. It is believed that such outbursts may be due in some, if not in all cases, to the sudden conversion into steam of water that has filtered through porous rocks to heated matter deep down in the crust of the earth,

56. Plutonic Rocks.—In all probability many of the rocks on the surface of the earth that were at one time in a molten condition have never been in that condition at the surface. Such rocks are distinguished by the name plutonic from those which have resulted from the solidification of volcanic outpourings. All granites¹ are believed to have been examples of this class, for their structure seems to show that they can have been formed only at such pressures as exist far below the surface. If they have in some cases resulted from volcanic lavas, then it is only from the bottom layers, which were subjected to a great weight by the layers resting on them.

determined whether a volcano is to be considered active or dormant, or even extinct. Those which are undoubtedly active are mainly scattered round the Pacific, on the west coast of America (with a wide gap in temperate North America), in the north-east of Asia, and on the islands in the east and south-east of Asia. Many islands in mid-ocean are entirely volcanic in their origin, and many volcanoes are flubmarinc.

¹ See Appendix, par. 70.

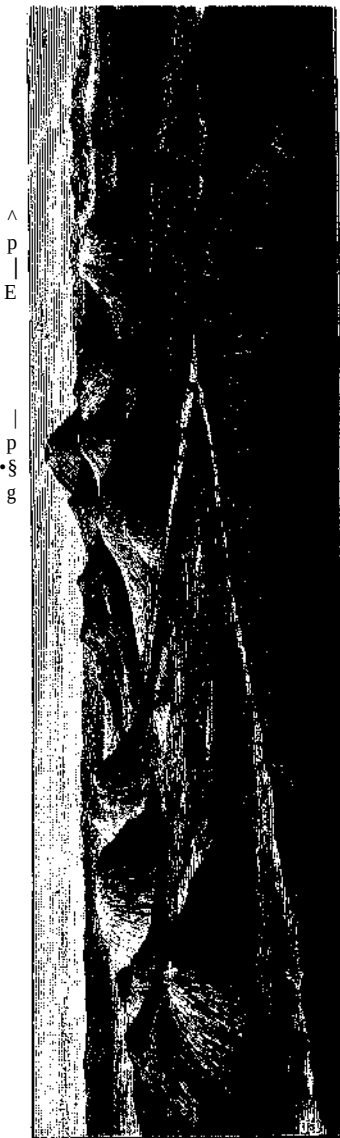


FIG. 13.—EXTINCT VOLCANOES ON THE CENTRAL PLATEAU, FRANCE.

57. Underground Heat.—The existence of volcanoes is one proof of the presence of heated matter below the earth's surface. But it is not the only proof. Everywhere it is found that when we descend below a certain depth¹ at which the temperature is constant all the year round, the temperature increases the deeper we go. The rate varies at different places, and even for the same place at different depths, but on an average is estimated at about 1° Fahr. for every forty-live feet of descent.² Hot springs are one of the effects of this internal heat of



FIG. 14.—BOILING SPRINGS, UNITED STATES.

the earth. **Geysers**, or hot springs liable to periodic eruptions, during which water is sometimes shot hundreds of feet into the air, occur in Iceland, western North America, and New Zealand. Their eruptions are probably due to the gradual increase of heat at the bottom of a deep column of water till the temperature exceeds the boiling-point at the pressure exerted by the column.³

58. Effect of Surface Inequalities on the Habitability of the Earth.—Mountains and plateaux act in some respects favourably, in others unfavourably, on the development of population.

i Varying in different places according to climate.

¹- Equal to 1° C. for every 81 feet of descent. See Appendix, par. 60.

³ The boiling-point is higher the greater the pressure (see Appendix, par. 56).

•59. {1.} Long mountain chains interrupt communication between the people on different sides more or less, and the interruption is the more serious the denser the populations that are thus separated. From this point of view the height, slope, and number of passes across mountains are of much more importance than the height and number of the peaks.

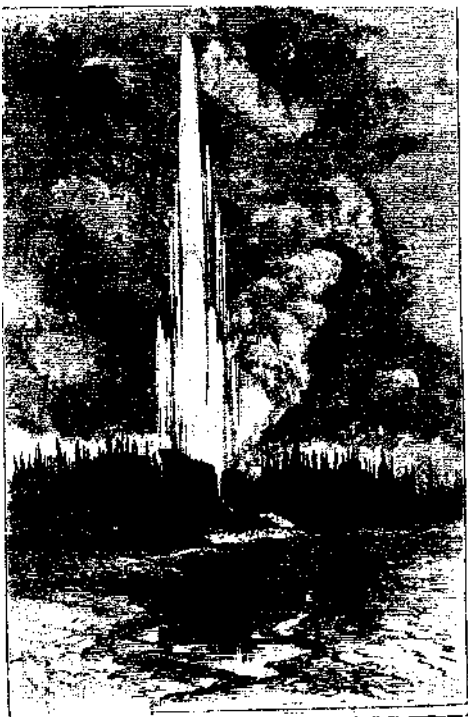
(2.) Mountain slopes are difficult of cultivation, and more difficult in proportion to the steepness.

In the temperate zone the rearing of animals is almost the only agricultural industry at great elevations.

(3.) On the other hand, in regions that require irrigation the slopes of hills and mountains often present one peculiar advantage for agriculture, inasmuch, as they can be cut out into level terraces, to which the fertilising water can be led down from stage to stage. In warm countries this is a very common mode of cultivation.

(4.) Mountains and plateaux have various important effects on climate, which will afterwards be explained.¹

(5.) Moun-



tains and highlands generally, in virtue of the processes already described, are the sources of soil for the plains lying at their feet.²

(6.) Through the contortions to which mountains owe their rise a great variety of strata, old and new, are brought to the surface, and with these a great variety of minerals, the working of which employs a large population.

¹ See pars. 94-7.

² See Appendix, pars. 88-9.

The Atmosphere.

60. The atmosphere is a mixture of gases¹ forming an envelope round the globe. Its height above the surface cannot be definitely stated, for its density gradually becomes rarer and rarer the greater the elevation. From the atmosphere both plants and animals derive gases essential to their existence.² Even aquatic organisms could not live without gases which pass from the air into the water. The movements of the atmosphere are of the highest importance in diffusing heat and moisture over the globe.

61. Winds.—The great cause of these atmospheric movements, or winds, is the heat of the sun. Heat expands or rarefies the air, and thus reduces its pressure,³ and the air in the neighbourhood at a higher pressure thus tends to flow inwards to the place of rarefaction. The most familiar illustration of this is presented by land and sea breezes. These are due to the fact that the land is more rapidly heated by day, more quickly cooled by night, than the sea.⁴ Hence by day it is warmer on land than at sea, and if the weather is otherwise calm, a sea-breeze blows on the coast by day. For the opposite reason, a land-breeze blows at night.

62. The Trade-Winds.—Under the same law there blow over a great part of the ocean constant winds, which, directly and indirectly, are of the highest importance for the climate of the whole earth. These are called the trade-winds, which are winds blowing more or less from the north and south towards a belt near the equator, where the amount of heat and consequent rarefaction is greatest, and where calms and variable winds prevail. The position of the dividing belt between these two winds varies from season to season through about 8° in the Atlantic, 5° in the Pacific Ocean, being farther north when the sun is high north of the equator, farther south when it is high south of the equator. In the Atlantic and Pacific Oceans they blow on each side of the dividing belt over a breadth varying from 20° to 25°. In the Indian Ocean only the south trade-wind prevails throughout the year.⁶

63. Effects of the Rotation of the Earth on the direction of Winds.—If the direction of these winds depended solely on the difference of temperature in different latitudes, it would be exactly north to south in the northern hemisphere, south to north in the southern, but this direction becomes altered in consequence of the rotation of the earth. One mode in which the rotation of the earth produces this effect is illustrated by fig. 16, in which the arrows represent the vibrations of a pendulum continued uniformly in the same direction while the

¹ See Appendix, pars. 84, 78.

² See Appendix, pars. 83-84.

³ See Appendix, par. 56.

⁴ See par. 69, and Appendix, par. 60.

• See p. 96.

earth is turning on its axis, the upper part of the figure showing how the motion of the pendulum, which began as a due north and south vibration in long. 0° , comes to cross the direction of the meridian in the northern hemisphere, as the rotation of the earth brings the position at which the motion commenced into those positions which were then occupied by the meridians 10° , 20° , &c.; the lower part of the figure showing similar effects in the southern hemisphere. By causing a pendulum to vibrate in this manner a French physicist named Foucault made the effect of the rotation of the earth visible. So also if the direction of motion of a current of air at starting in lat. 30° S. is due north, then in long. 0° (fig. 13, lower part of fig.) it is represented by the arrow pointing northwards upon that meridian; but if, while keeping the same direction, the current of air reaches lat. 10° S., when

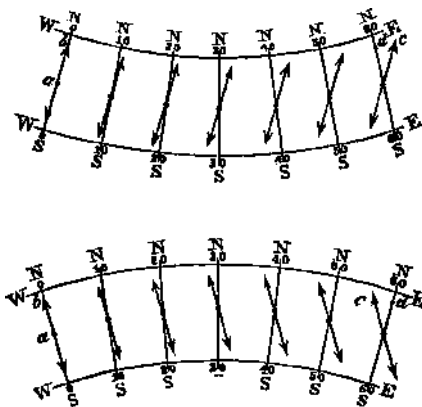


FIG. 16.

the earth has rotated from 0° to 60° , the original direction will be represented by the arrow pointing to c. The point moving from a to & will arrive at c instead of d. The wind will have become more or less south-east. Thus all winds of the northern hemisphere tend to appear as if deflected to the right, those on the southern hemisphere for similar reasons to the left. The amount of the apparent deviation of the wind's course from this cause in a given time does not depend at all on the original direction of the wind, but solely on its velocity and on the latitude. The deviation is greater the higher the velocity and the higher the latitude. Secondly, the movement of rotation along parallel 30° is slower than along parallel 10° (par. 15); hence the air coming from 30° tends to lag behind in moving towards 10° , and so become more easterly. This also leads to a deflection to the right in the northern hemisphere, to the left in the southern, but the amount of

deflection from this cause is greatest when the direction is due south or due north.

64. The Anti-Trade-Winds.—The winds which constantly pour in from the outer margin of the trade-wind belts must necessarily be balanced by others flowing outwards. Near the dividing belt this outward flow, constituting the anti-trades, takes place at an elevation too great for us to have any direct evidence of it, but the signs of it become more and more frequent the farther we advance towards the outer margin of the trade-winds. Within twelve or fifteen degrees of the equator occasional evidence of it is furnished by volcanic dust being projected up to the height at which this outward wind is blowing, and hence falling to the east instead of the west of the volcano. Nearer the margin high clouds can sometimes be seen moving eastwards; and on mountains, such as Teneriffe, in lat. 28° N., there is a constant westerly wind, which blows, however, only at the top in the height of summer, descending lower and lower as the winter advances and the margin of the trade-wind belt recedes to the south.

65. Atmospheric Circulation beyond the Trade-Wind Zone.—This shows that the anti-trades sink in elevation as they recede from the place of their origin. The subsequent movements of the air are far from being so simple. They are greatly complicated by the presence of the land, and more especially in the northern hemisphere, where the land area is so extensive. There are, however, a few general facts important to remember with reference to the atmospheric circulation beyond the zone of the trade-winds. The regions on the outer margins of this zone are those in which the barometer indicates the highest pressures over the ocean. Thence accordingly the air flows more or less northwards or more or less southwards towards areas in which the pressure is lower, always undergoing, however, the apparent deflection to the right or left from the course mentioned in par. 63. In the southern hemisphere, in which there is little land beyond 40° S., north-west winds (anti-trades) blow in consequence with great constancy, and are known to seamen, from the latitudes in which they prevail, as "tjie, Roaring Forties." In the northern hemisphere south-west winds prevail from the same cause throughout the year on the west coasts of Europe and North America, but in that hemisphere the winds of the temperate zone are extremely variable.

66. Cyclones and Anti-Cyclones, Hurricanes, Typhoons.—A certain constancy can, however, be observed even in these variable winds. Normally they either blow from all sides inwards to a centre of low air pressure, forming what is called a cyclone, or outwards on all sides from a centre of high pressure, constituting the wind system known as an anticyclone. If it were not for the deflection already explained, the winds would in either case blow directly at right angles to the isobars or lines connecting places having an equal pressure (in

cyclones accordingly directly inwards to the centre of low pressure); but in consequence of that deflection the winds blow spirally inwards in the one case and outwards in the other. In the northern hemisphere the direction of the winds in a cyclone is opposite to that of the hands of a watch, in an anticyclone the reverse. In the southern hemisphere the directions are reversed for both. The position of an anticyclone is usually pretty constant for days, or even weeks together, but that of a cyclone is constantly changing, as the centre of low pressure is always shifting, generally in a more or less easterly direction. Cyclones vary greatly in dimensions, but most commonly they are between 1,000 and 2,000 miles in diameter. In low latitudes cyclones are much rarer than nearer the poles, but when they do occur are generally smaller in size and more violent in character. They constitute, in fact, the revolving storms known in different regions as **hurricanes** and **typhoons**, as well as cyclones. In the seas where they occur these are most prevalent at certain seasons of the year. The hurricanes of the West Indies and the North American coast, and the typhoons of the China Sea and the coasts of Japan, occur chiefly from July to October, and above all in August and September; the cyclones of the Malabar Coast and the Bay of Bengal, chiefly in April and May, October and November; those of the South Indian Ocean, and in the South Pacific Ocean between the Australian coast and the Low Archipelago, chiefly from December to March or April. In both hemispheres accordingly they take place mostly in the summer month", except in the Indian seas, where they are most prevalent about the change of the monsoons (see next paragraph).

67. Monsoons (Seasonal Winds).—In many parts of the world sea and land breezes take place on a large scale, alternating not by day and night, but from season to season. The region in which such alternating winds prevail most extensively and in the most marked degree is south-eastern Asia, including the Eastern Archipelago and the northern part of Australia, throughout which the winds are known as **monsoons**, from the Arabic word for seasons. The contrast between the different seasons is most marked in the area to the south of about lat. 25° N. (India, Indo-China, and southern China, as well as northern Australia and the Islands), where sea-breezes (south-westerly, southerly, south-easterly) blow more or less steadily for half the year, while the sun is in the northern hemisphere, and the rarefaction greatest over the land; land-breezes during the rest of the year. Even as high as lat. 60° N. the seasonal changes are indicated by the predominance of sea and land breezes in summer and winter respectively. South of the equator the monsoon winds are governed chiefly by the rarefaction and condensation in the interior of Australia. Hence the sea-breeze (in the Eastern Archipelago and the greater part of northern Australia a north-west[^]wind, in the north-east of Australia a north-east wind)

occurs during the winter of the northern hemisphere* (the Australian summer). Seasonal winds of the same nature, though less constant, are observed in other parts of the world, as to the north-east of the Gulf of Mexico¹ and of the Black Sea.

The Ocean.

68. The ocean is a vast body of salt water, the volume of which relatively to the land surface of the earth has already been indicated.² The saltness varies from thirty-three to thirty-eight parts in a thousand, being greatest in the trade-wind area and in inland seas like the Mediterranean and the Red Sea, where evaporation is rapid and the influx of fresh water slight. In other inland seas, where opposite conditions prevail, the saltness is much less than that of the ocean. In some parts of the Baltic it is only about seven parts in a thousand.

69. **Temperature.**—The temperature, of the ocean generally, as compared with that of the land, is remarkable for its uniformity. At the surface the mean daily range of difference between the highest and lowest temperature within a single day of twenty-four hours is not more than 1° F. in deep seas, 4° F. in shallow waters. The annual range exhibits a corresponding equability, although, of course, the extremes in this case are wider apart. There are two causes of this very important geographical fact. (1) "Water requires a greater amount of heat to raise its temperature one degree than any other substance, a much greater amount than is required by the solid substances composing the land surface of the earth."³ (2.) The movements which go on unceasingly in the waters of the ocean, and of which some account will be given presently, have the effect of distributing and equalising the temperature. Another consequence of the slowness with which water is heated (and the like slowness with which it is cooled) is that the hottest and coldest months for the ocean (August and February) occur a month later than the corresponding months of the land surface of the earth, except in those maritime places where the temperature is governed in a marked degree by marine influents.

70. **Movements of the Ocean—Waves.**—The movements of the ocean are all of* great importance with relation to the inhabitants of the earth. The most obvious of these consists in wind-waves—sometimes only a gentle rocking and lapping, at other times terrible in their violence. Great difficulty exists in measuring the height of waves. The* highest storm-waves are said to measure forty-four to forty-eight feet in height, the average storm-wave about thirty feet. The distance from crest to crest in the case of great waves is said to vary from 500 feet to half a mile in extreme cases.

¹—See p. 288, B.

²

See pars. 26-7.

³See Appendix, par. 65.

⁴

See Appendix, par. 2fc,

•71. **Tides,**—The tides, which consist in a gradual rise and fall in the level of the ocean completed twice in about twenty-five hours, are practically important in relation to navigation, and more particularly in relation to the navigation of narrow seas and river mouths. In narrow channels the tides are not merely a rise and fall of the level, but also a backward and forward flow or current, and as such assist in propelling craft now up and now down a river; and, moreover, have in some cases an important effect in preventing the formation of river-bars, since they scour the lower part of the river-bed and wash the sediment far out to sea, or cause it to be deposited chiefly on the river-banks and not in mid-channel. But as a rise and fall also the tides are of great consequence in relation to shipping, as enabling vessels of large burden to ascend the estuaries¹ of rivers to a considerable distance, so as to facilitate the growth of great seaports in perfectly sheltered positions easily accessible on the land side as well as by sea. Great Britain and the shores of the North Sea are peculiarly favoured in respect of tidal influences, the tide rising in these waters to an exceptional height, as will be understood when the rise and fall of the tide is explained.

72. The tides are due to the attraction of the sun and moon on the earth, but chiefly that of the moon. If it were the whole amount of attraction exercised by the sun or moon on the earth that gave rise to the tides, then the influence of the sun's attraction would be by far the greater;^a but it is not the whole amount of the attraction in either case that has the effect in question, but the difference between the attraction of either upon the solid (or at least rigid) globe and that exercised on the movable body of waters on its surface. The waters swell up in a great wave on the side nearest the moon, because they are pulled more strongly towards the moon than the solid globe is. Those on the opposite side get heaped up likewise, because the solid globe is, as it were, pulled away from them. Two great waves are thus caused simultaneously by the action of the moon, and the course of the tides (the period and height of their rise and fall) depends chiefly on the phases of the moon. The influence of the sun is principally manifested in increasing the height of the tidal waves at new moon (when the sun and moon are on the same side of the earth and reinforce each other by pulling in the same direction), and at full moon (when they are on opposite sides and reinforce each other in another way, the sun's near wave being increased by the moon's distant one, the sun's distant wave by the near wave of the moon). The tides with an exceptionally great rise and fall, which occur every fortnight, are known as Spring Tides; those with a very small rise and fall, which occur at half

¹ The term *ettuary*, from *Litt. mtus*, the tide, is properly applied to the wide mouths of rivers exposed to tidal action.

² See Appendix, par. 7.

moon (also accordingly at intervals of a fortnight), are called Neap Tides.

73. In mid-ocean the height of the great tidal wave is much less than on the coast, and especially where the sea becomes gradually shallower as the coast is approached. In mid-Pacific it is only about three feet, in mid-Atlantic about twelve feet. The effect of a shallowing coast is to retard the progress of the wave, so that the advancing waters overtake those in front and cause them to be headed up. This effect is enhanced in certain funnel-shaped estuaries or gulfs, where the wave is more and more retarded as it advances.¹ In Cumberland Basin, at the head of the Bay of Fundy, between New Brunswick and Nova Scotia, where the highest tides in the world occur, the extreme difference is as much as seventy feet. In the estuaries of certain rivers, whose mouths directly meet the advancing tide, and in which the sudden or somewhat rapid shallowing of the waters hinders the ascent of the tidal wave, unusually high tides bring about a violent uprush of water known as a bore. Among Indian rivers the Hugli and the Meghna, and in Burma the Sit-taung, are remarkable for the frequent recurrence of this phenomenon. On the Meghna* navigation is sometimes impeded by it for days together. "Before anything can be seen, a noise like thunder is heard seawards in the far distance. Then the tidal wave is suddenly beheld, advancing like a wall topped with foam, of the height of nearly twenty feet, and moving at the rate of fifteen miles an hour. In a few minutes all is over; and the brimming river has at once changed from ebb to flood tide."

74. Inland seas like the Mediterranean or the Baltic have scarcely any tide. Their narrow mouths prevent them from sharing in the tides of the ocean, and the volume of water in them is too small for them to have considerable tides of their own. There are few points in the Mediterranean where the tides reach three feet in height, few in the Baltic with tides of even one foot. The smallest body of water in the world in which tides have been ascertained to exist is Lake Michigan, where the highest rise at Chicago even in spring tides is only about three inches.

75. **Currents.**—"With reference to the habitability of the earth, by far the most important movements of the ocean are its currents, chiefly owing to their effect on climate. The currents principally concerned in these effects are surface currents; but a consideration of these requires us to pay attention to another great movement of the waters

¹ It must be carefully noted that the advance of the tidal wave is different from the upward flow in a tidal river. The advance of the wave is indicated by the period of high water—that is, the time at which the crest of the tidal wave reaches a particular place; but the river continues to flow upwards for a considerable time after high water, as it continues to flow downwards for some time after low water.

of the ocean. The movement referred to is the gradual in-creeping of a vast body of cold water from the polar regions towards the equator, a movement whose existence, long surmised on the ground of observations of deep-sea temperature, has been clearly proved by the numerous additional observations that have been taken in recent years. These observations have shown (1) that all the deeper parts of the ocean in free communication with the surrounding water (from about 1,600 fathoms downwards) are occupied by a layer of ice-cold or nearly ice-cold water ($31\frac{1}{2}^{\circ}$ - 35° Fahr.); (2) that inland seas (like the Mediterranean) and isolated depression basins cut off from the surrounding waters by a submarine ridge have bottom temperatures either corresponding to the mean winter surface temperature of the place, or the same temperature as that of the water at the level of the ridge; (3) that submarine banks or islands cause the cold waters to rise nearer the surface (they being, as it were, forced up by the obstruction); and (4) that the colder waters rise nearer the surface about the equator than they do even at a distance of from 30° to 35° on either side.

76. All these facts are explicable only on the supposition above stated, and we may hence assume that there is a slow but steady in-flow of cold water from the polar regions to the neighbourhood of the equator, where the meeting streams rise towards the surface. The surface currents, on the other hand, mainly result in a transference of water from the equatorial regions towards the poles.

77. In the case of the chief surface currents there is little doubt that the prime movers are the winds; and hence in the domain of the most constant winds of the globe—the trade-winds—there are in both the great oceans two westerly¹ surface currents known as the North and South Equatorial Currents, in the Indian Ocean only the latter of the two. By means of these currents the waters are driven up against the eastern shores of the opposite continents or the islands lying off them, and are hence compelled to take another direction. Part of the water consequently returns eastwards, forming what is known as the Equatorial Counter-current, which in the two great oceans is between the north and south equatorial currents, in the Indian to the north of the only constant trade-wind current. Part of the water passes, however, obliquely to the north and south along the eastern shores of the continent. Now here we may note an important consequence of the disposition of land and water. In the Atlantic the eastern shoulder of South America lies to the south of the equator and under the influence of the south equatorial current, so that a considerable portion of its waters is deflected northwards along with other waters derived from the north current, and, owing to the contraction of the Atlantic towards the north, the benefit of this gain of warm water is confined within a limited area, within which it is all the more appreciable.

¹ Currents are named (unlike winds) from the direction in which they flow.

The benefit, too, is almost confined to the eastern shores of the North Atlantic basin, which are consequently more favoured than any other part of the world in the same latitude.

78. To understand this we must trace the subsequent course of these equatorial waters. The northern stream first encounters the small islands in the east of the "West Indies known as the Lesser Antilles. By these the main body of the current is directed north-westwards, so as to pass outside of the archipelago. A portion of the current, however, passes between them into the Caribbean Sea, and ultimately into the Gulf of Mexico. After penetrating a certain distance into that gulf it becomes deflected to the north-east, and, mingling with other water, quits the gulf at the strait between Cuba and Florida as a swift,¹ narrow,² warm,³ current of deep blue⁴ water, called the Gulf Stream. This current then unites with the portion that creeps along the outside of the West Indies, and thence proceeds north-eastwards, shallowing, spreading out, and finally breaking up into branches (a marine delta) as it advances. As a distinct current it comes to an end between long. 30° and 40° W., but a great deal of its waters is swept north-eastwards to the shores of Europe and Iceland (Gulf Stream Drift) under the influence of the prevailing south-westerly winds; a portion, however, returning southwards along the coast of Portugal and the north-west of Africa.⁵

79. The south-west branch from the south equatorial current of the Atlantic is much feebler, and there are no currents elsewhere which have anything like the same effect as the Gulf Stream in high latitudes. In the Pacific the current which answers to the Gulf Stream, known by the Japanese name of Kuro Siwo, or Dark⁶ Stream, is the most important, but is colder than the Gulf Stream. In this ocean also the configuration of the continent is favourable to the transference of a considerable body of warm water by drift currents to the north-east shores of the basin (north-west coast of America), but the benefit derived therefrom is less than on the corresponding shores of Europe, for the reasons already indicated (par. 77). Like the Gulf Stream, the Kuro Siwo gives off a return branch that proceeds southwards, this branch bringing relatively colder water which skirts the coasts of California.

80. Though the principal surface currents are equatorial in their origin, cold surface currents are by no means wanting, and, as regards the action of these also, the northern hemisphere is greatly favoured as

¹ About four miles an hour.

² About thirty miles wide.

³ Above 80° Fahr.

⁴ The depth of colour due to the high degree of saltness, and that again to the great amount of evaporation from the warm water. See Appendix, pars. 33, 58.

⁵ Within the area round which the currents belonging to this system flow lies what is known as the *Sargasso Sea*, where the surface of the ocean is thickly strewn with a floating seaweed.

⁶ That is, *dark blue*. See Note 4,

compaied with the southern through the disposition of land and water. The only important surface current from the Arctic seas proceeds from Davis Strait along the east coast of North America. It is known as the Labrador current, and advances southwards between the Gulf Stream and the coast of the United States, where it is known as the **Cold Wall**, on account of the sharp distinction in temperature between its bright green waters and the blue waters of the Gulf Stream. The shallow Bering's Strait does not admit any cold current to the Pacific Ocean; but, on the other hand, no less than three cold surface currents take their origin in the Sea of Okhotsk, in the north-east of Asia—one skirting the west coast of Kamchatka and passing southwards by the Kimie Islands, and one on each side of the island of Sakhalin.

81. But in the more open seas of the south the cold currents are very important. Everywhere beyond 45° S. the waters of the Southern Ocean appear to be drifting north-eastwards, and on the western coast of all the great land-masses of the south (South America, Africa, Australia) this drift is continued in the form of a cold current proceeding northwards. The most important of these is the Humboldt or **Peruvian** current, which advances along the west coast of South America to 4° S. The presence of this cold water is now, however, ascribed by many to the rise of water from below to replace the surface water drifted westwards by the trade-winds.

82. **Local currents** are often produced at the mouths of inland seas from different causes. Through the excess of evaporation over rainfall and over the influx of rivers in the Mediterranean and the Red Sea, there are inflow currents at the Straits of Gibraltar and Bab-el-Mandeb to make good the loss of water which thus ensues; and for the opposite reason there are outflow currents at the mouth of the Baltic (Kattegat) and Black Sea (Bosporus). In each case, however, there is a deeper current in the opposite direction, no doubt due to the differences in saltness between the communicating seas. There are numerous other local currents which it is not always easy to explain, but which often have important effects through the sediment which they carry extending the coast-line seawards and silting up harbours. Coasts directly exposed to currents carrying much sediment are generally flat and bordered by shallow seas, often lined with sand-dunes, and hence not easily accessible to shipping;^j while rocky coasts, on the other hand, are generally bordered by deep seas and have numerous creeks and natural havens.

83. **Marine Life.**—In the sea, as on land, the greatest variety of animal and vegetable life is found within the tropics, species becoming less numerous towards the poles. In the sea, animal life is everywhere much more abundant and varied than vegetable, and it extends to a much greater depth. Algae (the group to which almost all sea-plants

i See pp. 104-5.

belong) do not extend below 250 fathoms, while animals have been dredged up even from a depth of 3,000 fathoms. Among the forms derived from these dark deeps a large number are phosphorescent—• emit a light of their own. The effect of the uniform deep-sea temperatures on the life of the waters is worthy of note, inasmuch as it enables some species of whales, for example, to live in all parts of the ocean.

84. The oceanic circulation is of importance to ocean life in several respects. In the first place it is chiefly by means of the vertical circulation—that is, the sinking of cold polar waters from the surface to the bottom (to rise again at the equator)—that oxygen, which is as necessary to life in the ocean as on the land, is carried down to great depths¹ and the comparative dearth of life in the Mediterranean, for instance, is explained as a consequence of the submarine ridge at its mouth shutting out the bottom waters of the Atlantic and so limiting the supply of oxygen. Secondly, almost all the fishes extensively used for food (cod, herring, &c.) inhabit cold water, and are brought in immense profusion by cold currents to lower latitudes than they would otherwise reach, as to the shores of Newfoundland in North America, Ezo (Yezo) and Korea in the east of Asia, Table Bay in the south-west of Africa.

Climate.

85. Under this head three subjects are considered : temperature, rainfall, and salubrity. On the distribution of temperature and rainfall over the surface of the earth much light is thrown by facts that have been mentioned already. Near the beginning of this Introduction (par. 22) it was explained why temperature is on the whole higher within the tropics than elsewhere. There also temperature is on the whole most equable throughout the year, because in that zone the variations in the height of the sun are less, especially in very low latitudes.

86. The torrid zone is also on the whole the region of the greatest rainfall, which is a natural consequence of the nature and origin of rain. The source of rain is vapour or invisible moisture in the air, and the vapour is due to evaporation,² a process always going on over the surface of the globe, and especially over the ocean, most rapidly within the tropics. To condense or render visible this vapour, cold is necessary ; but even in the torrid zone that cold is found in the higher regions of the atmosphere, to which the moisture is drawn up by ascending currents of warm air. The vapour is first condensed into clouds, which consist of minute drops of water (hence elevated mists), or, when very high, of particles of ice. The necessity for a certain amount of cold to produce condensation is an important fact to bear in mind in considering the distribution of rainfall. The greater the cold the less the amount of moisture that can remain as vapour in the

¹ See Appendix, par. 84.

² See Appendix, par. 68.

atmosphere. Hence it is that all parts of the earth where the rainfall is very deficient are such as have at least very warm summers, for where the atmosphere is very cold even a small amount of moisture will be condensed. Hence, too, on the other hand, even in the torrid zone, the trade-wind region has very little rain, for, great as the evaporation is, the winds are always carrying the moisture onwards to latitudes where still more vapour can be retained without condensation. The belt of calms and variable winds between the trade-wind belts is that in which the most regular tropical rains occur. In it heavy rains take place daily, but, as generally happens in tropical climates, the rain falls in deluges¹ when it does fall, but not for long together.

87. In high latitudes, in most parts of the world indeed beyond 46°, and in many regions even nearer the equator, a considerable portion of the condensed moisture of the year falls in the form of snow,² so that a snow-covering of shorter or longer duration is a regular occurrence in the cold season.

88. Such are the most general facts regarding the distribution of rainfall and temperature over the globe ; but the circumstances that modify that distribution are of even greater interest, if not of greater importance. And with regard to the modifying circumstances there is one general fact to be borne in mind, that it is the winds which are the direct carriers both of temperature and moisture from one part of the earth to another. The modifying circumstances accordingly are those which affect the amount of heat and moisture which the winds carry. Of these there are three of sufficient consequence to be taken into account even in the briefest outline of the present subject. These are (1) the general relations of sea and land ; (2) ocean currents ; and (3) superficial configuration.

89. (1.) Effects of the Relations of Sea and Land.—(a.) **As regards temperature,** the sea being more slowly heated and cooled than the land,³ regions under the influence of sea breezes have a more equable temperature than those in the interior of continents removed from such influences. This is shown in the most instructive manner on charts indicating the average or mean temperature of different parts of the globe by means of **isothermal lines**—that is, lines connecting places having the same mean temperature for particular periods (as the whole year, the winter or summer months, the months of January and July, &c). A comparison of the isothermal lines for January and July in the north temperate zone is what brings the fact now dwelt on most prominently into view, showing at a glance that the former isothermals (those for the coldest month) rise, while those for the hottest month sink on both sides towards the sea. In other words, they show that

¹ Mostly in the afternoon and evening, when the power of the sun has declined.

² See Appendix, pars. 63-4.

³

See above, par. 69.

when we proceed inland from either coast on the same parallel of latitude we come to places that have greater cold in the depth of winter, greater heat in the height of summer, than those from which we started.

90. (b.) As regards rainfall, regions exposed to winds from relatively warm seas have abundant rain. Hence it is that, except where mountains intervene,¹ all parts of the earth in which monsoon winds prevail have abundant rains during the summer of the respective regions (in opposite seasons accordingly in the northern and southern hemispheres), and that the rains are most plentiful where they come from tropical seas (India, Indo-China, Eastern Archipelago, north of Australia).

91. (2.) Effects of Marine Currents.—These are most marked where the temperature of the current is considerably different from the average temperature of the latitude. Hence the warm currents which have the most noteworthy effect in this respect are the Gulf Stream Drift and Euro Siwo Drift, and more especially the former. The effect of these currents is, on the one hand, to equalise the temperature of the west coasts of Europe and North America in a much more marked degree than is done by the mere proximity of the sea, and, on the other hand, to supply the same coasts with plentiful rains, which fall all the year round, but chiefly during the autumn and winter months. The equalising of the temperature is chiefly the result of the raising of the temperature of winter by the prevailing south-west winds, which have their temperature maintained by the warm currents over which they blow. But it must also be remembered that the summer is cooled not only in consequence of the sea being everywhere in that season colder than the land, but also through the prevalence of clouds which keep off the heat of the sun.² The abundance of rain is due to the relatively greater amount of evaporation over the warm seas; and its greater abundance in autumn and winter to the fact that there is then the greatest difference between the temperature of sea and land.

92. A moist, mild, and equable climate is thus the characteristic of the regions under the influence of the currents above named, and in the latitudes to which they belong the extremes of temperature increase and the rainfall on the whole diminishes as we go eastwards, until we approach the eastern shores, where again an equalising effect is observable to a comparatively slight extent. The easterly increase in the cold of winter is especially marked, and the part of the habitable land surface of the globe where the greatest cold is experienced lies near the north-east of the broader of the two great land masses of the northern hemisphere.

93. The cold current which has the most marked effect on climate is the Humboldt or Peruvian current, which advances so far within the tropic of Capricorn on the west coast of South America.³ Similar but

* See below, par. 94.

² See p. 192.

³ See p. 81.

less marked effects are noticed in the west of Africa and Australia, where corresponding currents are found.

94. (3.) The Effect of Superficial Configuration on Climate is shown in various ways, (*a.*) In the first place, mountains often act as barriers to winds, and cut off the regions behind them from the temperature and moisture which they carry.¹ In the case of rainfall the effect of a mountain barrier is even more marked than in the case of temperature, because mountains (or the edge of a plateau), in compelling rain-bearing winds which strike against them to ascend to higher and colder regions of the atmosphere,² cause most of their moisture to be condensed on the side exposed to the wind. The highest rainfalls are, therefore, always met with in elevated regions, and mountains, even when far in the interior of a continent, often have their position pretty well determined on a rainfall map through the indication of a higher rainfall where they are situated. Especially is this the case when their general direction is at right angles to the prevailing rain-bearing winds.

95. (*b.*) The effect of elevation in lowering temperature has already been alluded to incidentally more than once, and is a fact familiar to almost every one. The effect is due to several causes. (1.) Air is heated with greater quickness in proportion to its density. The rarity of the air at great elevations is therefore unfavourable to its temperature. The effect of the sun's rays on the ground or any object on which they shine directly is not diminished by the elevation. At the height of 10,000 feet in the Himalayas, Hooker on one occasion observed the temperature to rise to 132° Fahr. when shaded snow close by was at a temperature of 22°. (2.) Air at any elevation receives very little heat from the direct rays of the sun. Almost all its heat is derived from the ground, partly by direct contact (conduction),³ but mainly through the dark rays⁴ which are reflected from the surface of the earth;⁶ and hence not only is the temperature greater or less in accordance with the elevation, but also in accordance with the nature of the ground (its power of absorbing or reflecting heat). For this reason, too, the decrease in temperature with elevation is the more rapid the more isolated a mountain is—most rapid of all in balloon ascents. (3.) Air is more readily heated the greater the amount of vapour it contains, since vapour absorbs the heat of the dark rays to an enormously greater extent than dry air; and usually the lower the elevation the greater is the amount of vapour present. The presence of vapour is of special importance in preventing the loss of heat by night, and hence dry regions even on plains are subject to great extremes of temperature by night and day. On the arid sands of Sind and Rajputana water may freeze by night in places where the thermometer has shown a

¹ See pp. 62, 74, 77, 96-7, 192, &c.

² See next paragraph, and Appendix, par. 67.

⁴ That if, rays of heat unaccompanied by light.

³ See Appendix, par. 46.

⁶ See Appendix, par. 47.

temperature of 90° Fahr. by day, whereas in the humid valleys of Assam, nearly in the same latitude, the temperature rarely falls below 45°, and the difference between the highest and lowest temperatures in the course of the year is less than 50°. One advantage of the cold nights of arid regions is that the ground thereby becomes so chilled that what moisture there is near the surface becomes deposited in the form of **dew**.

96. On account of the variations in the circumstances affecting the decrease of temperature with elevation, the rate of decrease varies so much that no general rule can be given with regard to it. On a very general average the rate is about 1° Fahr. for every 270 feet of ascent.

97. The Snow-line.—Whatever the rate of decrease may be it is everywhere sufficiently rapid to allow of the existence in all latitudes of mountains which rise above a limit beyond which their sides are clothed winter and summer with snow—the limit shortly called the snow-line. Even in the torrid zone near the equator more than one mountain reaches this limit about or even below 17,000 feet. The height of this line is largely dependent on the temperature of the hottest months of the year—the period when most melting takes place. But it does not depend on temperature alone. The humidity of the climate has a marked effect upon it, and where more snow falls in the course of the year on the sunny than on the shady slopes of a mountain range, the sunny side, which usually has the higher, may have the lower snow-line. In some parts of the Himalayas the snow-line has been estimated to be more than 2,000 feet higher on the northern than on the southern slopes. But in that mighty range the position of the snow-line seems to vary greatly in accordance with the great variety of local conditions. At different places it has been estimated to lie at latitudes varying from 15,600 to 19,600 feet. These mountain snows are geographically important in more ways than one. The moisture that falls in the form of snow is stored up for a longer or shorter period, and as the snow is gradually melted helps to maintain, during, it may be, long dry summers, the volume of the rivers issuing from the mountains.¹ Among the mountains themselves tremendous effects are sometimes wrought by avalanches, that is, by the fall of snow in ponderous masses moving with such velocity as to carry everything before them. In the Himalayas one observer came upon a place where an "avalanche . . . had received such an impetus on the mountainside whence it originated that it was propelled nearly half a mile through a forest, where the gradient was but slight or almost nil. The giant trees went down before it like grass under a steam roller, leaving here and there only a shattered tree-trunk standing alone."

98. Glaciers.—In the folds or high-lying valleys of snow-clad mountains the snow gradually sinks through the pressure from above,

¹ See pp. 98 (near the top), 244.

and after passing through, a stage¹ in which it is composed of large granules which are neither ice nor snow (due to melting by day and freezing by night), at last gets consolidated into a mass of ice, called a glacier/' The behaviour of a glacier is highly remarkable. Solid as ice is, and in small lumps rigid and more brittle than glass, the glacier moves slowly downwards like a river. It moves, that is to say, quicker at the surface than at the bottom, quicker in the middle than at the sides, quicker towards the inside of concave bends in its course than towards the opposite side." The rate of motion, however, is so slow as to amount in the Alps to only a few inches per day. The mode of its motion is difficult to explain, but it is known that even below the freezing-point ice can be melted by extreme pressure, and that the water will at once freeze again when the pressure is removed; and it is also known that fragments of ice readily get re-frozen into a solid lump. Most probably, therefore, the motion which makes a glacier appear as if it were composed of a very thick or viscous fluid,² is due to crushing or melting of the ice at different places, and to the melted parts freezing again, or the crushed parts becoming re-consolidated, when they have escaped from the action of the crushing or melting force. The level to which a glacier may descend depends (like the snow-line) upon the temperature and the amount of moisture by which it is fed, but it is usually thousands of feet below the limit of perpetual snow.

99. Slow as the motion of a glacier is, so great is their mass (hundreds and sometimes thousands of feet thick) that glaciers act even more powerfully than running water in wearing away the land. They round off the inequalities in the surface of their bed, scratch the rocks, and bruise the smaller fragments against one another, and press the soft materials of their bed into a tough clay. From an ice-cavern at their lower end almost invariably issues an ice-cold turbid stream (glacier milk), the solid matter in which is in part an evidence of the grinding action of the glacier mass. Yet this solid matter is far from being wholly due to the grinding of the glacier on its bed. Much of it comes from above. By the process already explained³ frosts cause great quantities of matter to be poured down upon the surface of the glacier from the rocks which bound and surmount it, and the finer matter is washed down by the rains and melted ice, which chiefly feed the stream at the bottom, through the numerous fissures by which the glacier is traversed. The larger fragments remain at the sides of the glaciers, forming moraines.⁴ Where two glaciers from two adjoining valleys unite, a middle moraine is formed by the union, and in the end many of these fragments are strewn at the foot of the glacier, where they form an end moraine. From the existence of such deposits at levels far below their present ones (as well as from other signs), it is known that at some

¹ In this stage known as *neve* (French), or *firn* (German).

2 See Appendix, par. 21. ³ See par. 89 (3). ⁴ See cut, p. 187.

remote period (yet geologically a recent one) glaciers in many parts of the world covered an enormously greater extent than they do now.¹

100. Icebergs and Ocean Ice.—Where (in high latitudes) glaciers descend below the water's edge in sufficiently deep water, their ends get broken off, and float away as icebergs, which also have in certain parts of the world an important effect on climate. From the high latitudes where they take their birth, icebergs are drifted into lower latitudes by the cold currents which issue from Arctic and Antarctic Seas. In the north they are confined to the western parts of the Atlantic and Pacific

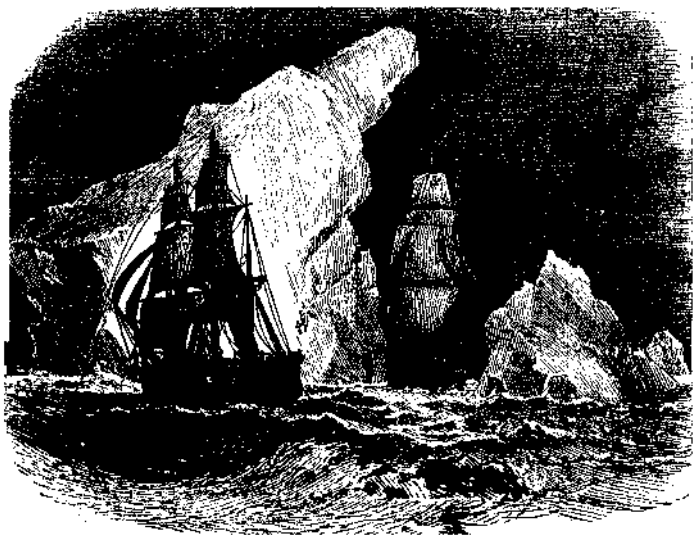


FIG. 17.—ARCTIC ICEBERGS.

Oceans. It is only in these parts that they descend below 40° N., whereas they may be fallen in with at 40° S., or even lower, everywhere in the South Atlantic Ocean. In very high latitudes the whole surface of the ocean is covered with an unbroken sheet of ice or with larger or smaller fragments of floating ice.²

101. Salubrity.—The healthiness of a climate depends on such a variety of circumstances that little of a general nature can be said on this subject. A healthy climate for the natives of the region is often

¹ At this period, known as the *Ice Age*, the greater part of the British Isles appears to have been covered with ice, in some places thousands of feet thick.

² See **Appendix, par. 63, and pp. 280 (n. 2), 319 (Antarctic Regions).**

unhealthy for tlio natives of other regions. All low-lying tropical lands are more or less unhealthy for Europeans, and in warm countries generally, whether tropical or outside of the tropics, stagnant water is peculiarly unhealthy, producing malaria, and rendering the inhabitants liable to fever and ague.

Vegetation and Animal Life.

102. The vegetation of the land surface of the earth often has a distinct stamp in accordance with the physical features, and the nature of the animal life is greatly affected by the vegetation. Heat and moisture* are the conditions most favourable to vegetable life ; **the most luxuriant vegetation, therefore, is to be found in the moister parts of the torrid zone**² (the valley of the Amazon and the islands of the Eastern Archipelago), **and the moister and warmer parts of the monsoon area.** Dense forests, composed of an almost endless variety of trees and filled



Fig. 18.—A MANUROVE SWAMP.

with an even greater variety of vegetable life of other kinds, are characteristic hi all these regions, except where there are thickly inhabited plains. Trees even advance into the ocean, forests of mangroves lining coasts within and near the tropics for hundreds of miles together, especially about the mouths of rivers. Palms are also highly characteristic, about a thousand different kinds being found within the tropics, and none far beyond their limits. Almost equally characteristic among animals are monkeys, parrots, and termites or white ants.

¹ See Appendix, pars. 86 7.

² See Frontispiece.

103. In the temperate zones the variety of vegetation diminishes,"and in the cultivated parts of those regions the forests are for the most part confined to the mountains.¹ There they are of use, like snow, in arresting the moisture and thus helping to protect the river valleys from inundation, as well as to prevent mountain pastures from being washed away by the violence of the rains. Still farther north, forests, less varied still in their character, being now chiefly composed of pines and firs, again cover the plains, and are haunted by fur-bearing animals. Trees, shrubs, and herbs all in turn disappear, until at last on the borders of the Arctic seas the only vegetation consists of mosses and lichens, uniform in their character, but often rich, splendid, and highly varied in colouring.

104. Characteristic changes are likewise observed if we pass to warm but arid regions. In steppes, grasses and lily-like plants, which by means of their thick matted roots and their large underground bulbs are enabled to withstand long periods of drought, are the prevailing vegetation; and hence burrowing animals which feed on these roots and bulbs are among the characteristic fauna (the bobak in south Russia, the prairie-dog in North America, the vizcaccia in South America). Above ground, fleet-footed antelopes, horses, oxen, &c, graze the herbage, and these are followed by the carnivorous animals which make them their prey. In the vegetation of dry regions, trees and bushes with thick leathery leaves, with fleshy stems and prickles, like the cactuses of the interior of America and the euphorbias of Africa, are also characteristic. In deserts where there is any vegetation at all it is mostly composed of prickly plants (on which only the camel can feed); and in salt steppes the chief covering of the ground consists of pale green herbs, which sometimes afford good fodder for sheep and cattle.

105. The increase in cold with elevation causes similar changes in vegetation to be observed in ascending a mountain to those which are seen in going from lower to higher latitudes. A snow-clad tropical mountain exhibits all the varieties of vegetable life met with between the equator and the Arctic Regions.

106. Of late years much attention has been drawn to the action of small animals in distributing the soil on the surface of the earth. Writing more than a hundred years ago, an English naturalist, Gilbert White, remarked on the importance of earthworms in this respect. "Earthworms," he wrote, "though in appearance a small and despicable link in the chain of Nature, yet, if lost, would make a lamentable chasm. For . . . worms seem to be the great promoters of vegetation . . . by boring, perforating, and loosening the soil, and rendering it

¹ "With regard to the aspect of the forests in different parts of these zones, see pp. 188-9 under Europe, Vegetation, and p. 193 under British Isles, Vegetation and Agriculture.

pervious to rains and the fibres of plants, by drawing straws and stalks of leaves into it; and, most of all, by throwing up • such infinite numbers of lumps of earth, called worm-casts, which being their excrement, is a fine manure for grain and grass. Worms probably provide new soil for hills and slopes where the rain washes the earth away; and they affect slopes, probably, to avoid being flooded." The action of worms in such ways has more recently been made almost universally known by Darwin. In some parts of the world a similar action is ascribed to ants,¹ termites, and buiying beetles.

Man.

107. The vigorous vegetation of the moister parts of the torrid zone is in itself unfavourable to the development of man, leaving little room for human habitations; while the enervating effect of the heat and the ease with which food can be obtained from the vegetable kingdom, cause him to be little disposed to contend with nature so as to keep down the aggressive plant life. Hence the island of Java and some parts of southern India are the only regions of the torrid zone in which the density of the population approaches that of the more populous districts of Europe. Both of these countries, it should be observed, are now under European control. In Java the present density of population is a direct consequence of European (Dutch) management; and though southern India had in some districts a dense population before it came under British influence, it must be noted that the greater part of that region suffers rather from a deficiency than from an excess of moisture. The oldest civilisations of which we have any record arose in the warmer parts of the temperate zone, and were in some cases (Assyria, Babylon, Egypt) assisted in their growth by regular inundations, which fertilised the ground and facilitated irrigation. The delta of the Cauvery, and the plains of eastern India still farther south, which probably contained a dense population at an earlier period than any other tropical lowlands, with few, if any, exceptions, have a comparatively small rainfall, but also enjoy exceptional facilities for irrigation owing to the character of surface and climate.² The colder and moister parts of the temperate zone, where the most advanced civilisations are now found, had to a large extent to be made fit for human habitation by the clearing of forests and the draining of marshes, and the seeds of civilisation were planted there by people who had become powerful in warmer and drier regions. Rome laid the foundation of the higher forms of civilisation throughout a great part of Europe, both in the warmer and the cooler and moister regions; and even where it did not do so directly, its example was, no doubt,

i See p. 146.

² See p. 103, under India, Irrigation Canals.

directly or indirectly, of great importance in promoting that development elsewhere.

108. In particular, it is to Rome that southern and western Europe owed the first construction of many of their chief roads, for road-making was one of the principal means adopted by that power for the spread of her own civilisation. Roads, indeed, are an essential condition of the maintenance of a dense population wherever there is not an exceptional abundance of waterways.

109. The ease with which a country can be supplied with roads is accordingly a circumstance of great importance with reference to the growth of its population, and this does not depend solely on the superficial configuration. Mountainous countries present one obstacle to road-making too obvious to need pointing out; but vast level plains may present obstacles of another kind, as in the plains of the Ganges, where there is a great deficiency of road-making material, and in those of Russia and Siberia, where, in addition to that deficiency, extensive marshes or soft ground offer further difficulties. Hence in such countries the construction of railways in quite modern times is a fact of peculiar importance. The railways (as well as the roads) of mountainous countries show the importance of superficial configuration by the way in which their course marks out the lowest levels and the easiest slopes. And here we may note that the importance of rivers with regard to communication does not lie solely in their navigability, but largely arises from this: that the valleys which they, with the help of rain and other denuding agents, have made for themselves often contain the routes along which roads and railways are most easily carried.

110. The Growth and Position of Towns.—Where a dense population exists, it is in some places pretty equally distributed over the surface, in others congregated to a great extent in large towns. Each town has its own history, and though the growth of all towns must depend more or less on physical features, the conditions that favour their growth are so varied that it is impossible to say why certain towns should be in certain places without taking that history into account.¹ Nevertheless there are one or two general facts of interest which it is well to bear in mind regarding the growth and position of towns.

111. Most towns, whatever their subsequent history may be, are originally centres of trade. They arise in places where it is most convenient for the products of a district to be collected in order to be sent out again in other directions to the places where they are required. Hence it is that in new countries with a one-sided industry, like the

¹ The modifications which man himself makes in the physical features of the globe have in many cases an important influence on the position of towns. It is for this reason, among others, that many of the chief towns of Roman Britain no longer have the importance which they once had.

United States and the British colonies of America and Australia, which are chiefly engaged in the production of food and raw materials, large quantities of which they must send to Europe in order to supply themselves thence with manufactured articles, large towns have grown up with extraordinary rapidity (Chicago, St. Louis, San Francisco, Melbourne). When the positions most generally occupied by towns are considered, the influence of trade in promoting their growth may be observed under most of the heads under which these positions may be classified.

112. (1.) Out of 233 towns which, according to recent returns or estimates, had a population of not less than 100,000, 102 are seaports—either situated on the sea-coast or near the mouths of rivers where they are navigable for sea-going vessels. In the case of river seaports, the situation is sometimes (*a*) at the highest point to which the tide rises (Glasgow, Antwerp), (*b*) at the head of navigation for large vessels (Calcutta), (*c*) at the head of navigation for smaller sea-going vessels.

113. (2.) Of towns which are not seaports, a large number are on navigable rivers, and among these (*a*) many lie at or near the confluence of two rivers (Allahabdd, St. Louis); (*b*) many at river bends, where merchandise has to be landed in consequence of the change of direction in the stream (Cincinnati, Katisbon); (*c*) many at the lowest point at which a river can be conveniently bridged (Buda-Pest), or at some point where the nature of the banks facilitates bridging (Magdeburg); (*d*) many at the head of navigation (Sambalpur); (*e*) others where falls or rapids stop or impede the navigation (St. Paul, Louisville).

114. (3.) Many towns (whether situated on navigable rivers or not) owe their importance to their situation at the meeting-place of trade routes. In this case they may occupy either (*a*) a central position in plains, such a position being the natural crossing-place of roads from all quarters (Lucknow, Moscow); (*b*) a site in a fertile valley at the foot of a mountain pass (Tiflis), or the point of convergence of several passes (Milan); or (*c*) a position on the edge of a desert across which caravans carry the merchandise collected from other quarters by roads or rivers (Lahore, Delhi, Damascus, Timbuktu).

115. (4.) In many cases facilities for defence first led to the rise of towns, but their subsequent growth is greatly affected by their possession of advantages for trade such as have been pointed out.

116. (5.) In modern times districts rich in coal and iron have become the seats of numerous large towns engaged in large manufacturing industries (round Manchester, Leeds, and Birmingham in England; in Belgium; in the Prussian province of Westphalia, &c), and some towns so situated are remarkable for their rapid growth (Barrow).

117. Towns once in existence (whether they owed their origin to advantages for trade or not) tend to grow in size for various reasons,

and the causes of growth are generally most numerous in capitals, which accordingly are often very populous even where the physical features are not specially favourable to their development.

In the diagram on p. 51 A and B represent a section across Central Europe about the meridian of 8° E.: A, vertical 6 times the horizontal scale; B, vertical 15 times the horizontal scale, a, Col di Tenda; 6, Turin; c, Monte Rosa; d, Mischabelhorn; e, Rhone valley (Brieg); f, Jungfrau; g, Aar; h, Rhine; i, Feldberg (Black Forest); j, Middle Rhine valley; k, Hardt; Z, Westerwald; m, north German plain.

o. Section across Asia about the meridian of 87° E., from the valley of the Ganges to the delta of the Yenisei, a, Mt. Everest; 6, Tibetan plateau; c, Kuen-lun; d, Altyn-tag; e, Tarim basin; /, Tian-Shan; g, Byelukha (Altai); h, Siberian plains.

D. Section across North America about the parallel of 40° N., from the west coast to the Mississippi valley and thence south-eastwards to the Atlantic, a, Coast Range; b, Pilot's Peak (Sierra Nevada); c, The Great Basin; d, Wahsatch Mts.; e, Dome Peak; /, Long's Peak; g, Mississippi; h, Ohio River; t, Black Dome (Appalachian Mts.).

E. Section across South America about the parallel of 16° S. a, Misti; 6, Lake Titicaca; c, Sorata; d, Amazon basin; e, g, Brazilian mountains (elevations uncertain); /, San Francisco River.

The horizontal scale represents hundreds of miles for c, D, and E, intervals of 20 miles for A and B. In c, D, and E, the vertical is 30 times the horizontal scale. In B, C, and E, the untinted portion shows the height above the snow-line. The figures on the vertical scales indicate thousands of feet.

COMPARATIVE TABLE OF THE GREAT LAND MASSES OF THE GLOBE.

	Area in Millions of Square Miles.	Percentage of the Total Land Surface.	Ratio to Europe.	Population in Millions.	Density of Population
Asia	17.3	32.8	4.7	830	57
Amenc.i	14.8	28.2	4.0	125	9
Africa	11.5	22.0	3.1	130	11
Europe	3.7	7.1	1	380	101
Australia and Oceania	3.5	6.6	0.9	47	1.4
Arctic and Antarctic Regions	17	33	0.5		

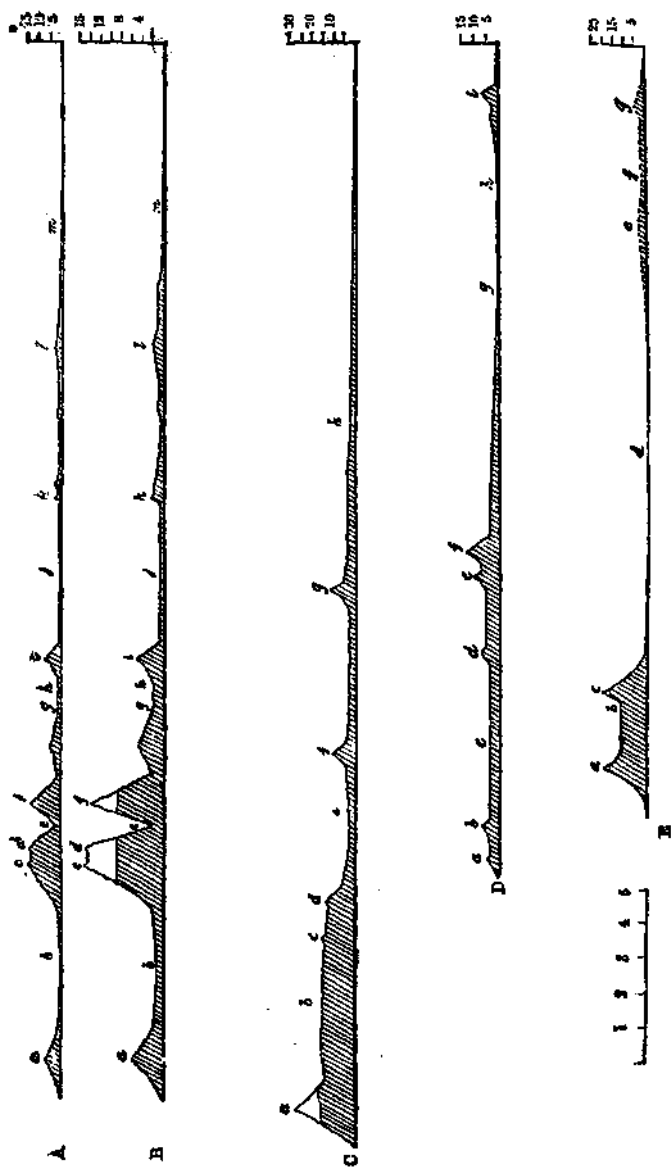


FIG. 10.

MAP DRAWING.

Since the earth is spherical in shape no flat surface can represent accurately any large part of its area. This may be shown by attempting to lay a sheet of paper of any size evenly over a part of a globe representing the earth. It will be found that this cannot be done; the paper must be puckered in one or more places. It follows from this that what is shown on the globe cannot be copied exactly on the sheet of paper.

In making any map of the surface of the earth the first thing necessary is to draw a sufficient number of lines representing latitude and longitude. On a globe this can be done accurately, on a flat sheet of paper all that can be done is to draw them in such a manner as to make the map as nearly as possible correct, or to make it most convenient for certain purposes.

Projections.—The methods devised for doing so are known as projections. The best way to understand the nature of a projection is to consider the literal meaning of the word. The word "projection" is derived from the Latin, and means literally "a throwing forward." Projections, then, are devices for guiding one in throwing forward points on a globe (like the surface of the earth) either on some flat surface or some curved surface that is capable of being spread out flat—in mathematical language, capable of being *developed*. Suppose, for example, that one hemisphere of the earth were drawn on half a globe made of some transparent substance such as glass, and this half globe were placed in the middle of a wall of a dark chamber with the convex side of the globe turned inwards, it is manifest that by admitting light into the chamber through the globe all that was drawn upon it might be shown on a white sheet covering the opposite wall. The drawing on the surface of the globe would be thrown forward on the wall, and would form what is called a plane projection of a spherical surface. The projections would differ according to the way in which the light was admitted. None of them could be an accurate repetition of what was shown on the globe, but the defects would differ in different projections.

To understand the nature of the defects we must consider first what is required for accurate representation. "We will suppose that the meridians and parallels of latitude are drawn on the globe at equal intervals. They cross one another at right angles at every part of the globe. The parallels of latitude are everywhere at the same distance from one another. The meridians are all of the same length, all converge towards the poles at the same rate and are everywhere at the same distance from one another on the same parallel of latitude. Now

no projection on a flat surface can exhibit all these things at once. To see how different projections deviate from accuracy we will make some further suppositions with regard to our transparent hemisphere.

The Orthographic Projection.—Let us suppose in all cases, merely for the sake of helping the imagination, that the hemisphere is fixed in the wall with the line representing the axis of the earth vertical, the north pole pointing directly to the ceiling, the south pole directly to the floor. With reference to the special case considered in this paragraph we must also suppose that the light comes from such a distance that it enters the dark chamber through the globe in lines that are practically parallel, and in such a position that these parallel rays are at right angles to the wall in which the globe is fixed. In that case we shall see the hemisphere in the wall represented on the sheet by a circle exactly equal in size to the circumference of the hemisphere. The parallels of latitude will all be straight lines and parallel to one another, but they will not be at equal distances from one another. They are seen to come closer and closer together the nearer they are to the poles. So also the meridians lie closer together the nearer they are to the circumference of the circle. The result is that the outer parts of the map are much too closely crowded as compared with the parts near the middle. The projection made in this way is called the orthographic. It is the projection on which the moon is always drawn, for, since we are at such a distance from the moon that we see half its surface at once, this projection is practically that in which the moon is seen. But it is not a good projection for the surface of the earth, of which we see only a small portion at a time, and of which it is desirable to show equal areas on equal portions of the map.

The Stereographic Projection.—Let us next suppose that the globe is completed outside the chamber wall, that a diameter is drawn through the globe at right angles to the wall, and that the light enters the chamber from the point at the outer end of this diameter. In that case we again see a circle on the opposite wall, but the circle is very much enlarged. The parallels of latitude are no longer straight lines, but get more and more curved towards the poles, and are not parallel to one another. Moreover, those near the middle of the map are much closer to one another than those near the poles. Similarly also the outer meridians are much farther apart on the equator than those near the middle of the map. The result is that this projection, which is called the stereographic, has the opposite fault to the orthographic. It spreads out the outer parts of the map relatively to the inner parts.

The Globular Projection.—A better position for the light is found by placing it on the same line as that supposed in the two previous cases, but at an intermediate point on that line. A light placed on that line at a distance from the surface of the globe equal to about $\frac{1}{2}$ of the diameter, throws on the opposite wall a projection in which all the

meridians cut off equal lengths on the same parallel of latitude, and all the parallels cut off equal lengths on the same meridians. But the meridians are not all of equal length. As they are more curved they are obviously also longer the nearer they are to the circumference of the circle on which the hemisphere in the wall is projected. On this account the outer parts of the map in this projection also are enlarged relatively to the inner. This enlargement, however, is not so great as in the previous case, and this mode of projection is in fact the most convenient to adopt, and that most usually adopted, when the world is drawn in hemispheres.

Mercator's Projection.ⁱ-In the projections already described the middle meridian cuts the parallels of latitude at right angles, but none of the other meridians do so. For that reason, if a transparent compass card were applied to a map drawn on any of these projections, the centre of the card being placed at the crossing-place of the equator and the middle meridian, and the north pole of the card pointing to that of the map, the directions north and south, east and west, are the only ones that would be shown correctly. For it must always be remembered that the meridians, however drawn, represent the direction of north and south, the parallels that of east and west. The projection named at the beginning of this paragraph remedies this defect.

To understand this projection, however, it will be convenient first to describe that known as the *central*. Let us suppose that a cylinder touches a transparent globe representing the earth at the equator, a light placed in the centre of the globe would throw on the interior of the cylinder a map of the world on the projection so called. As a cylinder is capable of being unrolled and laid flat, we can thus get this projection in the form of a map on a plane surface. In this projection the meridians are all represented by vertical lines on the sides of the cylinder, and the parallels of latitude by straight lines at right angles to them. All the meridians being vertical, and accordingly not converging towards the poles, the degrees of longitude are thus greatly elongated as we approach the poles. It is obvious, moreover, that the parallels of latitude must be placed wider and wider apart the nearer we come to the poles, seeing that the line by which a point on the surface of the earth is projected on the interior of the cylinder increases rapidly in length as the poles are approached. The poles themselves cannot be shown at all, being situated in the axis or middle line of the cylinder. The degrees of latitude are increased towards the poles more rapidly than those of longitude. For this reason the central projection is not much used.

The last particular mentioned is the only one in which the central projection differs from that of Mercator, in which the parallels of latitude are placed at such a distance from one another that at every latitude the map is drawn out from north to south in exactly the same propor-

PROJECT

tion as from east to west. The points at which the parallels must cut the meridians to fulfil this condition can easily be ascertained by mathematical construction, and the fulfilment of this condition enables a transparent compass to be applied directly to any part of a map drawn on this projection to determine the true bearings.

This fact makes Mercator's projection a highly convenient one for seamen. It is therefore that on which all marine charts are drawn. The name Mercator means "merchant," but that is only an accidental coincidence. The projection is named after its inventor, a German geographer of the sixteenth century named Gerhard Kremer, who, after the fashion of the times, translated his name Kremer into Latin. Besides being useful in navigation, this projection has the advantage of being the only one capable of showing nearly the whole world at one view without much distortion. It is therefore much used in maps of the ocean. In looking at such a map, however, the great exaggeration of the parts remote from the equator should always be borne in mind.

The Conic Projections.—For parts of the world the conic projection in one form or another is generally the most convenient, and is that most commonly adopted. A cone is, like the cylinder, a curved surface capable of being developed. In the *pure conic projection*, a cone is conceived to be placed like a cap over a globe representing the earth, its apex immediately above the north (or the south) pole in the line of the earth's axis, and part of its circumference touching the earth at the middle latitude of the part of the earth of which a map has to be prepared. This line of contact represents one parallel of latitude. The other parallels are represented by circles or parts of circles on the cone, therefore concentric to one another. Down the middle of the map a straight line is drawn to the apex of the cone (the centre of the concentric circles representing the parallels of latitude) to represent the middle meridian, which on the map when flat appears as a vertical line. From this line the parallel of latitude at which the cone is conceived to touch the earth is marked off at intervals for the meridians, and the meridians are then drawn in straight lines to the apex of the cone, and consequently all (as they should be) at right angles to the parallels. The objection to this projection is that in the latitudes higher (nearer the pole) than that which represents the line of contact, the meridians on the projection converge more rapidly to the pole than they do on the earth; in the lower latitudes, on the other hand, they open out more rapidly on the projection than on the earth. The parts in high latitudes are thus crowded together, those in lower latitudes too much expanded.

This defect is partially remedied by conceiving the cone as cutting a thin slice off the surface of the earth, the edges of this slice being equally distant on the middle meridian from the top and bottom of the map intended to be drawn. The cone thus touches the earth at two

parallels, one where it enters the earth one-fourth of the height of the map from the north end of the middle meridian, the other where it leaves the earth at an equal distance from the south end. The crossing-places of the other meridians are then marked off at the proper intervals from the middle meridian on both these parallels, and the meridians are drawn in straight lines through the points marked. Thus is constructed one of the forms of the *modified conic projections*. It still leaves a certain amount of contraction in the top and middle of the map and expansion at the bottom, but the amount of the deviation from exactness in this regard in any part of the map is reduced. On the other hand, the meridians no longer converge on the apex of the cone (centre of the concentric circles representing the parallels). Consequently they are no longer at right angles to these, and the angle becomes smaller and smaller towards the sides of the map. Where, therefore, the map has a considerable east and west extension, this construction leads to a good deal of distortion of outline at the sides.

This defect has led to the adoption of another modification of the conic projection, in which all the parallels of latitude are correctly marked off for the meridians, and these are drawn (with the exception of the middle meridian, which is then seldom shown on the map) in curved lines connecting these points.

It will be understood that in the actual construction of such projections no cone is actually made use of. The map-maker in drawing the curved and straight lines of his projection on the plane surface merely follows rules deduced from following out the conception here explained. The same is true also of the other projections previously described.

The Scale of a Map.—This varies according to the extent of surface represented and the size of the sheet on which the representation is made. What is called the *natural scale* is a number indicating the proportion which any given length on the map bears to the corresponding length in nature. It is expressed either as a fraction, thus, $1/3,500,000$ or as a ratio, thus $1 : 3,500,000$.¹ If a map is drawn on this scale, then one inch on the map ought to be equal to the number of miles which we get by the reduction of 3,500,000 from inches to miles. The scale of a map is also always indicated by means of a line in one of the corners or on the border of the map, divided so as to show the intervals corresponding to so many miles. From what has been said about projections it will be understood that this scale cannot be quite exact for all parts of the map.

Relation of Linear to Surface Scale.—Surfaces or areas represented on maps drawn on different scales differ from one another in

¹ One inch on a map on this scale is $1/3,500,000$ of the distance which it represents; or, expressed in the other mode, one inch ; the distance represented;: $1:3,500,000$.

the proportion of the square of the figure expressing the difference in length represented by any given interval (say one inch) on the maps. Thus let us suppose on a map A one inch stands for 20 miles, on B for 10 miles ; an inch of length on A represents twice the number of miles that it does on B ; but the surface represented by a square inch on A (400 square miles) differs from that represented by a square inch on B (100 miles) in the proportion of the square of 2 to the square of 1. Hence in a map of the world on Mercator's projection areas are exaggerated towards the poles in the proportion of the square of the exaggeration of the length. In Iceland, for example, the length of the degree is doubled as compared with the north of Bengal, so that that island is represented as about four times as large as it ought to be compared with an equal area in the latitude of Bengal.

Representation of Physical Features.—Certain physical features are shown on maps in ways that are easily understood by every one. The coast-line is shown by a line which follows the actual windings of the coast, more or less truly in proportion to the scale of the map and the purpose for which it is intended ; and the outline of lakes on the land and the course of rivers are shown in the same way.

There is more difficulty in showing on a map the irregularities of the surface of the ground. The slopes of hills and mountains are usually shown by means of shading. The summit of a mountain, or the highest line in a chain of mountains, is usually left unshaded, and so also is the bottom of a valley.

The surface of a tableland is left white like lowland plains, but the fact of there being a tableland is marked by the shading, which shows its slope all round.

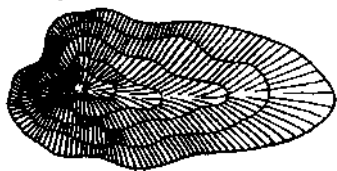
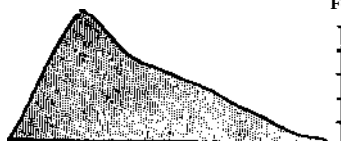
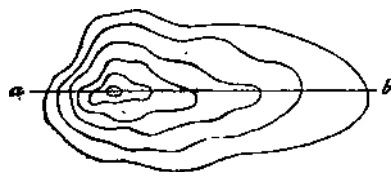
On ordinary maps on small scales there is no means of showing the gentle inequalities on the surface of the ground, nor of showing even the relative heights of hills and mountains, except the rough method of making high mountains darker than low hills.

On large-scale maps (that is, maps on the scale of 1 : 100,000,* or larger) this is often done by means of lines connecting together places of equal height. These are called *contour lines*, and are illustrated in fig. 20, in which A shows a hill the form of which is indicated by means of contour lines at intervals of 100 feet, and B shows a profile or side view of the same hill, supposed to be cut through at the line *a b*.

We can see from this figure that contour lines enable us to discern pretty clearly the form of the surface, all the more since it is plain, by comparing A and B, that the closer the contour lines come together the steeper must be the slope between them. Still a map that merely shows contour lines does not give a very good picture of the face of a

* A scale of one inch to the mile is equal to 1 : 63,360.

country, and hence shading is often added between the contour lines, and made darker in proportion to the steepness of the slope, as in fig. 20, C. This is the best way to show the features of a country on large-scale maps.



Foot

300
400
500
600
700

Other Indications on

Maps.—Besides physical features, various other tilings may be indicated on a map, even without colour. Rings, dots, and other signs are used to show the position of towns. Lines composed of dots or broken lines, or both, are used to show boundaries between states and provinces. Shading of various tints brought out in various ways may be used to show density of population, and the same method may be used to show many other things of interest, such as the proportion of the surface of a country occupied by crops or by forests. When different colours are used, it is still easier to show some of these things on a map, and by

Fro. 20.

this means many more things can be shown at once than can be done without colour. Very often different colours bounded by contour lines are employed to indicate differences of elevation, which has the effect of making such differences much more striking.

ASIA.

Approximate latitudes : Cape Chelyuskin, 78° N. ; (north of Lake Victoria Nyanza), Cape Romania, 1° N. ; (mouth of San Francisco, north of Lake Nyassa) south of island of Timor, 10° S.

Approximate longitudes: west coast of Asia Minor, 27° E. ; East Cape, Bering's Strait, 170° W.

Size, Position.—Asia, the largest of the continents, has an area of upwards of seventeen million square miles, or about *five* times that of Europe, the smallest; while the estimated population, about 830 millions, is only about two and one-fifth times that of Europe. In comparing the position of these two continents, it is most instructive to follow the **parallel of 40° N.**, which in the west of Europe has Madrid immediately to the north of it, in the east of Asia has Peking immediately to the south of it. Whereas therefore this line cuts off only relatively small areas in the south of Europe, it divides Asia into two nearly equal parts; and the contrast as regards the distribution of population is much more striking, inasmuch as less than one-twentieth of the population of Europe dwells to the south of that line, which in Asia has a much smaller fraction of the population on the north.

Outline.—The chief point of correspondence in outline between the two continents lies in the fact that in both there are three great peninsulas in the south, Arabia, India, and Indo-China, corresponding to the Iberian Peninsula, Italy, and the Balkan Peninsula. In Asia, however, all is on a larger scale.

Islands, Peninsulas, and Seas.—The islands and peninsulas on the east side of Asia enclose several border seas more or less cut off from the main body of the ocean, though none of them to so great a degree as the Baltic and the Mediterranean in Europe. The **Sea of Okhotsk**, between the peninsula of Kamchatka and the mainland, though an inland sea, may be most usefully com-

pared with the part of the Arctic Ocean between Scandinavia and Iceland, since it is cut off from the Pacific by a submarine bank,¹ the situation of which is marked by the line of the Kurile Islands. The **Sea of Japan**, between the islands of Japan and the mainland, naturally falls to be compared with the North Sea of Europe, but is much deeper. The elevation of the sea-bed to the extent of 600 feet would unite the islands to the mainland, but would leave a deep inland lake occupying the greater part of the area where the sea now lies;² whereas a similar elevation in the north-west of Europe would unite all the British Isles to the mainland, leaving only one or two comparatively small lakes. The **Yellow Sea**, farther south, between Korea and China, together with the **Eastern Chinese Sea** at its mouth, would all be converted into dry land by a similar elevation, and so also would the **Gulfs of Tongking** and **Siam** (respectively north-east and south of In do-China), while the land on the south-east of Indo-China would stretch out so as to enclose all the larger islands near (Borneo, Sumatra, and Java, with Bali).³ As to the storms of Asiatic seas, see Introduction, par. 66.

Surface.—As regards surface, there are two important points of agreement between Europe and Asia. (1.) In both continents the highland regions lie chiefly in the centre and in the southern peninsulas, while the greater part of the north is a plain.

(2.) In both continents the principal mountain chains trend more or less east and west. Only in the north-east do they assume a more northerly trend like that of the Ural Mountains.

There are, however, three important points of difference. (1.) The mountain ranges of Asia are not only, as might be expected from the greater size of the continent, of much greater extent than those of Europe, but also of much greater height. The Himalayas, in the north of India, are the highest mountains in the world, and have more than twenty peaks higher than the loftiest of the Andes, the mountains which rank next in point of altitude.⁴

(2.) The extent and height of the plateaux of Asia are enormously greater than those of Europe, in which the highest elevated areas of any considerable extent are under 3000 feet in height. The whole of Central Asia is indeed a series of lofty plateaux varying from 2000 to 20,000 feet in height, enclosed and partly cut off from one another by mountains, the

¹ See Introd., par. 26.

² Com p. p. 185.

³ A deep strait separates the islands of Bali and Lornbok.

⁴ See sections, p. 51.

chief of which take their origin in an elevated region (the Pamir) to the north-west of India (72° - 76° E.). From this centre the Himalayas proceed south-eastwards; the Kuen-lun Mountains proceed east and slightly south; the Tian-Shan Mountains more towards the north-east.

(3.) While the great mountain ranges of Europe mostly form water-partings, those of Asia are pierced by many river valleys, and hence many of the mountain passes of Asia are not across the heads of valleys, but through narrow denises along river-banks, or in their neighbourhood.

Rivers.—The principal rivers of Asia are necessarily of much greater length than those of Europe. All except those of the Siberian plains rise in the central plateau and flow east, south-east, or south to the Pacific and Indian Oceans. Since all these belong to the monsoon region,¹ they are all liable to overflow their banks in summer, while at all seasons of the year they are fed with copious supplies of water from the elevated areas in which they have their head-streams. In the interior, both on the high plateau from which the encircling mountains cut off the supplies of rain,² and in the plains of the west, between the Caspian Sea and the mountains, there are numerous rivers which after a longer or shorter course dry up in sandy deserts, their water being partly absorbed by the porous soil, partly evaporated. Such rivers are, however, of the highest importance, since on their banks are found fertile oases, sometimes with large towns for their centre.³

Lakes.—The fresh-water lakes of Asia compared with those of North America, Africa, and even Europe (if we consider the relative extent of the continents), are few and unimportant. The largest, **Lake Baikal**, on the Siberian slopes of the mountains in the north-east, is about half the size of Ceylon. On the other hand, there are large inland seas of salt or brackish water,⁴ besides an immense number of small salt lakes in the low-lying region adjoining Europe south of the Ural Mountains, and other salt lakes elsewhere. The **Caspian Sea**, 170,000 square miles in area (about one-seventh larger than Bengal), is the largest inland sheet of water in the world. The **Sea of Aral** (about equal in size to Ceylon) is inferior in size only to the largest lakes of Africa and America. **Lake Balkhash**, the next in size, is smaller than Lake Baikal—less than one-third of the size of Ceylon.

¹ See Introd., pars. 67, 90.

³ See par. 66, 73, 181, 263, 265.

²

⁴

See Introd., par. 94.

See Introd., par. 40,

Climate.—From its more easterly position, Asia* has a climate subject to greater extremes of temperature than Europe.

Owing to the great width from east to west of the land-mass to which it belongs, the coldest area in the world lies towards the north-east of this continent, and it is a fortunate thing for that part of Asia which lies to the south that the mountains intervene to shelter it from the cold winds that would otherwise sweep down on it from this area.²

The **rainfall** is insufficient, not only, as already intimated, in many parts of the interior, but also in the south-west (as far east as the Indus valley), where the southerly winds of summer blow not over the ocean, but over Africa or both Africa and Arabia. On the other hand, in the monsoon region in the south-east, and especially in the tropical portion of it, the rainfall is very abundant.

The region just referred to, including the whole area from India to the north of China, together with the islands of the Eastern Archipelago and Japan, is that which contains the great mass of the Asiatic population. It comprises, according to the best estimates, seven-eighths of the inhabitants, although not very much more than a quarter of the area. In the rest of Asia, the average density of the population is only about eight to the square mile. The principal parts in which a greater density is found are the western skirts of the central tablelands and some districts in Asia Minor.

People.—Most of the **inhabitants** of Asia belong to **two types**, the **Mongolian** and Caucasian, the former characterised among other things by yellow complexions without ruddy tinge, small almond-shaped obliquely set eyes and high cheek-bones; the latter by a fair complexion, usually with a ruddy tinge, low cheek-bones, and round eyes set straight. Of the Mongolian type (most abundant in the East) the Chinese are the most numerous representatives, as the Hindus are of the Caucasian. Each type is broken up into great groups, the languages of which are entirely distinct from each other, while the groups are themselves subdivided into smaller groups speaking allied languages.

Among the races of the Mongolian type, the most important of the great groups are the Chinese and Anamese, the Finno-Tatars, inhabiting Siberia and western Asia, and the Malays³ in the south-east. Of those of the Caucasian type, the chief great linguistic groups are the Aryan

¹ See *Introd.*, par. 92.

² See *IntrocL*, par. 94.

³ See pp. 168. 172.

(comprising Hindus and Iranians) and the Semitic (of which the Arabs are now the principal representatives). To this type belong also the majority of the inhabitants of the Caucasus (whence the name Caucasian).

As regards **religion**, Asia is remarkable as the cradle of all the great religions of the world—Judaism, Christianity, and Muhammadanism; Zoroastrianism, Brahmanism, Buddhism. The first three of these arose among Semitic peoples, the others among Aryans. **Brahmanism** or Hinduism, **Buddhism**, and **Muhammadanism** are now the prevailing religions, the first in India, to which it is confined, the second throughout the monsoon area, except in India, the land of its birth, and the third in western Asia and partly in India and the Eastern Archipelago.

ASIATIC COUNTRIES.

I. COUNTRIES OUTSIDE OF THE MONSOON REGION

1. SIBERIA.—Position, Size, Population.—Siberia is the Asiatic continuation of the more northerly parts of Russia in Europe, and in the north-west is politically as well as physically separated from Russia in Europe by the Ural Mountains. Its area is not far short of five millions of square miles, and about five millions make up the number of its settled population—a result chiefly of its severe climate, but partly also of its remoteness from the chief seats of civilisation.

Surface.—Plains occupy the greater part of the west, but mountains and hills cover a considerable area in the east (**Yablonoi** and **Stanovoi** ranges). Amidst these mountains the **Amur** winds on the whole eastwards, partly on the Chinese frontier. Mountains also occupy the southern frontier as far west as the 80th meridian of east longitude. Among these are the **Altai** and other ranges.

Climate, Vegetable, and Animal Products.—Agriculture is the principal occupation of the people, and grain has already risen to the rank of the chief export. The whole of the southern belt as far as 60° N. is described by Russian authorities as being more or less fit for cultivation, though large parts of this track will first have to be cleared of forests, and other areas are at present

marsh-land. For the greater part of the year the ground is covered with snow. The rainfall, though very scanty, occurs for the most part when most required, namely, during the short bright summer, the season of growth. North of this cultivable region the chief products are those of the **forests**, including **furs**, and still farther north lie the treeless moss-covered tundras, in which the only article of value in commerce is the **fossil ivory**, obtained from the remains of an extinct species of elephant (the mammoth¹).

Minerals.—The **mineral wealth** of Siberia is very abundant, the chief mineral being **gold**. At the present time the principal **goldfields** are in the east. The country also contains untouched veins of silver, and extensive deposits of iron ore, lead, copper, and graphite, besides coal. Till recently graphite, found in the mountains to the south of the Yenisei basin, was commercially important, but it is now little worked owing to the competition of Ceylon.

Navigable Rivers.—The chief obstacle to the commercial development of Siberia is the deficiency of communications. The great navigable rivers, the **Lena**, **Yenisei**, and **Ob**, draining into the Arctic Ocean, and the **Amur**, draining into the Pacific Ocean (Sea of Okhotsk), afford with their numerous navigable tributaries a large extent of waterways. To complete the line of water communication between Lake Baikal and the Urals, a canal is being made in about lat. 58° N. connecting the basins of the Yenisei and Ob, and the railway to Perm across the Urals now begins at Tyumen, the limit of navigation on one of the western tributaries of the Tobol. But this route is impeded by rapids on the Angara, the outlet of Lake Baikal; it is stopped by ice for five and a half or six months in every year; it is at best a very circuitous route; and, lastly, it carries the principal products of Siberia to a land which abounds in similar products,² and in which, accordingly, they have a smaller value than they would have elsewhere. On this account it is specially unfortunate for Siberia that its chief navigable streams open into seas so long closed by ice that it is extremely difficult to establish communication by sea with their mouths. Repeated attempts have been made to utilise the Yenisei for commerce with the west of

¹ The skin of ibis elephant was covered with wool.

² See p. 237.

Europe, and at last success appears to have been achieved. In 1890 two vessels which sailed from London reached a port 160 miles up the Yenisei, and were able to return with, cargoes the same year.

Postal Road and Chief Towns.—A great postal road traverses Siberia from end to end, beginning at Tyumen, and ending at the port of Vladivostok, on the Sea of Japan. It passes through the towns of Omsk, Tomsk, Krasnoyarsk, Irkutsk, round the south end of Lake Baikal (whence there is a branch to Kiakhta), to the valley of the Shilka, then follows that valley (passing through Nerchinsk) till it opens into that of the Amur, descends the latter valley to the opening of the valley of the Ussuri, and,



FIG. 21.—WINTER TRAVELLING IN SIBERIA.

lastly, proceeds southwards up the Ussuri valley and across the low water-parting at its head to Vladivostok. The laying of a railway along this route has been determined on by the Russian Government, and already steps have been taken with a view to railway construction in the Ussuri valley, which is attracting numbers of settlers. At present wheeled vehicles are the chief means of travelling in Siberia in summer, and sledges in winter.¹

¹ See Appendix, par. 54.

Of the towns above named, Kiakhta, on the frontier opposite the Chinese (Mongolian) town of Maimachin, a little to the east of the Selenga, is worthy of note as the seat of a considerable trade with China, which exchanges tea and some minor articles for furs and other Siberian and Russian products. The chief towns of Siberia not on the great postal road are Tobolsk, at the confluence of the Irtysh and Tobol; Yakutsk, a centre of the fur-trade, on the bend of the Lena that brings that river nearest to the Sea of Okhotsk; Yeniseisk, on the Yenisei; Semipalatinsk, on the Irtysh.

2. RUSSIAN CENTRAL ASIA.—Position, Area, and Distribution of Population.—To the south of western Siberia the greater part of the territory west and north of the Chinese, Indian, Afghan, and Persian frontiers is either directly under Russian administration or under Russian influence. There still remain the two semi-independent Khanates of Khiva (now confined to the west bank of the Amu) and Bokhara (including part of the Pamir). The whole area is about one and a half million square miles, the population less than five millions. This population is chiefly collected in the south-east, where the valleys opening out from the Tian-Shan Mountains contain the most fertile and best watered soil, and where accordingly there is a settled population pursuing agriculture. Farther to the north and west, agriculture can be carried on only in the neighbourhood of rivers, which supply water for irrigation, and the chief towns are the centres of oases seamed with canals led from the rivers for that purpose. Among the objects of cultivation, cotton is one of rapidly growing importance. The people are mainly of Turkish race, and the region is hence frequently known as Russian **Turkistan**.

Rivers and Chief Towns.—The principal rivers are the *Hi*, which finally flows through a swampy delta into Lake Balkhash; the *Sir*,¹ which flows into the north, the *Amu*,¹ which flows into the south of the Sea of Aral; the Zerafshan, which rises among the southern mountains, but after a westerly course dries up in the sands; and the Murghab, which enters this region from Afghanistan in the south, and also dries up. On or near the *Sir* stand Khokand and TASHKENT, the latter the principal town in Central Asia; near the Amu, Khiva; on the Zerafshan, Samarkand and Bokhara; on the Murghab, Merv.

The greater part of the region consists of steppes, roamed over by nomadic tribes (Kirghiz, &c), who dwell in felt tents, called yurtas, and rear horses, cattle, and camels. Muhammadanism is the prevailing religion.

¹ To these names the word *Darya*, meaning " river," is often added.

Communications and Commerce.—Most of this territory is under Russian sway, and even where not directly subject to Russia is under Russian influence. A railway (the Trans-Caspian Railway) has been constructed by the Russians from the Caspian Sea south-eastwards near the line of the Persian frontier, and then across the desert north-eastwards by way of Merv and Bokhara to Samarkand. The construction of this railway has led to a great development of trade with European Russia.¹ Formerly a large trade with India was carried on across the mountains of Afghri-nistdn,² but this trade was first greatly diminished by the customs duties imposed when the territory came under Russian rule, and has now been almost extinguished through the construction of the railway just mentioned



FIG. 22.—A YURTA OR FELT TENT OF CENTRAL ASIA.

3. CAUCASIA AND ARMENIA.—**Position, Surface.**—These are mountainous territories lying to the south-east of Russia in Europe, between the Black Sea and the Caspian. Caucasia takes its name from the **Caucasus Mountains**, a range which stretches from west-north-west to east-south-east for a distance of 700 miles, and has several summits above 16,000 feet (**Elbruz**, 18,500 feet). The principal **pass** in the chain lies about the middle, just to the east of Mount Kazbek, and is now crossed by a well-made Russian road through the **gorge of Dariel**.

¹ Raw cotton being the leading import into European Russia. - See p. XI.

The western half of the chain is the narrower, the eastern half spreading out to a considerable extent on the north, where it consists of an assemblage of lofty plateaux, natural fortresses bounded by huge precipices, which are washed at their base by torrents.

A still greater contrast is presented by the north and south. On the north, steppes occupied by nomads and their herds come close up to the base of the mountains, while on the south, protected by the mountain barrier from cold winds,¹ and hence from winter frosts, the orchards of the lower slopes are succeeded by vineyards, cornfields, and pastures in rich alternation.

The **Armenian Plateau** is separated from the Caucasus by a line of valleys, traversed by two rivers flowing in opposite directions—the **Rion** to the Black Sea, and the **Kur** to the Caspian. It is composed of a number of mountain-traversed table-lands, two of which are so completely isolated as to be occupied by salt lakes² (**Van** and **Urumfa**). **Lake Gokcha** is almost completely enclosed by mountains, from which it receives numerous influents on all sides, but it has an outlet to the **Aras** (tributary **Kur**), and is therefore fresh. Among these table-lands are the head-waters, not only of the **Kur** and its tributary the **Aras**, but also of the **Tigris** and **Euphrates**. The table-lands are mostly steppe-like in character, and hence the occupations of the people are mostly pastoral; but agriculture is also largely pursued, and fruit-trees are abundant.

People.—The isolation both of the valleys of Caucasia and the table-lands of Armenia is illustrated in several ways by their inhabitants. The Caucasus is inhabited by a large number of tribes belonging to the type which takes its name from this region, but speaking languages wholly distinct from those of the **Aryan** stock, and even in some cases from each other. Independent, and lovers of freedom, like all mountain tribes, they have been brought under one rule only through being conquered by Russia in the present century after fifty years of conflict; and one of the chief tribes, the **Circassians**, rather than submit to the Russian yoke, migrated to Turkey and settled there among fellow-Muhammadans.

The **Armenians**, another people of Caucasian type, are peculiar both in language and religion, the latter being an ancient and

See In *trod.* par. 94, and the pages referred to in the note.

² See *Intro.*, par. 40.

independent branch of Christianity. Cattle-rearers and tillers of the ground at home, they emigrate in large numbers, and are among the principal traders in the countries round the east end of the Mediterranean. The Armenians have never attained political unity, however, nor have they been able to keep out foreign elements from their isolated table-lands, which are in many places the haunts of nomadic plundering **Kurds**.

Government and Chief Towns.—At present Armenia is divided among three states, all the three divisions meeting in Mount Ararat, an extinct volcano 17,000 feet high. The northern division, with the town of Erivan and the fortress of Kara in the west, and the Aras region in the east, belongs to Russia; the south-western division, with Lake Van and the town of Erzerum, to Turkey; the south-eastern division, with LaLe Urumia and the town of TABRIZ, to Persia.¹

The whole of the Russian territory in this part of Asia forms the Lieutenancy of the Caucasus, which is divided into Cis-Caucasia, north of the Caucasus Mountains, and Trans-Caucasia (including Russian Armenia), to the south of that chain. The seat of government is **TIFLIS**, about the middle of the line of valleys between the Caucasus and the Armenian plateau. It stands² in a fertile district on the Kur, at the place where the main road and the railway which now run through this line of valleys are crossed by the road through the gorge of Dariel. This latter road connects the railway just referred to with the railway system of European Russia at Vladikavkaz. Among the other towns of this region are Baku, the eastern or Caspian terminus of the Trans-Caucasian railway, the centre of a district rich in petroleum; Batum and Poti, on the Black Sea, the two western termini of that railway, and, in Cis-Caucasia on the Caspian Sea, Derbent, from which a road passes round the eastern end of the mountains to Baku. The petroleum production of Baku is rapidly increasing, and from this region India is consequently deriving a larger and larger proportion of its import of kerosine, which is made from petroleum.

4. TURKEY IN ASIA.—The territory under Turkish rule in Asia comprises Asia Minor with part of Armenia (see above), Syria, Mesopotamia, and parts of Arabia (see p. 75).

Asia Minor.—**Size, Population, Surface.**—This peninsula comprises an area about three-fourths larger than that of the Punjab, but a population probably less than six millions—a population certainly much below what it was in ancient times when the condition of the peninsula was much more flourishing than it is now. As regards the form of the surface, it is a plateau upwards of 3000 feet in height, bordered on the north and south

i Comp. p. 78.

² See Introd., par. 114(6).

by mountain chains parallel to the sea-coast, but opening on the west by numerous valleys, the submerged portions of which, as in the opposite Balkan peninsula,¹ now form gulfs lying between rocky promontories and behind a breastwork of islands. The principal continuous mountain range is that on the south, the **Taurus**, which follows the windings of the coast, till in the east it turns inland north-eastwards, and is succeeded by the lower range of the Anti-Taurus. In the portion that trends northwards is the gorge known as the Cilician **Gates**, through which the descent is made from the table-land to the fertile **valley of Adana** in the extreme south-east of the peninsula.

Rivers.—Most of the rivers in the south are mountain torrents from the Taurus range, the general slope of the plateau (except in the west) being towards the north, where the **Halys**, or **Kizil Irmak**,² pierces the mountains before entering the Black Sea by a delta. On the west the principal rivers are the Gediz **Chai** and the **Menderes**, the latter being the ancient *Meander*, which on account of its numerous windings has given a word to the English language. At the broadest part of the peninsula the drainage of the interior is inland, and here a large salt desert has at its lowest part a long and shallow salt lake.⁸

Climate and Products.—This salt desert is the most arid part of the peninsula, but the rainfall is scanty everywhere within the border mountains.⁴ Only in the western valleys, where the rivers afford the means of irrigation, does cultivation ascend far into the interior, and there the products are those of the warmest parts of the Mediterranean peninsulas—not only sweet wine, olives, oranges, figs, raisins, and other fruits, but also tobacco and cotton, as well as mastic.⁶ On the inland steppes sheep are reared, and the district of Angora, adjoining the salt steppe on the north, is famous for a silky-haired race of goats (whence Angora wool).

People and Towns.—The inhabitants of the interior are chiefly Turks; on the coasts, where the largest towns have always lain, there are still many Greeks, as there were in ancient times. Of the coast towns now existing, the most important is **SMYRNA**, at the head of a deep inlet about the middle of the west coast, and now the terminus of three railways

¹ See pp. 254, 256-7.

²

Turkish=Red River.

³ See In trod., par* 40. ⁴ See In trod., par. 94.

⁵ A kind of resin.

ascending the three most productive valleys of this region. It is the last survivor of a number of ancient seaports (*Miletus*, *Ephesus*, and *Phocaa*),¹ most of which have decayed through the silting up of their harbours. Konieh, on the south-west of the inland salt steppe, is the meeting-place of the chief routes of the camel-caravans that cross the table-land. Brussa, a little to the south of the Sea of Marmora, is celebrated as having been the capital of the Turkish Empire before the Turks gained a footing in Europe. Scutari, on the Bosphorus, is a suburb of Constantinople. From Trebizond, on the Black Sea, in the east of the peninsula, an important trade is carried on by way of Erzerum in Armenia with northern Persia.

Islands.—Of the islands, Samoa, about the middle of the west coast, is tributary to Turkey, but otherwise independent. Cyprus,² off the south coast, about one-sixth of the size of Ceylon, consists of a plain, furnishing wine, cotton, and other products, stretching between two bays in the east and west, and ranges of mountains in the north and south. It is now under British administration, though still nominally a part of the Turkish Empire. Its capital is Nicosia, in the plain; its chief port, Larnaca, on a bay in the south-east.

Syria (including, in the south, the ancient Palestine).—Surface and Drainage.—The greater part of this province (lying to the east of the Mediterranean Sea) is a plateau varying from about 1,500 to upwards of 2,500 feet in height, but it is traversed from north to south by a trough or depression, the southern portion of which is one of the most remarkable valleys in the world. This is the valley of the Jordan, the greater part of which is below sea-level, and is without permanent inhabitants. The river, which flows southwards, terminates in the Dead Sea, a lake of extreme saltiness,³ the surface of which is nearly 1,300 feet below the level of the Mediterranean. The northern part of this trough, the part that lies between the mountain ranges of Lebanon and Anti-Lebanon, is, on the other hand, at a considerable elevation. It is drained northwards by the Orontes, which finally turns west and enters the Mediterranean. The Lebanon Mountains give name to a tree, the cedar of Lebanon, very closely resembling the deodar or Himalayan cedar.

¹ Smyrna owes its continued existence to the fact that the river which entered the inlet on which it stands entered not at the head of the inlet, but on the north side, where its deposits extended the coast-line without blocking up the entrance to the gulf. In order to keep this inlet open for large ships, the mouth of this river has been diverted farther to the north, so that the river enters the inlet no longer.

³ Anciently rich in copper, this island derives its name from the Greek word for that metal.

* See Introd., par. 40.

Population and Products.—This province also presents num-

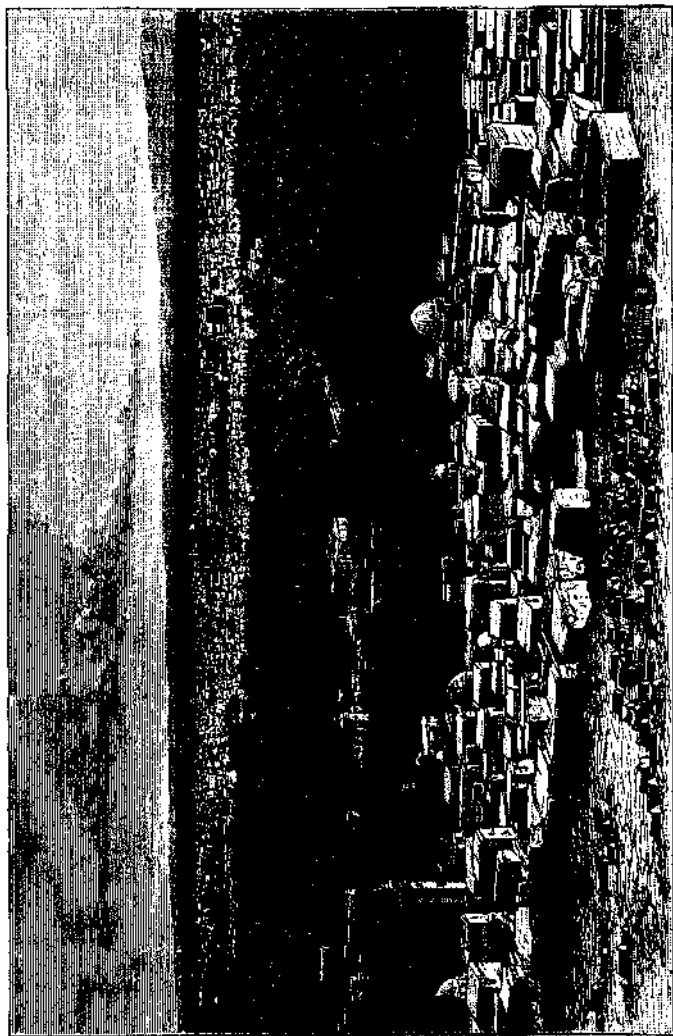


FIG. 23.—DAMASCUS. (By the kind permission of Messrs. Nelson & Sons.)

berless indications of the decline following **upon** misgoverament. The **population** is estimated to be less than a tenth of what it

once amounted to. The soil, in many places remarkably fertile, is to a large extent impaired by neglect; terraces for cultivation on the hill-sides have been allowed to fall in ruins; and the general neglect has injured even the climate. The agricultural **products** are those characteristic of the Mediterranean generally;¹ but the **silk** of the Lebanon, the **tobacco** of Latakieh, and the **oranges** of Jaffa may be specially mentioned. A short distance to the east of the Jordan and the Lebanon Mountains begins the great Syrian desert, which extends to the Euphrates.

Ancient Phœnicians.—In ancient times (as far back as three thousand years ago) part of the Syrian seaboard was the home of the Phœnicians, the earliest of the great mercantile nations of the Mediterranean of whom anything is known. They were probably the first to carry on a trade between India and the countries round the Mediterranean. Their chief cities were *Tyre* and *Sidon*.

Chief Towns.—The chief port is BEIEUT, which has taken the place of the ancient Tyre and Sidon, whose shipping has been destroyed by the rise of the coast. Like all the other Syrian ports, Beirut has no harbour, but it has a tolerably good roadstead, and now has the advantage of a road across Mount Lebanon, and through the breach in the Anti-Lebanon made by the Barada, the river of DAMASCUS. It is hence the port of this ancient oasis, which is now, as it always has been, a great centre of the caravan trade north, east, and south across the deserts. Beirut now has a rapidly growing trade and population. Alexandretta, or Iskenderun, to the north of Beirut, is the port of Aleppo, which, in the days when a large part of the trade of the East was carried on by way of the Persian Gulf and the Euphrates valley, was a commercial centre of the first rank. The now scanty trade of Aleppo with its port is still carried on by means of costly caravans, though a carriage-road, much neglected, connects the two places. A good road connects **Jaffa** with Jerusalem, and a railway between these two places is now in progress. Jerusalem, the capital of ancient Judæa, a sacred city both in the eyes of Jews and Christians, is situated at the height of about 2,600 feet to the west of the mouth of the Jordan.

Mesopotamia.—Both this name, derived from the Greek, meaning "the middle of the rivers," and the Arab name **£1 Jezireh**, meaning "island," refer to the two great rivers **Euphrates** and **Tigris**, by which, in fact, the region is almost islanded. These two rivers, after quitting the Armenian plateau, first diverge, but afterwards approach one another to within a distance of about thirty miles, and now ultimately unite to form the **Shat-el-Arab**, before entering the head of the Persian Gulf, into which in ancient times they flowed separately. To these streams the

¹ See p. 70.

region owes all its fertility. The rains are too scanty for agriculture, but the inundations due to the melting of Armenian snows annually cover the adjoining surface with layers of rich soil, and at the same time supply the necessary moisture. Consequently this region has always been occupied at least by a tolerably dense population, and the density has reached at different times and at different places a very high degree round great towns, such as *Nineveh*¹ and *Babylon*, which arose on or near the banks of one or other of the rivers, and became the centres of powerful states.²

Chief Towns.—On the Tigris such towns have always stood at points from which roads ascend to convenient passes in the eastern highlands. At the present day there are only two considerable towns, Mosul in the north, and Bagdad farther south.³ Both are decayed towns, having been at one time places of great splendour and renown. "When the Arabs were at the height of their power, Bagdad was the capital of their empire. At the same time Mosul was noted for its fine cotton fabrics, which were exported far and wide, and have hence given a name to such fabrics (muslins) in several European languages. On the Shat el-Arab stands Basra or Bussora, a port accessible to sea-going ships, and well known for its export of dates and other fruits.

5. ARABIA.—Position, Size, Surface.—Arabia is the largest peninsula in the world, being upwards of a million square miles in extent, or fully twice the size of the peninsular portion of India, which it also exceeds in average elevation (3,500, as against about 1,800 feet). One half of the peninsula lies to the south of the Tropic of Cancer.

The mountains of Arabia are situated along the coasts, and especially along the Red Sea coast in the west, and the Gulf of Oman in the south-east. Less elevated are the heights along the south coast facing the Indian Ocean, and along the east facing the Persian Gulf. In the extreme north-west, between the Gulfs of **Suez** and **Akabah**, the northern branches of the Red Sea, the granite **Mount Sinai** rises abruptly⁴ to the height of more than 9,000 feet amidst a rocky peninsula.

Nearly the whole of Arabia is scantily supplied with rain, and the coast mountains rob the interior of rain almost entirely.⁶ Hence in the north and south the greater part of the interior is

¹ The capital of the ancient Assyria.

³ See *Introd.*, par. 107.

* This was the seat of empire of Harun-al-Rashid, so well known from the "Arabian Nights."

⁴ See *Introd.*, par. 29 (1), p. 14.

• See *Introd.*, par. 94.

an utterly uninhabitable desert. Only in the middle the region known as the **Nejd or Negd** is studded with numerous date-crowned oases, the home of the Beduins or nomadic Arabs, who rear with care and affection immense numbers of horses and single-humped camels—both of these among the finest in the world. Here, too, ostriches and gazelles bear witness to the likeness which this part of Asia presents to Africa (see p. 264).



Distribution of Population.—The settled population inhabits the coast-strips, and above all the

*AD ON WHICH
A CAMEL'S LOAD
is LAID,

more mountainous tropical portions, which are the best supplied with rain—**Yemen** and part of **Hejaz** in the west, **Oman** in the south-east. Even in these districts, however, the rains are only periodical, and sometimes fail for years together, and hence water has from the remotest period been carefully stored in tanks for irrigation. Among the products of these regibns, besides the date and coco-nut^x palms, durrah² and other grains, are numerous aromatic trees and shrubs, balsam, gum, frankincense, as well as the celebrated **coffee** which takes its name from the port of **Mocha**, whence it was at one time chiefly exported.

Government.—Politically the greater part of the west coast is part of Asiatic Turkey, and so also is the northern half of the strip on the Persian Gulf, but even in these parts the Arabs have an organisation of their own. Small groups of families acknowledge the authority of a **sheikh**, and the subjects of several sheikhs recognise the supremacy of an **emir**. The most powerful emir is the Imaum of **Maskat** (Muscat), who rules over Oman. The fortress of **Aden**, with its fine natural harbour and a small district round on the south coast near the Straits of Babelmandeb, belongs to British India, being attached to the Presidency of Bombay. Under the same government is the island of **Perim**, in the narrowest part of the Straits of Bab-el-Mandeb.

The Arabs, now the most numerous, long the most aggressive, of the Semitic races, inhabit nearly the whole peninsula, but their true home is

¹ Frequently spelt *cocoa-nut*, but throughout this text-hook *coco-nut*, to avoid confusion with the cacao tree, from which the so-called cocoa is obtained.

² The *joar* of India.

the plateau of Nejd, whence have issued all the continuous streams of Arabs, who, soon after the founding of the Muhammadan religion, spread in conquering armies eastwards to Persia, and westwards to the Iberian Peninsula, and established in the Middle Ages splendid monarchies both in the East and West, and have since then constantly spread as traders through eastern and inner Africa, as well as in Asia as far as the Eastern Archipelago.

Chief Towns.—The most celebrated towns are in the Turkish portion of the peninsula on the west. Here, about the middle, is Mecca, the birth-place of Muhammad,¹ the founder of the Muhammadan religion, the sacred city of the ancient Arabs, and now of all Muhammadans. At the pilgrimage, or *Hajj*, which takes place in spring, myriads of pilgrims, attended by immense troops of camels, assemble for worship and trade. To the west is Jedda, the port of Mecca; to the north Medina.

6. I R A N I A.—Position, Size, Population, and Government.—This is a general name applied to the table-lands between Mesopotamia and the plains of the Indus, and thus embraces an area of about a million square miles wholly outside of the tropics (nowhere below 25° N.). The population, however, is estimated at only about twelve millions, a consequence partly of the nature of the surface and climate, partly of the state of government.

The western half of Irania forms the kingdom of Persia; the eastern half is divided between Afghanistan in the north and Baluchistan in the south.

Surface.—The table-lands of Irania have an average elevation about equal to that of Arabia (3,500 feet), and are begirt and traversed by mountain-ranges, the passes across which are generally high and inconvenient. In the western half the mountains generally trend south-eastwards (in a direction corresponding to that of the Caucasus), while in the east they have an east and west trend on the north and south, a northerly trend on the eastern borders (Sulaiman Mountains), and a north-easterly trend on the north-east. There the lofty range of the Hindu Kush (higher than the Alps) separates some of the most elevated and secluded valleys in the world; those on the south-east draining to the Indus, those on the north-west, including the Pamir Plateau, to the desert region of inner Asia. In the west the loftiest mountain-range is that of the Elburz, parallel to the

¹ Born A.D. 571. The Muhammadans reckon time from the date of the flight of Muhammad from Mecca to Medina, on the occasion of a rising against him in the former city. The date of the flight or *Hgra* (Hegira) was July 6, 622, which is hence the beginning of the Muhammadan era.

so\nh shore of the Caspian Sea, and at no great distance from it. At the head of the Persian Gulf, on the south-west of the table-lands, there is a fertile but sparsely peopled plain traversed by the **Kaxun**, the only navigable river in Persia. Its navigation is interrupted by rapids at Ahwaz, to which place (107 miles above the seaport of Mohammera) the navigation was thrown open to all nations in 1888.

Products.—Cultivation everywhere demands irrigation, and is thus confined to the borders of the rivers and the bases of the mountains,¹ into the heart of which canals (**karezes**) are often pierced till water-bearing beds are reached. Wheat, rice, cotton, tobacco, and opium are grown. Fruit-trees are abundant (the peach, a native of western Irania). The date-palm² flourishes in the south-west and south, but is banished from the interior by the winter cold due to exposure to the north-east winds. Nomads inhabit the districts incapable of cultivation, rearing horses and camels, the two-humped camel now replacing the single-humped camel of Arabia.

People.—The inhabitants of Irania are mainly of Aryan race and language, and, indeed, the tablelands of this region are believed by some to include the centre from which that now widely extended stock dispersed. The **religion** is almost everywhere Muhammadan.

Persia.—**Size, Population, Government.**—The western part of this region, comprising an area equal to about six times that of the Punjab, and a population roughly estimated at seven and a half millions, is under the despotic sway of the Shah of **Persia**, the eastern boundary of whose territory is a line drawn for the most part between 61° and 62° E. This boundary passes through a tract everywhere sparsely peopled and in a great measure desert. Twice it crosses the reedy **swamp of Seistan**.

Religious Sects.—The Muhammadans of **Persia**, as well as some of those to the east of this frontier, belong to a sect regarded as heterodox by the rest of the Muhammadan world. They are called **Shiahs**, and the chief ground of division between them and the other Muhammadans is that they reject the Sunna, or body of traditions supplementary to the Koran held sacred by the other Muhammadans, who are known as Sunnites. In the desert (chiefly round Yezd) are a few adherents of Zoroastrianism.

¹ See Intro., par. 94.

s See p. 264.

Chief Towns.—The capital of Persia is **TEHERAN** (200), at the base of the Elburz Mountains, on their south side. Even more populous is **TABRIZ** (300), in the north-west, on the Armenian plateau,¹ centre of the northern trade with western Europe, now chiefly carried on by way of Trebizond. The sacred city of **Meshed** (a Shiite Mecca) is the principal centre of trade in the north-east of Persia (Khorassan), where Russian trade has greatly extended since the construction of the Trans-Caspian railway. North of the Elburz Mountains the chief seats of the Caspian trade with the ports of Russia and Trans-Caucasia (Baku) are **Resht** and **Balfrush**, both situated a few miles from the coast. The bay of Enzelli forms the harbour of Resht. In the region to the south of Teheran, the towns of **Hamadan**, **Ispahan**, **Yezd**, and **Eerman** succeed one another at intervals of about 160 to 200 miles on a line nearly parallel to the trend of the south-western mountains. **Ispahan**, the former capital of Persia, was one of the residences of the Caliphs² in the glorious days of the Arabs. To the south of Ispahan, in the midst of the mountainous territory that formed the country of the ancient Persians, not far from the ruins of the ancient Persepolis, lies the lovely town of Shiraz, celebrated for its rose-gardens, vineyards, and nightingales. In the part of Persia to which these last five towns belong, the trade is almost entirely in British and British-Indian hands. The routes by which it is chiefly carried on are those leading to the sea-ports of Bender Abbas or Gombroon, Lingah, and Bushire on the Persian Gulf, and the Turkish port of Bagdad on the Tigris. Of the Persian ports just named, **Bender Abbas** is situated at the entrance to the Gulf, on the Strait of Ormuz, opposite the small island of Ormuz, which was made an important seat of trade by the Portuguese in the sixteenth century, **Lingah**, about 100 miles farther west, and **Bushire**, on the east side of the Gulf, to the west of Shiraz. The only other Persian seaport that need be mentioned is **Mohammera**, on a short channel connecting the Shat-el-Arab with the **Karun River**.

Foreign Commerce.—The chief **export products** of Persia are opium, raw silk, rice (from the plains on the Caspian), tobacco, wine, cotton, box-wood (from the Caspian provinces), wool (chiefly from Khorassan), gums, and various drugs and dyes; among manufactured articles, carpets. The chief imports are manufactured articles, besides tea and sugar, those from India consisting mostly of cotton fabrics and yarns and tea.

Afghanistan and Baluchistan.—The territory between Persia and India is mainly divided between these two countries, but part of it is now under British rule, and part occupied by independent tribes.

The part under British rule extends from the Sulaiman Mountains westward nearly to 60° E. on the north of Baluchistan, including (1) in the west the high valley of **Pishin** (average height about 5,000 feet), with the Khwaja (Khoja or Khojak) Amran

¹ See p. 69.

² The title of the successors of Muhammad,

Maun tains, which form the western boundary of this valley; (2) in the south-west, the whole route of the railway which has been laid from Sukkur in Sind* to Pishin, and for the continuation of which towards Kandahar a tunnel nearly 2½ miles long has been pierced through the Khwaja Amran range, and (3) on the north-west the valley of the Zhob, a tributary of the Gumal (Gomul).

Almost the whole region is high and mountainous, being traversed by spurs of the Sulalman Mountains, but it embraces also part of the desert plain of Kachh to the south. The railway just mentioned forms a loop before entering Pishin, one branch ascending by the Nari Pass, the other (western) branch by the Bolan Pass (5,800 feet) and the town and fortress of Quetta (5,600 feet above sea-level). Workable deposits of coal and petroleum have been found on or near the route of this railway.

The independent tribes beyond the limits of Afghanistan occupy a number of high valleys north of the Kabul Eiver, which flows eastwards into the Indus about the 34th parallel, and receives the drainage of most of the valleys occupied by these tribes. Their territory lies between the Hindu Kush Mountains on the north-west and the frontier of India (including Kashmir) on the south-east, and thus includes part of the main valley of the Indus.

The territory under the rule of the Amir of the Afghans is divided into well-marked regions by mountains, which form water-partings. First may be noticed a series of mountain ranges which stretch almost entirely across the country from east to west. It begins in the north-east with the Hindu Kush Mountains, trending from east-north-east to west-south-west, then, assuming a nearly east and west direction, takes the name of the Koh-i-Baba range, and finally, about 66° E., divides into three ranges, all of which have a more or less westerly trend. The southernmost of these three ranges is called the **Siah Koh** or Black Mountains.

Southern and Eastern Part of the Amir's Territory.—Surface Features and Drainage.—To the south of the Siah Koh range the Koh-i-Baba and the Hindu Kush, most of the minor ranges have a more or less south-westerly trend, and most of the rivers have a similar direction.

The Kabul, however, has an easterly course, and some of its tributaries flow to the north-east. The chief river of this region is the Helmand, which, after a long south-westerly course, ultimately turns to the north,

¹ See p. 121 (2) and p. 155.

and ends in one of the lakes at the north end of the Seistan swajmp. Its chief tributary, the Arghandab,¹ and many other rivers belonging to the same basin, have the same general direction as the first part of its course.

Chief Towns.—**Kabul**, the capital, with a citadel adjoining, called the Bala Hissar, on the Kabul River, at the height of about 5,800 feet above sea-level, 190 miles by carriage-road from Peshawar in the Punjab. Jalalabad (Jellalabad), lower down on the same river, at the height of 1,950 feet, to the south-west of Kdbul. **Cthazni** (Ghuznee), at the height of upwards of 7,000 feet, near the source of the Tarnak, one of the tributaries of the Arghandab, a few miles distant from the more ancient town of the same name, the capital of Mahm&d of Ghazni, the first Muhammadan invader of India (A.D. 1001); farther to the south-west, in the same river valley, the fortress of Khelat-i-Ghilzai; and still lower, between that river and the Arghanddb, the fortified town of Kandahar, at the height of about 3,500 feet, about 150 miles north-west of Quetta.

The Western Valleys.—In the valleys between the three nearly parallel ranges to the west of the Koh-i-Baha² range are the upper courses of two rivers which ultimately flow northwards and dry up in the sands in Kussian Turkistan.

Between the Siah Koh or Black Mountains and the middle range, called the Safed Koh or White Mountains, flows the Heri Riid,³ to the north of which, at the height of 2,250 feet, stands Herat, in the centre of a well-irrigated and fertile valley about 120 miles in length by 12 miles in breadth. Between the Safed Koh and the northern range, known as the Tirband-i-Tiirkistan Mountains, in a broader valley, are the numerous headwaters of the Murghtfb.

Afghan Turkistan.—Surface Features and Drainage.—The region so called lying north of the water-parting formed by the Tirband-i-Tiirkistan Mountains, the Koh-i-Baba, and the Hindu Kush, includes in the west the lowest, and in the east the highest, plains of Afghanistan.

In the west the sands on the banks of the Amu or Oxus are less than 400 feet above sea-level, whereas in the extreme north-east the region embracing the two chief headwaters of the Amu, namely, the Panj or Penj and the Murghab,* and forming the southern portion of the Pamir, the greater part of the surface is upwards of 13,000 feet in height. **Lake Sir-i-Kol** or Victoria, the highest lake in the world, from which issues one of the headwaters of the Panj, is at the height of nearly 14,000 feet above sea-level. All the rivers in Afghan Turkistan flow towards the Amu, but to the west of 68° E. they all dry up in the sands, or have their water used up for irrigation before they reach that river.

¹ *Ab*, Persian=water.

² *Koh*, Persian=mountains.

³ Also called Hari Rud. *Bud*, Persian=river.

⁴ Not the Murghab named in the last paragraph of small type.

Chief Towns.—Among these are Andkhui, Balkh, Khulm (or Tashkurg&n), which follow one another from west to east, and are all situated in plains irrigated by the lowest waters of streams flowing northwards; Maimana or Maimene, in the hill country to the south of Andkhui; Kunduz, to the east of Khulm, on the first stream that reaches the Amu ; and Faizabad, at the height of about 3,500 feet, on the Kocha.

Faizabad is the chief town of the Khanate of Badakhshan. This Khanate is tributary to the Amir of Afghanistan, but the authority of the Amir over it, as well as over the tribes occupying the still higher Talleys of the Pamir, is little more than nominal.

Chief Passes.—Between the western towns of Afghan Turkistan communication is carried on by numerous easy passes. Farther east, communication is more difficult. The chief passes are: (1.) and (2.) the Unai Pass (above 11,000 feet) and the Irak or Bamirin Pass (nearly 13,000 feet), the latter forming the separation between the Koh-i-Baba and the Hindu Kush, on the route from Kabul to Balkh; (3.) the Khdwak Pass (above 13,000 feet), on the route from Jalalab&d to Khulm and Kunduz ; (4.) the Dora Pass (above 14,000 feet), on the route from Kahul (by Ohitral) to FaizaMd; and (5.) and (6.) the Darkot Pass (across the Himalayas, 14,000 feet) and the Baroghil Pass (across the Hindu Kush, 12,000 feet), on the route from Gilghit in Kashmir to the Pamir. The trade across these passes has been greatly reduced of late years from causes already explained.¹

From the British districts of Afghanistan and the south-east of the dominions of the Amir there is a considerable export of wool to Sind.

Baluchist&n is the country to the south of Afghanistan, composed mainly of arid tablelands, which are inhabited, where not entirely desert, only by sparsely scattered tribes subject to the Khan of Khelat. The government of the whole area is now under the supervision of the agent of the Governor-General of India, and parts of Baluchistan (including the fortress of Quetta) are now included in the British districts.

On the east, Baluchistan is separated from Sind by the Kirthar Mountains (average height about 7,000 feet) and the Pab Hills (average height about 2,000 feet), which succeed the Kirthar range on the south, and terminate in O. Monze in Sind. The principal tribes of Baluchistan belong to two main stocks, the Baluchis, who speak an Aryan language, and the Brahuis, whose language has no known affinities with any other. The capital is Khelat, a fortified town at the height of 6,800 feet, occupying the west side of a well-cultivated plain. The coast-line, 600 miles long, has not a single harbour, but has two or three fair roadsteads, at which a small trade is carried on with British India. In the tables of the trade of British India this branch of trade is entered as with Mekrah and Sonmiahi, Sonmiani being the easternmost of these roadsteads, and Mekran the name of the territory in the south-west of Baluchistan, and the south-east of Persia.

II—THE MONSOON COUNTRIES AND THEIR DEPENDENCIES.

INDIA AND CEYLON.

Approximate latitudes : (South of Europe) north of Kashmir (north of plain of Tokio, Japan), 36°; (Havana) Calcutta (Canton), 23°; (Sierra Leone, Harrar), C. Comorin (middle of island of Mindanao), 8°.

Approximate longitudes : C. Monze or Ras Muari, 67°; C. Negrais, 94° E.

The latitude of India is roughly 14-42° farther south than that of the most southerly point of England.

Longitude and time at Bombay, Madras, and Calcutta.¹ Madras time is that used on all Indian railways.

	Longitude (East of Greenwich)	At Greenwich, Noon.	At Madras, Noon.
Bombay	72°	4 h. 51 m. P.M.	0.30 A.M.
Madras	80°	5 " 21 " "	0°0 " "
Calcutta	88°	5 " 54 " "	0°33 " "

Distance in nautical miles (60 = 691 statute miles) by Suez Canal:
 London to Karachi, 6,100 ; to Bombay, 6,300 ; to Madras, 7,280 ; to Calcutta, 8,000. By the Cape of Good Hope : to Bombay, 10,850 • to • Calcutta, 11,770.

Situation and Physical Features viewed broadly.—There is no part of the world better marked off by nature as a region by itself than India, exclusive of Burma. It is a region, indeed, full of contrasts in physical features and in climate, and one that has never been, strictly speaking, under one rule; but the features that divide it as a whole from surrounding regions are too clear to be overlooked. On the north it is bounded by the Himalayas, the loftiest mountains in the world; on the west, as we have already seen, it is bounded by mountains and deserts; and on the east and north-east, it is not only bounded by mountains, but lofty mountain chains and deep valleys follow one another for hundreds of miles. Elsewhere the boundary is the sea—on the west, the Arabian Sea; on the east, the Bay of Bengal, both of which are parts of the Indian Ocean.

Such frontiers form a natural defence for India such as few other countries of the world possess. By sea India can be successfully attacked

¹ See Introd., par. 18.

only by a strong naval power, and by a strong naval power it is easily defended. On the north and north-east the country may be said to be absolutely secure against attack. At a very remote period, indeed, some of the earliest inhabitants of India appear to have entered the country through passes in the north-east. Still later, when the country was fully settled, it seems to have been once or twice invaded by other northern passes; but by modern armies against modern means of defence India is on these sides almost unapproachable. It is the western frontier of India that is weakest on the land side. By the passes through these western mountains all the great historical invasions of India have taken place. Even there, however, the passes are few and by no means easy.

Within the mountains a vast plain, from about 150 to more than 300 miles in width, sweeps round from the delta of the Ganges and Brahmaputra in the east to that of the Indus in the west. The peninsular portion to the south of these plains is mainly made up of tablelands, varying in elevation for the most part from about 1,500 to 2,000 feet. In some places the elevation is below, in others above these limits. On the west, this tableland advances close up to the sea, and is bounded by the mountains called the Western Ghats; but on the east its boundary is at a greater distance from the coast, and is more winding. The name of Eastern Ghats is sometimes used generally for the whole of this boundary, sometimes restricted to its southern portion.

Details as to the Physical Features.—The Himalayas.—

These mountains stretch for about 1,500 miles with a gentle curve from the extreme north to the extreme east of India. Their limits are not clearly defined. In the north-west they start from that lofty highland region known as the Pamir;¹ in the east they end in another mountainous region, where the general direction of the mountains, like that of the great rivers, becomes nearly north and south, instead of nearly east and west. Throughout their length they are composed of two great parallel chains, of which the more southerly contains all the loftiest peaks. To it, in the State of Nepal or on its borders, belong **Mount Everest**, 29,000 feet high; **Kanchanjangh** (Kinchinjunga), nearly 28,200 feet high; and **Dhaulagiri** (Dhawalagiri or Dwalagiri), 26,800 feet high.

The two Southern Chains of the Himalayas.—These parallel chains, though well marked by the general direction of their crests or lines connecting their highest peaks, and by the long valley or series of valleys which separate them, are far from simple in their parts. Like all great mountain chains, they have numerous spurs striking off in different direc-

¹ See pp. 61, 80.

tions, dividing up their lower regions into a complex system of mountains and valleys, so that the view presented to a spectator in their midst is in many places as varied as it is imposing. Standing on a favourably situated spot, one may see ridge rising beyond ridge, higher and higher, and fainter and fainter in the distance, until in the background the highest summits of all stand out once more clear in the brightness of their everlasting snow. The higher valleys between these lofty peaks are filled with immense glaciers, one of which is at least sixty miles in length. From almost all points of view the snow-clad summits are the most conspicuous feature of the mountains, and to this the Himalayas owe their name, which means "the abode of snow."^x

Rivers that Break through these Chains.—In the valley between the great chains of the Himalayas rise the river Ganges and many of the chief tributaries of the Indus, the Ganges, and the Brahmaputra, so that the southern chain is broken up into many parts by the gorges through which these rivers make their way to the plain. The northern chain is more continuous, but it also is not unbreached, for the Indus, and its great tributary the Sutlej, and the Sampo or Brahmaputra, all rise in the valleys to the north of this chain, and thus have to force their way through both chains of the Himalayas, the Indus and Sutlej in the west, and the Brahmaputra far in the east.

Mountains North of the Second Chain of the Himalayas.—Behind the northern chain of the Himalayas there lies another great valley or series of valleys, at the height of about 12,000 feet, somewhat similar to that which separates the Himalayan chains, and this valley is also overlooked by mountains on the north, which are sometimes spoken of as belonging to the Himalayan system. These mountains are then called the Northern Himalayan chain, and the chain facing it on the south is called the Central Himalayan chain. But these northern mountains are not parallel to the other two throughout their course. For the greater part of their length they crown the edge of the great tableland of Tibet, and thus belong to the Tibetan ranges. In this region they are known as the **Gangri Mountains**. Farther west they connect the tableland just mentioned with the Pamir, and there they are known as the **Karakoram Mountains**. Across these lead some of the highest passes in the world regularly used for trade; and one of the peaks of this chain, a peak now named Mount Godwin-Austen,² rises to the height of 28,250 feet, the highest elevation reached, so far as is yet known, by any peak in the world except Mount Everest.

¹ See *Intro.*, par. 97.

² Formerly known as K, named as in the text by the Royal Geographical Society (London) in 1888 in honour of the first surveyor of the ranges to which this mountain belongs.



FIG. 25.—SCENE IN THE HIMALAYAS, DARJILING.

, In the west, a mountain network connects the Earakoram range very closely with the Himalayan system, but farther east the separation is more complete.

The Gangri Mountains and the Northern (or Central) chain of the Himalayas are, however, connected by one ridge, immediately to the east of Lake Manasarowar, a ridge short but important, inasmuch as it divides the source of the Brahmaputra from those of the Indus and the Sutlej.

Mountains on the Eastern Frontier.—Among the mountains in the east of India are those which bound the valley of the Brahmaputra on the south (the **Neg4, Jaintia, Khisi, and G&ro Hills**), where the river flows from east to west.¹ South from these **run the Arakan Yoma** Mountains on the Burmese frontier.

Mountains on the Western Frontier.—The mountains on the West of the Indian plain are mainly beyond the frontier, and have been mentioned under Afghanistan, but the chief passes across them being of vital importance to the defence of India, are best learnt here. The passes mostly follow the routes of rivers which break through the Sulainian Mountains, or the mountains farther south, and, after crossing the mountains, either empty themselves into the Indus, or dry up in the plains before reaching that river.

The North-Western Passes.—All these passes thus lead directly to the Indus, which flows, however, at a distance of from 50 to 200 miles from the mouths of the passes. Four of the chief passes may be conveniently remembered in connection with four towns on or near the Indus, which axe of importance with respect to commerce or defence in relation to these passes. The towns referred to are, in the order from north to south, Attock, Dera Ismail KMn, Dera Ghazi Khan, and Sukkur, which are situated at the distance of about two degrees of latitude (roughly 140 miles in a direct line) from each other. The first is somewhat to the south of the 34th parallel of latitude, the last to the south of the 28th; but as these places do, not lie due north and south of one another, the actual distance between them in a direct line is more than 450 miles. A fifth town, Bdwardesdbacl or Bannu, was founded near the frontier to defend two other passes which enter the Indian plain about midway between Attock and Dera Ismdil Khdn.

The town of **Attock**, with a fortress adjoining, stands opposite the place where the Kabul River enters the Indus, and may be held to mark the route of the most important of all these passes, the **Khaibar** Pass, which leads from Jalaldbdd in Afghanistan past the cantonments of

i See p. 131.

Peshawar, the terminus of the North-Western Railway of India. Bast of Attock (which is about 74 miles from the mouth of the pasg) this route leads to the great arsenal of Rawal Pindi.

The passes which meet at Edwardesabad are those which follow the Kuram (Kurrum) River southwards and a tributary of the Kuram east* wards across the Sulannan Mountains.

Dera Ismail Khan marks the route of the Gumal (Gomul) River and the Gumal or Ghwalaria Pass, whioh, on the Afghan side of the mountains leads north-westwards to Ghazni, and in a more westerly, slightly southerly direction to Kandahar. The Gumal River is entered on the south by the Zhob,¹ whose valley forms a natural route south-westwards to Pishin and the British fortress of Quetta.

From Dera Ghasi Khan an excellent military road leads westwards to the same fortress across the Sulaiman Mountains, and then through the Tal Pass.

The last important route is that which leads north-westwards past JacobdMd (close to the frontier) from Sukkur, and is now traversed by the railway to Quetta and Pishin² through the Bolan and Nari passes.

The Gbreat Indian Plain.—The plain lying within these border {mountains is, in some respects, of remarkable uniformity, but in mother respects presents contrasts no less remarkable. Almost the whole area is filled with the fine soil which in the course of ages .has been washed by rain and carried by rivers from the mountains on the north and south, and has been spread over the surface -by floods and winds. The contrasts of the plain will be better understood after the climate has been described, but here may be noted one great contrast which may be observed from the -map. The eastern part of the plain belongs entirely to the basin of the Ganges, including that of the Brahmaputra, and is thickly seamed with rivers, large and small, most of these rivers issuing, like the Ganges itself, from the Himalayan mountains, and in the western part of the basin flowing in the same general direction as the Ganges;³ but in the eastern half, flowing more directly southwards, either to the Ganges or the Brahmaputra. The western part of the plain, on the other hand, is traversed only by a comparatively small number of rivers, most of them tributary, directly or indirectly, to its great river the Indus.

Elvers of the Great Plain.⁴—Of all these rivers, the most important to India is the sacred river of the Ganges. It issues from a Himalayan ice*

¹ See p. 79.

² See pp. 78-9.

³ See In trod., par. 35,

⁴ Bee also pp. 97-8, under Alternation of low and high water,

cave near Gangotri, in the State of Garhwal, breaks through the southern chain of the Himalayas, and enters the plain just above Hardwar, becoming navigable almost as soon as the plain is reached, and flows eastwards and southwards to the Bay of Bengal, which it enters after a course of about 1,450 miles. On the left it receives from the Himalayas the Gumti, Gogra, and Gandak (Gunduk), and on the right the Jumna. The only great tributary which it receives directly from the southern tableland is the Son, but the Jumna receives from these highlands two great feeders—the Chambal (Chumbul) and the Betwa. Before entering the Bay of Bengal it unites with the Brahmaputra to form one great delta, the largest in the world, fully one-fourth larger than the island of Ceylon. The Brahmaputra is only in its lower course an Indian river. From its Tibetan source, already mentioned,¹ it flows at least 800 miles eastwards through Tibet, and then in the course of about 150 miles breaks through the whole of the Himalayan system, descending in that distance a height of more than 7,000 feet. On reaching the Indian plain, it flows at first westwards between the Himalayas and the hills of Assam, then turning southwards it receives the Tista (Teesta) on the right from the Himalayas (Sikkim), and lower down the Surma, on the left from the Naga Hills and the valley in the south of Assam.

Nearly all the rivers of this basin are important navigable channels. Vessels of considerable size ascend the Ganges to Agra, above which the navigation is mostly continued by canals. On the Brahmaputra steamers regularly ascend to Dibrugarh, about 50 miles below the place where the river enters the plain. In some parts of Bengal almost every cottage has a navigable stream at its door.

The Indus, after rising, like the Brahmaputra, beyond the frontier of India, first flows north-westwards through Kashmir, along the northern base of the Himalayas proper, and in turning southwards in the north-west of that state bursts through the northern chain of these mountains in a magnificent gorge, said to be 14,000 feet in sheer descent. It arrives on the Indian plain a broad and rapid river, subject to great floods. The chief minor rivers of its basin are spread out like a fan on the east. Farthest east is the greatest of all its tributaries, the Sutlej, which, though rising at no great distance from the Indus, breaks through the Himalayas to the east of Kashmir. Before uniting with the Indus it receives the Beas, and then the Chenab, this latter river having first received on different banks the Jhelam (Jhelum), from Kashmir, and the Ravi. These five rivers, the Sutlej, Beas, Bavi, Chenab, and Jhelam, forming when united the Panjnad, are those which give name to the Punjab, or "land of the five rivers."

Before the influx of this river, the Indus receives no tributary of any consequence on its left bank, and but scanty supplies of water on its right. At its mouth it divides into several arms, but none of these can be easily navigated. Even above the delta navigation is so impeded by shiftings of the river-bed and accumulations of sand, that since the completion of the railway to Karachi² the steamer service on the river has been abandoned.

A few smaller and comparatively unimportant rivers,³ the chief of

i See p. 86. 2See p. 121 (2). 3 see p. 140.

whifh is the **Luni** or **Loni**, traverse the plains of R4jputa*na and Gujardt, interposed between the southern highlands of India and the hilly peninsulas of Gutch and Kathia'war.

The Southern Highlands.—The region to the south of the great plain does not consist entirely of tableland. It begins with a hilly and broken region, on the north-west of which the chain of the **ArdvaUi Hills** look down on the plains of Rajputana. Of the tableland proper a marked feature is formed by the **Vindhya Mountains**, and their continuation the **Kdimur Mountains**, which crown the southern edge of the northern and smaller portion of the tableland looking down on the high valleys of the Narbadd (Nerbudda) and the Son. The whole region to the south of these mountains is properly known as the Deccan, that is, "the South," though this name is sometimes restricted to the area between the rivers Narbad& and Kistna (Krishna). The tableland, however, does not extend all the way to Cape Comorin at the southern extremity of India. It ends in the south at a well-marked depression known as the **P&lghdt Gap**, little more than 1,000 feet in height, which lies between the **Nilgiri Hills** on the north, and the **Anamalai Hills** on the south. Both of these hills or mountains rise to upwards of 8,500 feet in height, making the gap between them all the more notable a feature in the geography of India. The Anamalai Mountains are continued southwards by the **Cardamom Mountains**, which stretch near the west coast to the low rocky promontory of Cape Comorin.

The **Nilgiri Hills**, to the south of Mysore, form a small tableland by themselves, nearly detached from the great tableland by the gorge of the Moyar, which is drained eastwards to the river Cauvery. Their highest summit is **Dodabetta** (8,760 feet). On the north of this tableland meet the mountains which form the east and west boundaries of the great tableland, and which are known as the **Eastern** and **Western Ghats** (Ghauts), a name applying more properly to the passes leading down from the tableland to the coast plains than to the mountains themselves. The word is an Indian **one**, meaning "a stair" or "mountain pass."

Aspect of the Ghats and of the Tableland in detail.—Seen from the surface of the tableland, indeed, the Ghats scarcely present the appearance of mountains. They are rather low hills covering the edge of the tableland. This is especially the case with the Eastern Ghats, which

are in most **parts** lower than the Western, or Sahy&dri range, as it is^t^lso called, and are less continuous, so that the name is sometimes restricted only to their southern and more continuous portion south of the Kistna. They likewise differ from the Western Ghats in being more winding in their course, and in leaving a much wider stretch of plains between their base and the sea-coast (the Bay of Bengal). Seen from the sea, the Western Ghats have the appearance of an unbroken range of mountains parallel to the coast, and everywhere close to it. Only a narrow strip of lowlands fills the mouths of their numerous short valleys.

The same aspect is presented on the west by the mountains south of the Pdlghdt Gap, which are also sometimes comprehended under the general name of the Western Ghats.

The highest peak of the Western Gha*ts north of the Pillghfit Gap is Mulaina-giri (6,300 feet), in the west of Mysore. The highest of the Eastern Ghats (5,300 feet) belongs to the Galikonda group, in Vizagapatam district, Madras.

The so-called tableland of the Indian peninsula is far from presenting the uniform level surface that the name "tableland" may seem to imply. It is, in fact, highly diversified. Large areas, especially in the wider parts, are under 1,000 feet in height. The highest plains, situated towards the south, and forming the northern water-parting of the Cauvery basin, attain an elevation of about 3,000 feet. In some places the surface is traversed by ranges of hills running in various directions, in others it is studded by bold isolated rocky hills.

Rivers of the Tableland: General Characteristics.—The greater part of the tableland is drained eastwards into the Bay of Bengal. Mention has already been made of the principal rivers of the Granges basin flowing from this region.¹ South of the Ganges basin four rivers, the **Mahanadi** (Mahanuddy), **Godavari** (Godavery), **Kistna** *or Krishna, and **Cauvery**, the last three of which take their rise on the eastern slopes of the Western Ghats, drain five-sixths of the peninsula into the Bay of Bengal. Only two great rivers of the peninsula, the **Narbadd** (Nerbudda) and the **Tapti**, flow west into the Arabian Sea, the basins of both being long and narrow. These basins lie side by side in the north-west of the peninsula, stretching together over an interval of about 170 miles at the widest. The length of the basin of the Narbada, the longer of the two, is less than 600 miles. South of these two rivers the streams that descend from the Ghats to the Arabian Sea are only mountain torrents.

All the chief rivers of the peninsula on both sides agree in this, that they break through the Ghats in long and narrow gorges,

i See p. 88,

which in some of them offer a serious hindrance to navigation. Other impediments to navigation, through rocky obstructions, occur in other parts of their course, so that none of them affords a waterway from the sea to the rich inland tracts which in some places lie on their upper waters.

The four chief rivers of the east, the Mahanadf, Godavari, Kistna, and Cauvery, have also this in common, that they all form great deltas before entering the sea. The comparatively broad lowland strip at the base of the Eastern Ghats has everywhere a gentle slope from west to east, so that the same words, *mel* and *kil*, which signify upper and lower, signify also in this part of the country respectively west and east. On reaching this gently sloping ground, the rivers naturally divide into several arms.

Details with regard to the Eivers of the Tableland and the adjoining Lowlands.—The Mahanadf (Mahanuddy), the northernmost of the four, rises in the Central Provinces to the south of the fertile plain of Chhattisgarh, which is under 1,000 feet in height, and accordingly much below the general level of the tableland. It winds northwards on the east and south of this plain before breaking through the Ghats in the Gorge of Baramul, 200 miles long. Numerous streams flowing from mountains in the north, south, and west belong to its basin in the plain of Chhattisgarh, but in this part of its course the Mahtfnadi is not navigable. Small boats of 25 tons burden ascend to Sambalpur, at the head of the gorge of Baramul. The delta embraces a stretch of more than 100 miles on the coast of Orissa, from Lake Chilka* northwards.

The Godavari (Godavery), the next river to the south, is the longest, and has the largest basin in the peninsula. It is about 800 miles long, and its basin about 120,000 square miles in extent, which is not far short of that of the Presidency of Bombay, including Sind. Its source is in the Western Ghats, a little to the south of the 20th parallel, near the village of Trimbak. On a hill behind that village is an artificial reservoir, which receives drop by drop the water from a trickling spring that has been regarded as the source from time immemorial. The river flows with a nearly easterly course across the greater part of the tableland, but turns to the south-east, where it receives on its left bank the most important of all its tributaries. This is the Pranhita, which empties into it from the north the united waters of the Wardha and the Wainganga. The Wardha flows from the north-west in the same general direction as the lower Godavari, and the Wardhd, Pranhita, and lower Godavari form together the most important line of navigation of the Godavari basin, all the more important because the Wardha flows through a very fertile valley, which is also rich in coal. Unfortunately this line of navigation is not unbroken from the sea. There are three serious interruptions. The gorge of the Godavari through the Eastern Ghats, a gorge beginning where the Sabari flows in from the north, is navigable throughout. The first interruption to

navigation—the first barrier, as it is called—occurs at Dumagudiem, about 165 miles from the sea ; the second just below the confluence of the Prtfnhita; the third beginning about 40 miles higher up, and stretching for an equal distance upwards. This last stretch, which reaches to the neighbourhood of the important trading town of Ch£nda\ can be navigated in time of high-water, and so also can the first barrier if the river is very high. To render this entire line of navigation unbroken, works were begun by the Government, but were abandoned on account of the expense.

The Kistna or Krishna rises in the Mahribaleshwar range of the Western Ghats, and winds to the south-east, but afterwards turns north-west so as to approach the lower Godavari, so that the nearest arms of the deltas of these two rivers are within 30 miles of each other in a direct line. The river in one place forms part of the southern boundary of the State of Haidarabad (Hyderabad), and its chief tributary on the right bank, the Tungabhadra, forms the remainder of that boundary farther west. On the left bank its chief tributary is the Bhfma. For navigation the Kistna is almost useless, its whole course across the tableland being too rocky and rapid even for small craft.

The Cauvery rises in Coorg, and flows through Mysore and Madras, forming on the borders of Mysore and Madras, some distance below Seringapatam, the beautiful falls and rapids which enclose the island of Sivasamudram. In the plains it forms one of the largest of the Indian deltas, spreading over the whole of that part of the coast which runs due north from Palk Strait. The northern arm of this delta is known as the Coleroon, the name of the Cauvery being given to that which pursues a nearly easterly course. As regards navigation, this river also is of little value; such navigation as there is being carried on in basket-work boats.

Among the minor rivers of the eastern slope, in the order from north to south, are: (1) the Subarnarekha (Subanrika), or " river of golden sand," which enters the Bay of Bengal between the delta of the Ganges and that of the Mahinadi; it is used for the flotation of timber from the Chitid Nagpur Hills, but not for navigation ; (2) the Baitarani (Byturnee); and (3) the Brahmani, which unite and become connected with a northern aim of the delta of the Mahinadf; in their lower course they have deep water, which would be of great service for navigation, were it not for a bar* at the mouth of this arm, preventing the access of vessels from the sea; (4) the Northern Penner, (5) the Palar, and (6) the Southern Penner, which enter the Bay of Bengal between the mouths of the Kistna and those of the Cauvery, and (7) the small but important Tambraparni, which flows into the Gulf of Manar.

Of the rivers of the western slope of the tableland, the Narbada (Nerbudda) is the northernmost and the longest, about 735 miles in length (including windings). It rises in the state of Rewa, in the highlands of Amarkantak, belonging to the Mdikal Mountains, about 20 miles due west of the source of the Son in the same highlands, which are also important as sending feeders southwards to the Mahdnadi. It enters the sea below the seaport of Broach. For about 200 miles below Jabalpur it is navigable, but there the navigation begins to be interrupted by rocky rapids.

[†] See Introd., par. 81.

The Tapti is somewhat more than 400 miles in length. After a varied course it plunges over a rocky bed through a wild forest region scarcely inhabited, and at last it emerges in the plain of Gujarat, the lower part of which, above and below Surat, is fertile and thickly peopled. This lowest part of its course is that to which navigation is confined, and even here the navigation is carried on only by small boats.

Of the mountain torrents farther south, one, the Shiravati, which enters the sea a little to the north of the boundary between Madras and Bombay Presidencies, is worth remembering on account of its celebrated falls, called the Falls of Gersappa, in which it descends in one leap of 830 feet over the edge of the Ghats.

The Natural Lines of Communication across the Tableland.—From the account just given of the physical features, it may be inferred that communication between the tableland and the sea-ports is not generally easy, and that it is especially difficult on the west side, where the Ghats have to be ascended within a short distance, and there is no river navigable across that barrier. In other parts of the world the river valleys generally mark out the routes along which it is most convenient to lay roads and railways, but in southern India the valleys are in many places so narrow and rugged as to offer no facilities for this purpose.¹ As a matter of fact, few of the railways already laid in this part of India follow the valleys of the chief rivers for any great part of their course. Those which have been constructed have been in certain places expensive to build, and are still in places expensive to work. Before their construction many fertile parts of the interior had very imperfect means of communication with the coast.²

Lakes.—Most of the large sheets of fresh water in India have been formed artificially for irrigation or other purposes. There are only four natural lakes of any size, and these all differ greatly from one another.

Far in the north there is the fresh-water lake of Wulur, an expansion of the River Jehlam in Kashmir, between the two ranges of the Himalayas. In Rajputana, on the north-west of the tableland, is the salt lake of Sambhar.³ On the eastern lowlands are the two very shallow lakes of Koter and Chilka, Lake Kolar, a fresh-water lake between the deltas of the Godavari, and the Kistna, occupying, at least in part, the site of old villages; Lake Chilka, to the south of the delta of the Mahanadi, a salt lake, scarcely anywhere exceeding six feet in depth, and not properly a lake at all, but a gulf of the sea cut off from the Bay of Bengal by a low

¹ See ID *trod.*, par. 109. ³ See pp. 144 (Chhattiagarh), 152 (under Bombay).

² See p. 140, and Appendix, par. 68.

sandy ridge, through which there is only one opening. Lake Pulicaf, on the same coast, about midway between the mouths of the Northern Fenner and the Palar, is still less to be called a lake, Since it communicates even more freely with the sea, and is subject to the influence of the tides.

Islands, Peninsulas, and Gulfs.—Physically the large island of **Ceylon** belongs to India, being connected with the mainland by a string of islands, and a shallow bank known to Europeans as **Adam's Bridge**, which divide the intervening sea into the Gulf of Manar on the south and Palk Strait^x on the north.

So shallow is the sea between the islands, that only one channel, called the Pambam (Paumben) Passage, has been sufficiently deepened to allow of its being used by good-sized coasters, and though dredging is stiU going on, it is doubtful whether it can ever be made navigable for large ocean-going vessels. In consequence of this obstruction, the voyage for large vessels from Madras and other ports on the east coast to ports on the west coast or to Europe by the Suez Canal is increased by about 340 nautical miles.

Except those near the coast of Burma, those in the delta of the Ganges, and smaller islands elsewhere, the only islands under the government of India are the Andaman and Nicobar Islands, in the east of the Bay of Bengal, and the Laccadive Islands on the south-west of the Indian peninsula. The Maldive Islands, to the south of the Laccadives, are attached to the government of Ceylon. The only two peninsulas of India are Kathiawar, between the Gulf of Cambay and the Gulf of Cutch, and Cutch, between the Gulf and the ftann of Cutch.

The Rann of Cutch is a highly peculiar feature of the physical geography of India, and is without a parallel in any other part of the world. It is at one time water, at another time land—a hard, stony salt-incrusted waste, roamed over by herds of wild asses and antelopes, which feed on the grasses on its borders, and on patches that remain as islands during the period of submergence. It is divided into the Great Rann, on the north of the peninsula of Cutch, and the Eastern Rann, on the east of that peninsula. The Great Rann is filled during the rainy season partly by river-water and partly by sea-water, which enters chiefly by an inlet on the west of the peninsula. The Eastern Rann is filled by the rise of the Gulf of Cutch, even before the rains, and at high-water it can be entered by small craft. By the month of October its bed is so far dry as to be capable of being crossed.

¹ So named after one of the governors of the possessions formerly held by the Dutch in India.

Climate: the Monsoons.—Many of the most striking contrasts of India are due to its climate; yet the chief characteristics of the climate are all in a large measure governed by one great fact, namely, that during half the year the wind blows more or less in one direction, during the other half in a direction exactly or nearly opposite. These regularly changing winds are known, as stated in the Introduction, by the name of the **monsoons**,¹ and are not confined to India. In India the summer monsoon is usually spoken of as the south-west, and the winter monsoon as the north-east; but it must not be forgotten that there are few places in India where these names describe at all accurately the general direction of the wind in summer and winter respectively.

Circumstances that Modify the Direction of the Monsoon Winds.—By land and near the land winds rarely blow with the constancy which characterises them over the ocean. Their direction gets modified by various circumstances. Differences of temperature in different parts of a vast land area like that of India have a very important effect of this nature. As explained in the Introduction² the hottest districts are those in which the air is apt to be least dense. Towards these accordingly the winds tend to blow in from all sides, but they do not blow directly towards these centres, being twisted in the northern hemisphere more or less to the right.³ Moreover, the configuration of the surface has an important effect on the direction of the winds, since mountains obviously interfere with their direct course. In the Ganges basin the summer monsoon, partly on account of the interference of the Himalayas, blows up the valley, that is, from the south-east, the winter monsoon down. It is therefore not possible in speaking of the direction of the wind during the monsoons to make any general statement that applies to all places in India.

The Names South-West and North-East Monsoon, how far Appropriate.—Still the names south-west and north-east monsoon are so far fitting that they indicate the region of the ocean from which and to which the monsoon winds blow when they are at their height, and this is the important fact in virtue of which they have so much influence on the Indian climate. At the height of the summer monsoon, the winds that reach the greater part of India have their origin over or near the equator, far in the south-west; when the winter monsoon is fully established, the winds blow away from India as a whole, as north-east winds, towards the equator.

¹ See Intro., par. 67.

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Par. 61.

³ See Intro., pars. 68, 66.

These latter winds are, in fact, on the ocean nothing else than the trade-winds,¹ which are interrupted in these regions during half the year by the powerful action of the sun in drawing the air away from the ocean to the land.

Relation of the Monsoon Winds to the Rainfall.—The place of origin of the summer monsoons accounts for the large quantities of rain which they bring to certain parts of India. The winds blowing from the equatorial parts of the ocean are all heavily charged with moisture; and when these winds are forced to ascend by the form of the land surface, they rapidly become cooled and let fall their moisture in deluges of rain.² Let it be noticed, however, that the winds that reach the north-west of India do not arise over the equatorial parts of the ocean if they blow more from the west than the south. A map of the world shows that the position of Africa and Arabia prevents this. Now the fact is that the prevailing winds are not more southerly than westerly. Even at Bombay the dominant winds are to the south of west only when the summer monsoon is at its strongest, from June to August.

The Indian Seasons.—Such are the main facts which account for the varied climates of different parts of India. The Indian year is usually said to be divided into **three seasons**—the hot, the rainy, and the cool; but these names are appropriate only in certain parts, particularly in the north-east and along the western coast. The **hot season** is from March to May inclusive, the period that embraces the change of the monsoons from north-east to south-west, but before the "bursting" of the south-west monsoon—that is, before the southerly winds begin to be accompanied by rain. During this period the highest temperature is in the heart of the Deccan. The **rainy season** lasts from June to October inclusive, and during this period the western slopes of the Western Ghats, the hills of Assam, and in the east of the Himalayas, and even the plains of the Ganges delta, are deluged with rain, and the greater part of the north-east receives a fairly abundant rainfall.

The greatest rainfall of all falls on the hills to the north-east of the delta of the Ganges. The part of the south-west monsoon which crosses the Bay of Bengal sucks up more and more moisture as it advances, and striking directly against these hills causes a rainfall so great as to be without a parallel elsewhere. The station of Oherra Poonjee on the Khdsi hills, where the annual rainfall is sometimes between 500 and 600

¹ See In introd., par. 62.

² See In introd., par. 94.

inches, or more than twelve times the average of the whole of India, is well-known on this account in all parts of the world in which the distribution of the rainfall is studied. The average annual rainfall for the whole of India is about 42 inches.

The part of the Deccan immediately behind the Western Ghats has a very moderate and precarious rainfall, and so too have the plains in the north-west. A large part of the Indus valley is almost rainless. Where the rains are abundant the temperature is mitigated, but in the arid region just referred to this is naturally the hottest period of the year.

The **cool season**, or the season of the north-east monsoon, lasts from November to February inclusive, and this is the rainy season for the south-eastern plains; but the amount of rain that then falls is only one-third or one-fourth of that which falls on the best-watered plains during the south-west monsoon; and in the north-west, where the highest latitudes are reached, there are genuine winter temperatures by comparison with the extreme heat of summer even on the plains. In this region, in the latter half of the cool season (January to about March) there is a recurrence of rains.

Various Effects of the Peculiarities of the Indian Climate.—

The distribution of the Indian rainfall, together with the causes that give rise to it, has several consequences which deserve to be mentioned in connection with the geography of India.

1. In the first place, we now see the explanation of the small **number of the rivers** in the west of the great Indian plain, in the basin of the Indus, and their immense multitude in the east of the plain, the basin of the Ganges and the Brahmaputra.¹

2. Secondly, the regular alternation of rainy and dry seasons leads to a corresponding **alternation of high and low water** in the rivers, but the difference between the two states of the rivers does not depend solely on the difference in the amount of the rainfall at the two seasons.

The greatest discharge of the Ganges in time of flood above the delta is about 1,800,000 cubic feet per second; its smallest discharge at low-water sinks to about 45,000 cubic feet per second. The Mahanadi, with a basin only about one-ninth of that of the Ganges in extent, has discharged at times as great a quantity of water above its delta, but its lowest discharge is only 1126 cubic feet per second. The difference is due to various causes. In the Ganges basin the heavy rainfall of the rainy season is gradually carried off by the numerous rivers flowing across a gently sloping

i See p. 87.

plain, and hence the height of the flood lasts for a considerable time. The river remains near its highest level for three weeks. In the basin of the Mahanadi, on the other hand, a comparatively small number of tributaries sweep in flood-time furiously along their steep and rocky beds to similar beds of the main stream, carrying off the flood-waters as rapidly as possible, so that the river remains at its highest for no more than twelve hours. During the dry season, again, the Ganges and its numerous Himalayan tributaries are constantly replenished with water from these mountains, their water having partly fallen as rain on the Himalayan slopes, which receive more rain than most parts of India at all seasons, but being partly due also at certain periods to the melting of the Himalayan snows. In the basin of the Mahanadi, however, there are no such causes to maintain the level of the rivers.

Immense destruction was occasionally wrought by the excessive floods in the delta of the Mahanadi before the construction of the numerous canals that now help to carry off the surplus waters. Every year, too, more or less devastation arises from floods and shiftings of the river-bed due to floods in the Ganges valley. "Many a hamlet and rice-field and ancient grove of trees," in the words of Sir William Hunter, "is remorselessly eaten up each autumn by the current." Sometimes miles of railway disappear in a day. In some parts of Bengal the railway stations have to be shifted several times a year on account of changes in the channels.¹ Evil of another kind is wrought through the rivers sometimes deserting towns seated on their banks, or silting up so as to be no longer accessible to ships.-

But river floods are not entirely destructive. They are sometimes an aid in the cultivation of such crops as rice, which require great quantities of water in certain stages of their growth. Moreover, the fine silt which river floods spread over the surface often forms a soil of unsurpassable fertility. Hence, to use once more the words of Sir William Hunter, in the valley of the Ganges "embankments are in few places required to restrain its inundations. . . . If one crop be drowned by the flood, the cultivator calculates that his second crop will abundantly requite him."⁸

3. In the third place, the differences in the rainfall of India cause great differences in the **aspect of the vegetation**. Nowhere is this more strikingly observed than in the south of the peninsula, where an arid region to the east of the Ghats lies close beside a profusely watered area on their western slopes.

Here we behold on the west coast an "endless panorama of beautiful scenery; a surf-beaten shore-line, sometimes bold with dark rocks, or bright-red laterite⁴ cliffs; sometimes lightened with a brilliant streak of shining yellow sand, but always backed up by the luxuriant foliage of endless groves of cocoa-nut palm and evergreen bush, completely concealing the narrow belt of lowlands to the very foot of the Ghats, which raise their **dark** cliffs and lofty summits at a few miles' distance inland, their skirts

¹ See Introd., pars. 34-35. ² See p. 128. ⁸ See Appendix, par. 89.

⁴ From the Latin *later*, a brick; a brick-red rock very wide-spread in southern India.

and valleys clothed with primeval forest." But "on passing the end of the Ghats at Cape Comorin, the change is as sudden as it is remarkable. Universal verdure gives place to bare red soil and sandy wastes, and the moist teeming land of the west coast is suddenly changed for the parched sunburnt tracts east of the Ghats."

In the uncultivated region in the south of the delta of the Ganges and Brahmaputra, the region of the **Sundarbans**, as it is called, an uninterrupted forest of timber trees mingled with impenetrable underwood overhangs a labyrinth of gloomy streams. All the hills and lower mountain slopes in the north-east are clothed with forests of tropical or subtropical ever-



FIG. 26.—SCENE IN ONE OF THE DRIER PARTS OF INDIA. (The Kutah Miliar, Delhi.)

greens, and few parts of the tropics can show a greater variety of bright flowering trees, along with palms, plantains, bananas, as well as bamboos and other gigantic grasses, than the ever-humid valleys of this region (the valleys of Assam, Sylhet, and Cachar).

4. Irrigation.—A fourth effect of the distribution of the Indian rainfall is shown in the need for irrigation in certain places; and the differences in the mode of irrigation practised in different places are due partly to differences in the rainfall, partly to differences in the physical configuration. The amount of rain that falls varies in India, as everywhere else, from year to year. In most of

the cultivated parts of the world it may increase or diminish the abundance of a crop, but have no other effect. In a large part of India, however, the variation may be so great that in one year there is an ample supply for a good crop, in another a rainfall wholly inadequate to produce any crop at all. It is this area of uncertain rainfall that is liable to be visited by famines, and hence irrigation has to be practised not only in those parts of the country in which there is always a deficiency of rain, but also in those in which it is doubtful whether the rain may be sufficient or not. Even where the amount of the rain is sufficient for the requirements of the crops, irrigation is in many cases demanded by the mode in which the rain falls. The north-east monsoon, on which the southern plains (Madras) chiefly depend for rain, is remarkable for the fact that rain falls for the most part in bursts, and generally at night. "I have known," says Sir Arthur Cotton, "a fall of ten inches in one night, and a fortnight after twelve in another"^M—half a year's supply in two showers.¹

(a.) From Tanks.—It is necessary therefore to store up these supplies for a longer or shorter period. Throughout a large part of India this is done by means of tanks or artificial reservoirs. Thousands of tanks are dotted over the country in Madras, Bombay, and part of the Ganges valley. These, however, contain for the most part little if any more than one year's supply, and hence are inadequate to meet the uncertainties arising from recurring years of drought. In some places larger tanks are constructed, these being mostly situated near the headwaters of rivers flowing across the hard crystalline rocks,² which abound on the tableland of India, and the hollows in which are well adapted to form their beds. In such situations large artificial lakes can sometimes be made at comparatively small expense by throwing a dam across the river valley to collect the water above it.

Among the largest are **Lake Debar**, in the State of Udaipur, Rajputdna; **Lake Ekruk**, near Sholapur, Bombay, to the north of the River Bhima\ and the **Combum Tank**, amongst the Eastern Ghats, at the head of the Gandlakamma River, between the Northern Penner and the Kistna.

Some similar tanks have been formed also in the region of the "Deccan trap," a basaltic⁸ rock that covers the west of the tableland to the north of the 20th parallel, but there irrigation is less necessary than in many other parts of India on account of the

¹ Comp. p. 192. ² See Appendix, pars. 69, 74. ³ See Appendix, par. 72.

physical properties of its characteristic **black soil** (*regar*). The quality which gives peculiar value to this soil in the region where it most abounds is its remarkable tenacity of moisture. Instead of allowing the rain to sink away to great depths, the soil is converted during the rains into a tenacious mud. In dry weather the whole surface of the ground where it occurs gets seamed with inter-ramifying cracks, between which the soil forms hard lumps, which still, however, retain water imprisoned in their spongy cells. Hence, dry as the climate is, and notwithstanding



FIG. 27.—A PERSIAN WATER-WHEEL, AS USED IN INDIA FOR IRRIGATION.
(Similar water-wheels are in use throughout the Mediterranean region.)

the rapidity with which evaporation takes place on the surface, wherever this soil exists irrigation is not required.

(b.) **From Wells.**—In certain places there is a natural storage of water underground that can always be made available by means of moderately deep wells. The rain sinks into porous soil at the surface, but is retained by a stiffer stratum at no great depth.¹ The whole of the plain along the base of the Himalayas has constant supplies of fresh water underground, and the middle portion of it has these supplies near enough to the surface to be easily reached, while not having a copious enough rainfall to

¹ See Lutroil., par. C8.

enable it to dispense with irrigation. "Hence, between Delhi, and Aenares, the upper stratum of the alluvial plain is riddled like a sieve with water-holes or wells 10 to 50 feet in depth."²

(c.) From Canals.—Many of the irrigation works of India, and among these the greatest of all, are canals. In some cases, chiefly in the North-West Provinces and Oudh and in the Punjab, these canals are fed by mountain springs and the melting of Himalayan snows. For the most part, however, they are led from rivers. Some of the canals thus fed are laid so as merely to carry off the surplus waters in time of flood. These are known as inundation canals, and are confined to the north-west of India (Punjab and Sind), where they were much used even before the British occupation. But works of much greater magnitude have been constructed, mostly under British rule, in the form of perennial canals, into which is led nearly the whole body of water belonging to a river for a greater or less distance. The Upper and Lower Ganges Canals, which irrigate a large part of the Doab, or region between the two rivers Ganges and Jumna, have a length of more than 1000 miles, exclusive of distributing channels. The total length of canals under the supervision of the British Government is upwards of 28,000 miles, including distributing channels, and the area irrigated by them is equal to considerably more than half the area of Ceylon. Some of the chief canals serve also for navigation.

The Principal Irrigation Canals.—In the distribution of the irrigation canals over the surface of India we see the effects both of the climate and the physical configuration. One navigable canal, used also for irrigation, the Midnapur Canal, strikes westwards from the Hugli, but elsewhere there are no irrigation canals on the Lower Ganges or any part of the Brahmaputra valley, where they are not required.³ There are scarcely any canals between the Gumti and the Gogra, the wells being found mostly to suffice for irrigation in that area. About the influx of the Gogra, however, there are important canals both north and south of the Ganges. North of the Ganges are the Saran Canals, in the angle between the Gandak and the Gogra, but these, though partly used for irrigation, are primarily intended to supply water for the manufacture of indigo. South of the Ganges are the Son (Soane) Canals.

No part of India is more extensively irrigated than the great DOAB to the west of Cawnpur, a region the whole of which was visited by a severe famine early in the present century, and again in 1837-38. In that region there are not only the Ganges Canals, already mentioned, but also the Eastern Jumna Canal, and the region immediately to the west is irrigated

* *Statistical Atlas of India*. Comp. p. 174. * See pp. 96-7.

by the Western Jumna and Agra canals. Since the opening of the Upper Ganges Canal in 1854 the region has never been greatly affected by famine.

The Western Jumna Canal (an old work reopened under British rule) is connected by a branch with the Sirhind Canals, in the north-east of the Punjab, which are, however, mainly fed from the Sutlej. Farther west are the Bari Doab Canals, between the Beas, Sutlej, and Ravi rivers. In the Punjab generally, cultivation is mainly dependent on irrigation, and in Sind almost wholly.

In southern India the rivers on the tableland generally flow at too great a depth below the surface, and the surface itself is too irreguktu to permit of this form of irrigation works.¹ The works of this kind, like the chief tanks of the region, are mostly near the headwaters, and are comparatively small. The chief irrigation canal on the tableland is the Karaul Canal, connecting the Northern Penner with the Kistna* and this has not proved a great success.

On the other hand, the regular though gentle slope of the lowlands to the east of the tablelands² has proved just as favourable to the construction of irrigation canals as to the formation of deltas. All the great deltas in this region are also the sites of great systems of irrigation canals. The oldest and one of the greatest of these deltaic irrigation systems is that of the Cauvery. It is said to have been in operation for 1600 years, and, though it has been improved in some respects by British engineers, the general plan of the works remains the same as it has always been, and has served as a model for all the other Indian works of the kind. The other three great deltas—those of the Kistna, Goddvari, and Mahanadi—have been provided with their canals under British rule. Those on the Mahdnadi are known as the Orissa Canals. They are not yet completed, but it is hoped that when they are so, they will serve to protect the district entirely from the disasters by flood and famine to which it has been subject in past time.

On the minor deltas of the Northern and Southern Penner and the Palar there are also irrigation canals. The small river **Tambraparni**, in the extreme south, though only eighty miles in length, is of exceptional value for irrigation, as it flows across that part of India where the differences in the amount of the rainfall are most remarkable, rising amidst forest-clad mountains where the rainfall of the year is between 200 and 300 inches, and descending to plains in which it is only 18 inches. From an early period, therefore, its water has been carefully treasured and turned to account. Seven of the eight dams which have been made across it are old works due to native rulers; only the last and lowest of the eight has been added under British rule.

5. Another important effect of climate combined with other circumstances is to be seen in the distribution **of population**.

Taken collectively, the plains of the Ganges basin, exclusive of the Brahmaputra valley in Assam, are the most densely peopled region of

¹ Comp. Spain, pp. 244 5.

² See p. 91

India, and they include considerable tracts in the delta of the Ganges and North-West Provinces, with upwards of 600 to the square mile—a density exceeded by few areas of equal extent in the world. In this region, not only the extent of the plains, but the abundance of the rainfall, the facilities for irrigation, and the large number of navigable rivers, have all combined to promote the growth of population. Next in point of density is the angle of the peninsula from the latitude of Madras southwards, where also there are considerable areas of plain with a fairly abundant rainfall and exceptional facilities for irrigation. In the delta of the Oauvery, where the irrigation system is of such old standing, the population is far above the average of the region, exceeding 600 to the square mile. Other smaller areas, with a dense population, are situated on the well-watered parts of the west coast. The tableland, except such part of it as belongs to the angle just mentioned, has only a moderately dense population—under 200 to the square mile. Finally, the basin of the Indus is the most sparsely peopled portion of India, except in the north, at the base of the Himalayas, where the presence of these mountains favours the deposition of rain,¹ and where, it will be remembered, agriculture is promoted by winter as well as summer rains.²

6. Lastly, the **character of the sea-coasts**, both on the east and west, is due to causes connected with the Indian climate.

In this case the effect is due directly to the prevailing winds and sea-currents, whose course is dependent on the winds. On both coasts, during the south-west monsoon, the currents set strongly northwards. On the west coast the winds then blow inland, and thus tend to blow the dust and the sands of the coast landward. The silt that has been deposited in the sea is, however, slowly but steadily washed northwards, and the ports are apt to get blocked by the collection of sediment at their entrances. The strength of the wind, at the same time, drives the waves violently on the shore. From these causes there are few of these ports accessible at all seasons.* The great majority are only fair-weather ports, which cannot be visited during the prevalence of the south-west monsoon.

On the east coast the effect of the wind is still more adverse to shipping. On this side the south-west monsoon is the dry season of the southern part of the peninsula. The sand and loose soil of the plains and tableland is thus all the more readily blown about by the wind, and large quantities of such matter are carried directly seawards, and make the sea very shallow for a long distance out, especially off that part of the coast which runs nearly north and south. At Masulipatam, between the mouths of the Eistna and the Godavari, large vessels have to anchor five miles out. This shallowness of the sea has another effect, which is sometimes very disastrous. By checking the advance of the waves, it increases their height, and thus causes a constant surf to beat upon the coast, so that vessels cannot approach, and have to land their goods and passengers by surf-boats and rafts. And when storms rage—above all, when they happen at high

¹ See In trod., par. 94. ² See p. 97. ³ See p. 153.

tide-immense waves sometimes sweep over the shelving shores, carrying destruction along with them.^x The action of the currents on this side is the same as on the west, always tending to shift the entrances of ports northwards, and sometimes even cutting them off from the sea by deposits laid at their mouths. From all these causes there is not a single safe harbour on the south-east coast of India, nor a river-mouth navigable by vessels of any size.²

Vegetation.—There can be little doubt that at some remote period the greater part of India was covered with forests, but the area so occupied has been reduced to make way for cultivation, so that the forests have been left to flourish principally in regions which it is impossible, or scarcely possible, to reclaim, in rugged mountainous or hilly country, or in swamps like the Sundarbans. The tarai at the base of the Himalayas cannot be included under this description. Its presence has another explanation. In the times when the inhabitants of these plains were subject to inroads of the plundering hill-tribes on the north, this strip of dense jungle, the haunt of many wild beasts, was left as a barrier to protect them in some measure against such incursions, and now that order has been secured, this area is in certain places being gradually reclaimed.

The destruction of forests has gone so far in India, that it has had to be checked to prevent the people from suffering from a lack of necessary forest products, such as timber, firewood, canes, bamboos, as well as other products, such as caoutchouc (india-rubber), which, though not so essential to the every-day life of the people, are of great value in the arts or as articles of export. In most parts of India the management of the forests has been placed to a great extent under the control of the Government. Certain forest areas under such control are "reserved," and in these no one is allowed to cut timber or take any other forest produce without a license. In India proper (exclusive of Burma) the area of reserved forests in the provinces under British rule is now about 50,000 square miles, equal to one-third of the area of Bengal. Some of the native states have followed the example of the British Government with respect to forest management.

The prevailing trees naturally differ in different places. A few of the more important should be remembered. The slopes of the Himalayas, and especially the north-western Himalayas, are the chief home of cone-

¹ See Appendix, par. 20.

^s See p. 157.

bearing trees, with narrow, pointed leaves like the pine and the cedar.¹ On the higher slopes, from about 4,000 to 10,000 feet above sea-level, grows the deodar or Himalayan cedar, which yields the most durable wood of all such trees. The toon descends somewhat lower, and extends eastwards as far as the tea-gardens of Darjiling and Assam, where its wood is much valued for tea-boxes. Along with the toon, and even at lower elevations (down to 2,000 feet), is found the long-leaved pine; and below that we reach the zone of the sal and the sissii (sissoo), two of the most valuable Indian timber trees of another class. Neither of them is confined to the Himalayan region. The sal flourishes in a narrow strip skirting the lower slopes of the Himalayas and the mountains of the north-east wherever the rainfall is not too scanty, and also over a large part of the north-east of the tableland to the south of the Son (Soane), and in the east of the basin of the Godavari. The sissu is less abundant, but is even more widespread, being found in the Ghats even to the south of the Palghat Gap, as well as on parts of the tableland. Teak, the most valuable of all the timber trees of India, is found in nearly all the forests of the tableland, and very abundant on the Western Ghats. Satinwood and sandalwood are two of the more valuable trees of the inner parts of the tableland. Satinwood is largely used where it grows for the making of agricultural implements, and is exported for use in cabinet-work. Sandalwood, which is confined to the drier parts of the tableland, especially in the south, is valued chiefly on account of its fragrant heartwood, which has long been an important article of commerce. Among the trees of the plains (exclusive of palms), none are more valuable than various kinds of acacia, the most valuable of all being the *haltil*, which has the important property of growing rapidly and freely even in dry regions, and without which such tracts would often be badly off for firewood and timber. In swampy plains the most important timber tree is the *sundri*, the typical tree of the Sundarbans.

Among the palms of India may be mentioned the invaluable coco-nut, grown all round the coasts of the peninsula, but nowhere at a greater distance than 100 miles from the sea; the Indian date-palm or toddy-palm of Bengal, the Palmyra palm or toddy-palm of southern India; the Indian sago-palm, grown in the moister tracts both to the east and west; and the Java sago-palm, all of which are cultivated, and yield, among other products, sugar; besides these, the areca-palm, cultivated throughout India (above all in the south) for the sake of its nut (the betel-nut).

Animal Life.—Wild animals abound in India. Many of them are very destructive, and among these some are fatal to great numbers of human beings every year; but all the efforts made against these species serve only to keep their numbers down and to limit their ravages. Most of them it seems impossible to extirpate.

The chief haunt of wild animals is the jungle. Tigers and leopards or panthers, the principal carnivorous animals, and the most destructive to human life of animals of this class, are to be found in the jungles of all parts

¹ See cut, p. 337.

of India; and here also are to be found large numbers of antelopes, deer, and other herbivorous animals, which form their favourite prey. From their numbers the leopard is even more destructive to human life than the tiger, but the tiger is the more dreaded of the two, on account of the ferocity with which he satisfies his appetite for human flesh when he has once become a "man-eater." Among the other carnivorous inhabitants of the jungle is the dhole, or wild dog, which hunts in troops with a pertinacity from which no animal destined for their prey, whether tiger or antelope, can escape. Of the herbivorous dwellers in the jungle, the most noted of the deer tribe are the sambhar deer, the largest of all, known to sportsmen as the elk, and the gentle and beautiful axis or spotted deer. Of the ox tribe the most remarkable are the gaur, or the so-called bison, with massive curved horns; the gayer, an inhabitant of the north-east of India, with even more massive but nearly straight horns; and the wild buffalo, found in the same region. Of the jungle antelopes the most celebrated is the nilgai (nylgau), which frequents the outskirts of the jungle in the northern plains near cultivated tracts. The common antelope or black buck is met with almost everywhere. The elephant, the most valued of the jungle-dwellers, is found in forests in all parts of India except the north-west, but confines itself chiefly to the hills, and even to the higher ridges. It is now commonest in the north-east of India and in the extreme south of the peninsula. In all places it seemed to be threatened with extinction, so that it has been taken under Government protection. The capture of elephants is now reserved solely to the Government. A much more abundant inhabitant of the hills and forests is the common black or sloth bear, which feeds on ants, honey, and fruit, but is sometimes dangerous to man when attacked, or even disturbed, in his haunts.

Among the predatory animals of the open country, the commonest are wolves, which often do much damage in sheep flocks, and not infrequently carry off children. The striped hyæna is found wherever the wolf is absent.

The lion, the chief carnivorous animal of desert and arid regions, has been found easier to extirpate than the tiger, and is now almost extinct in India. A few of a peculiar variety, almost without a mane, are still preserved in the more rugged parts of the peninsula of Kachch. In the arid regions of India the principal wild animal still surviving is the wild ass, an inhabitant of the sandy deserts on the banks of the lower Indus and in the peninsula of Cutch.

High up in the Himalayas the typical animals are wild sheep, goats, and the yak, all of which are used as beasts of burden across Himalayan passes, and some much valued for their fine soft winter wool.

Monkeys, jackals, the wild hog, the most mischievous of all animals in cultivated districts, rats and mice, are too common everywhere to need particular mention. Among the larger birds are different vultures, and the adjutant bird, a kind of crane, all Useful on account of their habit of consuming refuse which would otherwise pollute the air.

Of all the animals of India, those which annually cause the greatest loss of human life are serpents. These abound in the country in many species. Many, indeed most of them, are harmless, but the poison of some, the most dreaded of which are the cobra or hooded snake and the beauti-

fully marked Russell snake, is rapidly fatal. Thousands of deaths from snake-bite occur every year, and the efforts of the Government to reduce the evil by offering rewards for the killing of noxious reptiles seem to have little effect in lowering the mortality from this cause.

Crocodiles occur in the rivers, and among other inhabitants of the rivers may be mentioned the gaviol and the dolphin of the Ganges.

Among the innumerable insects of India, bees, silk-moths,¹ and the insect from which the lac of commerce in its various forms (stick-lac, seed-lac, shell-lac (shellac), and button-lac) is obtained, are the most important for their utility; the most destructive, perhaps, are the white ants and locusts. Locusts are confined to the drier parts of the country, but white ants abound everywhere. On some parts of the tableland white ants are particularly noxious to sugar-cane, so much so as to prevent the cultivation of this crop in places otherwise suitable for it.

People, Language, and Religion. — India is inhabited by numerous races, which have obtained a footing in the country at different periods. Its fertile plains have attracted settlers from times far beyond the reach of recorded history, and time after time older settlers have had to fight for their lands against new arrivals. Sometimes they held their ground, at other times they were compelled to yield possession of their lands to the invaders and go in quest of new settlements in other parts of the country. The highlands of the south have been the refuge of many tribes driven from the plains by stronger races. In many cases language affords the only or the principal evidence of such events, but it must always be remembered that, though differences of language must have corresponded originally to differences of race, language does not continue to be an unfailing mark of race distinction. The inhabitants of a conquered race may become intermingled with the conquerors and adopt their language. Even when they remain comparatively isolated, they may in certain circumstances come to speak the language of their conquerors. Sometimes also the conquerors learn the language of the conquered among whom they settle. Difference of religion also sometimes corresponds more or less with difference of race, but this correspondence is even less trustworthy as a mark of origin than difference of language. It is thus impossible in a country like India to form any precise estimate of the proportion in which different races are represented among the inhabitants; even when there is sufficient evidence to show what the prin-

¹ See p. 116.

cial races originally were, and where they are still principally found.

Original Aryans.—One large section of the population of India is usually spoken of as the Aryan population, though this name, as will presently be explained, is apt to mislead. This term is applied to a people who must have originally entered India through the western passes opening on the great plain. The name is that of a great stock which has spread over by far the greater part of Europe, as well as a considerable part of Asia, and all the members of which speak kindred languages—languages which, however widely they may differ now, must have had one origin. Among the languages of this stock is English, and the English people are also to be regarded as Aryans in race. The language of the **original Aryans** of India must have been allied to the sacred Sanskrit language. It is their religion, now called the Hindii religion, that has come to prevail over the greater part of India, and the language just named is that in which their sacred books, the four Vedas, are written. The modern Brahmans and Rajputs, the priestly and the warrior caste, the two castes which are still, as they were in ancient times, the highest in the Hindu religion, are believed to be comparatively pure descendants of these original Aryan settlers. Together they now number in British India about one-twelfth of the population. They are mostly found in the northern plains, where their first settlements were made.

Non-Aryans—On settling there, they rendered subject to them the earlier inhabitants who remained among them, and forced the others to take refuge in the mountains. These **older non-Aryan inhabitants** of India were composed of races of different origin, speaking entirely different languages, and probably entered India by different routes, some from the north-west, some from the north-east.

Among them are included all the hill-tribes which still remain in different parts of India, distinct in language, religion, customs, modes of agriculture, and in other respects, who have in many instances made themselves intolerable to the inhabitants of the plains by their constant marauding descents, but some of whom, on the other hand, have strongly engaged the sympathies of those who had to deal with them by their remarkable, and indeed unfailing, fidelity and truthfulness. The great majority of these older non-Aryans may be divided into three great groups, Tibeto-Burmans, Kolarians, and Dravidians. The Tibeto-Burmans inhabit

the slopes of the Himalayas and the mountains in the north-east of India. The pure, or comparatively pure, Kolarians and Dravidians belong to the southern mountains and tablelands.

. How many of them are pure cannot be stated, hardly even guessed. The great bulk of the population of India has arisen from a mixture of old Aryan with old non-Aryan inhabitants who have embraced the Hindu religion. For a long period this religion remained wholly that of the conquering Aryan race, but since the eighth or ninth century of the Christian era it has gradually spread over the country, and all who adopt it are classed as Hindus, which renders it all the more difficult to distinguish the pure, or comparatively pure, descendants of the aboriginal non-Aryans. In the Hindu religion these mixed races form the innumerable lower castes, outside of the two higher castes of Brahmans and Eajputs. The majority are all classed as Siidras. The Vaisyas, who formed an important caste of the ancient pure Aryans, are now few in number, and these few are not to be regarded as of pure Aryan descent, though they also wear the " sacred thread " of the higher castes.

The Older Religions.—At the census of 1881 the adherents of Hinduism numbered nearly four-fifths of the entire population. In addition to those entered simply as Hindus, considerable numbers were entered as adherents of various sects founded by Hindu reformers, the chief of these sects being the Sikhs of the Punjab, who numbered nearly two millions.

In the interval between the settlement of the old Aryans and the rise of modern Hinduism a new religion arose in India, and for several centuries prevailed over the whole country, but its rise and progress are not connected with any events that modified the elements of the population. The religion referred to is Buddhism, which was founded about the end of the sixth century B.C. by a prince of the ancient kingdom of Magadha, named Gautama,¹ and also known as Sakyamdni or " the Sage of the Sakyas " (the tribe to which he belonged), and as Buddha or " the Enlightened." The religion preached by him is remarkable for its all-embracing spirit of humanity, a spirit in virtue of which it sought to include within its gentle influence all men alike, without distinction of caste. In India proper, apart from Burma, there are now very few adherents of this religion, but in most provinces except Bengal there is still a considerable number of Jains, who by some are looked upon as modern representatives of Buddhism, although they consider themselves to be an older and independent sect

Languages descended from those of the old Aryan and old non-Aryan

¹ See p. 129.

inhabitants of India are those which prevail over the country to this day. **Aryan** languages are those which are spoken not only over the greatest extent of country, but also the most populous regions, and thus by the great majority of the people. Their domain includes all the great plain, together with the northern half of the tableland. They are spoken in seven chief dialects, namely, **Bengali**, spoken in the valley of the Lower Ganges and Brahmaputra as well as the valley of the Surma* (the southern valley of Assam);¹ **Uriya**, spoken in the region to the south-west (Orissa and the neighbourhood); **H ndi**, the most widely spoken of all, its domain comprising the whole of the middle and upper Ganges basin, including all that pari? of the basin which belongs to the tableland on the south; **Punjabi** in the north, and **Sindhi** in the south of the Indus basin; **Gujarathi** in the north-west of Bombay, including the peninsulas of Cutch and Kutchiawar; and **Marathi** in the region next to the south, extending eastward into the Central Provinces. Of these seven, Sindhi is the only one that has no literature.

Of the non-Aryan languages the **Dravidian** are by far the most important, being spoken over nearly all the south of the tableland together with the adjoining lowlands. There are four chief dialects of this group; first, the Tamil, spoken by the largest population, its domain being all the densely peopled plains and lowlands, together with part of the tableland from Madras southwards; second, Telugu, spoken in the region to the north as far as the Godavari; third, **Kanarese**, spoken in the area to the west of the previous; and fourth, Malayalam, spoken on the Malabar coast from Coorg southwards. The Tamil is a cultivated language with an important literature. Besides these four, there are several minor dialects; two of which, the Khond and the Gond, are spoken over considerable areas on the tableland in the east of the Godavari basin.

Muhammadans.—Another large section of the population of India is formed by the Muhammadans, who to a large extent differ in race as well as in religion from the rest of the people.

Many of them are descendants of Muhammadan invaders, who forced their way in great hosts into northern India on many occasions during several centuries. The series of invasions began with the beginning of the eleventh century of the Christian era, the invaders being sometimes Afghans, sometimes followers of Turkish conquerors. As regards race, many of the settlers during these invasions must be classed as Aryans, for the Afghans proper are of the Aryan stock. Another series of Muhammadan invasions began in 1526, when the Mughal conqueror Babar entered the Indian plains at the head of great non-Aryan hordes from Central Asia. Twice these invaders gained a great victory over the defenders of India on the plains of Panipat beside the Jumna, on the eastern verge of the Punjab, once under Babar himself in 1526, and once under his grand-

¹ Assamese, the local language of Assam, is said to be a modern dialect of Bengali.

son, Akbar the Great, in 1556. This second victory led to the foundation of the great Mughal empire, which continued to exist, at least nominally, till 1857. During the continuance of this empire the Muhammadan population greatly increased. At the census of 1881 the Muhammadans made up about one-fifth of the population of India.

Europeans.—Meantime another element, small in numbers but influential, was added to the population of India. Europeans appeared on the seaboard. Long before their appearance, even before the end of the second century of the Christian era, **Christianity** had gained a footing on the Malabar coast (the south-west of the peninsula), where a small Christian community, descendants of these early Christians, survives to this day. But this community owed its origin to Asiatics.

The Portuguese were the first Europeans to visit India and acquire influence there, the Portuguese navigator Vasco da Gama having sailed to India after doubling the Cape of Good Hope (1498). For a century Portugal retained command of the entire trade between Europe and India, as well as the rest of Eastern Asia. In India they acquired power in various places, but now the only relics of their rule are the territory of Goa and the seaports of Daman and Diu, all in Bombay. The Portuguese were followed by Dutch, Danes, French, and English, all of whom established trading factories in India. During the eighteenth century a great struggle took place between the French and the British in India, at the end of which the British came out as the victorious power, and since then British influence in India has constantly increased. In 1765 the (British) East India Company secured from the Mughal emperor the cession of the populous provinces of Bengal, Behar, and Orissa in the north-east. Already, however, the power of the Mughal emperor had been reduced to a mere shadow by the establishment of the great Hindu power of the Marathas in the south, and the encroachments of the Sikh confederacy on the north-west. The British consolidated and extended their own authority by victories over each of these rivals in turn. Several wars were waged against the Marathas, and at the close of the last of them, in 1818, large additions were made to British territory, chiefly on the north-west of the tableland. In 1849 the Punjab was annexed by the British after a successful war against the Sikh confederacy in the north-west. In 1857 the last Mughal emperor was deposed by the British. All the European powers mentioned contributed more or less to the spread of Christianity in India, but at the census of 1881 the total number of Christians in the country was under two millions.

Government.—At the present day almost the whole of India, along with Burma in the Eastern Peninsula, is either under direct British rule, or is subject to native princes more or less under

British influence. Among European powers, Portugal and France alone retain possessions in India (see p. 159).

Since 1858 the government of British India has been vested in the Crown, which appoints a Viceroy or Governor-General for the whole country, who is the head of two councils, an executive and a legislative. The executive council is composed of seven members, including the Viceroy and the commander-in-chief of the army, the members presiding respectively over the following departments—finance, home affairs, revenue and agriculture, foreign affairs, military affairs, public works, and legislation. The legislative council comprises the same members along with twelve other nominated members, some official and some non-official, and the governor of the province in which the council is held. The provinces of British India are placed under the administration of officials bearing various titles, as shown in the table on the next page. Bombay, Madras, Bengal, and the North-West Provinces, have each a subordinate legislative council, the members of which are appointed by the head of the respective provinces. All the provinces of British India are divided into "districts," each under an officer bearing the title of magistrate and collector, or (in some parts) deputy-commissioner. In certain provinces the districts are grouped into "divisions," in each of which a "commissioner" is the head of the administration.

The revenue is mainly derived from a land-tax (yielding at least two-fifths of the whole amount); the sale of opium, which is a Government monopoly in Bengal, and on which a duty is collected when exported from native states through Bombay; a tax on salt (a Government monopoly in Madras); excise duties on spirits, *ganja*, and other intoxicating preparations made from hemp, &c.; customs (import duties and an export duty on rice), stamps, and provincial rates (mainly levied on land for special local purposes).

Education is fostered by the Government in British India in various ways. At the head of the educational system are five universities, at Calcutta, Madras, Bombay, Allahabad, and Lahore. These universities are all, as such, merely examining bodies with the privilege of conferring degrees, but the University College in connection with the Punjab University at Lahore has a teaching staff devoted to the study of Oriental literature, for which degrees are conferred by the university. There are likewise many colleges which impart the highest English education, or prepare students for the professions of law, medicine, or engineering, in addition to a large number of "public" schools, in which the course of study conforms to the standard prescribed by the department of public instruction or the university, and which are either inspected by the department or send up pupils to the public examinations.

The native states are subject to their own rulers, who are, however, bound to allegiance to the British authorities, and have a British official stationed at their court. In the larger states this official is known as the British Resident. Some of the smaller states are grouped together and placed under the supervision of an "Agent for the Governor-General."

**AREA AND POPULATION OF INDIA AND BURMA, INCLUDING*
THE NATIVE STATES.**

(Black figures are only estimates or incomplete returns.)

Presidencies and Provinces under the Administration of	Area in Thousands of Square Miles.	POPULATION.			
		1881.	1891 (Preliminary Results).		
		Thou- sands.	Thou- sands.	Per Square Mile.	Variation per Cent. since 1881.
The Governor-General of India :					
Ajmere and Merwāra	2.7	461	542	200	+ 17.62
Berar	17.7	2,673	2,897	164	+ 8.38
Coorg	1.6	178	173	108	- 3.19
Andaman Islands (Port Blair)	.9	15	16	...	+ 7.12
Governors :					
Presidency of Madras	143	30,813	35,580	249	+ 15.50
Presidency of Bombay (in- cluding Sind)	125	16,469	18,827	151	+ 14.31
Lieutenant-Governors :					
Bengal	150	66,590	70,909	473	+ 6.49
North-West Provinces and Oudh	106	44,108	46,923	443	+ 6.38
Punjab	111	18,843	20,803	187	+ 10.41
Chief Commissioners :					
Assam	46	4,881	5,423	117	+ 11.09
Lower Burma	87	3,737	4,569	53	+ 22.28
Upper Burma	69	...	2,985	43	...
Central Provinces	84	9,839	10,775	128	+ 9.51
Total British territory } (in round numbers) }	944	198,600	220,400	233	+ 11.00
Native States :					
Baroda	8.6	2,185	2,414	282	+ 16.09
Central India Agency	75	9,262	10,140	135	+ 9.47
Haidarābād	82	9,346	10,459	127	+ 10.16
Mysore	25	4,186	4,860	197	+ 16.16
Rajputāna Agency	130	10,268	12,301	95	+ 19.79
Bengal feudatories	37	2,947	2,710	...	...
Sikkim	1.6	...	...	...	...
North-West Provinces	5	742	799	156	+ 7.74
Punjab feudatories	36	3,862	4,257	111	+ 10.25
Kashmir	80	...	2,507	...	...
Central Prov. feudatories . . .	29	1,710	2,155	75	+ 26.07
Madras feudatories	9.5	3,345	3,694	39	+ 10.43
Bombay feudatories	60	6,926	8,060	69	+ 16.36
Manipur	8	45	...	...	...
Shān States	40	...	...	...	...
Total Native States (in round numbers) }	640	57,000	64,564	100	+ 14.37
Grand total India (in round numbers) }	1584	255,600	284,954	180	+ 12.36

industries—Agriculture.—India is essentially an agricultural country. At the census of 1881 the number of persons directly supported by agriculture made up more than seven-tenths of the male inhabitants engaged in specific occupations.

The **crops** that may be described as **universal in India** are **millets, pulses, and oil-seeds**; and, except on the best-watered plains, suitable for rice-growing, and in parts of northern India, where a stronger grain is required, millets and pulses, along with garden produce, form the bulk of the food of the agricultural population. The most extensively grown unirrigated crop in India is the great millet or *jodr*; the millets next in importance are the spiked millet or *bdjra*; and (especially on the southern part of the tableland) *ragi*, the principal small millet. The principal pulse is the chick-pea or gram. In all, fourteen cereals and nine different kinds of pulse are cultivated, exclusive of those confined to a few very restricted areas.

Rice is the characteristic grain-crop of the best-watered plains not only in India, but throughout the monsoon region of Asia. There are many varieties of this crop, some of which require very different conditions from others; but those which are most abundantly produced not only demand a high summer temperature, but have to be grown in fields capable of being flooded at certain stages of their growth. These conditions are afforded in the great river deltas and low-lying seaboard tracts subject to inundation during the summer rains of the area referred to.

Of the numerous varieties of rice, some ripen at one period and others at another, so that it is said to be possible for the owner of an estate in Bengal, with a mixture of soils suited to different varieties, to have as many as five crops in the year. Two rice-harvests in the year are almost universally obtained in Bengal, and frequently two crops are taken from the same field. There are even certain varieties of rice, known as upland or hill rice, which thrive on a drier soil, and in India often ascend to an altitude of 8000 feet; but these varieties make up only a comparatively small proportion of the rice-culture of any country.

The **oil-seeds** most extensively grown are sesame, linseed, •castor-oil, mustard, and different kinds of rape. The largest export under this head is that of linseed.

Other crops are characteristic of certain regions. **Opium** cultivation has its chief seats in the valley of the Ganges round Patna and Benares; and in Central India, in the region corresponding

to the old kingdom of Malwa. **Cotton** is mainly grown on the tableland, and above all, in those fertile regions covered with **regar**, a soil so well adapted to this crop as to be known as the **black cotton soil**¹ There is, however, no part of India with a moderate rainfall, in which cotton is not extensively grown. Equally wide is the area over which the cultivation of **sugar-cane**, **indigo**, and **tobacco** is distributed, though even the most extensively grown of these three (sugar-cane), does not occupy altogether one-fifth of the area under cotton. The sugar made from native cane or the sap of palms² (almost entirely in the imperfectly refined form of *jagari* or *gur*) is much below what is required for Indian consumption, so that there is a large import³ of this commodity (chiefly in the form of refined sugar). The provinces in which sugar-cane is most largely cultivated are the North-West Provinces and the Punjab. Indigo is most abundantly produced in the northern plains, and in certain districts of Madras. Tobacco covers the smallest area of the three. With regard to the place of its cultivation, all that can be said is that it is grown wherever a soil specially suited to it can be found, for this it requires. **Jute** is a product of Bengal; **tea**, of Assam and the Himalayas (Darjiling, Kumaun in the North-West Provinces, the Kangra valley in the Punjab), as well as Chittagong, Chutia Nagpur, Madras, and other parts of the country; coffee, of the eastern and therefore drier⁴ slopes of the Western Ghats, south of about lat. 15° N. (Mysore and Madras, where tea also has now been introduced); **cinchona**, of plantations on the Nilgiri Hills and the Himalayas (Darjiling); **pepper**, of the mountains in the south. **Silk** may also be mentioned among the agricultural products of India so far as it is obtained from silk-moths reared on mulberry trees planted (chiefly in Bengal) for the purpose, but a large proportion of Indian raw silk is obtained from "wild" moths in the hill forests of Assam, western Bengal, and the Central Provinces. The great **cattle-rearing region** of India is a belt extending from Cutch through eastern Rajputana and the Punjab to Kashmir, a belt in which the rainfall is not so excessive as to wash away all the saline constituents which are found to be so essential to the health of cattle. Cattle are the chief beasts of burden and draught in the greater part of India*

i See pp. 100-101.

• Chiefly from Mauritius.

* See p. 106.

⁴ *Intro.*, par. 94, and *comp.* above, pp. 96-7

In the moister parts of Bengal, however, cattle are replaced for field-labour by buffaloes.

For the most part two crops at least are reaped in the year, but not usually from the same land. In the area of the summer rains, one crop (*kharif*) is generally sown in the early weeks of the monsoon (June and July), and reaped in October and November; the other (*rabi*) is sown at the end of the monsoon, and reaped from January to March. The latter, accordingly, is the winter crop; and as the winter throughout the north-



FIG. 28.—PLOUGHING WITH ZEBUS.

western half of India is at least as cool as the summer of northern Europe, **wheat, barley, gram, and linseed** are among the winter crops of the region wherever the duration of cool weather is long enough to ripen them. A line drawn from the Tapti to the upper waters of the Mahanadi may be held to mark approximately the southern limit of the region within which wheat is grown to any great extent. The chief region of production of this cereal is in the Punjab and the North-West Provinces.

In southern India, and above all in Madras, where there is less difference of temperature at the different seasons than in northern India, the distinction between *kharif* and *rabi* does not apply. Most crops in that

region can be grown under either monsoon, and there the division of crops into "wet" crops and "dry*" crops, according as they do or do not require irrigation, is more important. Thus the greater millets, which in northern India are grown in the rainy season because it is the warmer, can be grown in the south during either season, but, being grown without irrigation, are "dry" crops.

Mineral Products.—The mineral wealth of India is tolerably abundant, but there are obstacles to its development in the face of foreign (chiefly British) competition. There are some extensive and numerous small **coalfields**; but the most extensive, in the west of Bengal and the east of Central India, lies in a region imperfectly explored and not easily accessible, and most of the Indian coal is able to do only from one-half to two-thirds of the work of imported English coal. Nevertheless the total production of coal in India is rapidly increasing. In the ten years from 1880 to 1889 inclusive, it doubled itself, increasing from a little over one million to upwards of two million tons. Meanwhile the amount of the import of coal into India fluctuated greatly, and showed little tendency to increase. The region that produces the greatest quantity of coal in India is the southern part of Bengal, to the west of the Ganges, on the outskirts of the tableland.

Principal Coalfields.—Here, in the valley of the Damodar, a tributary of the Hugli, and in that of the Baralchar, a tributary of the Ddmodar, are several coalfields, which together produce about four-fifths of the coal raised in India. Of these, the coalfield round Raniganj, about 120 miles north-west of Calcutta, is the most important. It has been worked for more than a hundred years, and is still the most productive. The coalfield of Karharbari or Giridhi,¹ about 65 miles north-west by west of Raniganj, yields a better quality of coal, and the amount of its output is rapidly increasing. It is connected by a branch line with the East Indian Railway, which possesses some of the mines belonging to it. The same railway is projecting the laying of another branch line to the Jharia coalfield, about 30 miles to the south of that of Karharbari. In the extreme north-east of India good coal, now used even by ocean steamers, is obtained at MAkum, in Assam, to the south of the Brahmaputra.

On the tableland three important coalfields are now in communication with the Indian railway system. One is the coalfield of Umaria, 60 miles east-north-east of Jabalpur, connected by a branch line with the East Indian Railway; another that of Warora in the Wardha* valley, 65 miles south by west of Nagpur, connected with the Great Indian Peninsula Railway; and the third that of Singareni, in the native state of Haidardbacl, on the Nizam's railway, about 120 miles due east of the city of Haidardbdd.

¹ The nearest station on the East Indian Railway.

This last produces good coal, and its production is rapidly increasing. A fourth coalfield on the tableland, that of Mohpini, in the valley of the Narbada* (Nerbudda), about 110 miles north by west of Ndgpur, has long been connected with the Great Indian Peninsula Railway, and has produced annually a small quantity of coal; but this field is difficult to work, and seems to be on the point of exhaustion.

Iron ore is widely scattered over the country, and, with the profuse employment of charcoal, the best material for smelting, the natives make iron of excellent quality; but in the districts most accessible to foreign commerce this expensive mode of working has almost been extinguished in consequence of the import of European iron and iron-wares.

Obstacles to the Establishment of Great Iron Industries in India.—

Notwithstanding the abundance of ore in India, there are great hindrances to the growth of a great native iron industry carried on by European methods. For besides ore, two other materials, heavy in proportion to their value, and therefore costly to transport, are required to prosecute an industry of this kind. One of these is the fuel for smelting, and the other is limestone, which is used as a flux, that is, as a means of assisting the fusion of the ore. It is not easy, therefore, to develop an iron industry like that of western Europe, except where these materials can all be obtained close together, or where one or other of them can be cheaply imported by sea, if it is necessary to import any from a great distance. Now in India no place is yet known where good ores, good fuel, and good limestone are found near together. The beds of iron ore which seem most likely to be turned to account some time in the development of a great iron industry are near Raniganj in Bengal, in the valley of the Wardha, and near Salem in Madras. The iron ores of Rdniganj are not of good quality, but they have the advantage of being near the most productive coalfields of India. Rdniganj coal, however, is not suitable for iron-smelting, but the better coal of Karharb£ri can be used for this purpose. Nevertheless, the **ironworks** that have been started at **Barakhar**, near the confluence of the River Barikbar with the Damodar, to utilise the neighbouring iron ore and coal, have not yet proved successful. The Wardha* valley, which contains iron ores in great quantity, could supply also excellent limestone, but though coal is found here also, neither the coal nor the ore is of such a quality as to make this region much more promising as the seat of great ironworks. On the other hand, the Salem ores, which are found cropping out on a hill close to the railway from Madras to Calicut, a few miles west of the town of Salem, to the north and east of the Cauvery, are almost inexhaustible in quantity, and of such excellent quality that it may turn out to be profitable either to carry these ores to some place in which fuel and limestone are abundant or can easily be obtained, or to carry fuel and limestone to the ores. As it is, limestone exists in the neighbourhood of these ores, but the only fuel that can be obtained

near is a small quantity of charcoal. The supply of charcoal might, however, be greatly increased, inasmuch as the climate is admirably suited for the cultivation of the quick-growing babul, which, among its other useful properties, has that of yielding a charcoal with great heating power.¹

Among other Indian minerals of importance are gold (in Mysore, in Madras, and Chutia Nagpur), copper, salt, and saltpetre. Salt is obtained by evaporation all round the coast, from the Salt Hills in the north of the Punjab, and from Lake Sambhar and other lakes or pits in Rajputana, but the production is not nearly enough to meet the Indian demand. Saltpetre is obtained from northern Bengal.

Manufactures.—Not only in metal-working, but also in various other branches of manufacture, the Indian handicrafts have suffered greatly from European competition and the introduction into India of • European methods of production. Cheap Manchester cottons, and, more recently, the products of the native cotton-factories, have told heavily on the old hand-spinning and weaving. Even the fine muslins of Dacca (Bengal) and Madras, for which India has long been celebrated, have almost become a thing of the past.

Cotton-mills (chiefly for the spinning of yarn) are now to be seen in all parts of India, but the great majority are in the Presidency of Bombay, and more particularly in Bombay island, where nearly two-thirds of the raw cotton made use of in Indian mills is worked up.²

Silk-factories worked by steam have been started at Bombay, and jute factories have long been worked with success in Bengal. The manufacture of leather from native hides and skins by means of native tanning materials,³ is also to be included among the rapidly growing industries of India carried on by European methods on a large scale.⁴ In the making of various articles of luxury and art, Indian artisans still excel. Cashmere shawls are still made both in Kashmir and the Punjab (Amritsar, Ludhiana, and elsewhere). Rich figured silks are made in many towns. Indian carpets and rugs are articles of export, and so also are a variety of articles skillfully wrought in ivory, gold and silver, copper and brass.

Means of Internal Communication.—The part which rivers play in this respect has already been referred to.⁵ The first of the great roads of India was the **Grand Trunk Road**, which was

¹ See p. 106. ² See p. 124.

⁴ See the bottom of p. 124.

³ Chiefly myrobalans.

⁵ See pp. 88, 91-2.

constructed for military purposes through the whole length of the great northern plain from the delta of the Ganges to the north-west frontier. It was begun by a Muhammadan emperor in the sixteenth century, but only finished under British rule in the first half of the present century. Numerous other roads have since been laid, most of them metalled with stone obtained by breaking up the kankar or nodular limestone lumps which are to be found in most parts of India (except the great deltas), in the river-beds, and on the alluvial plains.¹

The first railway in India was that from Bombay to *Tha*na*, opened in 1853—the first part of the Great Indian Peninsula Railway. In March 1890, the total length of railway in India had increased to upwards of 16,000 miles. In recent years the annual addition to the railway mileage has averaged about 1,000 miles. The great trunk lines of India are all on the gauge of 5 feet 6 inches,² which is known as the standard gauge. Railways on this gauge now connect Calcutta with the north-western frontier, and that frontier with Karachi; Bombay with Allahdab³, with Calcutta by way of Nagpur, and with Madras, and Madras with Calicut (by a line through the Palghat Gap).³ The chief trunk line still wanting is one to connect Madras with Calcutta. Several railways have been constructed on the metre gauge (3 feet 3½ inches), and there are a few other short lines on gauges still narrower.

Principal Railways.—(1.) The EaBt Indian Railway (standard gauge), which connects Howrah, the suburb of Calcutta on the west of the Ganges, with the Punjab, passing through Benares, Allahabad, Cawnpur, and Delhi, and now terminating at Kriika, in the Himalayas, the nearest station to Simla. Its principal branch line is that to Jabalpur in the Central Provinces. (2.) The North-Western Railway, which completes the communication between Calcutta and Peshdwar, uniting with the East Indian Railway on the east side of the Jumna a few miles to the east of Delhi. It also connects the north of the Punjab with Karachi by two lines which meet at Sher Shahi (near Maltan) on the Chendb, below which a single railway is continued southwards to the seaport just named. A branch from this railway proceeds to the British districts of Afghanistan and Baluchistan.⁴ (3.) The Oudh and Rohilkhand Railway (standard gauge), which connects Sahtanpur on the North-Western with Benares on the East Indian Railway, and forms the principal means of communication through the North-West Provinces north of the Ganges. (4.) The Eastern Bengal State Railway, the main line of which (standard gauge) connects Calcutta with Goalconda, the starting-point of steamer traffic on the Brahmaputra. A branch of this line proceeds northwards to the Ganges, and is connected by a ferry with another branch (metre-gauge), which continues in a

¹ See Appendix, par. 59.

² The distance between the rails of the same line.

³ See p. 89.

⁴ See pp. 79 and 155,

northerly direction to the base of the Himalayas. The communication with Darjiling is then completed by the short Darjiling-Himalayan Railway (two feet gauge), the highest railway in the Old World and one of the most remarkable engineering achievements in India. It reaches a height of over 7,300 feet. The Eastern Bengal Railway is now connected with the East Indian Railway by a bridge over the Ganges at Htiglf, completed in 1887, and hence known as the Jubilee Bridge.¹ The same railway connects Calcutta with **Diamond Harbour**, about the head of the estuary of the Htigll, and **Port Canning**, at the head of that of the Matla; but as these seaports have never attained the importance expected of them, the traffic on these lines is small. Along with the **Bengal Central**, this railway also connects Calcutta with Khulnri, in the middle of the delta of the Ganges. (5.) **The Bengal and North-Western Railway**, (6.) **The Tirhoot State Railway**, and a branch of the Eastern Bengal Railway (all metre gauge), form the principal means of communication in Oudh and the North-West Provinces east of the Gogra and in northern Bengal. (7.) **The Great Indian Peninsula Railway** (standard gauge) connects Bombay by different lines with the north-east, east, and south-east of India. One line proceeding north-eastwards connects with the East Indian Railway at Jabalpur, after sending off a branch eastwards up the valley of the Tapti to Nrfgpur. Another line proceeds south-eastwards in the direction of Madras. (8.) **The Bengal-Nagpur Railway** has since March 1891 completed the railway communication between Bombay and Calcutta, connecting the Great Indian Peninsula Railway at Ndgpur with the East Indian at Asansol in the Bengal district of Bard wan. (9.) **The Indian Midland Railway** (standaid gauge) has its centre at **Jhansi** in Gwalior, from which lines radiate in four directions—(1) south to Bhopal, whence another line descends a pass of the Vindhya Mountains, and unites with the Jabalpur line of the Gieat Indian Peninsula Railway; (2) east to Manikpur (for Allahabad) on the East Indian Railway; (3) north-east to Cawnpore on the same railway; and (4) north-west to Gwalior, and then by the Sindhia's Railway to Agra on the same railway. (10.) **The Bombay, Baroda, and Central India Railway** (standard gauge) proceeds northwards from Bombay to Ahmadabad, and there connects with one of the lines of (11.) **the Rajputana-Malwa Railway** (metre gauge). This railway, which is worked by the previous, has two principal lines. One connects Ahmadabad with Agra; the other branches off at Ajmere, and proceeds south-eastwards and unites with the Great Indian Peninsula Railway in the west of the Central Provinces. (12.) **The Madras Railway** (standard gauge) first proceeds westwards from Madras, and then at Arkonam sends one branch north-westwards to communicate with the south-eastern line of the Great Indian Peninsula Railway, and another south-westwards through the Palghdt Gap to Calicut. From the latter line there is a branch to Bangalore in Mysore. (13.) **The Southern Mahratta Railways** and (14.) **the Mysore Railway** (both metre gauge) are the principal railways in the triangle between the Madras Railway and the

¹ The year 1887 was that in which Queen Victoria completed the fiftieth year of her reign.

south-eastern line of the Great Indian Peninsula Railway, with both of which they communicate. (15.) The South Indian Railway (metre gauge) is the principal line from Madras to the south, terminating at present at Tinneveli.

Foreign Commerce.—The great bulk of the foreign commerce of India is carried on by sea; and the rapid growth of this commerce in recent years is shown by the following figures, giving, for the whole of British India, including Burma, in crores of rupees,¹ the average value of the imports and exports of merchandise, including Government stores, but excluding coin and bullion, for periods of five years ending 31st March :~

	1871-75.	1876-80.	1881-85.	1886-90.
Imports . . .	33.70	39.35	53.06	64.22
Exports . . .	57*02	62'50	82.28	92.68

In the year ending March 31, 1891, the total value of the imports by sea, expressed in the same manner, was 71*98; that of the exports (including foreign as well as Indian produce), 100*22,

Money.—The value of the rupee, which is the standard coin for British India (including Burma), Ceylon, and the Mauritius, depends on the value of silver, and as the value of silver has fallen greatly with relation to gold since 1873, there is great difficulty in comparing rupee values with values expressed in pounds sterling,² the value of which depends on that of gold. Down to 1873 a rupee was generally taken as equal to two shillings (24 pence) or one-tenth of a pound (£0*1), but in 1888-89 its average value fell to about 1s 4d., or little more than one-fifteenth of a pound. Since then its value has risen slightly, and is now (1891) about 1s. 5d.

Expressed in millions and decimals of millions of pounds sterling at the average rate of exchange for each year, the figures given above for Indian imports and exports are equivalent to the following:—

	1871-75.	1876-80.	1881-85.	1886-90.
Imports . . .	31-68	33'67	43.40	45'58
Exports . . .	53-66	53-42	67*30	65'83

Which shows that even when the same mode of statement is adopted the external trade of India has increased in recent years relatively at a more rapid rate than that of the United Kingdom.²

Exports and Imports.—In recent years raw cotton, opium, rice, and oil-seeds have formed half the value of the sea-borne exports

¹ Equal to millions and decimals of millions of Ex. (tens of rupees), according to the mode of statement now adopted in the official reports. ² See p. 196.

of British India, including Burma. Among the other leading exports are wheat, jute, hides and skins, indigo, and tea.¹ Cotton manufactures, including yarn, make up nearly half the value of the imports, and among the other leading imports of ordinary merchandise are metals, railway materials, machinery and mill-work, woollen goods, coal,² and kerosine (mineral oil).³

It is a very remarkable feature of the trade of India that bullion and specie, chiefly in the form of silver, are regularly imported to such an amount, that the value, even after deducting that of the exports under this head, is on an average equal to at least a fifth of that of all other imports. As a whole, the trade of India is a striking example of the exchange of agricultural produce for manufactured articles and minerals.⁴

Among the countries trading with India the United Kingdom takes the first place, supplying fully three-fourths of the value of the imports, and receiving about two-fifths of the value of the exports. China (including both Hong-Kong and the treaty ports) ranks second among the countries receiving the exports, since it takes most of the opium, and is also really second among the countries supplying the imports, for its only rival in this respect is the Straits Settlements, and many of the commodities imported from that colony have been previously derived from other countries.

In the recent history of Indian commerce the most noteworthy feature with regard to the commodities has been a steady rise in the quantities of nearly all the leading articles of export and import. The principal exception is in the export of opium, which shows a considerable decline if we compare the average of recent years with that of the period immediately preceding. On the other hand, during the last fifteen years or so India has shown a rapidly rising export of wheat,⁵ tea, and oil-seeds, and a less marked rise in other commodities. Two manufactured articles also are rapidly rising in importance among the exports: these are cotton twist and yarns, and leather. The cotton twist and yarns are mainly sent to China (including Hong-Kong) and Japan, and the amount of the export to these countries increased year by year from about 8 million lbs. in 1876-77 to fully 162 million lbs. in 1890-91, whereas the British exports of these articles to the same countries have not increased at all in recent years.⁶ As regards leather, an increasing proportion of the hides and skins exported from India leaves the country in tanned or dressed form. Under the head of imports, the rise has been most marked in sugar.

With regard to the countries with which the commerce is carried on,

¹ See p. 200.

²

See p. 118.

³ See p. 69 (Baku).

⁴ See, however, the next paragraph in small type.

⁵ See pp. 200, 238.

⁶ They are now less than one-fourth of the corresponding Indian exports.

the ynited Kingdom maintains its position pretty well in the supply of the imports, but the percentage of the exports received by it has greatly declined since 1870; that of France, Italy, Austria-Hungary, Egypt, and other countries steadily rising meanwhile. This is without doubt due to the fact that articles shipped through the Suez Canal are sent in increasing proportion direct to the countries mentioned, instead of being sent first to England as formerly, in order to be re-exported thence.¹ About four-fifths of the value of the sea-borne imports of merchandise into India, and nearly three-fifths of that of the exports from India, now pass through this canal; or, in other words, almost the entire trade with countries west of the canal passes by that route.

The foreign sea-borne commerce of India proper (exclusive of Burma) is almost confined to four **seaports**—Calcutta, Bombay, Madras, and Karachi (Kurrachee), and more than 80 per cent, of the whole falls to the share of the first two.

The **external trade** of India **by land** has a total value of more than four crores in either direction, or about nine crores when the imports and exports are combined, but this includes the trade with Kashmir. Nepal has the largest share of this trade, and Nepal and Kashmir are the only two countries with which this branch of trade exceeds one crore in value (imports and exports together).

DIVISIONS OP INDIA.

Bengal is made up of nine divisions. **Orissa** and **Chutia'** **N&gpur** correspond to two old provinces. The divisions of Bhagalpur and Patna in the north-west are equivalent to the old province of **Behar**. The remaining divisions form Bengal proper. These are Bardwan, Presidency, Dacca, and Chittagong, which succeed one another from west to east in the south, and Rajshahi, between Bhagalpur and Assam.

Surface.—The greater part of the lieutenant-governorship consists of plains, which are widest in the south, where they spread out along the seaboard. They are narrowest in an east to west direction, about the place where the Ganges and the Brahmaputra turn southward, the Ganges skirting the **Rajmahal Hills** on the west of the plains, the Brahmaputra washing the base of the **Garó Hills** on the east. The width of the plain is here about 130 miles. Farther north the plain expands in an east to west direc-

¹ See the top of p. 199.

tion, the narrower dimension being that from north to south between the Himalayas and the southern tableland. The width in this direction is about the same as that in the neck between the Eajmahal and the Garo Hills. The plains to the south of the neck just mentioned are the most extensive region in the world on which the soil has been accumulated by regular floods from an intricate network of rivers. The form of the surface is typical of all such regions.¹

Rivers.—Most of these belong to the delta of the Ganges and the Brahmaputra. The main streams of these rivers now unite at Goalanda, and the great body of the water belonging to both is carried onwards to the estuary of the **Meghna**, which receives also the waters of the Surma. This estuary is navigable at all seasons for the largest native boats and river-steamers, but navigation is at times rendered difficult, and even dangerous, by the violence of the bore.²

Between the Meghna in the east and the Hugli in the west, the two chief branches of the delta as regards navigability are the Bale-swar or Haringhata and the Matu or Raimatla. Throughout the historical period, however, the **Htigh** (Hooghly), at one time, as another of its names, Adiganga or Great Ganges, shows, the main arm of the Ganges, has been the most important branch of the delta as a highway for ships. At present it is supplied directly from the Ganges by three head-waters, the so-called **Nadiy rivers**, Bhagirathi, Jalangi, and the Matabhanga, or rather the Churni branch of this last river, but during the dry season these streams dwindle to shallow threads of water, which contribute only a small share of the supplies with which the great trough of the Hugli is filled. During that season the upper part of this trough is charged mainly with water that filters through the light porous soil on both sides, but during the rainy season the three Ganges feeders sweep down immense volumes of water, which serve to scour the trough of the Htigh, and thus prevent it from being wholly blocked with silt.³

In its lower course the Hugli receives on the right bank the **Dimodari** and the Rupnarayan, at no great distance from one another, and the arrest of the current due to the influx of these streams causes the deposit of sediment. In this way have been

¹ See *Intro.*, par. 33.

² See *Intro.*, par. 73.

* See *Appendix*, par. 19.

formed the **James and Mary Sands**, which constitute the chief danger of the navigation of the Hugli, and are remarkable for the appalling suddenness with which disaster has sometimes overtaken vessels that have struck on them.

Orissa has a separate **river system** from Lower Bengal. The chief rivers are the Mahanadf, Brahmanf, and Baitaranf,¹ together with the Subarnarekha, on the confines of the province in the north. The **chief river of Ghittagong** division, the **Karnaphulf**, also has a basin wholly distinct. Its upper waters flow between the parallel ranges of mountains which bound the Ganges delta on the east.

Climate and Products.—The climate of Bengal generally is more tropical than might be expected from its situation, seeing that fully half of it lies outside of the torrid zone. Its **agricultural products** are those of the tropics. **Rice** is the great staple, but numerous other grains besides pulses are grown. Among other products of the soil are oil-seeds, pepper, ginger, indigo, jute, tropical fruits, the silk-mulberry—in fact, almost everything that tropical India can furnish. Among **minerals** the coal and iron of the west have already been mentioned.² Coal also exists among the eastern hills, though here there is as yet but a scanty production. The northern plains of Behar have long been noted for their yield of **saltpetre**,⁸ which appears as an incrustation on the surface, and is regularly renewed after its removal. Other salts incrust the surface elsewhere, but only in the drier parts of the province.

Chief Towns.—The importance of the Hugh as a waterway is shown by the number of considerable towns that succeed one another at short intervals along its banks. Besides Calcutta, there are seven towns on this one river which had a population of more than 20,000 at the census of 1881. The most important of all, of course, is **CALCUTTA**, the capital of British India, on the left or east bank (including suburbs on the left bank, 840 j⁴ including **HOWRAH** and other suburbs on the right bank, 970). But the importance of Calcutta is of comparatively recent date. Its history may be said to begin with the year 1686, when Job Charnock established a factory of the East India Company at one of three villages now included in the city, which is believed by some to take its name from another of the three, Kalikata, that is, the shrine of the goddess Kali. Ten years later Fort William was built at the southern end of the present city.

¹ See p. 92.

² Pp. 118-9.

⁸ See Appendix, pars. 59, 94.

⁴ See note on p. viii. The populations are in most **oases** according to the preliminary returns of the census of 1891.

But it was nearly eighty years after that before it became the capital of Bengal, and a little later of British India. In 1772 the administration of Bengal was transferred by Warren Hastings from the hands of the Muhammadan officials to the East India Company, and at the same time the treasury of the province was deposited at Calcutta. In the following year pre-eminence was given to the Council of Bengal over those of Bombay and Madras, and thus Calcutta became the general seat of government for the country. Already, however, Calcutta had become the commercial capital of India.

It is the lowest of several seaports which succeeded one another on the Hugli, and the only one of all that is now accessible to sea-going ships. First came **Satgaon**, on a branch of the Hugli now silted up. It remained the principal port of the region from early Muhammadan times till it yielded pre-eminence to the town of **Hugli** in the early part of the 17th century, after which it rapidly fell into decay, and in the end nearly disappeared. By this time Hugli had been in existence about 100 years, the Portuguese having first established themselves there in 1537. In the seventeenth century the Dutch founded a factory at Chinsurah below Hugli, with which it now forms one municipality. In the next century the French founded a factory at **Chandarnagar** (Chandernagore), which still remains French, the German or Ostend Company (somewhat before the French) at **Bankipur**, still lower, and the Danes at **Serampur**.

Commercially Calcutta has an admirable situation. It has an excellent anchorage in the river. The port extends for ten miles along the river, has a broad working channel, and can always be reached by vessels drawing as much as twenty-six feet. The chief drawback consists in the sand-banks already mentioned. It has communications by water in three directions: eastward by various channels and rivers leading through the Sundarbans¹ to the Brahmaputra; northwards by the Hugli and the Nadiyd rivers to the Ganges, which can generally be reached, even in the dry season, by the broad boats, drawing from two to three feet of water, in use in this region; and westward by the Midnapur Canal.² As to the communications of Calcutta by rail, see pp. 121-2, under **Principal Railways** (1), (4), and (8).

As capital of British India, Calcutta is the seat of the Government House; as capital of Bengal, it contains the High Court of that province, and among its other fine buildings are a cathedral and other Christian churches. The Royal Botanic Gardens are at **Sibpur**, a suburb of Howrah, containing also an engineering college. There is a government dockyard at **Kidderpur**. In general, the European quarter of Calcutta is a city of palaces and gardens, and is still a great contrast to the native quarter, though the latter is by no means so bad as it was in the last century, when it was a byword for its filth and unhealthiness.

Of the other towns of the delta region, the most famous are Murshidabad and Dacca. **Murshidabad** (40) on the Bhagirathi, near the terminus of a branch railway to the south of the Ganges, was the Muhammadan capital of Bengal for the greater part of the 18th century, but has dwindled

¹ See p. 99.

² See p. 102.

since it lost this dignity. In 1815 its population was estimated at 160,000. It is still noted to some extent for such industries as flourish in a princely capital—ivory carving, embroidering with gold and silver, and the weaving of fine silks. A few miles to the south of Murshidabad is the site of **Elsimbar**, now a swamp, but at one time the seat of one of the great emporiums of Bengal. Having begun to decline in consequence of the growth of Calcutta and other rivals, it was further injured by a great change for the worse in its climate, and was finally ruined through being deserted by the Bhagirathi in 1813. Plassey, the scene of Clive's victory over Suraj-ud-daula in 1757, lies 30 miles south of Murshidabad.

Dacca, on the Buriganga (that is, "the old Ganges"), in the east of Bengal, to the north of the present course of the Ganges, is another town with a famous past. In the seventeenth century it was the capital of Bengal; in the next century it was renowned for its fine muslins ("woven wind"); but about the beginning of the present century this manufacture (still pursued to a small extent) began to decline in consequence of the import of Manchester cottons, and with the decline of this manufacture the population rapidly diminished also. In 1800 its inhabitants numbered about 200,000; in 1891, less than 85,000.

In following the Ganges upwards, we pass in succession four towns on or near its banks in Bengal, which had at last census a population of more than 50,000. These are, in order, **Bhagalpur** (69), **Monghyr** (57), **PATNA** (170¹), and **Chapra** (57), all except the last on the right bank. Patna, the most populous of these four, is that which has the greatest natural advantages for trade. It is situated opposite the influx of the Gandak, and a little below those of the Son (Soane) and the Gogra, so that it is the natural meeting-place of the traffic of all these rivers, as well as that of the Ganges.² It is also the starting-point of a trade-route leading nearly due north into Nepal. In this town is carried on the Government manufacture of opium, which is cultivated round about. **Bazar**, on the right bank of the Ganges, higher up than all the four towns last mentioned, is memorable as the scene of the decisive battle (1764) which led to the acquisition of Bengal by the British.

South from Patna a railway runs to **Gaya** (Gya, 80), a town situated amongst rocky hills running out into the Ganges valley, which teem with associations of Buddhism. Six miles to the south is **Buddh-Gaya**, the dwelling-place of the founder of Buddhism, and here is to be seen a lineal descendant of the famous *pipal* tree under which the sage sat when he attained to Buddhahood. Here too are ruins, probably of a palace of Asoka, the greatest of Buddhist kings. North of the Ganges, in Behar, are **Muzaffarpur** (42) and **Darbhanga** (66). Muzaffarpur is the capital of the district in which most of the Bengal saltpetre is gathered.

On a narrow Himalayan ridge, 6500 to 7500 feet in height, stands **Darjiling**, near the northern verge of British territory, but within twenty-four hours by rail of Calcutta.⁸ It is a hill-station with the summer residence of the Lieutenant-Governor of Bengal. On the neighbouring

i Census 1881.

² See Introd., pars. 113, 114.

³ See above, p. 121, under Principal Railways (4).

hills and along their base the tea-plantations are rapidly increasing, and there are also plantations of cinchona.

On the east of the Bay of Bengal stands the seaport of **Chittagong** (21), near the mouth of the Karnaphuli.

Among the towns of Orissa, two may be mentioned, Cuttack and Puri (Pooree). **Cuttack** (43), standing at the angle where the Mahdnadi gives off the Katjuri branch, is important as the key of the hill territory to the west (as such defended by an ancient fort), and as the centre of the Orissa Canal system.¹ **Puri** (22), on the coast, to the north of Lake Chilkd, is one of the most sacred places of the province, which for two thousand years has been the holy land of the Hindus. It is the seat of the shrine of Jagannndth (Juggernaut), and consequently a great resort of pilgrims, especially at the time of the great car festival, celebrated in June or July, when upwards of 100,000 persons sometimes assemble in the town.

Sikkim is a Himalayan state to the north of Bengal (capital, Tumlong), under the protection of the British, who now, under a convention concluded with China in 1890, have exclusive control over the internal administration and frontier relations of the state. Easy passes lead from Sikkim into Tibet, with which there might be a large trade but for the opposition of the Tibetan rulers.²

Assam, chief-commissionership, in the extreme north-east of India.

Natural Divisions—Surface Features.—The province consists of three parts ; in the north, that part of the valley of the Brahmaputra which runs from east to west in the south of the Himalayas, the hill region to the south of that valley, and the part of the valley of the Surmd which lies to the south of that again. The whole province is less densely peopled than any other part of India situated immediately to the south of the Himalayas. The most sparsely peopled part of all is the hill country in the middle.

History and Density of Population of the Brahmaputra Valley—The Brahmaputra valley, in Assam, notwithstanding the fact that it communicates freely at its mouth with the valley of the Ganges, has had in a great measure a separate history from the rest of India. This is to be ascribed to its narrowness and the peculiarities of its situation in other respects. The valley is upwards of 400 miles long, but only from 25 to 100 miles wide, the higher width being attained only at the mouth. Of this width the Brahmaputra alone, with the tracts of dense grassy jungle incapable of cultivation on its banks, occupies a space from 6 to 20 miles wide, and the inhabitants of the fertile plains were thus restricted to narrow limits, exposed to incursions from hill-tribes on both sides, as well as to invaders

¹ See above, p. 103.

» See p. 180.

across the passes on the east and south-east. These seem to have been the chief causes that kept down the density of population in former times. The Ahams, the inhabitants who gave name to this valley, a name afterwards extended to the whole province, entered it from the east, apparently in the thirteenth century, but they had to maintain an almost constant struggle against Muhammadans in the west, who were ever trying to annex the province to Bengal. These attempts were unsuccessful, and it was from the kingdom of Burma that the valley was ultimately acquired by the British in 1826.

The hill, or rather mountain, tract to the south of the Brahmaputra valley¹ is made up of a number of ridges and plateaux separated by deep valleys. The plains to the south form the most thickly peopled part of the whole province. That of **Sylhet**, in the west, is similar in character to the neighbouring plains of Bengal—a region of countless rivers flowing along ridges,² with gently curving hollows between them. The **Cachar valley** is narrower, and has numerous long minor valleys opening into it from the Lushai hills on the south, that is, from the region in which a succession of mountain chains, trending north and south, separate Bengal from Burma. The Surma, before entering the chief valley of Cachar and assuming a westerly course, flows first south down one of these valleys, then north down another.

The hill tracts and southern valleys were brought under British rule at different dates subsequently to the annexation of the Brahmaputra valley.

Products.—Under British rule the whole province has been rapidly increasing in population, largely in consequence of the rapid spread of **tea-cultivation**, first tried in northern Assam in 1835. The labourers on the European tea-plantations are mostly coolies, introduced from the crowded districts of western Bengal, and working under contracts for a term of years. The ordinary crops of the natives are similar to those of Bengal. The **mineral products** of Assam are also important. Coal has already been mentioned.³ Iron ore is plentiful, and is worked to some extent by native methods. Immense beds of limestone exist on the south side of the hills, and have been a source of supply for Bengal from time immemorial. There are only a few short railways in Assam, unconnected with the general railway system of India. The longest is from Dibrugarh, the limit of steam-navigation on the Brahma-

1 See p. 86.

3 See In trod., par. 33 3 See p. 118.

putra, to a point on that river opposite Sadiya, near the eastern end of Assam. This railway has a branch to the Makum coalfield.

Chief Towns.—The towns of Assam are for the most part merely groups of agricultural villages, and none of them had at the census of 1881 as many as 20,000 inhabitants. The only places that can be called towns proper are Sylhet and Silchar, the capitals of the two southern districts. The seat of administration of the province is Shillong, on a tableland of the Khasi Hills, nearly 5,000 feet high. It is now connected by a well-made road with GauMti, on the Brahmaputra, the old capital of the province.

Manipur, on the south-east of Assam, is a native state, with a British agent in correspondence with the chief commissioner of that province. It consists principally of a considerable valley in the heart of difficult mountainous country. In this valley lies Lake Logtak, and to the north of that lake the capital of the state, which has the same name.

North-West Provinces and Oudh.—These provinces lie to the north-west of Bengal. The nucleus of the present British territory belonging to them was acquired from the Nawab of Oudh in 1801, and was placed under the Governor of Bengal. Various additions were afterwards made, the last being the annexation of Oudh (the divisions of Lucknow and Sftapur) in 1856. The provinces were made a separate lieutenant-governorship in 1835.

Surface and Drainage.¹—The territory comprised by these provinces consists chiefly of the plains of the upper Ganges from the confluence of the Gogra, including the whole of the Great Doab or wedge between the Ganges and the Jumna; but in the extreme north-west it extends right up to the second range of the Himalayas.² This latter region, composed chiefly of the division of Kumaun and the native state of Garhwal, embraces the headwaters of both the Ganges and the Jumna, and contains some of the wildest and most magnificent of Himalayan scenery. The chief rivers of the plains, besides those just mentioned, are the Rapti, the principal left-bank tributary, and the Sarda or Chauka, the principal right-bank tributary of the Gogra, and the Giimti, a tributary of the Ganges on the left bank, above the Gogra. The provinces also include the lower courses of the Chambal and Betwa, and a linall part of the course of the Son (Soane).³

¹See also pp. 87-8.

² See pp. 83-4.

³ see p. 88.

These plains contained in early times the centres of the chief Aryan powers of India, afterwards those of the principal Muhammadan powers. They are the Hindustan proper of Muhammadan chroniclers, and they are the most populous part of the area in which the Hindi dialect is spoken.

Climate and Agricultural Products.—The nature of the crops indicates the passage to a cooler and drier climate in ascending the Ganges valley. Rice, though extensively grown, is no longer the principal crop. Wheat, one of the chief crops of Europe, now holds that rank, and barley, another European crop, one that thrives wherever wheat thrives, is cultivated over a large area. Millets and gram are also very extensively grown. The hills of Kumaun have a large extent of tea plantations. A considerable area of the province, extending through its whole width from east to west, is rendered barren by a saline crust similar to that seen in some parts of Bengal.¹

Communications.—See p. 88 and pp. 121-2 (1), (2), (3), (5), and (6).

Principal Towns.—The history of this region has caused it to be at all times the seat of great towns, but some of the large towns of the present day are of comparatively recent growth. The sites in it specially favourable to the development of great cities are not numerous, so that such centres are apt to grow up and decay in various places. Sometimes physical causes have contributed to this rise or decline, but in other cases only historical causes can be recognised.

(1.) **Towns on or near the Ganges** (all in the North-West Provinces, as distinct from Oudh) —They are here mentioned in the order in which they are passed in proceeding up-stream. **Ghazipur** (33), on the left bank, is the seat of the Government depot of the opium collected in the provinces. **BENARES** (222), the ancient capital of Hinduism, occupies a favourable site on the same bank of the river. It stands on the edge of the liver, where it makes a bend to the left, thus presenting at one view the whole series of the imposing ghats or steps descending to the river-bank, along with the temples and mosques by which these ghats are surmounted. The river is still accessible here to large steamers, and is now crossed by a railway bridge; but the town, in spite of its size, is not specially remarkable as a seat of trade and manufactures. It is enriched rather by the concourse of wealthy pilgrims. Three-fourths of the inhabitants are Hindus, less than one-fourth Muhammadans. **Mirzapur** (70), higher up, is an important grain* and cotton mart, and has considerable manufactures of shellac. **ALLAHABAD** (175) has one of the most advantageous natural situations in the plain,² and has been a place of importance commercially

¹ See p. 127 and Appendix, pars. 58, 94.

² See *Introd.*, par 113.

and strategically from very early times, though the present town and fort, as well as its name, date only from the time of Akbar the Great, in the second half of the 16th century. The town is built on a slightly elevated flat at the junction of the Ganges and the Jumna, and the advantages which these great navigable streams confer on it from a commercial point of view have been increased by the introduction of railways, seeing that it was the first place on the great railway system of the northern plains to be connected by rail with Bombay (1867). In December and January the great religious fair of Magh Mela* is held here, and is attended by about 250,000 persons. Allahdbtfd is the seat of government of the North-West provinces and of a university. **CAWNPUR** (Cawnpore, 150) is a contrast to Allah&b&d in being a great mercantile town of modern growth. It is purely a British creation, having been quite an unimportant place when it was first occupied as a British outpost, with the permission of the Nawdb of Oudh, in 1778. It has developed a large trade in grain and other agricultural produce, and since February 1888 its mercantile advantages have been increased through the opening of the railway to Jhrinsi, by which it has been brought into direct communication with Bombay. Cawnpur is now, indeed, one of the most important railway centres in India, having direct railway communication south-east with AllahdMd and the lower Ganges, north-west with Agra, Delhi, &c, north-east with Lucknow and other places in Oudh, and south-west with Bombay. The manufactures of the place are also characteristic of a large modern town. They do not consist of articles of luxury and refinement, such as are made in many an old capital of India, but of articles of everyday use, such as leather and cottons, produced on a laige f-scale The Memorial Gardens of Cawnpur commemorate one of the most lamentable incidents of the mutiny of 1857. Above Cawnpur, the ancient city of **Kanauj**, a famous capital on the Ganges at different periods of Indian history, now "moulders in desolation," four miles from the river-bank. **Hardwar**, situated where the Ganges bursts from a mountain gorge on the plains, is an ancient historical place of pilgrimage.

(2.) **On the Jumna**, above Allahabad, **AGRA** (160).—In its present situation, on the right bank of the river, this town is another of the creations of Akbar the Great. From 1566 it was for about sixty years the capital of the Mughal Empire, and it contains some of the finest examples of Muhammadan architecture, including that which is considered by many the finest of all, the Tdj Mahal, built in memory of the wife of the Emperor Shah Jahdn, whose tomb is in the same mausoleum. Agra is the terminus of a branch of the Ganges Canal, by means of which the navigation of the Jumna can be continued to Delhi.

(3.) **In the Doab (between the Ganges and the Jumna)**.—Three towns in the north of this region may be remembered—**MEERUT** (115), an old city, now a great military station, memorable as the scene of the outbreak of the mutiny on the 10th of May 1857 ; **Saharanpur** (63), headquarters of the Jumna Canal establishment; **Rurki**, to the east, a modern manufacturing town, with the chief workshops of the Ganges Canal and the Thomason Engineering College.

(4.) East of the Ganges above Oudh.—On the plain, BAREILLY (120); in the mountains of Kumdun, Naini Tal, a hill-station, with the summer headquarters of the provincial government, picturesquely seated on the banks of a beautiful lake at the height of 6,400 feet above the sea.

(5.) In Oudh, on the Giimti, LUCKNOW (including cantonments, 275), the former capital of the kingdom of Oudh, still the centre of trade for the province, which is the most populous in India, the seat of manufactures, chiefly of the luxurious class—gold and silver brocade, fine muslins, glass-work, &c. During the mutiny it underwent a siege of six months (May–November 1857) at the hands of the mutineers. Faizabad and the adjacent Ajodhya (together, 80), both on the right bank of the Gogra, occupy the site of the ancient Ajodhya, which was the capital of a Hindu kingdom long before the rise of the modern kingdom of Oudh.

Puiyab.—This province, if we include in it the large native state of Kashmir, occupies the extreme north-west of India.

Surface and Drainage.—The Punjab proper, the land of the five rivers,¹ which came into the hands of the British in 1849,^L consists mainly of the northern plains of the Indus, but some portions of it advance into the Himalayan region both on the south-west and south-east of Kashmir. In the east of the Punjab, and partly also in the North-West Provinces, from the Beas to the Ganges, a range of hills called the Siw&lik Hills, attaining at most a height of 3,500 feet, runs parallel to the Himalayas, from which it is separated by a line of valleys known as the Duns. Another noteworthy feature of the province is the rough and broken tableland in the north-west, in the angle between the Himalayas and the Sulaiman Mountains, bounded on the south and south-east by the Salt Range, which rises abruptly from the plains beneath to the height of from 2,000 to 5,000 feet. This range, or rather southern escarpment of the tableland, which owes its name to the enormous masses of rock-salt it contains (the largest known to exist anywhere), first faces that part of the Jehlam which flows to the south-west, and then trends west to and across the Indus. The salt-works supply the whole province with salt.

Climate and Agricultural Products.—The part of the plain which lies to the east of Lahore is almost the only part that has in favourable years an adequate supply of rain for agriculture. This part accordingly, though containing only about a quarter of the entire area, has half the cultivated area, and nearly half the population of the province, but its rainfall being precarious, it

is liable to disastrous failures of the crops. This was especially the case before the construction of the now numerous canals of the region.¹

Among the **crops** of this province, **wheat** predominates to an even greater extent than in the North-West Provinces, whereas rice is grown only to a small extent, occupying much less than a twentieth of the area devoted to grains and pulses. In the Himalayas there are numerous **tea-gardens**, especially in the district of **Kangra**, the tea of which is now well known in the English market. The **Kulu Valley**, a part of Kangra district containing the head-waters of the Beas, has a climate admirably suited for the cultivation of the fruits and vegetables of the temperate zone.

Communications.—The principal railways are those of the North-Western system: see p. 121 (2).

Towns.—**DELHI** (175), the easternmost of the chief towns of the province, is a place of great note in Indian history. Standing on a fertile plain on the right bank of the Jumna, which was formerly navigable to this place by large boats, it occupies the first favourable station for a great capital on the route of an army entering India by the north-western passes. Its site has accordingly been that of many successive capitals, but it attained its greatest glory as that of the Mughal Empire, after the seat of government of that empire had been transferred thither from Agra in 1637 by Shah Jahan. It was this emperor who built the present town, who first constructed the present fortifications (including the wall of solid stone which encloses it on three sides), and who adorned it with some of its finest buildings, among these his own palace and the great mosque (*Jamd Masjid*). Here again we meet with the industries characteristic of old capitals—gold, silver, and tinsel filigree-work and fine muslins.

Delhi was long the western terminus of the East Indian Railway,² but the railway is now continued northwards past **Panipat**³ and **Axnabala** (Umballa, 80) to **Kalka**, a place at an elevation of 2,000 feet on the route to the hill-station of **Simla**, which occupies a ridge of the Himalayas to the south of the Sutlej, at the height of more than 7,000 feet above the sea, and has long been the seat of the supreme Government of India during the hot season. Ambala stands also on the North-Western Railway,⁴ which, proceeding thence westwards through the region of the Sirhind canals,¹ sends off a branch to the south-west through Patiala, the most populous of the native states of the Punjab, and before crossing the Sutlej passes **Ludhiana**⁵ (44). Between the Sutlej and the Beas it passes **Jalandhar** (Jullundur, 52), and between the Beas and the Ravi, in the highly productive district watered by the Biiri Dodb canals, reaches

i See p. 103.

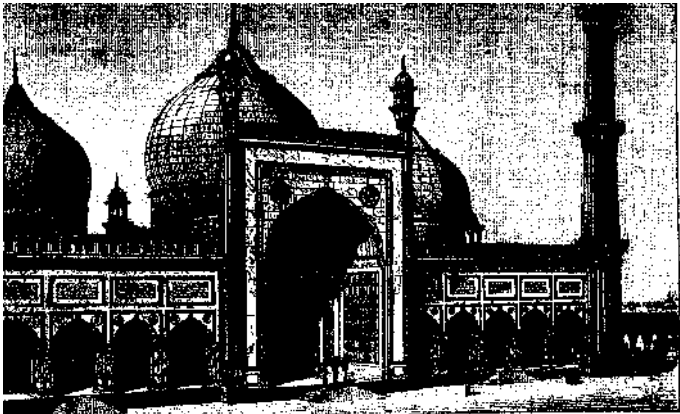
² See p. 121 (1).

⁴ See p. 121 (2).

³ See the bottom of p. 111.

* See p. 120.

first **Amritsar** and then **Lahore**. **AMRITSAR** (135), the capital of the Sikhs, is said to have been founded in 1574 by Guru *ll&m* Has, the founder of the sect, and was built round a sacred tank, to which it owes its name, meaning "the lake of immortality." It is the most flourishing commercial city of the province, and carries on manufactures of Cashmere shawls, that is, shawls made from the *pashm*, or fine wool or down, which in winter clothes the goat and other animals of the colder regions of the Himalayas. From Amritsar a railway proceeds northwards to **Pathankot**, the nearest railway station to Kangra and to **Dalhousie**, a sanitary hill-station (7,700 feet), in a district surrounded by the native state of Chamba. **LAHORE** (175), the capital of the province, is an ancient walled town, now situated about a mile from the left bank of the K.tvi. The European quarter, with



KIG. 29-THE JAMA MASJID, THE PRINCIPAL MOSQUE AT DELHI.

the Government House, the Lawrence Gardens, and the Punjab University, is outside the walls. The military cantonment of Meean Meer is six miles off. Before crossing the Chenjib, the railway gives off another branch northwards, which proceeds by **Sialkot** (55) to Jammii in Kashmir. Crossing all the other tributaries of the Indus, the railway passes the arsenal of **Rawal Pindi** (75), crosses the Indus itself at **Attock**, and terminates at **Peshawar** (85), a town with cantonments and a fort adjacent, about thirteen miles from the mouth of the Khdir Pass. From Ritwal Pindi a road leads up to the hill station of **Murree** (7,500 feet). To the Punjab belong also all the other towns on the Indus and near the frontier, except Sukkur,¹ mentioned in a previous paragraph as the eastern termini of pass routes from Afghanistan and Baluchistan. One of the lines of

¹ See p. 155.

the North-Western Railway passes to the south of the Salt Range, and a branch from this line runs north to Kheura, a village near the chief salt mines.

In the south of the Punjab the only town with more than 50,000 inhabitants is Multan (Mooltan, 75), a place with a large trade, situated a few miles from the left bank of the Chendb. farther south, near the left bank of the Sutlej, stands Bahawalpur, capital of the native state of the same name, the largest of the native states except Kashmir, but in great part a desert.

The battlefields of the first Sikh war (1845-6)—Mudki, Firozshdh, Aliwal, Sobrifon—lie in the angle south and east of the Sutlej, west of Ludhira. The final battles of the second Sikh war (1848-9) were fought at Chidn-wala and Gujrat, in the north of the province, west of the Chenab.

Kashmir and Jammu (Cashmere and Jummo) form together a large native state, about 80,000 square miles in extent, in the extreme north-west of India. It is nominally subject to a Maharaja, but since 1689 has been virtually under British administration. The state is the most mountainous in India, containing some of the highest mountains and passes of the Himalayas and the Karakoram Mountains, and the population is mostly confined to a few considerable valleys lying here and there among the mountains. The most important of these valleys is that of Kashmir proper, a beautiful expanse traversed by the Jehlam, between the first and second chains of the Himalayas, at the height of rather more than 5,000 feet above sea-level. The Jehlam is here a quiet stream, navigable from **Wular**, in the east of the valley, to its entrance into **Lake Wular**, and then after its exit from that lake to the **gorge of Baramulla**. Here the Jehlam begins to plunge through a series of rocky gorges, flowing first west to Muzaffarabad and then south, and it does not again become navigable till it enters on the Indian plain beyond the frontier of Kashmir. The valley has a delightful temperate climate, fitting it for the production of nearly all the fruits and grains of the temperate zone (apples, pears, plums, peaches, apricots, and even the wine-grape, wheat, barley, &c), as well as rice. The silkworm is also reared, and the inhabitants are industrious in manufactures. They have long been noted for the exquisitely soft shawls which they make from the fine winter-wool (*pashm*), but this manufacture has greatly declined of late years. Other branches of the woollen manufacture are, however, carried on. Notwithstanding these advantages, the population has been dwindling away in consequence of the oppressive char-

acter of the government; but since the British assumed control, attempts have been made to improve the condition of the people and to attract new settlers.

The chief town in the valley is **SRINAGAR** (120), "the city of fortune." Adjoining it is a small lake called the Dal or the City Lake, celebrated for its floating gardens, on which the best of cucumbers and melons are grown on a soil of fine mud spread over floating beds of matted reeds.

There are several routes leading out of the valley both west and south into the Punjab, and northwards across the second chain of the Himalayas into the valley of the Indus. The chief westerly route follows the course of the Jehlam to Muzaffarabdd, and then continues south-westwards to Peshawar. The chief southerly route leads across the Banihal Pass into the territory of **Jammu**, which lies to the south of the Chendb, and whose capital, bearing the same name, is now connected with the railway system of India.¹ The chief northerly route is that which goes north-eastwards to **Leh** in Ladjikh, an expansion of the Indus valley at the height of more than 11,000 feet above sea-level, in the east of Kashmir. From Leh a trade-route diverges northwards to Eastern Turkistan across the highest pass in the world regularly made use of in this way. This is the well-known **Karakoram Pass**, 18,500 feet in height, that is, upwards of 7,000 feet higher than Leh, and more than 14,000 feet above the level of the towns of Eastern Turkistan -

Below, or north-west of Ladakh, there is another important though smaller expansion of the Indus valley round **Iskardo** (or **Skardo**), the chief town of Baltistan or Little Tibet, which occupies the rugged region between the Karakoram range on the north and the second chain of the Himalayas on the south. Still farther to the north-west, another comparatively open valley, that of the River Gilghit³ or Yasin, opens south-eastwards into that of the Indus. The town of **Gilghit** occupies the middle of the valley, at the height of rather less than 5,000 feet above the sea. In this region the British frontier advances to within 50 miles in a direct line of the crest of the Hindu Kush.

Rajputana is the name of a region to the south of the Punjab, composed of twenty native states, together with the territory of Ajmere-Merwara under British administration. Most of the native states placed themselves under British protection in 1818, on the conclusion of a war in which the British put down the robber hordes of the Pindaris, by whom the region had previously been harried. In the same year Ajmere was ceded to the British| who two years later conquered the district of Merwara to the south-west. The name Kajputana is due to the fact that in this region most of the pure Rajput clans, or members of the

¹ See p. 137.

³ See p. 131, n. 1.

» See p. 81.

great warrior caste of old Aryans, have maintained, with varying fortunes, a certain measure of independence under their own rulers, The native states are all under the supervision of an agent to the Governor-General resident at Ajmere.

As regards surface features, climate, and productions, Rajputana is divided into two well-marked sections by the AraValli Mountains, which stretch from north-east to south-west through the whole territory.

To the west of these mountains is a region of low sandhills, in which the rainfall is extremely scanty, in which there is only one permanent river, the Lini or Loni, in which the underground water is for the most part too deep to be used for irrigation, and, where it can be so used, is in many places not constant, so that the agricultural villages have to shift from spot to spot when the water fails.

To the east of the AraValli Mountains the surface is mostly composed of tablelands, in the north-east of plains, on all of which there is a more abundant, but yet somewhat precarious rainfall, along with a much better soil and ampler opportunities for irrigation, which is effected mainly by means of innumerable small tanks. Some parts of this region have that black soil¹ which is so valuable in an arid climate on account of its remarkable tenacity of moisture. In the south, in Udaipur (Oodeypore), a rugged, jungle-clad district, known as the hill tracts of Me war, a district inhabited by the aboriginal tribe of the Bhils, connects the southern end of the Aravalli Mountains with the Vindhya range.

The principal riven of the eastern section are the Chambal,² which partly flows through it, and in the north-east forms the boundary; the Banas, a left-bank tributary of the Chambal, and the Mahf, an angle of which cuts off a portion of Rajputana on the south.

The chief wealth of the western region consists in herds of sheep, goats, camels, and some hardy breeds of cattle and horses, which graze on the coarse and sparse herbage that appears on the sandhills in the rainy season. Almost the only cultivated crops of this region are the spiked millet (*bajra*) and the *math*, a kind of bean. The eastern section is part of the great cattle-rearing region of India,³ and has a much greater variety of crops. The most important mineral product of the whole of Rajputana is salt, which is obtained from Lake Sambhar⁴ (to the north of Ajmere), and the pits of Pachpadra, on the western frontier of Jodhpur.

Rajputana is traversed by two main lines of the Rajputana-

i See pp. 100-101, and p. 116.

* See p. 116.

- See p. 88.

⁴ See Appendix, par. 50.

Malwa railway¹ (metre-gauge), which has branches to both the places of salt production just mentioned.

The principal towns are mostly capitals of the principal states, bearing the same name as the states. JAIPUR (Jeypore, 140), in the north-east, four or five miles to the south-west of the ancient but now entirely deserted city of Amber, is the largest, and is one of the handsomest cities in India. Ajmere (70), situated on a plateau enclosed by ridges of the AraValli Mountains, Alwar (Ulwur, 90), north-east of Jaipur, and Udaipur (Oodeypore, 38), in the south, are all remarkable for excellence of situation and picturesque beauty. Among other important towns in the eastern section are Bhartpur (Bhurtপুর, 68), Dholpur (Dholপুর), both near the north-east frontier, Tonk (40), Kotah (40), Blind! (Boondee, 21). Abu is a sanitary hill-station in the state of Sirohi, situated at the height of about 4,000 feet on the mountain of the same name, usually spoken of as the southern extremity of the Ardvalli range, but in reality detached from that range by a valley fifteen miles in width. The mountain rises more than 1,600 feet above the station, and is adorned with some of the most beautiful specimens of Jain² architecture.

In the western section of Rdjputitna the chief town is Jodhpur, a walled town built on the southern slope of a small range of hills. The permanent towns, even in the deseit region farther west, all of them centres of trade, are well built and fairly prosperous. The chief are Jaisalmer and Bikaner, both standing on patches of hard rock surrounded by deep sand.

Central India is the name officially given to a collection of native states under the supervision of an agent to the Governor-General resident at Indore. They lie to the south of Rajputana and the North-West Provinces, and are divided into two groups by a narrow tract belonging to the North-West Provinces, stretching southwards.

The eastern group is part of a larger district, once known by the name of Bundelkhand (Bundelcund), but now divided into the Bundelkhand Agency in the west and the Baghelkhand Agency in the east. This latter agency is made up chiefly of the native state of Rewa on both sides of the Son (Soane). The western group is bounded on the south for a considerable distance by the Narbadd (Nerbudda), but in the south-west advances beyond that river, and in places even beyond the crest of the Sdtpura Hills. This group is made up chiefly of scattered districts belonging to the native states of Gwalior, the largest separate portion of which is in the north, Bhopftl, the largest portion of which is in the south-east, and Indore, the fragments of which are all in the west and south-west.

Surface and Drainage.—Almost the whole area belongs to the Indian tableland, but the north of Gwalior is included in the

¹ See p. 122 (11).

³ See p. 110.

plains of the Jumna basin. The most elevated tract is the plateau of Malwa, which is bounded on the south by the Vindhyan range overlooking the valley of the Narbada. Being covered to a large extent with black cotton-soil,¹ this plateau is fertile, and not much in need of irrigation; it is indeed the richest part of the Central India Agency. The slopes of the Vindhya, as well as the Satpura Hills to the south of the Narbada, are forest-clad regions, inhabited by large numbers of uncivilised B.M.s.

The Narbada is the only river which has considerable stretches of navigable water within the area of these states, and that only in the rainy season.² The principal rivers in the north are the Chambal, Betwa, and Ken, tributaries of the Jumna, and the Son, tributary of the Ganges.

Products.—Among the special crops of these states may be mentioned opium, on the plateau of Malwa generally, and excellent tobacco (reputed to be the best in India), grown round Bhilsa, in the east of that plateau.

The mineral products include coal in Rewa, diamonds in the Bundelkhand Agency, and iron ore, which is worked by native methods in many places.

Communications.—Three railways, connecting the railway systems of southern and northern India, cross these states. One of them (the easternmost) is the main line connecting Bombay with Allahabad³ (standard gauge); the next to the west, also standard gauge, that which ascends the Vindhya Mountains at the Bhopal Ghat, and proceeds first to Bhopal, then to Jhansi in Gwahar, the centre of the Indian Midland system;⁴ the westernmost, a metre-gauge railway,⁵ which, after climbing the Vindhya with steep gradients, proceeds by Mhau (Mhow), Indore, Ratlam (Rutlam), and Nainach (Neemuch) to Ajmere.

Chief Towns—Indore (75) stands in a healthy situation at an elevation of about 1,800 feet. Ujjain (Oojein, 33), to the north of Indore, in a part of Gwalior, has been regarded from an early date as one of the sacred cities of the Hindus. It marked the prime meridian of Hindu geographers. The modern city (a mile from the ruins of the ancient) is connected by a

¹ See pp. 100-101 and p. 116.

² See p. 92.

³ The portion in Central India belongs to the East Indian Railway. See above, p. 121 (1).

⁴ See above, p. 122 (9).

⁵ Belonging to the Rajputana-Mahva section of the Bombay, Baroda, and Central Indian Railway. See p. 122 (11).

branch line with the railway to Ajmere. Bhopdl, in the east of the Molwd plateau* capital of the state of Bhopdl, is a walled town, at the height of nearly 1,700 feet. Bhilsa, to the north-east, in Gwalior, on the river Betwa\ and now also on the Bhopdl- Jhtlnsi Railway,¹ is noted not only for its tobacco, but also for the temples in its neighbourhood in the bed of the Betwd, a great resort of pilgrims, as well as for the Buddhist topes, including the great Sdnchi tope, a little to the south-west. Gwalior (90), near the north of the state of Gwalior, is celebrated as an ancient seat of Jain worship, and also for its strong fortress, crowning a rock which rises sheer above the plain to the height of 342 feet. This fortress was in the hands of the British from 1858 to 1885. The British cantonments are now at Morrfr, to the east of Gwalior. In Bundelkhand Agency one of the most important towns is Panna, capital of the state of the same name, about 20 miles to the south-west of the chief diamond-yielding district of the Central India Agency. In Baghelkhand the state of Rew& has a capital of the same name (pop. 22,000), on the Kdimur plateau. South of the Son is the Umaria coal-field, now connected with the railway to Allahibrid by a branch line, which has been continued south-eastwards to join the main line of the Bengal-Nagpur Railway.

Central Provinces.—These comprise a territory mainly under British administration, but embracing also a considerable area of native states to the south of the native states of the Central India Agency and Bengal.

Surface and Drainage.—This territory contains the head-waters of some of the principal rivers of the tableland, including the Narbada, the Taptf, the Mahanadf, and the Wardha and Wain-ganga, belonging to the basin of the Godavari. The middle course of the Narbada forms a large part of the northern boundary of the provinces, and the Wardha, Pranhfta, and Godavari form together the greater part of the south-western boundary, separating these provinces from Berar and Haidarabad (Hyderabad).

The regions within this province containing the head-waters of the Wardha and Wainganga, and the plains of Chhattfsgarh (Chut-teesgurh), traversed by those of the Mahanadi, include most of the area less than 1,000 feet above sea-level, and the most considerable tracts of fertile soil. In the higher region, to the north of the Wardha-Wainganga lowlands, there are other largo tracts, especially in the valley of the Narbada, well adapted for cultivation; but the highlands on the west, and still more those on the east and south of the Chhattisgarh plains, are rugged tracts, with a very sparse population.

Native States.—It is in these latter tracts that the principal

¹ One of the lines of the Indiau Midland system. See p. 138 (9).

native states are situated; among these, BastAr, the largest, lying in the extreme south. In these are numerous hill-tribes, mostly Gonds, who at one time were the dominant race throughout the greater part of the area now belonging to the Central Provinces (Gondwana).

Agriculture and Minerals.—Less than one-third of the area of the provinces is under cultivation; a somewhat larger area is stated to be capable of cultivation, though not cultivated; and a still larger area is described as waste land. Of the area not under cultivation, only a small portion is now covered with forests, the jungle areas consisting mainly of low scrub yielding little useful timber. Among the crops of the provinces wheat is one of great importance; cotton is very extensively grown in the valleys of the Wardha and Wainganga, the Tapti and the Narbad&, and a few other regions. Nagpur is noted for its oranges. The chief minerals are coal and iron.¹

Communications.—Mention has already been made of the very imperfect means of communication afforded by the rivers.² The provinces are now, however, traversed from side to side by two important standard-gauge railways, one the railway from Bombay by Jabalpur to Allahabad,³ the other that from Bombay by Nagpur to Calcutta.⁴ The latter traverses the plains of Chhattfsgarh, a region well adapted for the cultivation of wheat, hitherto sparsely peopled on account of its isolation, first partly opened up by the establishment of railway connection with Bombay, and now brought into communication with the much nearer market of Calcutta by the opening of the Bengal-Nagpur Kail way (March 1891).

Towns—(1.) In the Narbada (western) Division:—On the right bank of the Tapti, Burhanpur, a decayed town, once the seat of the Deccan princes of the Mughal Empire, with manufactures of fine cottons and silks, brocaded with gold-plated silver thread, this industry being a relic of its former greatness as a capital. (2.) In the Jabalpur (northern) Division:—Jabalpur (Jubbulpore, 85), in a rocky basin to the north of the Narbadd, nearly 1,500 feet above sea-level, an important centre of trade, the place of meeting of the Great Indian Peninsula and the East Indian Railway, with cantonments; Sagar (Saugor), to the north-west, more than 1,900 feet above sea-level, another military station and centre of trade. (3.) In the

» See pp. 118, 119.

* See p. 91.

⁹ The Great Indian Peninsula and East Indian Railways.

* The Great Indian Peninsula and Bengal and Nagpur Railways. See p. 122 (7) and (8).

Nagpur (bouth-western) **Division**:—**NAGPUR** (120), the seat of administration «f the Central Provinces, situated in the middle of the district of the same name, about midway between the rivers Wardhd. and Waingangri, a commercial and manufacturing town, with some Hindu temples in the best style of Manlthti architecture; the municipality includes the European station of Sitdbtildi; a few miles to the north-east **Kamthf** (Kamptee, 50), on the Bengal-Niigpur Railway, an important centre of trade, dating only from the early part of the present century. The following four towns are all in the Wardhil valley.—**Wardha**, an active centre of the cotton trade, founded on the site of an old village only in 1866, but very prosperous through being the place of junction of the railway down the Wardh»i valley with the main line from Bombay to Niigpur; **Hinganghat**, on the same railway, a name associated with one of the finest kinds of Indian cotton, a place with a large trade in cotton, and manufactures of cotton by steam; **Warora**, with coal-mines, at present the terminus of the railway; **Chanda**, a great seat of trade in all kinds of agricultural produce.¹ (4) **In the Raipur** (eastern) division, **Raipur**, in the plain of Chhattisgarh, to the south of the Sdonath, the principal tributary of the Mahdnadi in that plain; **Bilaspur**, situated in the same plain to the north of the Seonath, the place of junction of the main line of the Bengal-Nagpur railway with the branch through Rewtf to the East Indian Railway; on the left bank of the Mahdnadi, **Sambalpur** (Sumbulpore).-'

Berar, or **Haidarabad Assigned Districts**, a territory to the south and west of the Central Provinces and to the east of Bombay, properly belonging to the dominions of the Nizam of Haidarabad (Hyderabad), but placed in 1853 under British administration by a treaty in which the British Government undertook the maintenance of the Haidarabad contingent of troops in return for this cession. The districts are under the administration of the Resident at Haidarabad, who is'chief commissioner for this territory.

Surface, Drainage, and Products.—The southern portion of the territory belongs to the tableland bordered by the Ajanta Hills, but the northern, and by far the richer half, consists mainly of the valley between these hills and the Satpura range. This valley, now traversed by the railway from Bombay to Nagpur, is filled with the rich black cotton soil,⁸ and has a regular and ample rainfall, so that famine is here unknown. More than three-fifths of the whole area of **Berar** is under cultivation, the cultivated area being principally in this valley. Great millet (*Jodr*) and cotton are by far the most important **crops**, wheat and oil-seeds ranking next in order. The only mineral of importance is **coal** in the south-east (Wardha valley), but it is as yet little if at all worked.

¹ See new **the top** of p. 92.

^a See p. 91.

» See p. 100 101, 116.

Towns.—The population is mainly scattered over agricultural villages, and there are no towns which had as many as 30,000 inhabitants at the census of 1881. Among the chief are Amraoti (Oomrawuttee, 24), an ancient walled town, now a great centre of the trade in cotton, on a short branch line to the north of the main railway traversing the districts; Ellichpur (27), farther north, with a military cantonment and civil station adjacent; Akola, in West Berar, the largest town on the main line of railway.

Haidarabad (Hyderabad) or the Nizam's Dominions, a large native state, confined to the southern tableland. It owes its second name to the title conferred by the Mughal emperor in the early part of last century on the nobleman who afterwards became the first ruler of the present dynasty, and who fixed his capital at the city of Haidarabad.

Boundaries and Drainage.—The territory still under native administration^x is bounded in the north-east by the Wardha, Pranhfta, and Godavari, in the south by the rivers Tungabhadra and Kistna, the line of which is continued roughly north-eastwards to the Godavari by the Eastern Ghats, which complete the boundary on this side. In the north-west the territory extends to the Ajanta Hills, which separate it from part of Bombay; farther east the northern boundary is mainly formed by the River Penganga, the southern limit of Berar. The whole course of the River Manjira, the chief right-bank tributary of the Godavari, is within the western boundary of the state, but the three more important rivers, the Godavari, Bhima, and Kistna are all cut by the irregular western boundary separating Haidarabad from Bombay. The Godavari and the Sina, the latter a tributary of the Bhfrnd, form part of this boundary in certain places. The general character of the principal rivers is described in the general section on India.²

Surface and Products.—The surface is varied, and presents no very marked features. The soil is equally varied even on the level tracts. In some places there occurs the black soil (*regar*), already frequently mentioned: in others, a coarse red soil, far from fertile; in others again, a finer and richer red soil, believed to have been first accumulated in the form of anthills.⁸ Among the **grain crops**, in addition to the commoner millets, *ragi* has a prominent place. **Cotton** is grown in considerable quantity, and in some

1 See the previous section.

³ See p. 91.

* See In trod., par. 106.

places of specially good quality. Indigo and sugar-cane are among the other more valuable products of agriculture. Fruits are abundant, and some of these, as the melons and pine-apples of Haidarabad and the purple grape* of Daulatabad have a high reputation outside the limits of the state. Among domestic animals may be mentioned sheep and horses. Sheep abound everywhere. The horses of this dominion have long been noted.

Communications.—The rivers have only a minor value as means of communication.¹ One of the lines of the Great Indian Peninsula Kailvay² crosses the south-west angle of the state, and from this line the Nizam's railway, also standard-gauge, proceeds eastwards past Haidarabad, to which there is a short branch, and finally south-eastwards to Bezvada, at the head of the Kistna delta in Madras. A branch from this line goes to the Singareni coalfield.

Towns.—HAIDARABAD (in 1891, including suburbs, 390), the capital, founded in 1589, and first called Bhdgnagar, is situated towards the south of the state, on the Musi liver, a tributary of the Kistna. It is a walled town, standing amidst wild and picturesque scenery, and is inhabited by the most varied population in India, and the most warlike in aspect. Its chief buildings are the palace of the Nizam, several mosques, and, towering above all, the magnificent pile forming the British Residency. Golconda, seven miles to the west, in an arid rocky desert, once gave name to a powerful kingdom, of which it was the capital, but is now a decayed city, though it still possesses a fort crowning a rocky ridge of granite, which alone gave importance to the site. The diamonds, for which it used to be famous, were merely cut and polished here, being found chiefly in the south-east of the Nizam's dominions. Secunderabad (75), six miles north-east of Haidarabad, is the largest military station in India. In the north-west of the Nizam's dominions there are several places worthy of being remembered. The largest town is Aurangabad (20), a walled town, to a large extent in ruins, but once an important and populous provincial capital. Adjoining are some noted caves, some of Buddhist origin. Proceeding westwards by the fortress of Daulatabad, and then north-westwards, one reaches the village of Ellora, where there are still more famous rock-caves and temples containing statues and symbols sacred to Hindus, Buddhists, and Jains. Another village, that of Ajanta, with even more wonderful architectural remains, lies to the north-east of Ellora, near the frontier of the Nizam's dominions, at the head of a ghāt belonging to the hills of Ajanta. Here there are numerous Buddhist monasteries and temples hewn out of the living rock, illustrating the architecture of all the periods during which Buddhism was dominant in India. To the south-east is the

¹ See p. 91.

² See p. 122(7).

battlefield of Assaye, where in 1803 General Wellesley (afterwards Duke of Wellington) inflicted the first severe blow on the Marathas.

Mysore and Coorg.—These territories occupy the southern and highest part of the great Injilian tableland, in the angle between the Eastern and Western Ghats, just to the north of the Nilgiri Hills, from which Mysore is separated by the gorge of the Moyar. Mysore is a large native state, Coorg a district under British administration, on the south-west of Mysore.

Surface and Drainage.—This region is divided into the Malnad or hill country in the west, that is, the country belonging to or bordering on the Western Ghats, and the Ma-ida-n or open country to the east. The region generally may be described as that of the head-waters of the rivers of southern India. The main water-parting stretches from west to east across the middle of Mysore, at the height of about 3,000 feet, the ground sloping thence gently northwards and southwards, but rising again in the extreme south of Mysore towards the junction of the Eastern and Western Ghats. Most of the rivers in the north belong to the basins of the Kistna and the Northern Penner and flow northwards, those in the south mostly belong to the basin of the Cauvery, and flow some north, some south. In the north there are the head-waters of the **Northern Penner** itself, and those of the rivers **Tunga** and **Bhadra**, which within the territory of Mysore unite to form the **Tunga-bhadra**, the principal tributary of the Kistna. In the south the **Cauvery** takes its rise in Coorg, in a recess of the mountains formed by a westerly curve of the Western Ghats. Farther east the **Palar** and the **Southern Penner** both take their rise on the southern slopes of the main water-parting. None of the Mysore rivers is navigable,¹ but they are of great service for irrigation, many of the tanks of the region being formed by anicuts (dams) laid across the rivers in suitable places to hold back part of the water.

A striking feature of the Malnad or hill country of Mysore is formed by the hook-shaped **Baba Budan** spur of the Western Ghats, which strikes eastwards for 15 miles, leaving a narrow opening at its west end for the passage of the Bhadra, then southwards in an unbroken line for 20 miles, enclosing between itself and the main chain of the Ghats a rich but unhealthy valley. To this spur belong three peaks above 6,000 feet high, among these the highest in the Western Ghats.² On the slopes of **Kalhatti**,

¹ See p. 92,

* See p. 90.

one of these lofty mountains, there now stands a hill-station resorted to by Europeans during the hot weather. On another part of this spur coffee, which is now grown on its slopes in many places, was first planted in India.¹

On the Maidan or open country a no less striking feature is formed by the **drugs** (droogs), or precipitous isolated rocky hills which are dotted over the surface, some of them rising to the height of 2,000 feet or more above the surrounding country, 4,000 to 5,000 feet above the level of the sea. Many of them contain water at their summit, and formerly were taken advantage of as sites for fortresses, which enabled the owners to domineer over the neighbouring districts. Among those most conspicuous in the history of Mysore are Nandidrug (Nundydroog) and Savandrig, both in the east (Bangalore district).

Products.—Among the **crops** of Mysore, grain and oil-seeds occupy nine-tenths of the cultivated area, the chief grain being *rdgi*, which furnishes the staple food of the bulk of the people. Other millets are also grown in all parts, and rice is cultivated in the south where water for irrigation can be obtained from rivers. In similar situations occur plantations of sugar-cane. Among other important products of the south are areca or betel-nut and coco-nut palms. In the north, where black soil occurs, a good deal of cotton is grown. On the slopes of the Ghats in Mysore and Coorg there is more than three-fourths of the area under **coffee-plantations** in India. Next in importance to coffee among the hill products are cardamoms (especially in Coorg) and cinchona bark. The narrow valleys which form all the lowland area in Coorg capable of cultivation are almost entirely occupied by rice-fields. The chief mineral in Mysore is **gold**, one or two mines of which are now profitably worked in the district of Kolar, in the east of the state. The signs of the occurrence of gold, both here and elsewhere, in Mysore give the promise of even better results in the future.

Commuaicafcions.—See p. 122 (12), (13), and (14).

Towns.—At the census of 1881 there were only two, Mysore and Bangalore, with a population of more than 15,000. **Mysore** (60), situated in a valley stretching north to south about nine miles to the south of the Cauvery, has been the capital of the state since 1800. The previous capital was **Seringapatam**, ten miles north by east, on an island in the Cauvery sacred to Vishnu, from one of whose names, *Sri Rangtf*, the name of the town is derived. The town has fortifications erected by Tipti Sultan, who was killed in defending them on the occasion of the last

¹ According to local tradition, about two centuries ago by a Muhammadan pilgrim to Mecca (d. 76) **iwfrid** (fian.i Budau).

assault by the British in 1799. When Tipti was at the height of his power, the town is said to have had a population of 150,000, but after the transference of the seat of government to Mysore, it rapidly fell into decay. Its population in 1881 was under 12,000, and its almost deserted site has a bad reputation for malaria. **BANGALORE** (in 1891, including cantonments 180) lies towards the south-east of Mysore, near the main water-parting of the state, at the height of more than 3,000 feet above sea-level. Since 1811 it has been the chief military station in Mysore, and it is now also the seat of the British Resident. It is also a manufacturing town, specially noted for its carpets. In the beautiful botanical gardens of the place numerous experiments have been made with a view to the introduction of various tropical exotics (vanilla, cacao, ipecacuanha, &c). In Coorg, **Merkara**, the seat of administration.

Bombay.—The Presidency of Bombay embraces the whole of western India down to about 14° N., (the place where the native state of Mysore advances nearest to the west coast). It includes also the distant possessions of Aden,¹ Socotra, and the other British possessions on the Gulf of Aden and in the Red Sea. The territory belonging to it in India comprises a large area under the direct administration of the governor, the commissionership of Sind, and many native states. Among these are, in the north, **Baroda**, the states of the **Rewa Kaiitha** Agency, dutch, occupying the peninsula of that name, and a large number of small states occupying the hilly and even mountainous peninsula of **Kdthiawar**;² in the middle, **Satara**, to the south-east of Bombay city, and, in the south, **Kolhipur**. The greater part of the Presidency came into the possession of the British on the overthrow of the Peshwa of the Marathas in 1818. Sind was added in 1843.

Surface, Drainage, and Climate.—These have for the most part been sufficiently described in the general account of India.³ It is enough to add here, with reference to Bombay proper, exclusive of Sind, that the lowland area to the west of the Ghats or Sahyadri Mountains, begins to widen out a little to the north of the 20th parallel. South of that limit the lowland area is confined to a narrow strip, varying from one or two miles to about 50 miles in width, the wider portions being river valleys running up eastwards between spurs of the great mountain chain. This narrow strip of lowlands and small valleys is known as the **Konkin**, and includes the Portuguese territory of Goa, which is

¹ See p. 75.

² See p. 94.

³ See pp. 89-90, 92-3, 95-7.

entirely surrounded by the Presidency of Bombay, except on the side⁸ of the sea. To the north of that limit the lowlands, which include the lower course of the Tapti¹ and Narbadd,² (Nerbudda), the two great rivers of the tableland belonging to the basin of the Arabian Sea, as well as of the Mahf, Sabarmati, Saraswati, and Western Bands, gradually widen out to upwards of 100 miles in width. These lowlands are known as the plains of Gujarat (Guzerat).

The limit between these two areas west of the highlands nearly coincides on the coast with the limit between two of the chief Aryan dialects of India, Gujarathi and Marathi.³ The I)ravidian dialect known as Kanarese prevails in the southern part of the Bombay tableland.

Products.—The differences in the crops of different parts of the territory correspond to the contrasts of climate described on pp. 96-7. In Bombay proper (exclusive of Sind), millets of one kind or another are the prevailing grains. West of the Ghats, as far north as the Tapti, rice, the characteristic "wet" crop, ranks next in importance, but in the northern plains wheat, the most valuable of the "dry" grains, covers larger areas than rice, and the relative area under wheat is still greater in the northern parts of the tableland. Cotton, another dry crop, accompanies wheat, but is a crop of importance farther south than wheat, both on the plains and on the tableland. One of the chief areas of cotton cultivation indeed is the south-east of the tableland (the district of Kaladgi, and part of that of Dharwar), but the greatest cotton as well as the greatest wheat region of Bombay is the district of Khandesh, that 1/2 the middle portion of the basin of the Tapti, a region with an extensive covering of deep black soil,⁴ forming the western continuation of the valley of Berar.⁵ The mineral wealth of Bombay is comparatively small, but this is the part of India in which manufactures⁶ are carried on by modern machinery to the greatest extent

Communications.—See p. 122 (7), (8), (9), (12), and (13).

Towns (exclusive of those in Sind; Portuguese possessions are in italics).—1. Seaports.—BOMBAY (800), the seat of government of the Presidency during the cooler part of the year, the largest town in India, the

¹ See p. 93. ² See p. 92. ³ See p. 111.

⁴ See p. 100-1, 116. ⁵ See p. 145. ⁶ See p. 120

chief manufacturing town, and now the leading seaport, is a place of comparatively recent origin. It is built on a small island of the same name, *Ilhich** along with the larger island of Salsette to the north, is now connected with the mainland by roads and railways. These islands form one side of a magnificent natural harbour, safe for ocean-steamers in all weathers, and to this enormous advantage the town owes its present prosperity. It has, however, the misfortune to be backed by mountainous country, which long cut it off in a great measure from the more productive regions beyond. In 1661 the island of Bombay was acquired by the British king Charles II. from the Portuguese, and in 1687 the East India Company, to which it had previously been handed over, made it the headquarters of their possessions. The advance of Bombay was retarded, however, by the fact that the island of Salsette and the other islands in Bombay harbour remained in other than British hands till 1774-82, when they were acquired from the Marathas. Even after that its advance was slow till the establishment of improved communications with the interior raised it to the commanding position it now holds in the commerce of India. First of all, a carriage-road, itself a remarkable engineering achievement, was constructed up the Bhore Ghat (1830). A railway up the Thane Ghat (1912 feet at the summit), now the means of communication with the whole of the north-east of India, was completed in 1861, and one up the Bhore Ghat¹ (2027 feet), now the means of communication with the south-east of India, followed in 1863.

There are several small seaports on Bombay harbour and the channels and small rivers communicating with it. Among these may be mentioned Thana (Tanna), on the east side of Salsette island, at one time the capital of a great kingdom (till 1318), and even after that a large and famous city, and Kurla, on the south-east of Salsette, with numerous cotton-mills. Near Thana are many Buddhist rock-cut temples and monasteries. The island of Elephanta in Bombay harbour is much visited on account of its Brahmanic rock-cut temples.

On or near the coast to the north of Bombay are *Daman*, which has belonged since 1780 to the Portuguese, to whom it was ceded by the Marathas; SURAT (110), near the mouth of the Tapti, on low ground, which renders it subject to floods, a seaport accessible only for small vessels but affording in the Suwari (Swally) Roads to the north of the mouth of the Tapti a safe anchorage for large vessels from October to April—during the 17th and 18th centuries the chief seat of foreign commerce in India, and before 1687 the headquarters of the British East India Company; Broach, near the mouth of the Narmada; another seaport, very celebrated in former times under the name of Barugaza, one of the oldest Indian seaports known in the commerce with the East or West; Cambay, at the head of the Gulf of Cambay, capital of a native state of the same name, in the 18th century one of the chief seaports of India, but now of comparatively little importance, its shipping having declined in consequence of the silting up of the gulf and the violence of the bore² in that estuary. On the peninsula of

¹ Both line* belonging to the Great Indian Peninsula Railway, see p. 122 (7).

² See *Introd.*, par. 73,

Kathiawar, **Bhaunagar**, on the west side of the same gulf, a railway terminus, now the chief place of export of the cotton of the peninsula; *Dm*, on an island of the same name, belonging to the Portuguese (since 1535), at the south end of the peninsula. **On the coast to the south of Bombay** are *Goa*, with an admirable double harbour, and **Karwar**. Of all the ports mentioned, *Goa* and *Kdrwdr* are the only two besides those on the harbour of Bombay which can be visited at all periods of the year.¹ The harbour of *Goa* is in the middle of the coast-line of the **Portuguese territory** of that name, which embraces an area of more than 1,000 square miles, and a population of about 450,000, the majority of whom profess the Roman Catholic religion. The town of *Goa* is situated on the north side of an island which divides the harbour into two large basins. It was captured by the Portuguese admiral, Albuquerque, in 1510, and has remained in the hands of the Portuguese almost uninterruptedly ever since. Almost immediately after its capture, it became the chief seat of Indian commerce with Europe, and reached the height of its splendour about the end of the 16th century. Its commerce afterwards greatly declined, but the metre-gauge railway which now connects the harbour" with southern Bombay, Mysore, and the west of Madras, will no doubt lead to a considerable revival. The terminus of this railway is at *Mar-magdo*, which stands on a platform of laterite² on the south side of the entrance to the southern basin of the harbour.

2. Inland Towns—On the plains of Gujantt stand the two large towns of **Baroda** and **Ahmadabad**. **BARODA** (116, including cantonments), to the east of the head of the Gulf of Cambay, a city of temples and bankers, is the capital of the scattered dominions of the Gdekwr of Baioda, a non-tributary prince. **AHMADABAD** (Ahmedtibrd, 145 including cantonments), to the north-west, is a walled town in British territory, the head-quarters of the Gujanit Jains, in the 16th and 17th centuries a city of great splendour, with a population estimated at 900,000; now noted for its numerous architectural remains, as well as for its manufactures, the most important of which are relics of industries formerly pursued on a much greater scale. Among them may be mentioned all those connected with the production of gold brocaded silks. On the peninsula of Ktithiilwdr, to the west of the head of the Gulf of Cambay, **Dholera**, once a seaport, but now cut off from the sea by the silting up of its river, still an important seat of the cotton trade, giving name to a certain quality of cotton. **Rajkot**, the chief town in the interior of Kdthiawdr; **Bhuj**, the capital of Cutch.

On the tableland, **Dhiilia**, the chief town of Khndesh, 30 miles north of the railway to AUahalnid; **Ahmadnagar** (37), on the railway connecting the north-east and the south-east lines of the Great Indian Peninsula Railway, a manufacturing town producing carpets, saris, copper and brass pots, &c.; on the railway leading south-east from Bombay **Karli**, with the most complete cave-temple yet discovered in India** and **POONA** (including cantonments, 160), the latter on the Muta River, about 1,850 feet

¹ See p. 104 (under 6).

² A rock of a brick-red colour very widespread in southern India (from the Latin, *later*, a brick)*

above sea-level, the military capital of the Deccan, and the seat of the government of Bombay from July to November, also noted as a town with varied manufactures, and as the seat of the Deccan College and a College of Science; to the south-west, at a distance of 74 miles by road Mahabaleshwar, the chief hill-station of Bombay, situated on a long and nearly level ridge about 4,500 feet high; in the east, in the middle of a large plain, Sholapur (60), on the railway to Madras a little to the north of the place where the eastern line of the South Marsha" (metre-gauge) railway branches off to the south; one degree farther south, Bijapur, with remains of former Muhammadan grandeur; a hundred miles or more farther south, in the southern cotton district of Bombay, Hubli (50) and Dharwar, both centres of a great trade in cotton and grain, and both on the railway to the port of Marmagdo; to the north-west of Dharwar on the railway to Poona, Belgium, at the height of nearly 2,500 feet, a town with a large military cantonment and a rising trade; to the north-west, Kolhapur (38), the ancient and picturesque capital of a native state of the same name, situated opposite a gap of the Western Ghats* to the west of the line to Poona, with which it is getting connected by a branch.

Sind (Scinde), to the north of the Arabian Gulf and the Rami of Cutch, is mainly composed of an alluvial plain, every part of which appears to have been traversed at one time by the Indus or its branches. The eastern part of it is now mainly desert, but vestiges of ancient towns here testify to the former presence of fertilising water. Almost the only exception to the generally level character of the surface is in the wild and rocky tract of Kohistan, between the easterly curve of the Indus and the Pab Hills and Kirthar Mountains, which separate Sind from Bahichistan. Cultivation in the plains mainly depends on irrigation from rivers, and that mode of irrigation being favourable to "wet" crops, rice is grown more largely than millets of all kinds in some parts of the province. The domestic and other animals are even more characteristic of the province than the agriculture. Immense herds of camels are reared on the salt marshes of the Indus. On the swamps of the delta graze herds of buffaloes, from whose milk *ghi* is made in such quantity as to form one of the exports of the province. Here also are to be seen great numbers of long-legged birds, such as flamingoes, storks, cranes, and the Egyptian ibis, besides pelicans.

Chief Towns.—The chief seaport and the head-quarters of the administration is KARACHI (Kurracbee, 105), which stands on a small bay to the west of the Indus, and has been provided with an excellent harbour. Its

¹ See Intra!., par. 114(6).

trade, especially its export trade in wheat, has increased greatly since the Completion (in 1878) of the standard-gauge railway¹ connecting Sind with the Punjab, and Karachi now ranks as one of the four great seaports of India (exclusive of Burma). Haidarabad (Hyderabad, 58), the old capital of Sind, to the east of the Indus, stands on one of the few insignificant limestone ridges that traverse the Indus valley. A second forms the basis of the towns of Rohri and Sukkur (27),² and the island fort of Bukknr in the Indus between these towns, situated where the railway from the Punjab has since 1889 been carried across the Indus. Six miles north of HaidarriMd is the battlefield of Miani, the scene of Sir C. Napier's brilliant victory over an army of Baluchis in 1843.

Madras.—The territory belonging to this Presidency, acquired by the British from various Indian princes at various dates from 1763³ to 1801, embraces all the eastern plains to the south of Lake Chilka, nearly the whole range of the Eastern Ghats, together with a considerable area of the Indian tableland, more particularly a great wedge between the native states of Haidarabad and Mysore, and the whole area to the south and south-west of Mysore. Among its striking physical features are thus included the Nilgiri Hills, the Palghat Gap, and the Anamalai Hills and Cardamom Mountains to the south of that gap.⁴ Of the mountains to the south of this gap, however, the western slopes belong to the native states of Cochin and Travancore. There are three other native states under the control of the Madras Government, the most important being that of Piidukattai (Poodoocattah); and the greater part of the highland region in Madras to the north-east of the Godavari, forming the Jaipur (Jeypore) -Agency, is under a peculiar administration. There are three French possessions on the east coast, besides one on the west. Dravidian dialects⁶ are spoken throughout the entire area of the Presidency, except the extreme north-east, where the Urfya dialect is spoken, as in Orissa.

The plains behind that part of the coast which trends north eastwards are known historically as the Northern Circirs. The coast on the Bay of Bengal to the south of this is known as the Coromandel Coast, probably through a corruption of the name Cholanmandalam, that is, "country of the Cholas," as the people of this region were at one time called. The south-west coast, on the Arabian Sea, is called the Malabar Coast.

¹ One of the lines of the North-Western Railway. See p. 121 (2).

² See pp. 87 and 121 (2).

³ From 1639, if we date from the time when the site for the factory at Madras was acquired.

⁴ Seep. 89.

* Seep. H I.

The general character of the surface, its drainage, climate, and mode of irrigation¹ are described in the general section on India. The lower course of all the important rivers entering the Bay of Bengal to the south of the Mahanadi (Mahanuddy) are within the Madras territory.²

* **Products.**—The products of the soil increase in variety as we advance southwards into the warmer parts of the tropics. In the parts irrigated directly from rivers, including the great delta systems, **rice** is the prevailing grain, elsewhere **millets** and pulses, the millets including *rdgi* in great abundance, as well as the two commoner kinds, *joar* and *bajra*. Wheat is scarcely known in the Presidency. Cotton is chiefly grown on the tableland tracts, but also to a large extent in the extreme south. Among other crops of importance to the south of the Kistna are indigo (especially in the north-east of this area), sugar-cane, tobacco, chillies, coriander, the betel-leaf tree, pepper, and various other spices, all kinds of tropical fruits, on the mountains coffee, tea, and cinchona. The Government plantations of cinchona on the Nflgiri Hills are the oldest in India, the tree having been fiist planted there in 1860. On and near the coast coco-nuts abound, and the areca-nut, date, palmyra, and other palms are more widely distributed.

Among the **minerals** of Madras, the most important are the iron ores of the Salem district,³ gold in the Wainad (Wynaad), a tract of the Western Ghats immediately to the north-west of the Nilgiris, and salt, obtained by solar evaporation all round the coast.

Communications.—Along the east coast the **Buckingham Canal** (salt-water) is an important means of communication from the Palar to the Godavari. The Karnul Canal⁴ also belongs to this Presidency. See also under **Principal Railways**, pp. 122-3 (12) and (15).

The Laccadive Islands, situated between 10° and 14° N., at an average distance of 200 miles from the Malabar Coast, are a group of flat coral islands⁵ attached to the Presidency.

They are fourteen in number, nine inhabited by upwards of 14,000 people, all Muhammadans, speaking the Malaydlam dialect. Almost the sole product of value is coir (*kdbdl*, *katha*) or coco-nut fibre, which the inhabitants of the northern group sell at a fixed price to the Madras Government; those of the southern group to the Raja of Cannanore.

i See pp.₄ 90-1, 95-7, **100-101**.⁵
Sec p. 10S.

See p. 92.³ See p. 119
See **Introd.**, par. 45, n. 1 (p. 22).

Towns.—1. Seaports.—MADRAS (450), on the east coast, a little to the north of the 13th parallel, is the seat of government, the head-quarters of the Madras army, the seat of an observatory* and a university, and, notwithstanding the disadvantages for shipping,² the third in importance among the seaports of India, ranking next after Bombay and Calcutta. The site for a factory at Madras was first acquired by the East India Company in 1639. The town grew up rapidly, and within a hundred years had become, what it still remains, the most populous of southern India. The nucleus of the city, the centre of business, containing the banks, customs-house, mercantile offices, as well as the High Court, is the "Black Town," an ill-built, densely peopled block about a mile square, but the whole city within the limits of the municipality includes a number of suburban tracts and villages scattered over a partly cultivated district stretching for nine miles along the coast and 3¹ miles inland.

Among the **minor seaports on the east coast**, named in the following lines in the order from north to south, only the more important in respect of their shipping are in black type. French possessions are in italics. *To the north of Madras are* Ganjam; **Kalingapatam** with the only safe roadstead on a line of coast four hundred miles in length; **Vizagapatam** (30); **Cocanada** (29), to the north of the delta of the Godavari, with one of the safest roadsteads on the coast, now, in consequence of the construction of navigable canals, and of the dangerous character of the coast farther south, gradually absorbing all the traffic both of the Godavari and the Kistna delta; *Yanaon*, a French possession on one of the arms of the Goditvari; **Masulipatam** (35), belonging to the delta of the Kistna, one of the earliest settlements on the Coromandel Coast, formerly an important seat of manufactures (specially noted for its chintzes), but now declining both in industry and trade; * *Pulicat*, at the southern extremity of the lagoon of the same name, the earliest settlement of the Dutch on the mainland. *To the south of Madras are:* *Pondicherry*¹ capital of a French territory, with an area of 115 square miles and a population of about 140,000; **Cuddalore** (43), with a good anchorage at the distance of 11 miles from the shore, but capable of being approached more nearly only by native craft; on the Cauvery delta, **Tranquebar**, **Karikal**, and **Negapatam**, —**Tranquebar**, formerly belonging to Denmark, and at that time (17th and 18th centuries) a busy port, now with no export trade; *Karikal*, with a fine roadstead and a brisk rice trade with Ceylon; **Negapatam** (50), with a similar trade; on the Gulf of Manar, **Tuticorin**, a railway terminus, with a large rice and passenger trade to Ceylon, as well as a European trade; pearl and shank or conch-shell fisheries are carried on on the neighbouring coast, but the pearl-fisheries sometimes fail for years together. **On the west or Malabar coast** (again beginning in the north): —**Mangalore** (32), at the mouth of the Netravati, the place of export of a good deal of Coorg coffee; **Cannanore** (26), with a military cantonment and a small trade; a few miles farther south, **Tellioherri** (26), and then *Maht*, a French possession, with a roomy harbour, shut off, however, by

¹ See p. 82.

²

See p. 105 (small type at the top).

³ See p. 104.

a bar from all vessels of more than 70 tons, trade declining; **Calicut** (60), a little to the north of the 11th parallel, interesting as the first place in India visited by Europeans (by Covilhao in 1486, Vasco da Gama in 1498), and as the place which gave name to the cloth called *calico*, first introduced by the Portuguese into Europe: the town and port, now a railway terminus, has prospered since it came into British hands in 1790; **Cochin** (16), a British port surrounded by the native state of the same name, at the south of the entrance to the great lagoon of Travancore.

2. Inland Towns.—**Bezwada** (Bezvada), at the head of the delta of the Kistna, an important centre of river and canal navigation, and now also of railway traffic;¹ **Bellary** (55), a strongly fortified town and military station on an arid plain in the middle of the wedge between the territories of Haidarahdd and Mysore, an important railway station at the crossing-place of the railways to Bombay and Goa (Marmagdo); **Arcot**, a railway station 65 miles west of Madras, noted for the capture and subsequent brilliant defence of its fort by Clive in 1751; farther west, on the Pilar, to the south of the railway, **Vellore** (30); to the south-west, **Salem** (50), at the height of upwards of 900 feet on the western slopes of the Shevaroy Hills, a little to the east of the railway to Calicut; **Coimbatore** (48), west-south-west of Salem, on the Nilgiri branch of the same railway, in a cool situation at the height of more than 1,400 feet above sea-level, formerly important from a military point of view as commanding the approach to the Pdlghat Gap on the south-west, and that to the Gazzalhatti Pass leading north into Mysore; **Utakamand** (Ootacamund), in the Nilgiris, the chief hill-station of the Presidency, on an extensive flat more than 7,200 feet above sea-level, overlooked by a circle of noble hills, on which there are now numerous coffee plantations; on the Cauvery and its delta, in what must always have been one of the most densely peopled regions of southern India,² **Trichinopoli**, **Tanjore**, and **Combaconum**, all ancient cities, each of them at one time or other the capital of a powerful kingdom, or at least containing within its present limits the site of such a capital, the first two of them still noted for artistic manufactures, such as flourish in capitals (silks, carpets, jewellery, &c); Trichinopoli (90), on the right bank of the Cauvery, is also noted for its cigars, and is the seat of St. Joseph's College, affiliated to Madras University; Tanjore (55), in the delta, has many interesting monuments of Hindu art and early civilisation; Combaconum (50), in the richest tract of the delta, is still regarded as one of the most sacred cities of the south, and is hence a great resort of pilgrims; farther south, **Madura** (87), on the right bank of the River Vaigai, from time immemorial the religious capital of Southern India, a great seat of Siva worship, celebrated for its great pagoda dedicated to Biva.

The two native states of **Cochin** and **Travancore**, the latter 6,700 square miles in extent and four times as large as the former, are similar in physical features. A narrow strip of lowlands, covered with coco-nut and areca-palms, and traversed close to the coast by a

¹ See p. 147.

² See *Introd.*, par. 107.

line of navigable lagoons, rises eastwards to the forest-clad Anamalai and Cardamom Hills or Travancoro Mountains, which in places have cool, healthy, and fertile plateaux at the height of 7,000 feet. All the products of southern Madras are here grown, and cardamoms may be specially mentioned as an important product of the hills to which they give name.

The capital of Travancore is Trivandrum (40), near the south, the chief seaport Alleppi (26), near the head of the great lagoon which has its mouth at Cochin; the only other seaports of importance are Quilon and Kolachel. The capital of Cochin is Ernakolam.

Foreign Possessions in India.—These have already all been mentioned in the sections dealing with the regions to which they geographically belong. Here accordingly they are merely enumerated. *French Possessions*;—Chandernagore, in Bengal, near Calcutta; in Madras, Yanaon, Pondicherri, Karikal (Carical), and Mahe^ total area, 203 square miles, pop. 275,000. *Portuguese Possessions* (all in Bombay):—Goa, Daman, and Diu; total area, 2,365 square miles, pop. 475,000.

Andaman and Nicobar Islands, two groups of islands in the Bay of Bengal, now placed under a chief-commissioner in direct correspondence with the supreme Government of India. The Andaman Islands, about 2,500 square miles in extent, situated between 10J* and 13¾° N", 160 miles to the south-west of Cape Negrais (the extremity of the Arakan Yoma Mountains); the Nicobar Islands, about 425 square miles in extent, beginning somewhat more than a degree to the south of the nearest of the Andamans, and extending to 6° 40' S.

The Andaman Islands are volcanic and hilly, rising in one place to an altitude of 2,400 feet. They are densely wooded, and are inhabited by a small black race altogether without civilisation. Since 1858 the Indian Government has had a penal settlement at Port Blair, on the east side of the island, called South Andaman, and there about 12,000 convicts are employed in reclaiming land, which is planted with vegetables for the use of the settlement, as well as tea, Liberian coffee, cacao, arrow-root, and other plants. Many thousands of coco-nut palms (rarely seen wild) have been planted. Of the natural products of the islands, the most valuable is padnk, a fine timber which takes on a polish like mahogany.

The Nicobar Islands are partly volcanic, partly flat coral islands.¹ They are inhabited by a copper-coloured race quite as uncivilised as the Andamanese, and much addicted to piracy, to check which the Government of

¹ See Introd., par. 46, n. 1 (p. 22).

British India in 1869 established a station called Nancowry on the south-east end of Camorta Island, on one side of an excellent harbour enclosed between that island and the islands of Nancowry and Trinkati.

NEPAL and **BHUTAN**.—These states belong physically to India, inasmuch as they lie to the south of the great Himalayan water-parting, that is, the second or northern chain of the Himalayas,¹ but they are entirely independent of the British Indian Government.

Nepal (Nepaul) occupies the Himalayan region between Sikkim and the division of Kumaun in the North-West Provinces, a tract including the highest known peaks of these Himalayan mountains.² In the east it is confined to the valleys south of the southern chain. These valleys afford many easy routes to the Indian plains, with which a considerable trade is carried on.³ The chief Nepalese exports are food grains, oil-seeds, timber, cattle, and horns. The imports include both European and Indian products. From Khatmandu, the capital, two routes branch over the northern Himalayan chain, and by means of these a small trade is carried on with Tibet.

Bhutan is the Himalayan region to the north of the Brahmaputra valley, extending only as far north as the southern chain of the Himalayas. It is very sparsely peopled by a hardy and vigorous, but oppressed and very backward people, the Bhutias.

Formerly the country included the hill tract known as the Dwtis (Duars), at the base of the Himalayas, containing the entrances to the passes leading into the Himalayan valleys ; but the Bhutids took advantage of this position to make such frequent descents upon the occupants of the plains, that the British Government was obliged to interfere, and, after various disputes, the Dwars were formally ceded to the British in 1865. They are now annexed partly to Assam, partly to Bengal. The capital of Bhutan is Panakha or Dosen, a place of great natural strength.

CEYLON.⁴—This island, the Taprobane of the ancients and the Lanka-dwipa (shining island) of the Hindus, was once a Dutch possession, but was taken by the British in 1795. At first annexed to Madras, it was made a separate colony in 1801.

¹ See p. 84.

⁹ See p. 125.

² See p. S3.

⁴ See p. 94.

Extent, Surface, Drainage.—The island, including the small islarfds adjacent, is between 25,000 and 26,000 square miles in extent, considerably less than one-fourth of the area of the Punjab. Its length, from **Dondra Head** in the south to **Palmyra Point** in the north, is 266 miles. It consists of a core of mountains surrounded by a plain, but the mountains are confined to the southern half of the island, and in that half leave only a narrow strip of plain, in some places hardly any between them and the sea.

The highest summit is **Pedrotallagalla** (8,300 feet), near the middle of the mountainous core, but Adam's **Peak**, though nearly a thousand feet lower, is much better known on account of its conspicuous position on the south-west of the mountains, and on account of a remarkable phenomenon sometimes observed from its peak at suniise, when the shadow of the mountain seems to stand erect in front of the spectator. The principal river is the Mahavilla **Ctanga**, which flows north-eastwards and enters the sea by several mouths, partly in Trincomah Bay, partly to the south of that bay.

People.—Most of the inhabitants (3,000,000 in all) are **Sinhalese**, a gentle people, Buddhists in religion. The local trade is mostly in the hands of so called Moors, Muhammadan immigrants. In some parts of the mountain jungles there dwell two or three thousand survivors of a very uncivilised race, known as the **Veddahs**.

Climate and Products.—The south-west, which is the most populous region, gets the benefit of rain from both monsoons. Here the plains and lower hdl terraces are in the occupation of the natives, and are covered with plantations, chiefly of coco-nut, but also of areca-nut, palmyra and other palms, and with rice-fields; and the higher mountain terraces (below 5,000 feet) are occupied by the **coffee, tea, and cinchona** plantations of Europeans. True cinnamon,¹ cacao, and tobacco are also among the more important products of the island. The labourers on the European plantations are mainly Tamil-speaking immigrants from southern India, most of whom come only for the season, though some of them have formed permanent settlements for themselves on the dreary eastern coast. The northern plains are arid and require irrigation. Now-a-days they are very scantily peopled, but remains of gigantic reservoirs and other extensive ruins show that at one time the population in these parts was much denser. The island has many

¹ Diffeient from the *cassia lignea* of India, China, and elsewhere, which, however, was probably the cinnamon of the ancients.

minerals, but at present a very pure graphite (containing more than 90 per cent, of carbon) is the only one of commercial importance.

The chief exports of the island are the products of the European plantations, besides coco-nut oil, graphite, cinnamon, and areca-nuts. A few years ago coffee was by far the most important of all, but various diseases which attacked the coffee-trees caused so much loss to the planters, that the coffee-plantations have been rapidly reduced in favour of those of tea,¹ so that the area under tea now exceeds that under coffee. The cinchona plantations of Ceylon are now the chief source of supply of bark for Europe. The chief imports are rice (from British India, including Burma), cotton manufactures and coal.

Chief Towns.—The capital and principal seaport is COLOMBO (110), on the west coast, now connected by rail with the European plantations, as well as with Kalutara, a minor seaport farther south on the coast. On the south-west coast is the seaport of Galle (32), and in the north Jaffna (40), on the south coast of a well-cultivated and populous island of the same name separated from the mainland by the strait known as Elephant Pass. On the east coast is Trincomali, a fortified town with a fine natural harbour, used as a British naval station, but at too great a distance from the chief seats of production to be of much value for trade.

Of the inland towns the most important is Kandy (22), the former capital, situated at the height of nearly 1,700 feet. To the south-west lies Perideniya, with noted botanical gardens; farther south the sanitary hill-station of Nuwara Eliya (6,200 feet). In the northern plains lies the deserted city of Anuradhapura, a place with extensive ruins, and with a celebrated bo or fig-tree, venerated by all Buddhists as being sprung from a shoot of that under which the founder of Buddhism sat when he attained to Buddhahood at Buddh-Gayl*

The Maldivé Islands, a group of coral islands³ to the south-west, are tributary to Ceylon. They produce, among other things, large numbers of cowrie-shells, which are used as money in central Africa and elsewhere.

INDO CHINA TO JAPAN.

1. INDO-CHINA, also called the **Eastern Peninsula** and **Farther India**, is the peninsula between India and China, and

¹ See p. 200 (small type). ² See p. 120.

³ See In introd., par. 46, n. 1 (p. 22).

though composed of countries under different governments, forms a well-marked geographical unit.

Divisions.—It is now divided between Great Britain, Siam, and France. The **British territory** is made up of the former empire of **Burma**, which, as regards administration, forms part of British India, together with the **Straits Settlements** and protectorates; the **French**, of **Lower Oochin-Ohina, Cambodia, Annam**, and **Tong-king**. The northern part of the interior, which is very mountainous, is occupied by Shans, partly belonging to British, and partly to Siamese and French territory, but practically in a large measure independent.

General Characteristics.—Compared with India the **density of population** is everywhere low. It is mostly under 60 to the square mile. Even Tong-king, which is estimated to have a population of more than 150 to the square mile, does not equal in density of population the more populous parts of the Indian table-land, such as Mysore or Berar. The mountainous character of a large part of the country, the existence of numerous extensive swamps in the more level tracts of the interior, and the defectiveness of the communications, go a long way to account for this state of matters. Among other causes have been devastating wars, inroads of robber bands from the mountains, and other consequences of the want of strong government. Since Lower Burma has been in the hands of the British, there has been a constant stream of settlers southwards and westwards, as well as of immigrants from India proper and China into that territory, and population,¹ production, and commerce have rapidly increased.

In **race** and **language** the people of IndoChina are totally different from those of the Indian peninsula. The prevailing **religion** throughout is Buddhism.

Burma occupies the north-west of the peninsula, extending over an area which, including the British Shan States, is estimated at less than twice that of the Punjab.²

Divisions.—The southern portion, which formed part of British India before the first of January 1886, is known as **Lower Burma**, the remainder, annexed by proclamation of the Governor-General on that date, is called **Upper Burma**. Lower Burma

¹ See Col. 5 of table on p. IK

²

See the table on p. 114.

was annexed partly in 1826, partly in 1852. The areas annexed in 1826 were the greater part of the present division of **Arakan**, occupying the narrow strip between the Bay of Bengal and the mountains on the west side of the basin of the Irawadi (Irrawaddy), and the **Tenasserim** division, occupying the lower part of the valleys of the Salwin and Sit-taung, and the narrow coast strip to the south, extending to the Isthmus of Km.¹ The delta of the Irawadi and the lower part of the valley of that river above the delta, now forming the Pegu and **Irawadi** divisions, were annexed in 1852. **Upper Burma** includes, in addition to the area formerly directly under the rule of the King of Bin ma, an extensive region occupied by feudatory tribes, mostly **Shans**, who are subject to their own chiefs. One or two of these chieftaincies have been brought under direct British rule since the annexation of Upper Burma. Among the feudatory tribes of Burma may be mentioned also the **Karens** of Karen-ni, a plateau from 3,000 to 4,000 feet in height between the Paunglaung Mountains and the River Salwin. The Karens are a Mongolian people who immigrated from central Asia, and many of whom are now found in Burma proper and in other parts of Indo-China.

Surface and Drainage.—The mountains of Burma mostly trend from north to south, in the same general direction accordingly as that followed by the principal rivers. The principal mountain ranges are the **Arakan-Yoma** Mountains, between Arakan and the basin of the Irawadi, the **Pegu-Yoma** Mountains, between the basins of the Irawadi and the Sit-taung, and the above mentioned **Paung-laung** Mountains, between those of the Sit-taung and the Salwin. The **Patkoi** Mountains, in the north-west, on the Assam frontier, trend from north-east to south-west. Of the **rivers** of Burma, the **Irawadi** (Irrawaddy) is in every respect the most important, and as regards navigation it is by far the most important river of the whole peninsula. It traverses the entire length of the middle portion of the province, and is regularly navigated by steamers of considerable size as high as Bhamo, in about lat. 24° N, a distance of about 900 miles. At Bhamo the further progress of steamers is obstructed by rapids. The Kyendwin or **Chindwin**, the chief tributary of the Irawadi (right bank), is also navigated, but is ascended with no little difficulty

¹ **Aftam** was annexed in the same year: see p. 131.

on account of the strength of the current. The same hindrance is met with on the Sit-taung, the navigation of which is likewise impeded by shifting sandbanks and the windings of the course, and is sometimes rendered dangerous by the violence of the bore.¹ The Salween is scarcely navigable at all, except for a few miles above its mouth.

Climate, Agriculture, and Principal Forest Products.—The climate of Burma is very similar to that of Bengal, but is somewhat warmer, especially during the cool season, in consequence of the more southerly latitude. The delta of the Irawadi and the other low plains of the province are just as well suited to the cultivation of rice as the delta of the Ganges and Brahmaputra. Rice is consequently here, as in Bengal, the principal object of cultivation; and as the area covered by this crop is extensive in proportion to the population, there is a large surplus of rice for export. Between 60 and 70 per cent, of the whole export of rice from British India comes from this one province, which has indeed the largest rice export in the world. The province also ranks first for its export of teak, mostly from the mountains of Upper Burma, for though the teak-tree is abundant in India proper, the rivers of Burma afford special facilities for floating and shipping the timber.

Minor Products. — Among these may be mentioned cutch, rubber, petroleum, coal, gold, jade, and rubies. Petroleum has long been a commercial product of some importance both in Lower and Upper Burma. It is obtained both from islands on the west coast and in the Intwadi valley. Three coalfields are known in Upper Burma, that supplying the best coal being in the valley of the Kyendwin (Chindwin). Gold, jade, and rubies are all products of the northern parts of Upper Burma. The Burmese jade forms the chief supply of that mineral in the markets of China and Japan, where it is of great value. The ruby mines of Burma (at Mogoke, a high valley to the east of the Irawadi, about half way between Mandalay and Bhamo) furnish the only rubies of the finest colour to be found anywhere.

Communications.²—There are two **lines of railway** in Burma, both metre-gauge.³ Both start from Rangoon, one proceeding to Prome on the Irawadi, and the other first proceeding north-eastwards to Pegu, then ascending the valley of the Sit-taung, and

¹ See *Intro.*, par. 73.

- See also above under *Surface and Drainage*.

³ See p. 121.

then continuing farther northwards to Mandalay, on the left bank of the Irawadi. A farther extension of this railway northwards is now being made on the opposite side of the Irawadi. The route for a proposed railway across the Patkoi Mountains, to connect the railway system of Burma with India proper, has been surveyed.

Chief Towns.—1. **Seaports.**—RANGOON (180), the chief port of Burma and the capital of the province, stands on the Rangoon River, or Hlaing, an arm of the Irawadi delta, but one which is not navigable directly to the Iniwadi itself, although in the rains there is a navigable connection with that river. Two-thirds in value of the exports of Burma are shipped, and all but a small fraction of the imports are received, at this port, which ranks third among the seaports of British India. The minor ports of Burma are Bassein (30), on a western arm of the Irawadi delta; Akyab (35), on the Bay of Bengal, the port of the division of Arakan; Maulmain (Moulmein, 58), at the mouth of the Salwin, the chief port of the Tenasserim division; Mergui and Tavoy, still smaller ports on the still narrower parts of Tenasserim farther south. Maulmain can be kept open for large vessels, but much dredging is necessary to keep the approach free from obstructions.

2. **Inland Towns.**—In Lower Burma, Pegu, on the Pegu River, now a place with less than 10,000 inhabitants, but described by European travellers in the 16th century, when it was the capital of a kingdom embracing the Sit-taung and Irdwadi valleys, as a place of great size, strength, and magnificence; on the left bank of the Iniwadi, Prome (30); in Upper Burma, on the same bank of the Irawadi, Pagan, another old capital, with very extensive ruins. Still farther north, just to the south of the 22nd parallel, there lies a group of four old capitals, Bagain and Amarapura, on the right bank of the Irawadi, and Ava and Mandalay, on the left. MANDALAY (190) was the capital of the last Burmese king, and is still the chief town in Upper Burma. It lies in a plain two miles from the river, and is partly enclosed by a wall. The part so surrounded contains the old royal palace, and is now the military cantonment of the British.

The Malay Peninsula.—This is the name given to that part of Indo-China which projects south-eastward nearly to the equator, the mainland terminating in Cape Romania. It is highly mountainous, and clothed with dense tropical forests.

At its northern end, however, at the Isthmus of Km (between 10° and 11° N.) there is a gap separating the mountains of this peninsula from those of Indo-China. This gap is only about 100 feet in height at the highest part, and it has often been proposed to pierce the isthmus by a ship-canal, which would shorten the route from Calcutta to China by 660, and that from Burma to Bangkok by 1,300 miles.

Division*.—The southern part of this peninsula is either under British rule or occupied by states under British protection or



FIG. 30. — THE GILDED PAGODA, PAGAN.

British influence. The island of **Singapore**, in the extreme south, the small territory of **Malacca**, on the west coast, the **Dindings**, comprising two or three small islands, with a small strip of mainland farther north, the island of **Penang**, and the patch of mainland called **Province Wellesley**, still farther north, form the British Crown colony of the **Straits Settlements**. The remainder of the south-west is occupied by three states under British protection—Perak,¹ Selangor, and Sungei Ujong. The British influence in the states of the south-east, except Pahang, which is also now a British protectorate, is not so well defined.

People.—The **natives** of the peninsula are **Malays**, whence the name ; but the Malays are being ousted in trade and industry by **settlers** from abroad of a more enterprising temperament. These are mostly **Chinese and Indians**, the latter mainly from southern India, and known in the peninsula as **Klings**.

Gutta-percha, gambier (a substance used in tanning), and many other tropical products are obtained from the forests and plantations, but the chief export is **tin**, for the mountains running through the peninsula, and reappearing in islands farther south,² are the richest part of the world in this metal. The largest supplies of tin in the peninsula are at present obtained from Perak, in the north-west of the British region.

Commerce.³—The Straits Settlements, however, derive their chief importance not from local products, but from their favourable situation for shipping. **Malacca**, founded by the Portuguese (Albuquerque) in 1509, was in the 16th and 17th centuries the chief centre of commerce in the far east. In the middle of the 17th century it became a Dutch possession, and in 1824 was ceded by the Dutch to the British. Meantime however, it had deteriorated as a port by the silting up of its roadstead, and it was rapidly eclipsed by the port of **Singapore**, which was founded in 1819 on the island of that name by Sir Stamford Raffles, who justly estimated the unrivalled advantages of its situation. Singapore is now, therefore, the great entrepot of the east, and is becoming more and more an entrepot for local commerce, as distinguished from a calling-place for large ocean-steamers. **Penang**, which also has an excellent harbour, has likewise **far** distanced Malacca in commerce, its rise being favoured, among other **things**, by the fact of its being the outport of Perak.

Siant—This kingdom is mainly composed of the basin of the Menam River and the middle part of the basin of the Mekong

¹ Pronounced Pera.

² See p. 173.

* See also p. 124.

structed, it is proposed to place it in communication, by a branch railway, with the Burmese port of Maulniain. For this purpose the necessary line would be short, and would have to cross only two mountain passes, the higher of which is not more than 2,400 feet above sea-level, but it would have to be laid through dense forest in a region exposed to very heavy monsoon rains.

French Possessions.—**Lower Cochin-China** consists of the delta of the Mekong with the adjacent low plains on both sides. Here also the principal product is rice. **Cambodia** is the territory to the north, between Lower Cochin-China and Siam. At one time it was the seat of a highly developed civilisation, of which there are some magnificent remains, the most remarkable being the temple known as **Angkor Wat** (now within the Siamese frontier). **An nam**, including Upper Cochin-China, is an empire under French protection occupying the east of the peninsula to the south of the Gulf of Tongking. It has a small trade, the chief exports being cinnamon and "false gambier." **Tongking**, formerly a part of the empire of Annam, is now directly under French rule. It consists chiefly of the large and populous delta of the **Songkoi** or Red River, which is navigable for small steamers to within the Chinese frontier. Its chief export products are raw silk and rice.

Chief Towns.—The capital of Lower Cochin-China is **Saigon** (SO), a river-port connected by rail with **Mytho**, on one of the main arms of the Mekong delta, although the Saigon River is likewise connected with the larger stream by a natural navigable channel, uniting these two ports. The capital of Cambodia is **Pnom-penh**, on the Mekong. That of Annam is **Hue** (50), and the chief harbour and port is the **Bay of Tourane**, about half a degree to the south. The capital of Tongking is **Hanoi** (70), near the head of the delta of the Song-koi; the chief place of import, **Haifong** or Haiphong.

2. **THE EASTERN OR MALAY ARCHIPELAGO.**—This large assemblage of islands in the south-east of Asia extends over an area nearly as great as that of Europe, although the land surface is only about one-fifth of the area of that continent. It consists of islands both large and small, Borneo, the largest, having nearly three times the area of the Punjab, and Sumatra, the next in size, being more than one-half larger than that province. A line of active volcanoes (about fifty in all) passes round the outside of the group, just touching Celebes in the north-east.

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The whole group lies within the tropics, and all, except the



FIG. 32. THE TEMPLE OF ANGKOR WAT. CAMBODIA

Philippines, between 10° north and 10° south. Favoured by the monsoon rains, the vegetation is almost everywhere as luxuriant

as the tropics can show. Dense forests cover the slopes of the mountains, which occupy the greater part of the surface. Coconuts, bananas, and the pith of the sago-palm supply food with too much ease to demand much energy on the part of the people.

People.—Most of the original inhabitants are Malays, a brown-complexioned race, with smooth straight hair, rather silent in disposition and subdued in manners, expert in fishing and in the management of small slim boats, with which they make long voyages from island to island. At one time Buddhists, they attained in Java, under Buddhist influences, a high degree of civilisation, of which there are relics in the form of a Malay literature and splendid buildings,¹ rivalling those of Cambodia. Afterwards the Arabs gained them over to Muhammadanism, and that religion is still professed on most of the islands, on some of which the Arabs, though few in number, hold a very influential position. After the discovery of the sea-way to India at the close of the fifteenth century, the Arabs were followed by Portuguese and Dutch, the latter of whom now claim possession of most of the archipelago, except the Philippine Islands, which, together with the adjacent small islands of the Sulu Archipelago, belong to Spain. Chinese traders and miners are pretty numerous.

The Dutch possessions consist of the Great Sunda Islands in the west, the Lesser Sunda Islands, forming a string stretching eastwards from Java, and the Moluccas, between Celebes and New Guinea.

Chief Islands and Towns.—Among the Great Sunda Islands, Java is that in which Dutch influence has been most exerted, and this island is consequently the most productive and most densely peopled of all large tropical islands. Fields of rice and sugar-cane occupy the lower levels along with tobacco, higher up follows coffee, and then tea and cinchona. Some of these products are grown in plantations belonging to the Government, others on native plantations, the owners of which are bound to sell their crop to the Dutch Government at a low fixed price, so that in prosperous times the revenue from Java makes up for all the deficiencies in the other Dutch islands. Under this system the population has grown from 6,000,000 in 1825 to upwards of 20,000,000,² and the density now

¹ The most remarkable is the temple of BOJO Buddor, near the middle of the island.

³ See Iutiud., par. 107.

exceeds that of England. The principal towns are on the north coast—**BATAFFIA** in the west, **SURABAYA**¹ in the east.

On **Sumatra** the natives are to a large extent independent, living in fortified villages called *kamport/s*. The smaller islands of **Banca** and **Billiton**, adjoining on the east, are rich in **tin**,² Of **Borneo** only the south-east is claimed by the Dutch, and even this part is chiefly left to the natives. Off the north-west coast is the small island of **Labuan**, belonging to Britain. It produces coal. The territory of the **British North Borneo Company**, in the north of the island, the native state of **Brunei**, adjoining it on the south-west, and **Sarawak**, a state subject to a rajah of British family, are now all under British protection. The very irregular island of **Celebes** has **coffee** and other plantations, under Dutch supervision, in the north-eastern peninsula (Menado), but in most parts the natives are not interfered with. The coffee is said to excel that of Java.

Of the **Lesser Sunda Islands** the largest is Timor, the eastern half forming the last relic of Portuguese rule in the archipelago.

The **Moluccas**, also called the **Spice Islands**, from the nature of their principal products, grow cloves, nutmegs, cinnamon, and other spices, and are very carefully managed by the Dutch.

Spanish rule in the, **Philippines** has resulted in the nominal conversion of the inhabitants to Christianity, but has done little for industry and commerce.

Only one island, **Luzon**, has a tolerably dense population (more than 100 to the square mile). Here the chief products are **tobacco**, **sugar**, and a strong fibre known as **Manilla hemp**. **MANILLA** (200), on a fine bay on the west coast, is the chief town, and is the largest in the whole archipelago. It has frequently suffered from earthquakes and typhoons.³

3. CHINA.—Position, Size, Density of Population.—China proper occupies the east of Asia, from about 43° N. to five degrees south of the Tropic of Cancer (in the island of Hainan). Shut off from the rest of Asia on the north and west by scarcely habitable tablelands, and on the south-west from the plains of India by the mountain barriers of Indo-China, it is by nature one of the most isolated countries in the world, and, being at the same time blessed with a soil of extraordinary fertility and a genial climate, It supports a dense population, which has for the most part remained separate from the rest of the world, and which developed at an early period a high civilisation, with manners and ideas quite peculiar.

¹ The Dutch spelling is *Soerabaja*, which is pronounced in the same way as the form given in the text.

² See p. 1G8.

³ See *Introd.*, par. 66.

Its total area is about equal to that of India (inclusive of Burma), but the population, according to the most likely estimate that can be formed,¹ is perhaps one-third greater than that of India.

Contrasts between Northern and Southern China.—The country is, for the most part, elevated, and even mountainous, though there are plains and lowlands of great extent.

The great plain or lowland region is that which extends in the east from Peking to the Yang-tse or Yang-tse-kiang,² interrupted only by the mountainous peninsula of Shan-tung.³ Of the mountains, by far the most important, as a physical feature, are the **Fu-niu-shan Mountains**, forming the eastern continuation of the Kuen-lun, and running from west to east, about the parallel of 34° N., more than half across the country. This range separates **two regions in the north and south, presenting a marked contrast to one another.**

1. As regards **physical features**, in the north the valleys and hollows between the mountains are filled with a yellow⁴ earthy deposit of great fertility, known as **loess**, sometimes thousands of feet in depth. It is apt to weather away so as to form terraced perpendicular precipices.⁵ Being very porous, rain readily sinks into it, and in some places where it occurs every field has a well for irrigation. To the south this loess is generally absent, and the mountains, frequently separated by chasmy hollows, stand out in all their grandeur. In the north, again, the **rivers** are not easily navigable, partly from their impetuosity, and partly from their being filled with shifting shoals derived from the soft loess. The great river of the north is the rapid **Hwang-ho**,⁶ or Yellow River, which now flows in the end north-eastwards into the Gulf of

¹ All the estimate* are, however, very uncertain.

² *Kiang*, Chinese = river.

³ Shan-tung = Eastern Mountains, as distinguished from Shan-si = Western Mountains.

⁴ Hence the names Hwang-ho = Yellow River, Hwang-hai = Yellow Sea, due to the colouring derived from this deposit.

⁵ See cut, p. 175. In northern China millions of human beings live in oaves hollowed out in the sides of these precipices. The loess is believed to have been blown into the hollows which it fills from the highlands of central Asia. See *Introd.*, par. 29 (1), and *com p. top of p. 102.*

⁶ Sometimes spelt Hoang-ho, but this is properly a French, not an English mode of spelling.

Pechili, on the north side of the mountainous peninsula of **Shan-tung?** but about thirty years ago continued its eastern course to the Yellow Sea, south of that peninsula. To the south is the **Yang-tse-kiang**, one of the finest navigable rivers in the world (hence having on its banks many of the largest towns in China), while its tributaries on the right bank form in many cases

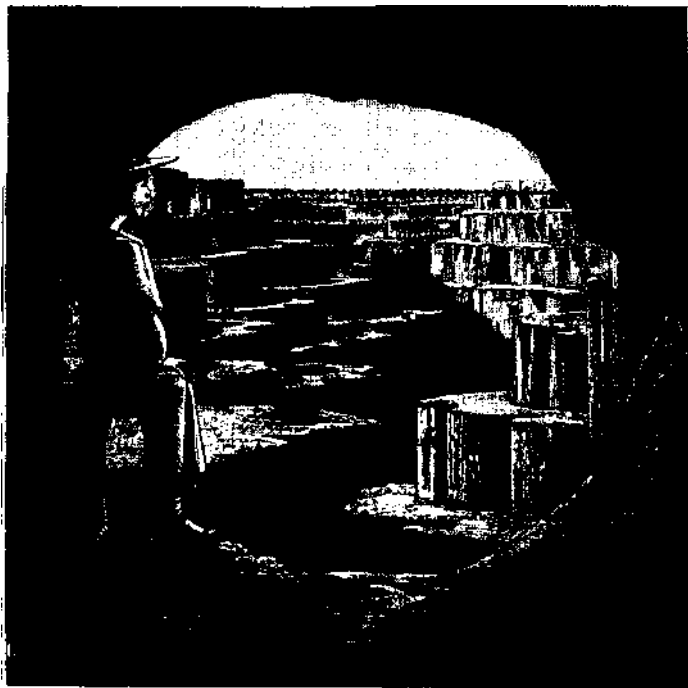


FIG. 1. AMONG THE LESS TERRACES OF NORTHERN CHINA.
(By the kind permission of Mr. Dietrich Reimer.)

admirable means of communication between it and the extreme south.

2. As regards **communication**, in the north are numerous roads, and horses, mules, asses, and the two-humped camel are abundant as beasts of burden, while in the south human carriers are mostly employed where boats and ships are not available.

3. As regards **products**, the north is the land of **wheat, millet, cotton**, and **pod-fruits**, the south of rice, tea, silk, and sifear;¹ and while in the north agriculture may be pursued on the fertile loess as high as 8,000 feet above sea-level, in the south it is mostly confined to the plains and valleys, and to artificial terraces² cut out on the lower slopes of the mountains. In part of the south-western province of Se-chwan, however, a fertile red soil takes the place of the yellow loess, and there agriculture is pursued to a great height up the mountain sides. The cultivation of **opium** is spreading rapidly both in the north and south of China.

4. As regards climate, there is in the north only an alternation between a warm, cloudy, and rainy summer, and a long winter with clear skies and icy north winds; while in the south, on the other hand, there is a more gradual succession of the seasons.

People.—The original seats of the Chinese are unknown, but it is certain that this people immigrated from the north, and it was in the northern part of China that the emperor, an absolute monarch, acquired the title of "Hwang-ti," meaning "Lord of the Yellow" (earth). The Chinese are the chief representatives of the Mongolian type of the human race, but though they make up the great bulk of the population, they have for the last 250 years been subject to a Manchu dynasty, which invaded China from the north-east.³ In **religion** they are **nominally Buddhists**, but all religions that have taken a strong hold on the Chinese have been reduced by them to little more than ceremonial observances, and the worship to which the people most steadfastly cling is the worship of their forefathers, tablets in honour of whom are preserved in every Chinese household. The system of Confucius, an ancient Chinese sage, whose descendants are still held in great reverence by the Chinese, can scarcely be called a religion at all, consisting as it does merely of a code of duties. It is the system adhered to by the learned classes, and all the higher officials are obliged at stated times to perform certain rites connected with it.

¹ The beet Chinese sugar is grown on the island of Formosa.

* See *Introd.*, par. 59 (3).

* It was from their Manchu conquerors that the Chinese adopted the practice of wearing their hair in a "pig-tail," that is, in a single long plait hanging down behind.

The **language** is the type of monosyllabic languages, or languages composed of words of one syllable, which remain unchanged in the making of compound words. There are, as in India, numerous dialects, but the peculiarity of the Chinese written language enables it to be understood over the whole country. There is an immense number of written characters, each of which denotes an idea, so that it may be read by one word in one dialect, by another word in another dialect. There is no alphabetic writing. This makes the acquisition of the language a matter of great difficulty to foreigners. Learning is held in high esteem among the Chinese. All Government offices are the reward of success in examinations.

Foreign Commerce.—The Chinese in their own country have maintained their isolation in a large measure down to the present day. From a remote period there has been a trade with the west by land, chiefly in silk. Intercourse with Europe by sea began in the early part of the sixteenth century, but was confined to Canton till 1840, since which date a considerable number of ports have been opened by treaty (hence treaty ports) to European and American commerce. The **chief articles of export** are now **silk** and **tea**, and the **chief import opium** (from India); next to which come various **manufactured goods**.

Even yet, however, the whole foreign trade of China is only about one-fortieth of that of Europe. The long-continued aversion of the Chinese Government to the construction of railways has been an obstacle to its development. The construction of a network of railways has often been proposed, and would have all the more importance since China is known to possess enormous coalfields—coalfields the united extent of which is estimated to be twenty times as great as that of the coalfields of Europe. The **gold**, copper, and other minerals of the province of **Yon-nan**, in the extreme south-west are among the products which it is hoped to make accessible to European commerce by railways. Telegraphs are already extending in China with remarkable rapidity, and the attitude of the Government towards railways has at last been changed.

Chief Towns.—The large towns of China have been known by repute in Europe since the time of the Venetian traveller Marco Polo (end of the thirteenth century), but his accounts were then ridiculed as exaggerated. Even according to the best estimates of the present day, however, China can boast of several towns containing more than a million inhabitants.

PEKING, the seat of government, stands in a densely populated plain in the north-east (prov. Pechili), but in one of the dreariest parts of it. Its population is variously estimated at from 500,000 to upwards of a million.¹ Its port is TIENTSIN (1,000), on the Pei-ho, a treaty port accessible to Chinese junks,² but much more important as the northern terminus of the Grand Canal, a canal 700 miles in length, which forms the great channel of communication between north and south,³ as far as HANGCHOW," at the head of the inlet or gulf of the same name. CHIFU (or Chefoo), on the north coast of the peninsula of Shantung, at the entrance to the Gulf of Pechili, has the largest trade among the treaty ports of the north. Of the towns on the Yang-tse-kiang, the largest is HANKOW (700), a treaty port at which, though lying in the centre of the country, sea-going ships can be freighted with tea from the rich tea-growing districts all round. Lower down lies NANKING⁴ (500), a former capital of China, and still a great seat of Chinese learning. Above Hankow, about 1,000 miles from the mouth of the Yang-tse-kiang, stands Ichang, a treaty port situated at the upper limit of the unbroken navigation of the river, which here emerges from a long and deep rocky gorge, with numerous difficult rapids. On the Wusung, a little above the mouth of the estuary of the Yang-tse-kiang, stands **SHANGHAI** (350), the most important of the treaty ports, the principal centre of foreign commerce on the mainland of China. The chief town of the south, and indeed the most populous apparently of all China, is **CANTON** (properly Quang-tung, which is the name also of the province in which it lies; pop. 1,600), on the delta of the Si-kiang (a branch of which is known as Canton River). It lies in the middle of a region rich in rice, sugar, and indigo, and possessing admirable water communication with the silk and tea districts farther north. Close by, on the river, a population of 300,000 dwells in boats moored in long rows. **SWATOW**, **AMOY** (300), **FUCHOW** (600), and **NINGPO** are important treaty ports on the coast between Canton and Shanghai.

At the mouth of the estuary of the Canton River are two small European possessions ; at the northern entrance lies the rocky island of Hong-Kong, with the town of Victoria, belonging to the British; at the southern, **Macao**, belonging to the Portuguese. Of these, the former is by far the more important, being the principal seaport of southern China,

MANCHURIA, in the north-east of China, is all more or less directly under Chinese administration, and the southern part of it is governed exactly like a Chinese province. It is drained partly by the Liau-ho into the Gulf of Pechili, partly by the Sungari and its tributaries belonging to the basin of the Amur. In general it is a fruitful country, rich in pastures,

¹ All the estimate* of population of Chinese towns are very uncertain.

² The name of a kind of flat-bottomed ship, high in the prow and stern, used in China and Japan.

³ The Grand Canal is no longer navigable throughout, on which account one of the Chinese railway schemes most actively promoted at present is that for a railway from Nanking to Tientsin and Peking.

⁴ Meaning "Southern Court," as distinguished from Peking, "Northern Court,"

hitherto sparsely peopled, but now receiving large numbers of Chinese colonists in the south. **MUKDEN** (200), on a tributary of the Liau-ho, is the capital, and Niuchwang (Newchwang), near the mouth of the Liau-ho, is a rising treaty port.

5. **KOREA**, the mountainous peninsula between the Yellow Sea and the Sea of Japan, is only a loose dependency of China. Since 1883 three Korean ports have been opened by treaty to foreign commerce. These are Chemulpo on the west coast, Fusan on the south-east, and **Wonsan** or Yuensan, on Broughton Bay, on the east coast. Chemulpo is the port of the capital,



Kifl. 34.— CHINESE GATEWAY. (By the kind permission of Messrs. Chapman & Hall.)

SE-UL, or Hanyang. Ginseng, a drug highly valued by the Chinese, is exported as a monopoly of the king. Gold, in dust and bars, and hides are among the other chief exports. Of the import trade by far the largest share falls to Great Britain, which sends chiefly cottons.

6. **CENTRAL ASIA**.— The vast mountain-girt table-land* to the north and west of India and China (covering an area, of about two and a half millions of square miles in all) are mostly uninhabited solitudes, in some parts of which explorers may travel for three months together without seeing a human being. The whole region is either directly or indirectly subject to China.

Tibet.—The southern part of the area is the loftiest tableland in the world, in the south and west nowhere less than 12,000 feet in height, though sinking in the north, at the base of the Kuen-lun Mountains, to about 4,000 feet in some parts. On this great tableland lie the headwaters of all the great rivers of south-eastern Asia. The vegetation consists principally of pasture grasses, which support large herds of yaks, horses, sheep, and other animals, both wild and domesticated. The inhabitants, who profess a form of Buddhism known as Lamaism, are chiefly settled along the narrow basin of the Sanpu (upper Brahmaputra). Here, on a northern tributary of the Sanpu, at the height of nearly 12,000 feet above sea-level, stands Lhasa, the residence of the Dalai Llama, or high-priest of the "yellow lamas," the priests of the principal division of the Tibetan Buddhists. The government of the country is under the control of Chinese residents, and is persistently hostile to free intercourse with British India. In consequence of this, the trade with India is very limited (under one crore in value), although, were it not for this restriction, it might be developed to a great extent, seeing that each country lacks what the other supplies. The animals of Tibet might yield any quantity of wool, and the supplies of salt and borax on the Tibetan tablelands are inexhaustible. On the other hand, Tibet can produce but little grain, and that coarse, no cotton or cotton fabrics, and no tea, all of which it might obtain from India in abundance by comparatively easy passes which are known to cross the Himalayas in various places. At present Tibet sends into India only small quantities of the products above mentioned, along with horses and other animals, taking in exchange grain and cotton and woollen cloth. Though the Tibetans look upon tea as almost a necessary of life, Indian tea is jealously excluded in favour of Chinese, laboriously carried from the east by routes of tremendous difficulty.

Eastern Turkistan and Mongolia.—North of Tibet and China lies a long relatively depressed area, mostly desert, called by the Chinese the Han-hai, or Dry Sea, a name so far appropriate that the region is known to have actually been a sea in some previous period of the history of the world. This area, stretching from the abrupt eastern slopes of the Pamir plateau, in the west, to the so-called Khingan Mountains¹ in the east, is as long as the Mediterranean Sea, and, like it, is divided into two portions by a narrowing in the middle. This narrowing is important for two reasons; first, because it reduces the journey across the desert to fourteen days; and secondly, because at this part are situated the only two openings by which great bodies of people can emerge from the Han-hai, either northwards along the northern base of the Tian-shan Mountains, or southwards into China along the Nan-shan Mountains. Through these gates great hordes of mounted barbarians have swept north and south at different periods, and hence they are now included in a province directly under Chinese rule. It was to prevent such inroads that the Chinese in the third century erected the **Great Wall**—a stone-faced earthen rampart, more than 1,200 miles in length, extending from Peking to Sucbau, on the northern

¹ IN reality merely the eastern edge of a lacss plateau.

slopes of the Nan-shan Mountains; but the wall (uow in many places in a state of decay) did not always prove effectual.

In both halves of the Han-hai a caravan trade with China is carried on. The western half, or Tarim basin, forming Eastern Turkistan, is inhabited by Muhammadan Tatars, who during the short but hot summers grow wheat, maize, and even rice and wine along the banks *pi* the numerous short rivers which dry up in the sands soon after quitting the base of the mountains. The chief towns are Kashgar and YARKAND,¹ the former the starting-point of the caravans across the Pamir to the valley of the Sir,² the latter of those to the valley of the Amu.⁸

The eastern half of the Han-hai is the Shamo,³ or Gobi, which, along with the mountain-traversed area stretching westwards to Siberia, makes up Mongolia, a region inhabited by nomadic Mongols, Buddhists in religion. Maimachin³ is the town of greatest importance.

7. JAPAN, an empire called by the Japanese themselves Nipon, consists of a group of large islands opposite the Japanese Sea, together with strings of smaller ones in the north opposite the Sea of Okhotsk (Kurile Islands), and in the south opposite the mouth of the Yellow Sea, (Riu-kiu Islands⁴). Their area is about equal to that of Bengal, but their population not much more than half that of Bengal. The density of population is consequently much less in Japan, which will be easily understood when the character of the surface is described. Hondo, Shikoku, and Riushiu, the most populous islands in the group, lie in a latitude extending about two degrees south and five degrees north of the latitude of Kashmir.

The climate, notwithstanding the influence of the sea,⁵ is one of extremes.⁰ At Tokio, the capital, a coast-town,* the mean temperature of the hottest month is only three or four degrees F. lower than that of the Brahmaputra valley in Assam, but that of the coldest month is about thirty-three degrees lower than in Assam, that is, only about three or four degrees above the freezing-point. Ezo (less properly called Yezo), the northernmost island, has a very severe climate, and is inhabited only by a scanty population, mostly settled on the coast, where they support themselves by fishing.

¹ Both situated at the height of about 4,000 feet above sea-level, on the routes of the old overland silk trade between China and the west. * See p. 66.

³ Chinese—"Sea of Sand." A portion of this desert extends even to the east of Khingan.

⁴ Called by the Chinese Lu-chu Islands. The Chinese language has no *r*, the Japanese no *l*. ⁵ Introil., par. 89. • Introil., par. 92.

Surface.—The entire group is mountainous, so that even on the populous islands the level cultivated ground, including the terraces on the hill slopes,¹ forms less than one-eighth of the entire area. The few plains of any importance lie along the lower courses of the rivers. The principal mountain peaks are conical volcanoes, active or extinct, which rise to a great height above the general elevation of the mountain ranges, thus leaving low and easy passes between. **Fusino-yama**,² the highest, is upwards of 12,000 feet in height.

Soil and Agriculture.—The old lavas from these volcanoes, crumbled by vegetation³ and changes of weather and washed down by rain, have yielded to the plains and valleys an exceedingly rich soil, and this, together with the warm summers and the copious summer (monsoon) rains,⁴ renders the low grounds so productive that, small as their area is, the density of the population in all the three more populous islands is upwards of 300 to the square mile. The principal summer crop is rice (the staple food of the people), but **barley** and **wheat** are largely grown as winter crops, the young grain springing up before the winter, and remaining green, but not growing all the winter through. **Tea** and **silk** are likewise staple products.

Minerals.—The mineral wealth of the country needs development. The most important product under this head is coal, the production of which (in the west of Kiushiu and the west of Ezo) is rapidly increasing. In 1886 the amount raised was below that raised in India, but now the Japanese production exceeds the Indian. The Japanese have the advantage of having some of their mines close to the sea, which favours the growth of an export trade in coal.

People.—The Japanese, **mostly Buddhists in religion**, attained a high degree of civilisation before they came much into contact with Europeans and Americans, and their manufacturing industries had reached a corresponding degree of advancement. Their **silk fabrics** and **lacquered wares** are particularly celebrated, and their skill in lacquering has even given a word to the English

¹ See *Intro.*, par. 69 (3), and *comp.* p. 176.

² Also known as Fujiyama, Fujiyama, and Fujisan. *Yama* = " mountain " in Japanese, *san* in Chinese.

³ See *Intro.*, pars. 29 (2) and 59 (5).

⁴ See *Intro.*, pars. 67, 90.

language (japanning). For a long period the Japanese showed the same jealousy of foreign intrusion as the Chinese, and foreign trade was strictly limited to Chinese and Dutch. Now, however, several ports have been opened to other nations, and foreign trade has been greatly extended in consequence. Still more recently the Japanese have begun to show an eager readiness to learn from western nations: to teach European languages (especially English) in their schools, to employ foreign teachers of science in their colleges and universities, and to send Japanese students to the universities of Europe and America for education. The railway system is getting rapidly extended, and machine factories on the European model are becoming, as in India, more and more numerous.

Chief Towns —The capital of Japan, the residence (since 1869) of the Mikado, or ruler of the country, is called TOKIO (formerly Edo)¹ 1,100, and is situated at the head of an eastern bay, on one of the most extensive and best watered of the Japanese plains. It is a treaty port, but being accessible only for small vessels, the foreign commerce is chiefly centred at Yokohama, another treaty port on the same bay. West-south-west of Tokio, about seven miles to the Mouth of a beautiful lake in another rich plain, is KIOTO (260), capital of Japan for 1,000 years previous to Tokio, and still the chief seat of Japanese industry, the centre of Japanese art, and the most interesting of Japanese towns in virtue of its general appearance and historical associations. Kobe, on a bay to the south, is the principal treaty port for Kioto, OZAKA. (400), another treaty port on the same bay, having only a shallow harbour, so that it is visited principally by native craft. Nagasaki, in the south of the island of Kiu-shiu, is a treaty port, with one of the deepest and safest natural harbours in Japan. Being in the vicinity of coal-mines, it is now much frequented as a coaling-station, and has a growing export of coal. Niigata is the only port on the west coast, and is accessible to shipping only in summer, navigation being stopped for half the year by the strong surf which beats along the whole of the flat and dangerous west coast during the prevalence of the north winds of the winter monsoon

¹ Improperly, Yedo

EUROPE.

Approximate latitudes: North of Norway, 71° N. ; south of Spain (north of Kashmir), 36° N.

Approximate longitudes: Ural Mountains, 60° E. ; west coast of Iberian Peninsula, 9½° W. ; of Iceland, 24° W.

Boundary, Area, Density of Population.—The eastern boundary of Europe has always been a matter of dispute, for in the east this continent is united to Asia in such a manner as to form only a peninsula of the latter continent. Yet Europe has from the first been recognised as distinct (1) because the earliest civilisation in Europe was in the south, where it is divided from Asia by seas, and (2) because Europe, as a whole the most densely populated of all the continents,¹ has so much in common in the history of its inhabitants.

The area varies according to the boundary-line adopted *in the east*. On the whole, the most convenient line to adopt is that of the Ural Mountains, the Ural River, the Caspian Sea, and in the south-east a line running east to west through what is called the **Manich Depression**, from being partly traversed by the Manich, a tributary of the Don. By the adoption of this boundary the whole of the Caucasus region is assigned to Asia, but part of European Russia is on the Asiatic side of the Ural Mountains.

Within the boundary indicated, the area is about three and three-quarter millions of square miles—more than two and a half times the area of India (exclusive of Burma), and more than forty times the area of Great Britain

Outline.—The **coast-line** is the longest relatively to area of any continent, and the advantage of this to shipping is increased by the fact that the length of coast-line is due not merely to a large number of small indentations, but to its running out and

¹ See table, p. DO.

in in such a manner as to form large inland seas and gulfs with peninsulas between. The interior is thus brought nearer to the sea, and in fact no part of Europe (within the limits above mentioned) is as much as 1,000 miles distant from the coast.

Seas.—There are three considerable seas in the north of Europe—the **North Sea** or German Ocean, between the British Isles and the mainland; the **Baltic** and its branches, between the peninsula of Scandinavia and central and eastern Europe; and the **White Sea**, in the north of Russia. The last is the smallest, being about equal in extent to the Gulf of Peehili, in the north-east of China. Even the North Sea is less than one-fourth of the area of the Bay of Bengal, if we consider this bay as reaching south to the latitude of Ceylon and the Nicobar Islands. The great seas in the south are the **Mediterranean**, between Europe, Africa, and the west of Asia, and the **Black Sea** in the south of Russia.

All the seas in the north of Europe are shallow, the great seas of the south both deep. If the level of the whole continent with the surrounding seas were raised 600 feet, which is not much more than the height of the highest buildings above the ground, the northern seas would all be converted into dry land with the exception of a few small basins, and at the same time the west coast of Europe would be extended so as to run from the west of Norway round the British Isles, and then back to the south-east corner of the Bay of Biscay. Deep seas would, however, still remain along the south of Europe, although the greater part of the Adriatic, between Italy and the Balkan Peninsula, would be added to the mainland. Sicily would be united to Italy, Corsica to Sardinia, and Majorca to Minorca.

The Mediterranean Sea presents a contrast to all the other inland or nearly enclosed seas, namely, the Black Sea, the White Sea, and the Baltic, in the degree of its saltness. It loses by evaporation more than it receives from rivers, so that its saltness is somewhat greater than that of the ocean,¹ whereas in all the others the reverse is the case, and the saltness is much less than in the ocean.

Islands.—The largest of European islands is **Great Britain**, which without the smaller islands adjacent is about 84,000 square miles in extent, or nearly three and a half times the area of Ceylon. Next in size is **Iceland**, which lies far to the north-west, nearer the coast of America (Greenland) than that of Europe, but is considered a European island because it has long

¹ See Appendix, par. 69; also Introd., pars. 68, 82, and, as to tides, par. 74.

been inhabited by a European people, and has a climate resembling that of Europe more than that of the neighbouring parts of America. Its area is less than half that of Great Britain. Ireland, the smaller of the two British Isles, is the third in size, being about one-third larger than Ceylon. The largest islands in the south of Europe are Sicily, Sardinia, and Corsica, the largest of which is a good deal less than half the area of Ceylon.¹

Surface.—With respect to the surface, the mainland of Europe may be divided into three regions. (1.) In the north there is a highland or mountainous region occupying the peninsula of Scandinavia. (2.) Another mountainous region occupies the greater part of the south, reaching farthest north about the middle. In central Germany its boundary advances nearly to the latitude of London, but from that district it recedes south-westwards through the middle of France to the Pyrenees, and south-eastwards to the mouth of the Danube. (3.) Between these two mountainous areas in the north and south there is a vast plain which stretches continuously from the shores of the English Channel and the German Ocean to the east of Europe, and in Russia spreads out north and south from the shores of the Arctic Ocean to those of the Black Sea.

The principal mountain systems are those of the Alps, the Pyrenees, the Carpathians, and the Ural Mountains. The highest and most important in every respect are the Alps, but their highest peak is under 16,000 feet in height—13,000 feet below that of the highest known peak of the Himalayas.

Bivers.—From the smaller size of the continent, and the way in which the surface is broken up and the outline indented, it follows that there can be no such large rivers in Europe as in Asia, Africa, and America. The largest are the Volga and Danube; the Volga in the great European plain, the Danube in the depression between the Alps and the Carpathians.

Though wanting in large rivers, Europe has three advantages in its river system. (1.) The rivers, though short, are very numerous, and are almost all navigable for a longer or shorter distance, so that they serve to bring a great number of points on the coast into communication with the interior. (2.) The chief rivers radiate from common centres, and thug



Fig. 35.—THE ALETSCHE GLACIER IN THE ALPS (SWITZERLAND).¹

bring the same inland regions into communication with far distant coasts. Two important centres should be remembered: {a.) The **Alps**, whence flow the Rhine to the German Ocean; the Rhone, Po, and Adige, to the Mediterranean; and several tributaries of the Danube to the Black Sea. (b.) The region in the heart of Russia, of which the Valdai Hills are the centre, the region from which flow the Volga to the Caspian Sea, the Don and Dnieper to the Black Sea, the Western Dvina and Niemen to the Baltic, and a tributary of the Northern Dvina to the White Sea. (i.) The chief rivers, and hence different seas, have been very easily brought into communication by means of canals.

Lakes.—The principal lakes are in two great groups. One group lies round the Baltic, and includes large lakes in Russia (**Ladoga**, 7,000 square miles, the largest in Europe, **Onega**, &c.), and in Sweden (Wener, Wetter, and MSlar), and a large number of small ones in Russia and north Germany. The other group is situated north and south of the Alps,¹ chiefly in Switzerland and Italy, the largest in this group (the Lake of **Geneva**, 220 square miles) being only about one-third of the size of the smallest of those mentioned as belonging to the former group.

Climate.—The continuous series of mountains along the north of the Mediterranean peninsulas has a very important effect on the climate and vegetation of this region, which is thus very distinctly marked off from all the rest of Europe. The mountains serve to ward off the cold winds from the north and north-east,² and hence the temperature here is remarkably equable all the year round. The broad and deep Mediterranean assists in mitigating the extremes of temperature.³

The Mediterranean region also differs from the rest of Europe in its **rainfall**. The summers here are the driest part of the year, and in the extreme south they are almost without rain. In this respect, accordingly, the Mediterranean region of Europe presents a complete contrast to the monsoon region of Asia. Owing to the dearth of summer rains, the rivers, and especially those of the south, are poorly supplied with water in summer, and many of them in that season dry up altogether.⁴ For navigation they are of little use, but, on the other hand, much needed for irrigation.

North of the Mediterranean region, Europe is far from

¹ See pp. 230, 249.

² See *Infocrod.*, par. 94.

³ See *introd.*, par. 89.

⁴ Hence the excess of evaporation already referred to (p. 185).

having a uniform climate, but the changes are more gradual, and¹ are greater from west to east than from north to south. In this part of Europe, in consequence of the influence of the Gulf Stream,¹ we see more markedly than anywhere else in the world the characteristics of the west coast climate of the northern hemisphere—cool summers, mild winters, and plentiful rains. To the east the winters become colder, the summers warmer,² the rains on the whole scantier. Hence it is that while the seas on the coasts of Norway are never frozen, even within the Arctic circle, and icebergs are always kept far away from the Atlantic shores,³ the rivers in the south of Russia (in the latitude of the middle of France) have their navigation stopped by ice for a shorter or longer period every year.

Vegetation.—The contrast in climate between the Mediterranean countries and the rest of Europe leads to a corresponding contrast in vegetation. In the Mediterranean region broad-leaved evergreens abound, their leaves being mostly tough and leathery, which enables them to withstand the summer droughts. In the rest of Europe the evergreens are mostly narrow-leaved, like those of the Himalayan pines,⁴ and most of the trees are not evergreens, but are entirely stripped of their leaves during the colder months. Among the cultivated crops, wheat, barley, and maize are the only important cereals of India, extensively grown also in Europe. In the Mediterranean region, rice and other Indian crops,⁵ including various fruits of a warm climate (oranges, pine-apples, &c), are cultivated, but not over a wide area.

Wild Animals.—Large wild animals are now found in Europe only in the more thinly peopled regions. Bears and wolves, though found as far west as the Pyrenees, abound most in the forests of the east. The wild boar is wholly or nearly extirpated in most parts of the continent. The jackal is confined to the Balkan Peninsula. The lion, anciently met with in the same peninsula, is now extinct in Europe. The tiger, leopard, cheetah, and hyaena are all likewise unknown, and so also is the elephant. Serpents are few.

People, Language, Religion.—The population of Europe is

¹ See *Intro.*, par. 78. ³ See *Intro.*, par. 92. * See *Intro.*, par. 100.

* See *out*, p. 337.

¹ See pp. 245-6, 250.

rapidly increasing. This fact, together with the desire to make use of the advantages of European civilisation to develop *the natural wealth of the thinly peopled continent of America and other parts of the world, has led to a constant stream of **emigration**, which has flowed without interruption since the discovery of America, but in this century more rapidly than ever.^x

The immense majority of the people speak **languages** belonging to three great families of the Aryan **stock**.² These are (1.) **the Teutonic**, spoken in Germany, Scandinavia (Sweden and Norway), Denmark, Holland, part of Belgium, and the British Isles; (2.) **the Romance**, in certain countries where Roman influence formerly prevailed³ (Italy, the Iberian Peninsula, France, part of Belgium, Roumania, &c.); (3.) **the Slavonic**, in the east and south-east.

Less important Aryan families* in Europe are the Keltic, now confined to certain isolated districts in the British Isles and France; the Hellenic, in part of the Balkan Peninsula and in the Grecian Archipelago; and the Lithuanian, in part of Russia

Among **non-Aryan** peoples, the most important are those speaking the languages known as **Finno-Tatar**, including those of the Finns and Lapps in the north, the Magyars in Hungary, the Turks, and many tribes in Russia. A small but very interesting race is that of the **Basques**, on both sides of the western Pyrenees, that race being a remnant of very ancient inhabitants of Europe, and speaking a language quite peculiar.

As regards **religion**, the bulk of the inhabitants of Europe profess different forms of **Christianity**. **Muhammadanism** is the religion of the Turks and some other inhabitants of eastern Europe, and there are between five and six million **Jews** scattered through the different countries (chiefly in the east).

Products.—Regarded as a whole with reference to its productions, Europe is remarkable for the amount of manufactured goods which it produces and exports to other continents. This pre-eminence it owes to three causes: (1.) that here the inventions by which the great manufactures are carried on had their origin; (2.) that here there is a remarkable abundance of coal and iron in situations near the sea, and hence favourable to transmarine commerce; and (3.) that the varied outline, so advantageous for commerce, enables Europe easily to procure supplies of the raw material used in manufactures from other parts of the world, and to send away the manufactured goods.

¹ See top of p. 192. ³ See p. 62 (bottom), and pp. 109, 111. * See p. 251

THE BRITISH ISLES.

Approximate latitudes: (Winnipeg), Lizard Point, the southernmost point of England, (Prague) 50° N. ; South of Shetland Islands, (St. Petersburg), 60° N.

Approximate longitudes : 11° W. to 2° E.

Position, Size, and Density of Population.—The British Isles are made up of the two large islands of **Great Britain** and **Ireland**, together with numerous small islands lying near. Great Britain, the larger of the two, consists of **England** in the south, **Scotland** in the north, and **Wales** in the west of England. Being now under one government, they are frequently known by the name of **The United Kingdom**, when they are spoken of as one.

These islands lie to the west of the mainland of Europe, and are surrounded by the shallow seas which have already been mentioned (p. 185) as extending for some distance beyond the west of Ireland. The **North Sea or German Ocean** is at its widest part about 400 miles in width, but at the narrowest part of the seas severing England from the continent the width is only 19½ miles, or about two-thirds of the distance between the nearest points of India and Ceylon. These narrow seas between England and the Continent form the **Strait of Dover**, which separates the opposing chalk cliffs of England and France, and forms the communication between the **English Channel** and the North Sea. The **Irish Sea**, which separates Ireland from the north of England, is narrower but somewhat deeper than the North Sea, though it also is of only trifling depth compared with the ocean.

The total area of the British Isles, large and small, is rather more than 120,000 square miles; that of Great Britain, with all its adjacent islands, about 90,000 square miles, or about one-fifth less than the area of the Punjab. The average density of population of the whole country exceeds 300 to the square mile, a density reached in India only in the more populous plains. The most populous parts are England, part of the middle districts of Scotland, and **the north-east of Ireland**; the **least** populous, the north western **half of Scotland**.

In recent years the number of emigrants from the United Kingdom has averaged nearly a quarter of a million annually.

Surface.—See the sections on Great Britain and Ireland (pp 204-8 and p. 213).

Climate.—The climate of the British Isles is peculiarly favoured by the action of the currents and winds from the south-west which prevail in this part of the world.¹ To this cause these islands owe milder winters than are experienced anywhere else on the globe in the same latitude. In most parts of the country snow falls to a greater or less extent every year, but it seldom lies long on the ground except in the more northerly and more hilly districts. On the other hand, the vicinity of the sea all round serves to reduce the heat of summer. The great advantage of a climate of this kind is that it is very favourable to the energy of the inhabitants. The regular recurrence of winter cold braces the nerves and tends to make labour agreeable. There is, indeed, no period of the year in which the temperature makes hard work unpleasant at any time of the day. As regards **rainfall**, the British Isles differ greatly from India in having the rains pretty equally distributed all through the year. The climate may be said to be moist, but it is even more cloudy and misty than rainy. At any period of the year the sky may be completely overcast with **clouds** for days together, without the fall of a drop of rain. On the other hand, it may rain, at any time of the year, a whole day without ceasing, and yet the whole rainfall may be under one inch.² On the whole, these islands have a much smaller annual rainfall than India. Small as their area is, however, there are, as in India, great differences in respect of rainfall in different places. The chief rain-bearing winds are, as in India, south-west winds, and the hilly districts on the west most directly exposed to these winds have in some places a rainfall more than three times as great as in the more level tracts in the south-east of Great Britain. In this part of the country, which embraces most of the area fit for cultivation, the total rainfall of the year is only from 25 to 30 inches, or less than half that of southern Bengal; but as the evaporation is much less rapid,³ in consequence of the **greater** coolness, this

¹ See hi trod., pars. 65 and 91, and p. 189. ² Comp. p. 100.

³ See Appendix, par. 68.

amount is sufficient for the requirements of the crops without irrigation, which is little practised in any part of the British Isles. In consequence of the higher latitude, there is much greater difference in the **duration of sunlight** in summer and winter in the British Isles than in India. For example, in south Lancashire (about 53J° N.), where most of the British cotton-mills are, the time between sunrise and sunset on the shortest day is only about seven hours, so that in winter the mills require to be lighted artificially for a longer or shorter time, whereas the cotton-mills of Bombay (if not worked by night) can be worked all the year round without artificial light.

Vegetation and Agriculture.—The difference between the climate of the British Isles and that of India is most strikingly shown in the aspect of the vegetation. For half the year vegetation is almost at a standstill. Most of the trees are then stripped of their leaves, presenting to view only naked trunks, branches, and twigs. During this half of the year no crops are grown in the open air. The seed when sown before the winter remains underground for months, and begins to appear above ground only when the warmth returns in early summer, or rather in the period of the year which is for this reason known as the spring. Nevertheless, short grasses (only an inch or two in height) cover a large part of the surface, in some districts the greater part of the surface, and never lose their greenness all the year round. Tall grasses like bamboos are unknown.

The most valuable of the **crops** of the British Isles is **wheat**, which is principally grown in England, the climate of Scotland and Ireland being for the most part too cold or too damp for it. The coolness of the summers prevents the cultivation of grain-crops requiring a higher temperature. Hence there are no millets or rice in any part of the British Isles. Even maize is nowhere grown for its grain, though cultivated in the warmer parts of England to yield green fodder for cattle. **Barley** and flax are the only well-known Indian crops, besides wheat, grown to any great extent in the British Isles. Barley can be grown in any climate suited for wheat. **Flax** is almost confined to the north-east of Ireland, and is cultivated not for its seed (linseed), but for the sake of a fibre obtained from its stem and used in making linen, a kind of cloth much stronger than cotton. The only grain-crop

besides wheat and barley largely cultivated in the British Isles is **oats**, which is the principal crop of this class in Scotland and Ireland. It affords the best food for horses, for which the British Isles are famous. Among **pulses** one or two kinds of beans and peas are grown, but not over a great extent of ground. The chick-pea (*gram*) is unknown. **Green-crops**, or crops having a green foliage and not yielding an edible grain or seed, occupy a very large extent of ground. The principal are potatoes, which are eaten by everybody, both rich and poor, and various kinds of turnips and mangold, all of which have a long tapering root which affords a valuable food for sheep and cattle. In a few districts hops, used in making beer, are cultivated. There are comparatively few **fruit-trees**. The principal are apples, pears, and plums. Mangoes, guavas, pine-apples, and all the other tropical fruits of India are incapable of being grown in the open air, although some of them are cultivated in hot-houses under glass. Stunted orange-trees may be seen in a few gardens, but the small oranges which they occasionally produce get nipped and distorted by the frost long before they are ripe.

Domestic animals, principally sheep, cattle, and horses, are very numerous and of excellent quality, the great extent of pasture-grasses and fodder-crops being favourable to their rearing. They are most numerous compared with the population in Ireland, which exports great numbers of cattle, sheep, pigs, and horses to Great Britain. Horses are used almost exclusively in the labours of the field and in drawing vehicles on roads.

In recent years there has been a great decline in the area **under corn-crops** in the British Isles, and a smaller decline under green-crops in consequence of the great rise in the imports of agricultural products from distant countries (including India), where they are grown more cheaply. The principal increase to make **up** for this loss has been in the area under pasture-grasses, on which account there has been a considerable rise **in** the number of horses and cattle.

Wild Animals.—There are now hardly any animals dangerous to human life or to the larger domestic animals. The viper, a small venomous snake, still **survives in** some places in Great Britain (not in Ireland), but **its bite is** seldom fatal. There are no large carnivorous animals, **the wolf** having been exterminated

in every part of the country for more than a hundred years. There are still a few wild animals (foxes, hares, rabbits, &c.) destructive to crops, but these are kept pretty well in check.

Mineral Products.—The products for which the United Kingdom is most noted, however, are not those of agriculture, but those of its mines and manufactures. As a manufacturing country it takes the lead among all the countries of the world, and this position it owes in a great measure to its wealth in the useful minerals coal and iron, and the ease with which they can be worked. As the supremacy of British commerce over that of all other countries in the world depends so largely on this wealth, the nature of the advantage which the United Kingdom enjoys over other countries will be more fully explained in a subsequent paragraph (p. 197) under the head of Foreign Commerce. Here it is enough to say that the British production of **coal** is the largest in the world. Its total amount is still rising every year, and is now about ninety times as great as that of India. The important coalfields are, however, confined to Great Britain, the production of Ireland being very trifling. Till quite recently the British production of **iron** was also ahead of that of all other countries, but it has at last been surpassed by the production of the United States. The iron produced by smelting in Great Britain, however, is not all produced from British ore. More than one-fifth of the ore used is brought from abroad. The principal deposits of iron ore in the United Kingdom are, like those of coal, in Great Britain. Among other important mineral products of the country (apart from stone and slate) are **salt**, which is most largely produced in Cheshire, not far from the port of Liverpool, whence large quantities are exported to India and elsewhere; ores of **tin**, **copper**, **zinc**, and other metals, the first two principally produced in the south-west of England; and oil-shale, from which kerosine is made, produced chiefly in Scotland near the Firth of Forth.

Manufactures.—It is unnecessary to mention these separately here, as the most important are also among the leading exports of the country (p. 199). The principal manufacturing towns are on or near the great coalfields. Hence there are few in Ireland, where only one branch of textile manufacture flourishes in a high degree, **namely, the making** of linen. This industry is

largely carried on at or near the seaport of Belfast, where coal can easily be obtained from Great Britain, and near which the linen (flax) fibre is grown.

Foreign Commerce.—The foreign commerce of the United Kingdom is much greater in value than that of any other country in the world, and greater also per head than that of most other countries in which there is a dense population. As to its amount, the following figures may be compared with the corresponding figures under India (p. 123). Here the average value of the year of the imports and exports (including re-exports of imported articles) is given in millions and decimals of a million pounds sterling (£).

		1871-75.	1876-80	1881-85.	1886-90.
Imports	. .	360*2	382.5	399.9	389.6
Exports	. .	2977	258.0	295 3	298 5

The enormous extent of the foreign commerce of the United Kingdom shows that that country must have peculiar advantages in relation to commerce. The most important of these are stated in the following paragraphs.

Money.—The standard coin of the British Isles is the sovereign or pound sterling, which is a gold coin weighing 123.274 grains, 916 $\frac{2}{3}$ parts in 1,000 being pure gold. It is divided into 20 shillings, and each shilling into 12 pence. The same money is used in Australia and the Cape Colony.

Advantages of the British Isles in relation to Foreign Commerce.

(A.) Physical or natural advantages.

(1.) A climate conducive to energy on the part of the inhabitants. See above p. 192.

(2.) The abundance of coal and iron and some other raw materials. With regard to the wealth of the country in coal and iron, it should be noted that the advantage arises not only from the abundance of these minerals, but also from the fact that important supplies of both are found quite close to seaports, and that the coal necessary to the smelting of the iron is at no great distance from the iron ores, often on the very spot. Some of the British ores require no limestone for smelting,¹ but when required this mineral also is abundant. These circumstances

¹ See p. 119 under Obstacle to the Development of a Great Iron Industry to India.

make this perhaps the most important of **all** the advantages of Great Britain, at least in relation to manufacturing industry.

Principal Coalfields and Deposits of Iron Ore.—The great **coalfield of Durham* and Northumberland**,¹ in the north-east of England, is bisected by the Tyne, with the seaport of Newcastle, which first carried on a great trade in coal, and is close beside Sunderland and several minor ports. The southern end of it, moreover, is near the **iron deposits of Cleveland**, on the Tees, in Yorkshire, the district which produces on an average more than a third of all the iron ore raised in the kingdom. On the other side of the country the **coalfield of Cumberland*** includes Maryport and other seaports, and lies close to the rich iron ores (**red hematite**) of south Cumberland and north Lancashire, which are among the best ores for steel-making. The great **coalfields** of the south-east of **Lancashire**¹ and the south-west of **Yorkshire**¹ and the adjoining counties to the south are in a narrow part of the country, having ready access to the ports of Hull and Grimsby on the east, as well as Liverpool on the west. The **South Wales coalfield**, extending continuously from the south-east of Carmarthenshire* to the valley of the Usk in Monmouthshire, embraces the fine natural harbour of Swansea, and is in immediate proximity to the seaports of Cardiff and Newport. This coalfield produces the best steam-coal, and the ports just mentioned are hence known in all the maritime parts of the world as the place of shipment of that coal. Great beds of ironstone here gave rise to a vast iron industry, which is still carried on with great energy, though the local ore is now worked only to a limited extent, in consequence of the facility with which ores more easily worked can be got from abroad, chiefly from Spain.² The **coalfields of North Wales**, in the counties of Flint and Denbigh, are close to the seaport of Chester, and are within easy reach of the much more important seaport of Liverpool. The seaport of **Bristol** gives name to a **coalfield** to the south of the Severn. In the midland counties, where the coalfields are farthest from the sea, the character of the surface renders communication particularly easy, and in this region canal carriage is most largely made use of. Amongst these coalfields also local deposits of iron ore are worked to a great extent. In the south-eastern half of England no workable coalfield is yet known to exist. The nearest to London, however, is within 85 miles in a direct line.

In **Scotland** the coalfields are likewise close to the sea, and likewise rich in iron. A coalfield in the Clyde basin extends below the port of Glasgow. Another in the west embraces several ports on the Ayrshire¹ coast. In the east **there** are coalfields adjacent to Leith (the port of **Edinburgh**) and other seaports on the **Firth of Forth**.

(3.) The natural facilities for establishing means of communication. There is no place in England or the south of Scotland more than 15 miles in a direct line from a railway, and no considerable town in either country that cannot be reached by railway or steamboat.

¹ Names of counties; see p. 201.

^a See pp. 246, 248 (under Bilbao).

(4.) The nearness of the coast on both sides. This advantage may be regarded, in the first place, as an additional circumstance in favour of internal communication. The value of a railway is obviously much enhanced by being connected with a seaport, and the form of the country is such that a short railway establishes such a connection with any part of the interior. There is no place in the British Isles as much as a hundred miles from a seaport

The nature of this advantage is well illustrated by the trade of some of the seaports. Though Lancashire, on the west side of the Pennine Chain,¹ is the great seat of the cotton manufactures, Hull exports nearly as great a value of cotton yarn as Liverpool. The woollen manufactures, again, are mainly carried on to the east of the Pennine Chain, but the woven fabrics are much more largely exported from Liverpool than from any other port, though woollen yarns are exported thence only to a limited extent.

(5.) The **abundance of seaports** is what enables the advantage just illustrated to be utilised, but is also of importance in the extent of the accommodation it provides for shipping.

No doubt such accommodation can sometimes be provided artificially, as in most cases it needs to be improved artificially, but there is an enormous advantage in respect of cost where facilities are furnished by nature at a great many different points. In the British Isles there are more than twenty seaports with a depth of at least 25 feet at high water, and most of these are situated in the vicinity of the great seats of production. In view of the increasing size of the shipping of the present day, this large number of deep harbours is a matter of peculiar importance.

(6.) The **geographical position** of the British Isles. These islands lie nearly in the middle of the land surface of the globe, or, what is of more consequence, occupy a somewhat **central position among the nations that carry on a great commerce at the present day**. It was of no importance to England that America lay on the west, until America began to rear a population more or less dependent on foreign commerce.

The effects of this central position with respect to the distribution of home products and manufactures will be understood readily enough from the illustration already given of the advantage of having seaports on different sides. Another important effect is well illustrated by the fact that on an average about one-fifth of the total value of the British exports

¹ The principal range of hills in England. See p. 206.

represents articles that have been collected from various parts of the globe, to be as widely distributed again in other parts. Among the product! of the British East Indies (including Ceylon and the Straits Settlements) that contribute most largely to this trade are raw cotton, tea, coffee, hides, jute, indigo, and other dyes and tanning stuffs, cinchona bark, oil-seeds, spices (cinnamon and pepper), lac, tin. But by far the most important article in this branch of trade is wool, which is principally derived from the British colonies in Australasia and South Africa.

(B.) Advantages due wholly or partly to historical causes.

(1.) The fact that nearly all the great mechanical inventions by which modern industry has been revolutionised (the steam-engine and the locomotive, machinery for spinning and weaving, &c), originated in Great Britain.

(2.) The abundance of capital.

(3.) The skill, endurance, and energy of the British workman; compared with most of his rivals.

(4.) The magnitude of British shipping.

This advantage is intimately connected with some of those which have been mentioned under the head of physical or natural advantages. The number of British seaports affords an exceptional amount of accommodation for shipping. What is of still more importance, now that iron and steel have come to be the chief materials used in the construction of ships, the British Isles have special facilities for shipbuilding. Another advantage is less obvious. British coal being of excellent quality, and conveniently situated for export, the United Kingdom is the greatest coal-exporting country in the world. Now, in proportion to its value, coal is a very bulky article, and demands for its carriage a large amount of tonnage. In recent years coal alone has required more than two-fifths of the tonnage of vessels cleared with cargoes from British seaports. The ships that are thus sure of a cargo outwards are able to carry cargo homewards all the more cheaply, which is a great advantage to British shipping over that of other countries.

Exports and Imports.—In recent years cotton manufactures, exclusive of yarn, have made up about one-fourth of the whole value of British **exports**, and the **products of the textile industries** in general about one-half the entire value. These are, in order, cottons and cotton yarn,¹ woollens and woollen yarn, linens and linen yarn, silks and jute manufactures, besides apparel and haberdashery. **Iron** and **steel** in all forms, together with manufactures of iron and steel, including steam-engines and machinery, **make** up not far short of one-fifth of the total

* See p. 124, n. G.

value. Among other exports of importance are **coal**, copper, and copper wares, as well as bronze and brass wares, earthenware and porcelain.

Among the **imports** the first place belongs to **cereals**. Grain and flour of all kinds (principally **wheat**) make up about 15 per cent, of the value, **raw cotton** more than 10 per cent. Cotton, wool, flax and hemp, silk, jute (the raw materials of the principal textile industries), make up together about one-fifth of the total value of the gross imports; that is, the imports without deduction of those which are re-exported. Nearly all the imported grain, however, is retained for home consumption, whereas large quantities of the raw materials mentioned are sent abroad to be consumed elsewhere. Among other imports of considerable value may be mentioned sugar, tea, coffee, timber, butter, wine, tobacco.

Almost all **countries** in the world share more or less in the commerce of the United Kingdom, but those having the largest share are the United States, British India, and the Australasian colonies, together with the adjacent countries of Europe. India, the United States, and the Australasian colonies rank first among the countries that receive British produce and manufactures, taking together one-third of the whole. Since about 1874 the share of India has, **on** the average, ranked under this head first **of all***

The principal articles imported by the United Kingdom from India are all the chief exports of India by sea except opium. Two articles derived from the British East Indies, tea and wheat, have risen very greatly in relative importance among British imports in recent years. In 1885 the amount of tea imported for home consumption from India and Ceylon was equal to less than 40 per cent, of the whole, that from China about 60 per cent. ; in 1890 the proportion from India and Ceylon was above 70 per cent, that from China accordingly less than 30 per cent. About half the wheat (including wheat flour) imported into the United Kingdom comes **from** the United States. India and Russia are now rivals for the second place in the supply of this commodity.¹ The United States supply nearly three-fourths of the raw cotton imported into the United Kingdom. Under this head India ranks second, and is closely followed by Egypt.² The principal exports **from** the United Kingdom to India are cotton manufactures, metals, and metal wares.

* See p. 288.

² See pp. 110 and 266.

Government.—The British Isles form what is called a **limited monarchy**. The head of the state is a king or queen, whose dignity is hereditary; but the power of the king or queen is limited by the fact that all laws are passed by a body called a Parliament, while they are carried out by ministers responsible to Parliament. The Queen also bears the title of Empress of India.

The parliament, which has been adopted as the model for the legislative assemblies of many of the British colonies, and even to some extent those of foreign countries, consists of two houses, one, the **House of Peers**, composed mainly of hereditary members; the other, the **House of Commons**, composed of elected members. The members of the latter house are returned partly by old divisions of the country called 'counties,'¹ or by subdivisions of counties, partly by towns which are known as *parliamentary boroughs.'

Education.—Elementary education under State supervision has made great progress in Great Britain since the passing of two Acts for its promotion in 1870 and 1872. For the higher education there are eleven **universities**, the most famous of which are, in England, those of Oxford and Cambridge, two very ancient seats of learning; in Scotland, those of Edinburgh and Glasgow; and in Ireland that of Dublin. The University of London is not a teaching university, but merely an examining board conferring degrees, like the University of Calcutta.

The British Empire.—This is composed of the British Isles and a large number of colonies and dependencies scattered over the globe.

The more important colonies have all parliaments of their own, and are completely independent, except that they acknowledge the supremacy of the English Crown, the authority of which is represented by a governor, whose signature is required for all laws passed by the colonial parliaments. {Some of the others are governed by officers appointed directly by the Crown, and are hence known as **Crown Colonies**. In other cases, the members of the government and legislature are partly nominated, partly elected, and these colonies are said to have representative government. British India is a dependency of the Crown with a peculiar form of

¹ Counties are also known as * shires,' and the term * **shire**' is frequently written at the end of the county name. In some cases the name of the county is somewhat modified when 'shire' is added. Thus we say either 'the county of Lancaster' or 'Lancashire,' 'the county of Chester' or 'Cheshire.'

government. The following table contains the names of the principal parts of the British Empire, with other particulars regarding them :—

Name.	Area in Thousands of Sq. Miles	Ratio to Gt. Britain	Population in Millions (1881 ¹)	Date of Acquisition
British Isles	122	...	35	...
British India				
Under direct British rule	944	9½	200	1625-1886
Native States	640	7	55	
Ceylon	25	¼	2·76	1796
North Borneo (protectorate)	90	1	0·53	1881-88
Cape Colony and its Depend- encies in South Africa	233	2½	1·2	1806-84
Natal	21	⅙	0·4	1843
South African Protectorate, &c	160	1½		1871-85
Dominion of Canada	3,470	39	4·3	1623-1760
Newfoundland	44	½	0·18	1583
West Indies and Bermudas	13	⅙	1·2	1605-1803
British Guiana	85	1	0·25	1803
Australasia	3,160	35	2·74	1769

Among the minor possessions of the British Crown or territories now occupied by the British are : in Europe, the two small islands of Malta and Gozo, and the rock of Gibraltar ; in Asia, the Straits Settlements on the Malay Peninsula, Hong-Kong in China, Aden (with the island of Perim) in the south-west of Arabia, Labuan off the north-west of Borneo, Cyprus (under British administration since 1878), in Africa, various districts on the west coast (see p. 268), besides Mauritius and other islands (see p. 275); in America, British Honduras (acquired in 1670), and the Falkland Islands, including South Georgia; in Australasia and Polynesia, a portion of New Guinea (see p. 315), the Fiji Islands, and various other small islands. At present Egypt is practically under British control, and vast territories in west, south, and east Africa are now recognised as belonging to the "sphere of British influence " (see pp. 268, 274, 272). Even excluding these territories, the total area of the British Empire, the largest in the world, is above eight millions of square miles, and the population upwards of 330 millions.

GREAT BRITAIN.

Great Divisions.—Great Britain is divided, on historical grounds, into the two ancient kingdoms of **England** and **Scotland** and the so-called principality of **Wales**.² The last-mentioned

¹ See also table on the last page of the book.

² *Wales and Welsh* are not names originally used by the people of Wales *Welsh* is the name applied by those who speak a German language to those who do not, and properly means simply *foreign*.

region consists of a hilly and even mountainous tract of country in the west, between the Bristol Channel and the estuary of the Dee, and owes its separate name to the fact that here the ancient British or Keltic inhabitants of the country remained longest unsubdued by the Germanic peoples (Angles, Saxons, and other tribes) who founded the kingdom of England. The people were finally conquered by the English about seven hundred years ago, and their country was completely united to England, but many of the inhabitants still speak a Keltic dialect known as Welsh. Since the conquest the eldest son of the king or queen of England has always borne the title of Prince of Wales.

England with Wales makes up two-thirds of Great Britain. The remainder belongs to **Scotland**, which was a separate kingdom until, in 1603, the king of Scotland succeeded by descent to the crown of England. Even then the union of the two countries consisted only in their having the same sovereign. Their parliaments remained separate for more than a hundred years later, and even yet Scotland has its own law, with its own courts to administer the law.

Boundary between England and Scotland.—The boundary is formed on the east for about sixteen miles by the **Tweed**, which is for the most part a Scotch * river. It then passes along the crest of the range of grassy hills called the **Cheviot Hills**, to the lowlands at the head of the estuary of the **Solway**, where the surface was formerly occupied by morasses.

Such bills and morasses formed in remote times a natural boundary between two countries, the chief part of whose population has always been settled at some distance from this boundary. In Scotland the bulk of the inhabitants have always occupied the lowland area extending between the great estuaries of the Forth and Clyde, and stretching to the north-east and south-west of these estuaries. In England, again, the nearest districts with a tolerably dense population are the fertile valleys of the Eden and the Tyne, that of the Eden in the west, with Carlisle in its centre, that of the Tyne in the east. Hence it is not surprising that in former days, when communications were bad, a separate kingdom should have had its centre in the northern lowlands.

Islands.—It is to Scotland that by far the greater number of the small islands of Great Britain belong, these lying chiefly on

¹ *Scotch* and *Scottish* are two forms of the adjective, meaning "belonging to Scotland."

the west. Many of them are separated only by narrow channels, here called "sounds,"¹ from the mainland, and these are known as the **Inner Hebrides**. Among these is the small island of Staffa, noted for its caves, of which the most remarkable is **Fingars Cave**, with its flat-sided basaltic columns.² Farther out lies a long string of islands called the **Outer Hebrides**, a group in which the surface is mainly low, the soil boggy and unfruitful, the climate damp and foggy, and in which accordingly the scanty population depends largely on fishing. To the north of Scotland, beyond the stormy channel known as the **Pentland Firth**, are situated the **Orkney** and **Shetland Islands**, in which also fishing is one of the mainstays of the people.

To the southern part of Great Britain there belong only three smaller islands of importance. One of these is the **Isle of Wight**, which is separated from the south coast of England only by two narrow channels, an island noted for its quiet beauty and its mild climate. Another, the Isle of **Anglesey**,³ forms one of the counties of Wales, from the mainland of which it is divided by the **Menai Strait**, which is narrow enough to be crossed by two bridges. The third is the **Isle of Man**, which lies in the Irish Sea, almost equally distant from England, Scotland, and Ireland.

Surface.—The surface of Great Britain is very varied. The most mountainous part is the north-west of Scotland, which is hence known as the **Highlands of Scotland**, a region filled with hills, mountains, and valleys, running in various directions. It is divided into two portions by a depression known as **Glen More**,⁴ or the Great Glen, running from Loch⁵ Linnhe in the south-west to the Moray Firth in the north-east, and partly occupied by lakes connected with each other and with the sea by a ship-canal, which is not, however, much used. Near the south-western end of this depression is situated **Ben Nevis**, 4,400 feet high—about 100 feet less than the hill station of Mahabaleshwar, in the Presidency of Bombay. The group of mountains to which it

¹ A Scandinavian name, Scandinavians having made many settlements in these parts of Scotland.

² See Appendix, par. 72.

³ Also a Scandinavian name, meaning *Isle of the Angles*.

⁴ *More* means *great* in Gaelic, a dialect of Keltic still spoken to some extent in the highlands and islands of Scotland.

⁵ A Scotch name meaning either a lake or a long inlet from the sea. The Irish "lough" (p. 214) is merely another spelling of the ~~same~~ word.



FIG. 23.—FINGAL'S CAVE.

belongs is known as the **Grampians**, a group far too irregular to be properly spoken of as a mountain range. Many of the valleys in the highlands of Scotland are occupied by beautiful lakes. Of these the most celebrated are **Loch Lomond** and **Loch Katrine**, which have been made by the novels and poems of Sir Walter Scott familiar in the mouth as household words wherever the English language is spoken.

The boundary of the highlands of Scotland, and the limit of the Grampians, is a line stretching from south-west to north-east from the mouth of the estuary of the Clyde to a point near the middle of the east coast of Scotland, but lowlands also occupy the peninsulas which jut out in the east, as well as the shores of the **Moray Firth**, the great opening that lies between these peninsulas.

As stated already in describing the boundary between England and Scotland (p. 203), hilly country extends southwards as far as the valleys of the Eden and the Tyne. To the south of these valleys hilly country is again met with. A range of moorlands and hilly sheep pastures known as the **Pennine Ohain** stretches southwards into the heart of England, but though it separates fertile plains in the east and west, it is sufficiently low to be easily crossed, not only by railways but even by canals, so that it is possible for barges to be towed along navigable rivers and canals from the estuary of the Mersey in the west to that of the Humber in the east. West of the northern part of the Pennine Chain is a group of hills with valleys occupied by beautiful lakes, forming what is known as the **Lake District** of England, a great resort of poets, artists, and tourists. Here lie **Keswick Lake**, or Derwent Water, and **Lake Windermere**.

The **south western peninsula of England**, which runs out to **Lizard Point** in the extreme south, and **Land's End** in the extreme south-west, two bold rocky headlands, is mainly composed of low hills, moorlands, and pasture lands, and derives its chief wealth from its mines of tin, lead, and other metals, for which it has been celebrated from ancient times.

The **south-east of England** as a whole is a region of plains and gently undulating lowlands, and, as already intimated, contains most of the best agricultural land of the country. In the neighbourhood of the Wash, the region known as the **Fen Country**, the

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surface is so low and flat that it requires to be protected in some places against the sea, and has been made capable of cultivation only by the most careful drainage. The canals and sluggish streams of this part of the country are more apt to be frozen in winter than more rapid streams elsewhere, and all the more so because this district lies farther than any other from the favourable influence of westerly winds.¹ The scene in the cut on the previous page, which shows people skating or sliding over the ice on a kind of iron or steel runners, is a characteristic winter scene in this part of the country.

Rivers.—All the chief rivers of the country except the Severn belong to the south-east of England. The Thames, the longest and most important of all, rises within a few miles of the estuary of the Severn, and flowing eastwards, enters the German Ocean by a magnificent estuary, which can be ascended as far as the London docks by the largest vessels afloat. The estuary of the Humber, which is likewise well suited for ocean commerce, receives at its head the Trent, which drains the midland counties, and the Ouse, which flows southwards through the fertile vale of York. The Severn takes its rise in the heart of Wales, and sweeping round to the east, traverses some of the finest English counties, but unfortunately terminates in a shallow estuary, the navigation of which is much impeded by sandbanks.

In the north-east of England, the Tees, in the north of Yorkshire, the Wear, in Durham, and the Tyne, in Northumberland (in its lower course between Northumberland and Durham) are all short rivers, but noted for the mineral products of their basins³ and the great seaports at their mouths. On the west side of England the Mersey is utterly insignificant as a river, but its estuary, between Lancashire and Cheshire, is rendered famous all the world over by having at its mouth the port of Liverpool.

In Scotland the chief rivers, besides the Tweed,³ which is of little commercial consequence, are the Clyde, Forth, and Tay, all of which have important navigable estuaries. The Clyde flows north-west into the Firth of Clyde, the Forth eastwards into the Firth of Forth, and the Tay south-east into the Firth of Tay.

Towns in England and Wales.—(1.) Seaports and Coast Towns.—LONDON, the capital of England and of the British Empire, is situated at the

¹ See Jntrod., pars. 88 and 91-2.

² See above, p. 197.

³ See p. 203.

head of navigation for large vessels on the Thames,¹ a situation all the more important because the estuary of that river directly faces that of the Scheldt, the great continental estuary which leads up to the seaport of Antwerp. It hence early became an important seat of foreign commerce, as well as the centre of inland commerce between the north and south of England. Since the time of William the Conqueror it has been the virtual, if not always the recognised, capital of the country, and as the country grew in wealth and power, so also did London grow in size and importance. As the commerce of the country became world-wide, so also above all others became that of the port of London. In its growth it has come to embrace many surrounding cities and towns, the most important of which is the ancient city of Westminster, which lies, like the city of London proper, on the left bank of the Thames, in the county of Middlesex,* and now London in the larger sense, including all the contiguous boroughs returning members to parliament, has a **population of more than four millions**. As capital of the country, it is the seat of the supreme courts of law, the Houses of Parliament, one of the royal palaces, one of the palaces of the Archbishop of Canterbury (the head of the Church of England), of the chief public libraries and museums. As a seaport, London includes the whole of the Thames to Tilbury on the north or Essex² side of the Thames, and Gravesend on the Kent² or south side. It is the port that carries on by far the largest trade with India. From it sail the ships of the Peninsular and Oriental, the Orient, and the British India Steam Navigation companies. Greenwich, one of the parliamentary boroughs included in London, is the seat of the Royal Observatory.³ Lower down on the south side of the estuary of the Thames are important towns (Woolwich, Chatham, Sheerness) possessing arsenals and Government dockyards, as well as watering-places.

HULL, in the south of Yorkshire,² on the north side of the estuary of the Humber, nearly opposite the Continental estuaries of the Elbe (with Hamburg) and the Weser (with Bremen), the point of convergence of the railways belonging to the valleys of the Trent and Ouse and their tributaries, has a large trade with the Continent of a very general nature. **Middlesbrough**, in the north of the same county, is the chief seat of the great iron industry of the Tees.⁴ **NEWCASTLE**, at the head of sea-navigation on the Tyne, has been noted for another special product, coal, for a much longer period, and for that reason has given name to other towns elsewhere, rich in the same mineral. The coalfields round about supply domestic coal of the best quality, which is exported to many parts of the world. A constant stream of steamers laden with coal proceeds along the east coast from the Tyne for the supply of London alone.

South of London the port of **Dover**, which occupies a notch in the chalk cliffs here forming the English coast, has long been celebrated as the starting-point of the shortest passage to the mainland of Europe (the Dover-Calais route). **BRIGHTON**, farther west, has become within the last century the most celebrated of all English watering-places, the

¹ See *Introd.*, par. 112 (6).

³ See *Introd.*, par. 13,

² Names of counties.

⁴ Cleveland; see p. 107.

ease with which it can be reached from London being one chief cause of its being so largely frequented. Still farther west, nearly opposite the eastern end of the Isle of Wight, stands **PORTSMOUTH**, on a deep and spacious natural harbour with an easily defended entrance, on which account it has been one of the chief naval stations of England since the time of Henry VIII. in the sixteenth century. **Southampton**, at the head of the inlet which forms a continuation of the Channel on the north-east of the Isle of Wight, is the busiest mercantile port in this region. **Plymouth** and **Devonport** form together another arsenal and royal naval station, occupying an inlet in the south-west (between the counties of Devon and Cornwall), equally spacious and easily defended with that of Portsmouth, and much more beautiful.

On the west coast the principal seaport down to last century was **BRISTOL** (220¹), on the Lower Avon, six miles above its mouth in the Bristol Channel. Lying nearer than Liverpool to the West Indies and the American mainland, and nearer also to London, it was more favourably situated than the latter port for commerce with the west before the development of manufacturing industry increased the population in the northern counties. Being situated on a coalfield, it is itself a manufacturing town. On the opposite side of the Bristol Channel, **CARDIFF**, in south Wales, has rapidly risen into importance on account of its vicinity to a great coalfield, the coal from which is smokeless and well adapted for steamships and for smelting, so that Cardiff now exports more coal, and that of greater value per ton, than Newcastle. **Swansea**, farther west, lies on the same coalfield, and has probably the largest smelting industry in the world, ores being brought from all parts of the globe (copper ores, for instance, from South Australia) to be smelted here. The old Roman city of **Chester**² on the Dee stands on too shallow a river to be of much importance as a seaport at the present day, and now by far the most important seaport on the west coast is **LIVERPOOL** (520), on the estuary of the Mersey. This estuary is broad and deep, but its shores are low, so that docks had to be constructed in order to provide wharfs. Hence as late as the beginning of last century Liverpool was little more than a village, and not till the great cotton industry developed in the neighbourhood did it grow into the great seaport that it is—the rival of London, possessing six or seven miles of continuous docks, a sight unparalleled elsewhere. Importing grain and other food products, cotton and other raw materials of manufacture, it sends out manufactured articles to all quarters of the globe. The Anchor Line is the chief line of steamers trading from this port with India. In the north of Lancashire² stands **Barrow**, a seaport which has sprung into importance since the middle of the century, owing to the development of a great iron and steel industry, which makes use of the excellent iron ores³ found close by.

2. Inland Towns.—The chief inland towns of England are great manufacturing and commercial centres, and are almost all situated on coalfields on which different branches of industry are pursued. **MANCHESTER**

¹ The populations are those of the municipal boroughs, according to the census of 1891, ² See p. 201, n. 1. ³ Red hematite ; see p. 197.

(including Salford,¹ 700), on a small tributary-of the Mersey, has long been famous for its woven fabrics, and for about a century as the centre of the cotton manufacture, which is carried on in a largo number of towns round about. A ship canal (with locks), capable of being used by the largest vessels afloat, is now being constructed between Manchester and the estuary of the Mersey. Of the manufacturing towns surrounding Manchester the largest is **OLDHAM**, which is noted not only for its cotton manufactures, but also for the- making of machinery for cotton and woollen mills. The yarns spun in Oldham are mainly the coarser kinds ("low counts"), such as those produced in Indian mills. **BOLTON**, which lies to the west of Oldham, is the principal town engaged in the spinning of fine yarns (much finer than those for which Indian cotton is suited).



FIG. 38.—AN ENGLISH IRON-WORKING TOWN (BARROW).

Almost all the cotton-manufacturing towns belong, like Oldham and Bolton, to a coalfield on the west side of the Pennine Chain in the county called Lancashire. On the east side of that range, in the south-west of Yorkshire, is another large coalfield, the towns on which are chiefly engaged in the woollen manufacture, for which the adjacent sheep pastures at one time supplied the bulk of the material. The most important of these towns are the adjacent towns of **LEEDS** (370) and **BRADFORD** (215). Farther south, on the same coalfield, in a district yielding also iron ore and a kind of stone admirably suited for making grindstones, stands the town of **SHEFFIELD** (325), which has for these reasons long been noted for its cutlery. Steel in all shapes, and not merely cutlery, is now the

¹ Salford lies even closer to Manchester than Howrah to Calcutta,

product with which the name of Sheffield is most properly associated. Still farther to the south or south-east stands **NOTTINGHAM** (210), on the Trent, with manufactures of lace and hosiery.

Other coalfields lie in the heart of the country between the Trent and the Severn. In the south of this area lies **BIRMINGHAM** (430), the world-renowned centre of all kinds of hardware manufacture, though it is only the chief of many adjacent towns engaged in the same industries, which are fostered by the presence of abundance of iron as well as coal. In the north of the area is the district known as the **Potteries**, from the fact of its being occupied by several towns engaged in the manufacture of earthenware. For this industry the neighbourhood furnishes many suitable kinds of clay, though the finest kinds have to be sent from the south-west of England.

Among the towns that owe their celebrity to other causes than their manufacturing industries may be mentioned **Stratford-upon-Avon**, the place of birth and death of Shakspeare, on the Upper Avon, a tributary of the Severn; and **Windsor**, on the Thames, in Berkshire, about thirty miles in a direct line west of London, a favourite residence of the kings and queens of England. Opposite Windsor, on the north bank of the Thames, stands **Eton**, with a famous public school; and a few miles to the south-east of Windsor is the Royal Indian Engineering College of **Cooper's Hill**. The two ancient university towns of England both give name to counties. **Oxford** (on the Thames) is about 50 miles in a direct line west of London, **Cambridge** about the same distance to the north.

Towns in Scotland.—The only inland town of great importance in Scotland is **EDINBURGH** (260), the capital, near the shore of the Firth of Forth, a city noted for the beauty of its situation and for its great medical school. Though, strictly speaking, an inland town, it is immediately contiguous to its port, **Leith**. A few miles above Edinburgh, near the narrowest part of the Firth of Forth, a railway bridge has been constructed across that estuary. On the Clyde, on the west side of the country, stands **GLASGOW** (570, with suburbs upwards of 700), now the chief seaport in Scotland, and one of the largest manufacturing towns in the United Kingdom. The river on which it stands was formerly only a shallow stream at this point, but the discovery not only of rich coalfields, but of abundant deposits of excellent iron ores, developed manufacturing industries of various kinds to such an extent that it became worth while to deepen the river so much as to allow of the ascent of the largest trading steamers. The existence of these minerals has likewise made the Clyde the greatest seat of shipbuilding in the world since iron and steel came to be used as the chief materials for the purpose. Lower down on the south shore of the estuary of the Clyde stands the port of **Greenock**, which has a large sugar industry. **DUNDEE**, on the north side of the estuary of the Tay, here crossed by a railway bridge, is a seat of jute and linen manufactures (including sailcloth). **ABERDEEN** is an important seaport and manufacturing and university town at the mouth of the Dee. on the east coast.

IRELAND.

Size, Surface.—Ireland is an island about one-third larger than Ceylon. The greater part of the island is a low-lying plain. The mountains belonging to it are mostly collected in groups or short chains near the corners. The highest summit belongs to the Macgillicuddy Reeks, in the south-west of the island ; a range which, though short, boasts a greater renown than many a longer and loftier chain, from the fact that it overlooks the beautiful **Lakes of Killarney**, an annual resort of thousands of tourists.

So level is a large part of the surface of Ireland that the natural drainage of the country by its rivers is very imperfect. Excess of moisture ruins a large part of the soil. **Nearly a tenth of the entire surface is occupied by bog**, the western counties, which are directly exposed to the westerly rain-bearing winds, suffering most in this respect. Nevertheless there are large tracts elsewhere possessing great natural fertility.

The principal river is the **Shannon**, the longest river not only in Ireland but in the British Isles. It flows sluggishly from north to south through three considerable lakes, and finally turns westwards and enters the Atlantic Ocean.

Manufacturing industries being few, for the reason stated on p. 195, the greater part of the population is engaged in agriculture, but the state of agriculture is more backward than in any other great division of the British Isles.

Besides being divided like Great Britain into counties, Ireland has long been divided into four chief sections, called provinces. These are—**Ulster** in the north-east, **Leinster** in the south-east, **Munster** in the south-west, and **Gonnaught** in the north-west. Of these Ulster, in which a large proportion of the inhabitants are descended from English and Scottish settlers, is the part of Ireland in which agriculture and other industries are most advanced. The Irish proper are a Keltic race, and many of them still speak a Keltic dialect. Every census since that of 1841 has shown a great reduction of the population of Ireland, chiefly in consequence of emigration of the inhabitants to foreign countries and migration to Great Britain.

Chief Towns.—The capital is **DUBLIN** (280), which is situated at the mouth of the Liffey, and the head of a fine bay in the middle of the east coast. It formerly carried on various branches of manufacture, but now the only products for which it is noted are whisky and porter. **BELFAST** (275), at the head of Belfast Lough,¹ is the chief town in Ulster, the great seat of the Irish linen manufactures, the only large manufacturing town in the island, and the only one with a rapidly increasing population. Londonderry, at the head of Lough Foyle, in the north of Ireland, is a place of historical note, but the inlet on which it stands is too shallow to allow of its being reached by large vessels. **CORK**, at the head of a fine estuary on the south coast, is the third town in Ireland in respect of population, and a place of export for the produce of the surrounding district, principally butter. **Queenstown** (so named in honour of Queen Victoria), on a small island in the estuary, is noted as a place of call for ocean steamers.

THE MAINLAND OF EUROPE.

WESTERN EUROPE.

The three countries here treated of under this heading—Holland, Belgium, France (in the order from north to south)—have, in accordance with their situation,² a milder climate than countries in the same latitude farther east; but the greater extremes experienced in going from west to east are illustrated by the products of the northern districts as compared with those of England in the same latitude. The winters on the mainland are colder than in England; but, the summers being warmer, both tobacco and sugar-beet are cultivated even in Holland (though only to a small extent), whereas in England these crops are scarcely grown at all, and only by way of experiment. When both climate and surface are considered, France, the southernmost of these countries, may be said to have the greatest advantages for agriculture of all the countries in Europe. With it, as the most important of the three, we begia

1. PBANOE.—Position, Size, and Density of Populations.—France is a republic with a coast-line both in the west and south. In the north-west it is bounded by the **North Sea** and the **English Channel**, in the west by the large bay known as the **Bay of Biscay**, and in the south by the **Gulf of Lions**, a bay of the

¹ See p. 204, n. 5. ² See Introd., par. 02, and pp. 188-9.
³ See table on the **latt page** of the book, before the index.

Mediterranean. It includes also the mountainous island of Corsica lying to the south-east of the Gulf of Lions. The area of the republic is nearly twice that of the Punjab. The density of population is less than in the British Isles, but in France the population is more equally distributed.

Surface and Communications.—The greater part of the mainland of France is made up of plains, gently rolling land, or broken hilly country offering little hindrance to communication. Lofty mountains, the **Pyrenees** and the **Alps**, form the land frontier on the south and south-east. The only railway communication with Spain hitherto is round the ends of the Pyrenees, where there is a difference of gauge as a security in case of war. As yet the sole railway from France across the Alps is that which connects the valleys of the Isere and the Dora Riparia by means of the earliest of the longer Alpine tunnels, the so-called **Mont Cenis** tunnel, opened in September 1871. The **Jura** Mountains and the **Vosges**, on the eastern frontier, reach a much greater height than any British mountains, and obstruct to a considerable extent the communication with the countries beyond the frontier. No railway crosses the Vosges for a distance of seventy-five miles. The chief highlands within the French frontier are those of the so-called **Central Plateau**, which is really situated more to the south-east, the mountains on their eastern margin towering above the narrow valley of the Rhone. The surface of the plateau has an average height of from 2,500 to 3,000 feet.

Rivers.—Most of the great rivers of France flow westward from the high grounds in the east. The most important of these are the **Seine**, the **Loire** (the longest), the **Dordogne**, and the **Garonne**. The Garonne takes its rise in the Pyrenees, and flows northwards before turning to the west. Before entering the Atlantic it unites with the Dordogne to form the estuary known as the Gironde. All these rivers, and many other smaller ones on the western plains of France, are important for their navigation. The most important in this respect are those in the extreme north, where the plain is most level, and the rivers are consequently most easily connected by canals. The only other great river in France is the **Rhone**, which enters the country from the east, but finally turns south and flows on impetuously

in that direction between the highlands of the Central Plateau and the spurs of the Alps, till it empties itself by a delta into the Gulf of Lions. Its swiftness and shifting sandbanks render it of little service for navigation.

Agriculture.—Of the agricultural products, **wheat** is, as in England, the principal cereal, but to the crops of England France adds, in the warmer parts, **maize**, the **vine**, **sugar-beet**,¹ **tobacco**, **oil-seeds**, and in the Mediterranean provinces the **olive** and **mulberry** (the latter for the rearing of silkworms). The wheat production of France is the largest in the world except that of the United States. In recent years it has been estimated to form on an average nearly one-fourth of the wheat-crop of Europe. Yet it does not suffice to meet the local consumption, and wheat is imported (from India among other countries). The vine is of even more importance to France than wheat, for France is the greatest wine-producing country in the world. The region in which most of the wine is produced extends from the Mediterranean at the base of the Pyrenees, westwards to the mouth of the Garonne; but the districts that yield the most celebrated wines are scattered. The best *clarets* are derived from vineyards near the Gironde. *Champagne* wine is made from grapes grown on hills in the north-east belonging to an old province of that name.

Minerals.—The mineral wealth of France is greatly inferior to that of Great Britain, and the inferiority is most serious in the case of coal. Its total production of coal is about one-seventh of that of the United Kingdom. The **most productive coalfield** is on the northern frontier. The great bulk of the **iron ore** produced in France is obtained from the basin of the Moselle, in the extreme north-east of the country. Sea salt is obtained from salt-pans on the western Mediterranean coasts, and on those of the Bay of Biscay.

Manufactures.—In point of value the most important are woollens and silks, the former carried on chiefly in the north, the latter in the Rhone valley.

Foreign Commerce.—In recent years, wine, grain, and flour, raw wool, and raw silk have made up together about 30 per cent.

¹ A plant with a tapering fleshy root, from which most of the European sugar—about half the sugar of the world—is made.

of the value of the **imports** for local consumption ; and among other* leading imports have been timber, raw cotton, hides and skins, oil-seeds, coal, and living animals. Four articles have also made up about 30 per cent, of the value of the **exports** of native origin, namely, woollen and silk manufactures, wine, and raw and waste silk. Among others of importance are leather and leather wares, haberdashery, cheese and butter, raw wool, and cotton manufactures.

The raw wool imported into France is mainly derived from South America. Oil-seeds are a rapidly growing import from India and other tropical countries, including the French settlements in west Africa and Indo-China. The countries with which the foreign commerce of France is mainly carried on are the adjoining countries of Europe, the United Kingdom being first both in exports and imports. It receives more than a fourth in value of the whole exports. From India France receives, besides oil-seeds, large quantities of raw cotton, wheat, indigo, and jute; to India it sends chiefly silks and cotton manufactures.

Chief Towns.—The capital is **PARIS**, on the river Seine, just below the confluence of the Marne, in the centre of the northern plains. Originally built on a small island in the middle of the river (now the heart of the city), it now occupies both banks, and contains 2½ millions of inhabitants, being second to London alone among the cities of the world in point of population. Its exposed situation renders defensive works necessary, and, besides being surrounded by a strong wall, it is protected by a ring of forts extending a considerable distance into the country round. Famous all over the western world as the centre of fashion and elegance, it is in France without a rival in influence, the focus of all the best intellect and energies in the country, and the originator of all the movements by which the destiny of the people is decided. W.S.W. of Paris is **Versailles**, formerly a favourite residence of the French kings, from Louis XIV. downwards. **ROUEN**, lower down on the Seine, is the chief seat of the French cotton manufactures. Through the deepening of the river below the town, it can now be reached by **vessels** of 2,000 tons burden. The principal port in the Seine, however, and the principal port in the west of France, is **HAVRE**, or Le Havre (that is, 'the port'), at the mouth of the river, on the light bank. It was founded in the sixteenth century to take the place of older ports in the vicinity which had silted up.¹ It is now the principal seat of the French trade with America, whence it imports cotton and some other raw materials of French industry, as well as articles of food from

¹ Comp. Calcutta, p. 128, and Appendix, par. 19.

the mainland, dried codfish from the French island of Miquelon,¹ near Newfoundland, coffee, cacao, sugar, and other colonial products from the French West Indies,² &c. In exchange for these it exports the products of French industry—silks, woollens, wine, &c. It is now connected with America by two telegraph cables, both of which touch at Miquelon. Farther north on the coast are Boulogne and Calais, two seaports which carry on a large passenger traffic with England.³ Calais is a strong fortress, and was possessed by the English for upwards of 200 years (1347 to 1558). Still farther north is the important seaport of Dunkirk (as it is called by the English, spelt by the French *Dunkerque*), a place with a large and rapidly growing ocean commerce. It is becoming one of the chief places of shipping for a cluster of manufacturing towns situated on and near the northern coalfield of France. The chief of these towns is LILLE, which carries on all the chief branches of the textile industry as well as other manufactures. To the west of Havre stands Cherbourg, a fortress and naval arsenal on the north coast of a small peninsula nearly facing the English town of Portsmouth. East of Paris lie Reims and Epernay, both well known through their trade in champagne wine.

On the Loire, the principal towns are Orleans, Tours, and NANTES, all places of historical note. Nantes is a seaport, but being at present accessible only for small vessels, it is now being connected with its outport, St. Nazaire, by a ship-canal.

On the Garonne, a short distance above the head of the estuary of the Gironde, stands the ancient seaport of **BORDEAUX** (240), the *Burdigala* of the Romans, the third seaport in France, the place of export of the excellent wines (claret, &c.) for which the surrounding country is famous. This port can be reached by larger vessels than Nantes, but vessels of the largest size have to load and discharge at the outport of Pauillac, on the left bank of the Gironde. High up on the Garonne stands **TOULOUSE**, another town of ancient celebrity, and owing its continued importance to the nature of its site. It stands at the angle where the course of the Garonne changes from north-east to north-west,⁴ and is the first point on that river touched by any one travelling eastwards from the Mediterranean through the narrow opening between the foothills of the Pyrenees on the south and those of the Central Plateau on the north.⁵ Through this opening is laid a canal which joins the Garonne at Toulouse, and thus permits of navigation from the Atlantic to the Mediterranean (at Cette). It is now proposed to construct a ship-canal along the same route.

On the east side of the Gulf of Lions is the greatest and oldest of all French seaports, **MARSEILLES** (270), the ancient *Massilia*, a town which was founded by a Greek colony in the eighth century B.C., on a fine bay as near as possible to the delta of the Rhone,⁶ and speedily developed into a great seaport on account of its situation at the end of the only convenient route

¹ See p. 268.

³ See bottom of p. 209.

⁵ See Introd., 114 (6), and comp. Delhi, p. 136.

⁶ On the marshy and unhealthy delta itself there is no suitable site for a seaport.

² See p. 296.

See Introd., par. 118 (6).

connecting northern Europe with the western half of the Mediterranean. It is the headquarters of the *Messageries Maritimes** (a great steamship company), and has a growing trade through the Suez Canal with India and other eastern countries, whence it imports wheat, oil-seeds, copra,¹ coffee, pepper, sugar, and other products. Its trade in oil-seeds is greatly promoted by its large manufactures of soap, an old industry of the place, in which olive-oil obtained in the neighbourhood was first used almost solely, but for which vegetable oils and oil-seeds of many kinds are now imported from many parts of the world. Farther east is the almost impregnable fortress of Toulon, with a naval station ; and under the shelter of the spurs of the Alps are the mild health resorts of Cannes, Nice, and Mentone, and between the two latter Monaco, the capital of a nominally independent principality less than ten square miles in extent.

In the middle of the Rhone valley, on the Rhone itself just where it turns to the south, stands **LYONS** (400), which has long been the leading town in Europe for the making of silks and velvets. The raw silk is partly obtained from the surrounding districts, partly imported from Italy and eastern Asia. The town is the birthplace of Jacquard, the inventor of an ingenious loom for weaving patterns in silks and other fabrics. Lyons obtains coal from a small coalfield to the west, on which stands another important town, ST. ETIENNE, engaged in similar manufactures.

Ajaccio, on the west coast of the island of Corsica, is celebrated as the birthplace of Napoleon Bonaparte.

2. BELGIUM.—Position, Area, Density of Population, Language.—Belgium is a kingdom on the north of France with a coast on the North Sea. Its extent is little more than one-tenth of that of the Punjab, but its population is not far short of a third of the population of that province. It is the most densely peopled country in Europe, except the kingdom of Saxony.² Even in India there are no divisions of equal extent with as dense a population. Part of the people speak French, part Flemish (a Teutonic dialect).⁸

Surface and Drainage.—The surface is similar to that of France, but is nowhere so elevated as the higher parts of that country. On the whole it slopes from the south-east towards the north and west. The chief rivers enter the country from France. In the west the **Scheldt** (French *Escaut*) and its tributaries wind sluggishly through the plains. In the east the **Meuse** and its tributaries flow through deep narrow valleys cut in a low table-land. Neither of these rivers has its mouth in Belgian territory.

Products.—The **agricultural products** are the same as those

¹ Dried coco-nut. ³ See table on the last page of the book, before the index,
² See p. 190.

of the north of France. They do not include maize or the vine, olive and mulberry, but all the other crops mentioned on p. 216. are cultivated more or less. Relatively to its extent, Belgium is remarkably rich in minerals, the principal being coal, iron, and zinc. The region of mineral production may be described as occupying the Belgian tableland from the eastern frontier near Aix-la-Chapelle to about the middle of the Franco-Belgian frontier.

Manufacturing industry caused the provinces which now make up the kingdom of Belgium to be renowned throughout Europe long before British manufactures were heard of, and the existence of the wealth in coal and iron fosters such industries under the new conditions of the present century. Belgium is consequently one of the most important manufacturing countries of Europe.¹ The industries of this class pursued in the country are similar to those of England; only, among textile industries, those connected with cotton do not take so prominent a place as in the latter country.

Foreign Commerce.—Grain, wool, vegetable fibres, and raw hides make up considerably more than one-fourth of the value of the imports. Among others of importance are animals, oil-seeds, timber, metals and minerals, petroleum, coffee. Grain, coal, flax, linen, hemp, and woollen yarn, machinery, glass and glass wares, make up more than a third of the value of the exports. Among the countries with which the foreign commerce is carried on the neighbouring countries of Europe take the lead, the United Kingdom ranking second among those which receive Belgian exports, and fourth among those which furnish the imports. Its chief imports from India are the same as those of France.

Chief Towns.—The capital is BRUSSELS (400, including suburbs), near the middle of the country. Its chief seaport is ANTWERP (250, including suburbs), a strongly fortified town on the right bank of the Scheldt, a little above the head of its deep estuary, in nearly the same latitude as that of the Thames. It is the centre of an immense inland as well as oceanic navigation, and since about 1880 has risen to be one of the greatest seaports on the mainland of Europe, its shipping being exceeded only by that of Hamburg. GHENT, higher up on the Scheldt, is another seaport and ancient manufacturing town. LIEGE and its suburb Seraing, on the

¹ See p. 190, under Products.

Meuse, form together the chief seat of the iron manufactures of the country. It is ahead of all other places in Europe in the number of fire-arms which it makes. Verviers, farther east, is noted for its woollen manufactures. Mons and **Charleroi**, in the south, are the chief centres of coal-mining.

3. HOLLAND.—Position, Area, and Density of Population.—Holland is a kingdom on the north of Belgium and the east side of the North Sea. It is more than one-ninth of the size of the Punjab (rather larger accordingly than Belgium), and has a population equal to about one-fourth of that of the Punjab. The people and language¹ are called by the English **Dutch**, though this name is a corruption of that which the people of Germany apply to themselves.



FIG. 20.—WINDMILLS FOR THE DRAINING OF A POLDER AT ZAANDAM, NORTH HOLLAND.

Surface and Rivers.—In some respects Holland is one of the most remarkable countries in the world. The very name Holland refers to its chief peculiarity. This is not the name applied to the country by the people themselves. The proper name is Kingdom of the Netherlands, that is, "the low countries," the whole

ⁱ See p. 190.

of the country being flat and low-lying. But Holland means "hollow land," and is applied by the Dutch only to two of the western provinces, in which the land is really hollow, being below the level of the sea, so that the cultivated land is everywhere enclosed by high dykes or embankments to keep out the sea and the rivers that here enter the sea. The river **Rhine**, which enters the kingdom on the east from Germany, and the river **Meuse** (called by the Dutch **Maas**), which enters it from Belgium, break up in this country into several branches which communicate with one another, and the lower parts of which are confined by embankments in Holland proper. The third western province, that of **Zeeland** (or "sea-land"), farther south, has a similar character, being chiefly made up of islands below sea-level washed by branches of the estuary of the **Scheldt**. Numerous canals connect the rivers of Holland, those in the area below sea-level being led along the embankments. In no other country in Europe are the waterways, natural and artificial, of greater importance. The embanked areas, known as *polders*, have to be drained by pumping, the surplus water being emptied into the canals and rivers. Numerous windmills are used for the purpose, but these are now getting replaced more and more by steam-engines.

Products.—The soil of the polders, the richest part of the country, is naturally moist, and produces **rich pasture grasses**, so that horses and cattle are very numerous, and the cattle yield abundance of **milk**. The other crops of Holland are similar to those of Belgium and the north of France. (See p. 220.)

In manufacturing industry Holland formerly had a high reputation. The absence of minerals, however, is adverse to the carrying on of manufactures by machinery. Nevertheless, cotton, linen, and woollen spinning and weaving by modern methods are all largely pursued. Wooden ships are built with timber floated down the Rhine, but this industry is no longer so important as it once was.

Foreign Commerce.—Holland has stood in the front rank of commercial nations from the very beginning of its separate existence (about 300 years), but in examining the list of its imports for home consumption and exports of native origin, it must be borne in mind that the products of the extensive colonial possessions **of** the country (p. 258) **are** always included. In recent

years iron and iron-wares, cinchona bark, wheat, coffee, and sugar have made up about a third of the value of the imports under this head. Iron and iron-wares and cinchona bark are also entered in Dutch returns at the head of the list of exports, but butter is really the first among the exported commodities produced in the country. The Dutch East Indies rank fourth or fifth among the countries furnishing the imports.

Chief Towns.—The capital is THE HAGUE, in South Holland ; the chief seaports are AMSTERDAM (370), in North Holland, and ROTTERDAM, on the Maas, in South Holland. Amsterdam is the commercial capital of the country. Its port was formerly entered by the Zuider Zee,¹ the large but very shallow inlet in the north of the country, but since 1877 it has been made accessible for the largest merchant vessels by a canal connecting it with the North Sea. Flushing, on the estuary of the Scheldt in Zeeland, is on the mail route from England to Holland and north Germany.

Luxemburg, of which the King of Holland is grand-duke but not king, lies to the south-east of Belgium, forming part of the tableland to which the adjoining parts of Belgium and Germany belong. It produces much of the iron ore smelted in Belgium, France, and Germany. It forms part of the German Customs Union (p. 224).

CENTRAL EUROPE.

(THE GERMAN EMPIRE, SWITZERLAND, AUSTRIA).

1. THE GERMAN EMPIRE.—Area, Position, and Density of Population.—This is an empire in central Europe extending from the North Sea and the Baltic southwards to the Alps in the western half, and to the Erzgebirge² and the Sudetes range in the eastern half. Its area is nearly equal to twice that of the Punjab, and its population is nearly two and a half times that of the Punjab—on the whole, accordingly, considerably denser. Compared with its rival France, it has a slightly larger area and a much larger population.

Members of the Empire.—The empire is made up of 26 different territories, varying in size and rank, but each of which

¹ A Dutch name meaning 'south sea.'

² German, meaning, • ore mountains; * pronounced erts-ga-mYga.

has a separate government in respect of local affairs. There are four kingdoms, namely, **Prussia**, the territory of which is*equal to more than three-fifths of the whole empire, and comprises by far the greater part of the German plain; Bavaria and Wurtemberg, in the highland region in the south-west; and Saxony, lying to the north of the Erzgebirge. The remaining territories consist of grand-duchies, duchies, and principalities (each having a single hereditary ruler at its head), the three free cities of Bremen, Hamburg, and Lubeck, each with a republican form of government, and the territory of Alsace-Lorraine (or, as it is called by the Germans, Elsass-Lothringen), which was acquired from the French in 1871, and is directly under the imperial government. The Zollverein, or Customs Union, the affairs of which are now regulated by the imperial parliament, includes the grand-duchy of Luxemburg, as well as the whole territory of the empire.

Surface and Communications.—The whole of the northern and eastern region is one great plain. The south-western portion is made up of mountains and tablelands, enclosing some broad and numerous narrow valleys. The great plain of Germany is for the most part of but slight fertility, and endowed with little mineral wealth, except here and there salt. It is thus on the whole a region of low density of population. The remainder of the empire has for the most part a density of population as high as the southern angle of Madras. This higher density is due partly to the more fertile soil and more favourable climate of the sheltered valleys, partly to mineral wealth and manufacturing industry. In the south east of the western half of the empire, a region occupying fully the half of Bavaria, and composed in large part of a bleak tableland with a poor soil and without mineral wealth (except once more salt), has as sparse a population as the northern plain. The height of this tableland is about equal to that of the Indian tableland in Haidarabad (Munich, 1,700 feet).

The **mountains** of Germany are mainly on the frontier, and for the most part consist of comparatively short ranges, with breaks which have admitted of railways being pierced through them with economical advantage at no great distance from one another. Besides the **Vosges**,¹ the **Erzgebirge** present a serious

¹ See under France, p, 215,

barrier to communication, not so much on account of the distance for which the railway connection is broken, as on account of the fact that they lie between the most densely peopled parts of Saxony and Bohemia, (p. 233). The **Bohemian Forest**, on the south-west of Bohemia, has two railways across the range, in addition to the communications through the gap at its northern end between it and the Erzgebirge. The **Sudetes**, on the south-west of Silesia, are also a serious railway barrier, and several railways converge to the narrow gap (similar to the Palghat Gap¹) between the south-eastern extremity of these mountains and the Carpathians. The **Harz** Mountains in western Germany, entirely within the frontier, are still uncrossed by any railway for a distance of sixty miles. But the Alps to the south of Bavaria, in Switzerland and Austria, are the most serious of all the mountain hindrances to German commerce.

Rivers.—Except the south-east of the Bavarian tableland, which is drained by the Danube,² the whole of Germany is drained northwards or north-westwards, the principal rivers being the **Rhine**, the **Elbe**, the **Oder**, and the **Vistula**, all of which are navigable to the neighbourhood of the German frontier or beyond it. The Danube is navigable for steamers from Ratisbon, at the most northerly part of its course. The **Weser**, a shorter river between the Rhine and the Elbe, is navigable throughout. In spite of the competition of railways, the navigation on the Rhine and Elbe, and the waterways connecting the Elbe with Berlin, is still of great magnitude.

Agricultural Products.—Among these are included nearly all those of France, but the crops, such as maize and wine, requiring a warmer climate, are confined to much smaller areas, chiefly in the sheltered valleys of the south-west. The noted Taunus wines (hock, &c), are the produce of the hill-slopes looking down from the north on the valley of the Rhine to the east of the Yosges. Sugar-beet³ is a very important product.

Minerals.—In mineral produce Germany takes a very high place, ranking amongst European countries next after the United Kingdom in the total amount of production, and outstripped only by the United Kingdom and Belgium in the production relative

¹ See p. 89.

²

See pp. 186, 188.

³ See p. 216, *note*.

to area and population. Among the minerals, coal and iron, as in the other two countries named, are the first in importance. The total production of coal in the empire is considerably more than one-third of that of the United Kingdom, and if the production of lignite (an inferior kind of coal) is also taken into account, the total is equal to half that of the United Kingdom. Moreover, the German production is increasing at a more rapid rate than the British. The production of pig iron in Germany (mainly from native ore) is more than half that of the United Kingdom. Zinc, lead, copper, silver, and salt are also important mineral products of the country.

The chief coalfields are that of the Ruhr basin, on the right bank of the Rhine, in the west of Prussia, that of the Saar basin, partly in the west of Prussia and partly in Alsace-Lorraine, that of Upper Silesia, in the extreme south-east of the kingdom of Prussia, and one in the kingdom of Saxony at the base of the Erzgebirge.

Manufactures.—All branches of manufactures are vigorously carried on, principally in the neighbourhood of the western coalfields, the Saxon coal held, and in the capital of the empire (Berlin).

Foreign Commerce — In recent years grain and flour, raw wool, cotton, and silk, animals, and coffee have made up more than a third of the value of the imports; the others including hides, petroleum, tobacco, flax, yarns, &c. Woollen and silk manufactures, sugar (raw and refined), animals, iron (wrought and unwrought), and leather wares have made up more than one-fourth of the value of the exports, and among others of importance have been grain, potatoes, and other agricultural produce, cotton manufactures, coal, machinery, &c. The direct trade of Germany with India is rapidly increasing. The export trade to India is still small (the principal articles, salt and woollen goods). In 1889-90, however, the value of the Indian commodities (principally raw cotton, jute, indigo and oil-seeds) sent direct to Germany reached about 2½ crores—nearly seven times the value sent four years previously.

Chief Towns.—1. Inland Towns of the Plain.—The capital of the empire and the kingdom of Prussia is BERLIN (1,600),¹ in the province of Brandenburg.

¹ The populations are those of the census of 1890 (in round numbers).

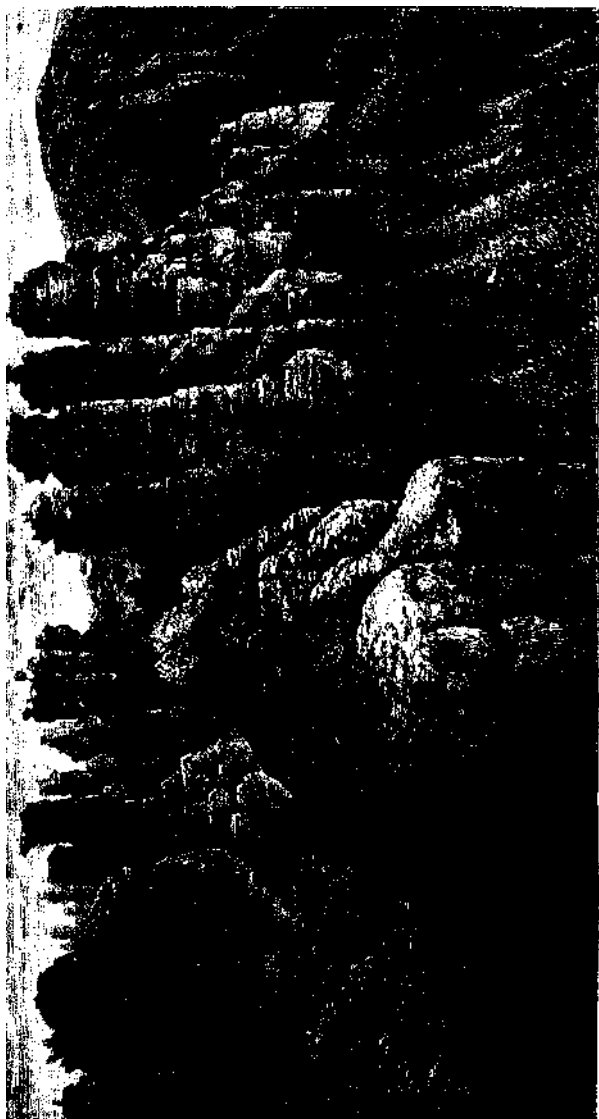


FIG. 40.—SCENE IN THE 'SAXON SWITZERLAND.'

burg, on the insignificant river Spree, which communicates with the Elbe, partly by means of artificial channels.

Situated in the midst of an unfruitful, sandy district, it owes its importance solely to the fact of its lying in the centre of the German plain, which made it a convenient spot to select as the capital of the power which acquired predominance in that plain.¹ This fact has likewise promoted the development of its trade, and manufacturing industry has naturally been added. Its most important manufacture is the making of machinery. About 20 miles to the west is the garrison town of Potsdam, with the summer palaces of the Prussian kings.

BRESLAU (335), on the Oder, the chief town in Silesia, has been for hundreds of years a great centre of trade, exchanging principally the agricultural products of eastern Europe for the manufactured articles of the west. MAGDEBURG (200), west-south-west of Berlin, occupies an important military position on the Elbe, and is the centre of the German manufacture of sugar. West-north-west of Magdeburg lies HANOVER, once the capital of a kingdom of the same name, which was at one time one of the dominions of the kings of England. In the west of Prussia, in the basin of the Rhine, are numerous manufacturing towns crowded together near the coalfield of the Ruhr. Among them may be mentioned ELBERFELD and BARMEN, with various textile manufactures, and KREFELD, which is specially noted for its silks. COLOGNE (280) is one of many famous old towns on the Rhine. AACHEN or Aix-la-Chapelle,² still farther west, in the basin of the Meuse, is noted for its woollen manufactures.

All the towns of the plain hitherto mentioned are now in the kingdom of Prussia, but there are two large towns in Saxony in this part of Germany. One of these, DRESDEN (275), the capital, is celebrated for the beauty of its situation and its art treasures. It is also noted as the centre from which one may visit the scenery of the so-called Saxon Switzerland, where the Elbe breaks through the mountains at the end of the Erzgebirge amidst fantastically-weathered sandstone rocks. The second of the cities referred to is LEIPZIG (300), in the north-west of Saxony, a city long noted for its great annual fairs, which, however, are now declining. It is also noted as the centre of the German book-trade, and since the creation of the present German Empire, it has been made the seat of the supreme courts of law.

2. Seaports.—(a.) On the North Sea.—On the Weser stands BREMEN, no longer accessible for large ships, on which account Bremerhaven, lower down, is now the actual seaport. HAMBURG (325; pop. of the entire state, 625), 60 miles from the mouth of the Elbe, is still accessible, with the aid of the flood-tide, for large sea-going vessels,³ and is the chief seaport in Germany, and indeed on the mainland of Europe. This pre-eminence it owes not only to its commerce with the eastern ports of Britain and North America, but also to the fact that the river on which it stands is navigable even as high as the industrial region of Saxony, and is connected by important waterways, natural and artificial, with Berlin.

¹ See Introdl., par. 114 (a).

²

The French name.

³ See Introdl., par. 112 (6).

Cuxhaven, a port belonging to Hamburg at the mouth of the estuary of the Elbe, is naturally of less importance to Hamburg than Bremerhaven to Biemen, though useful, especially in winter, when the Elbe at Hamburg is usually frozen for a shorter or longer period.

(b.) On the Baltic.—All the ports on this sea are closed by ice in winter, those farthest east being closed longest.¹ Lubeck, on the east side of the Prussian province of Schleswig-Holstein, was at one time, before the settlement of America gave greater importance to the seaports communicating more directly with the Atlantic, one of the leading seaports in Europe. STETTIN, at the mouth of the Oder, is the nearest seaport to Berlin. DANZIG and KONIGSBERG are the principal seaports (both Prussian) in the east of the Baltic, Danzig near the mouth of the Vistula, Konigsberg, near the mouth of a smaller river, which also communicates with the Gulf of Danzig.

3. Towns belonging to the German Highlands and intervening Valleys.—On the Main (a tributary of the Rhine), FRANKFURT, formerly a free town, but annexed in 1866 to Prussia, still one of the chief seats of banking and exchange in Germany, but chiefly celebrated as the birthplace of Goethe, the greatest of German poets. Near the left bank of the Rhine, STRASSBURG, the chief town of the imperial territory of Alsace-Lorraine, the seat of a university. In the valley of the Neckar (a tributary of the Rhine), STUTTGART, capital of the kingdom of Wurtemberg. In the middle of the southern plateau,³ MUNICH (350), capital of Bavaria, on a tributary of the Danube, the largest town in south Germany, with a university and rich art treasures. West-north-west Augsburg, on another tributary of the Danube, formerly a place of great commercial importance on account of its situation at the meeting of the roads leading across the Alps.³ Ratisbon,⁴ in the same kingdom, on the Danube,⁵ is likewise a town of great historical importance. In northern Bavaria, NURNBERG (or Nuremberg, as it is usually called in English), on a small river belonging to the Rhine basin, is one of the oldest and most celebrated manufacturing towns of Germany. Being situated at a considerable distance from any coalfield, however, its principal manufactures are not such as require the use of modern machinery to any great extent. They are mostly of a somewhat artistic nature.

2. SWITZERLAND.—Position, Area, Density of Population, Languages.—Switzerland is a republic in the heart of Europe, equal in area to about one-seventh of the Punjab, or two-thirds of Mysore, with a population of rather less than three millions. It has an average density of population about equal to that of the Punjab. Different languages are spoken, the principal being German, French, and Italian.

¹ See p. 189.

²

See p. 224.

³ See Introd., par. 114 (6), and p. 252 (under Venice).

⁴ German, *Rcgmburg*.

⁵ See p. 225 under **Rivers**, and Introd., par. US (6).

Surface.—About five-sevenths of the surface is divided between the Alps in the south and east and the Jura in the north-west, while the remainder forms a plain or rather a hill-studded plateau stretching north-east from the Lake of Geneva to the Lake of Constance. The length of the plateau, which contains most of the agricultural land and the majority of the population of Switzerland, is about 100 miles, and its average breadth from twelve to twenty miles. The Alps are pierced in Switzerland by the longest railway **tunnel** in the world—that **through the St. Gothard** (nearly ten miles long), on the railway which leads into the north of Italy.

Rivers, Lakes, and Scenery.—Since the Alps form the great water-parting of Western Europe, the **rivers** of Switzerland flow outwards in all directions—the **Rhine** to the German Ocean, the **Rhone** to the Gulf of Lions (west of Italy), tributaries of the Po and **Adige** to the Adriatic, the **Inn** to the Danube, and hence to the Black Sea. Many lakes lie in the valleys or on the surface of the plateau, the largest being those already mentioned on the frontier, which only partly belong to Switzerland. Of the others, the most celebrated perhaps is the **Lake of Lucerne**, in the heart of the country, the chief resort for the thousands of visitors who annually flock to Switzerland from all parts of Europe and North America, attracted by the beauty and grandeur of its lake and mountain scenery. On the banks of this lake rise two mountains (the **Rigi** and **Mount Pilatus**), whose summits can be reached by railway, and command magnificent views all round. The Kigi is nearly 6,000, Pilatus nearly 7,000 feet high.

Climate and Products.—The climate of the Swiss tableland allows of the same **crops** being grown as in the adjoining parts of France and Germany. The heavy rainfall promoted by the mountainous character of the country¹ nourishes excellent pastures, which make Switzerland noted for its cattle and cattle products (cheese, butter, and condensed milk). For the prosecution of its **manufacturing industries** and handicrafts, Switzerland, though possessing little coal or iron, has advantages of its own, the principal being (1.) the **abundance of water-power** afforded by the torrents of the Alps; (2.) the abundance of cheap skilled labour, to keep up the quality of which the Government

¹ See In trod., par. M.

FIG 41.—THE LAKE OF GENEVA.

has done a great deal in the way of providing for efficient technical education, and (3.) the central position of the country between other populous and highly civilised countries.

Foreign Commerce.—Silks, cottons, machine embroidery, trimmings, and watches are the manufactured articles for which Switzerland is most noted. These articles make up more than 60 per cent, of the value of the exports. Cotton manufactures of one kind or another are annually exported even to the United Kingdom to the value of between one and two crores, and to India to the value of between two and three millions of rupees. Swiss watches are sent even to China and Australia, the United States and South America. The chief imports are articles of food and the raw materials of manufacture.

Chief Towns.—The capital is **Bern**, on the river Aar, a tributary of the Rhine. **Geneva**, beautifully situated at the south-west end of the lake of the same name, is the principal French-speaking town in the country. **Zurich**, likewise beautifully situated at the end of a lake named after it, and **Basel** or Bille, on the Rhine where it turns north¹ and leaves the Swiss frontier, are the principal towns in the north; both busy manufacturing centres.

3. AUSTRIA—Position, Size, Density of Population, Constitution, Languages.—Austria lies to the south of eastern Germany, and to the east of western Germany, of Switzerland, and of Italy. It has a coast-line on the north and east of the Adriatic Sea. In area it is equal to about 2½ times the extent of the* Punjab, but it is somewhat inferior to that province in average density of population. It is, like Germany, an empire composed of numerous divisions with independent governments for local affairs, but differs from Germany in not having separate princes at the head of these divisions. It is often spoken of by the double name of Austria-Hungary, because the provinces are divided into two great groups, in one of which the old kingdom of Hungary takes the lead. Many languages are spoken, the principal being German and different dialects of Slavonic. (See p. 190.)

Surface and Drainage.—The western portion of the empire south of the river Danube is filled with the mountains and valleys of the **Alps**. In the east the **Carpathian Mountains** sweep round

in a great curve from the north to the east, sending out from the north numerous intricate branches towards the south, and from the east a similar broad network towards the west. A narrower part in the north-east connects these two extensive mountainous areas. Between the Alps and the Carpathians there is spread out a wide area of lowlands, including a large extent of flat alluvial plains like those of the Ganges. Besides the Alps and the Carpathians the principal mountains of Austria are those on the German frontier.¹ By far the greater part of the empire belongs to the basin of the **Danube**, which is navigable throughout its whole course within the Austrian dominions, and receives great navigable tributaries on the right bank from the Alps and on the left bank from the Carpathians.

Principal Divisions.—Almost the whole of the Alpine area in the west belongs to the **Tyrol**, which contains one of the most important pass-roads across the Alps. This road crosses the **Brenner pass**, connects the valley of the Adige with that of the Inn, a tributary of the Danube, and thus establishes communication between the chief towns of south Germany and those of the north-east of Italy. Before the discovery of the sea-way to India (1498)² this was one of the main routes by which the products of India reached central Europe. A railway now follows this route, passing through the Alps by the **Brenner tunnel**. In the east of the Alps the chief province is **Styria**. To the north of Styria lie the provinces of Austria proper (Upper and Lower Austria), which are traversed by the Danube, and include some of the outer spurs of the Alps on the south of that river. **Bohemia**, the most populous division of the empire, is the province in the north-west belonging to the basin of the Elbe, and bounded on three sides by mountains separating it from Germany. **Hungary** is the province that embraces nearly all the lowlands between the Alps and the Carpathians.

Products.—The principal products of the empire are agricultural, and of these Hungarian **wheat** is the most celebrated, its quality being unsurpassed. But Austria is also rich in minerals, including **coal** and **iron**, **gold** and **silver**. The principal coal-producing province is Bohemia, which is also that which contains most of the manufacturing towns of the empire. The

¹ See pp. 224-5 (Erzgebirge, Bohemian Forest, Sudetes). ² See pp. 112, 252.

principal iron-producing province is Styria. Among the manufactured articles for which Bohemia has been noted for centuries is **ornamental glass**.

Foreign Commerce.—In recent years raw cotton, grain, raw wool, coffee, and tobacco have made up nearly one-third of the value of the imports; grain (including wheat and wheat flour), sugar, and molasses, timber, animals, and woollen manufactures more than one-third of the value of the exports. In the British market Hungarian wheat appears chiefly in the form of flour, Hungarian mills producing flour of the finest quality. Raw cotton, jute, indigo, and hides are increasing imports from India.¹ The jute manufactures are growing rapidly owing to the large amount of sacking required for the export of the agricultural products.

Chief Towns.—The capital is **VIENNA** (including suburbs, 1,100), situated chiefly on the right bank of the Danube, at the base of the foothills of the Alps, and at the head of a plain on which the Danube emerges after leaving a long and comparatively narrow valley between the Alps in the south and spurs of the Bohemian Forest and other mountain ranges in the north. Vienna thus guards the entrance to this valley against all invasions across the Hungarian plains and lowlands, and is likewise an important meeting-place of trade-routes² crossing these plains, or traversing the valley that bounds the Carpathian Mountains on the north-west. Its site is thus doubly important. It is also a great manufacturing town (noted for its silks, machinery, wooden wares, &c.), and has a university specially famous for its medical school. **BUDA-PEST** (360), the capital of Hungary, has a site on both banks of the Danube, in some respect similar to that of Vienna. Where the Danube turns abruptly to the south, it has to force its way through ranges of hills trending from south-west to north-east. The part of Buda-Pest on the right or west bank of the Danube (the part to which the name Buda properly belongs), lies at the base of the lowest of these hills skirted by the river. It is also the lowest place at which the Danube can be conveniently bridged,⁴ and the lowest at which as yet any permanent bridge has been constructed. **PRAGUE**, the capital of Bohemia, is the third town in population in the empire, and it is a place even more noted in history than the Hungarian capital. It stands on the Moldau, the tributary of the Elbe which flows from north to south through the middle of the province. It is the seat of the oldest university in central Europe.

Notwithstanding the considerable length of the Austrian seaboard, there are only two important **seaports** in the empire, one at the head of each of the small gulfs on opposite sides of the small peninsula (Istria),

¹ See p. 123 (small type)

² See Introduction, pars. 114 and 115. Comp. Delhi, p. 136.

³ See p. 225.

⁴ See Introduction, par. 113 (c).

that juts southwards into the Adriatic Sea. In both of them Italian is the prevailing language. On the west side of the peninsula is TRIESTE, the chief seaport of the Austrian section of the empire, and the seat of the shipping company called the Austrian Lloyd. It is the chief place of export by sea of the manufactured articles of Austria, and the place that receives the bulk of the Indian imports of the country. On the east side of the peninsula stands Fiume, the chief seaport of the Hungarian portion of the empire, and hence the chief place of export of the wheat and other grains of Austria. There are numerous small seaports and fishing stations on the long Dalmatian coast, but none of these has as yet any railway connection with the interior, which is here separated from the coast by mountains.

EASTERN EUROPE.

(RUSSIA AND ROUMANIA.)

1. RUSSIA.—Position, Size, Density of Population.—European Russia occupies the whole of eastern Europe between the Arctic Ocean and the Black Sea, comprising more than half the area of the whole continent. Its area is upwards of two millions of square miles, or fully a half more than the area of India (excluding Burma), but its population is not much more than a third of that of India. The average density of population is thus comparatively small. Even when we leave out of account large areas in the north and the south-east, which are almost without inhabitants, and consider the population as distributed over the remaining area, the average density is still under 100 to the square mile. Except, indeed, in the west and about the middle of the country, there are no parts of Russia where the density of population reaches that of the Indian tableland.

Government.—The head of the state is the Czar or emperor, who, in the greater part of his dominions, is an absolute ruler. In **Finland**, however, a division included in the area above mentioned, situated in the north-west of Russia proper, there is a parliament or legislative assembly elected by the people. The provinces forming what is known as Russian **Poland** (situated in the part of Russia extending farthest west) are under a separate administration, but in this part the Czar is absolute ruler, as in Russia proper. The part so called is only a small portion of the

former kingdom of Poland, other parts of which are incorporated with Russia proper, Prussia, and Austria. *

Outline (Seas and Gulfs).—In the north the shallow **White Sea** communicates with the Arctic Ocean, and in the south the still shallower **Sea of Azof** with the Black Sea. The western coasts all line the Baltic and its branches (**Gulfs of Bothnia, Finland, and Kiga**), and in some places are bordered by a breastwork of small islands. On the south-east there is the inland **Caspian Sea**.¹ Almost everywhere the coasts are low and flat.²

Surface—The only great mountain range is that of the **Urals**, which extend for about 1,400 miles from north to south in the east, and these, though they rise in some places to upwards of 4,000 feet in height, slope up with such gentle undulations from the European plain, that their mountainous character cannot always be recognised. Hence in this part the Ural Mountains do not form a political boundary, European Russia extending 200 miles beyond them. West of the Ural Mountains Russia may be regarded as one vast plain, though the highest part of it rises to 1,100 feet above sea-level. This elevation is reached in the central plateau of the **Valdai Hills**, from which the principal rivers of Russia radiate,³ and from which the descent is so gradual that it is impossible to fix a boundary between plain and plateau.

Rivers.—The chief rivers are the **Volga**, entering the Caspian Sea; the **Don**, entering the Sea of Azof; the **Dnieper**, entering the Black Sea; the **Western Dvina** (or Dwina⁴), entering the Gulf of Finland, and the **Northern Dvina** (or Dwina⁴), entering the White Sea. All these rivers and their chief tributaries are navigable nearly to their source, but the navigation of the Dnieper is greatly impeded by rapids in that part of its course where it flows from north to south after making a great bend to the east. On all the rivers the navigation is stopped by ice in winter, on some of them for more than 100 days on an average.

Climate, Forests, and Agriculture.—Russia lies in that part

¹ See p. 61.

² The large uninhabited Arctic islands of Novaya Zeralya or Nova Zenibla ("New Land") and the Spitzbergen group are considered part of European Russia.

³ See p. 188 (b).

⁴ *Dvina* is the spelling that indicates the pronunciation. *Dvjwix* is originally a German spelling.

of Europe where the extremes of temperature are greatest, and the* rain fall on the whole least.¹ About half the entire area, in the north-east, east, and south-east, has a total rainfall for the year of less than 20 inches, a considerable area in the south-east one of less than 16 inches.² Liability to drought make** the amount of the harvest extremely variable. In 1887, for example, the yield of the corn-crops was more than a third greater than in 1885. Snow covers the ground for months every year, but not for so long a period as in Siberia,³ and not so long in the south as in the north.

In the northern half of Russia, **tundras** and **forests** occupy a large part of the surface, as in Siberia;⁸ in the south-east **steppes**, so arid in climate as to be habitable only by nomadic tribes.. The extent of arable land is thus so reduced as to form less than one-third of the entire area. Most of the corn-crops of Russia proper (exclusive of Poland) are grown in the region of **black earth**, a soil of unsurpassed fertility which is spread over southern Russia in larger or smaller patches from the frontier on the south-west to the Volga. Of the grain-crops of Russia the most important is rye, which is produced to an amount about four times as great as wheat, and the second of the corn-crops in importance is **oats**. **Flax** and **hemp** are important crops in the Baltic provinces and Poland, sugar-beet⁴ in the south-west.

Minerals.—Though agriculture and forestry form the basis of by far the greater part of the export trade of Russia, the mineral wealth of the country is enormous, and its mining and manufacturing industries are rapidly extending. Coal and iron are both abundant. **Coal** is mined in different parts of the country, but the largest coalfield, and that of which the production is increasing most rapidly, lies just to the north of the Sea of Azof. The total production of coal in Russia in the year is more than twice that of India.⁶ Iron ores, gold, platinum, and copper are obtained in the Ural Mountains, iron ores also in other parts of the country.

Foreign Commerce.—Raw cotton, tea, raw wool, and iron and steel have made up in recent **years** more than 40 per cent, of the value of the imports. The principal grain crops of the country

¹ See In trod , pai. 92. ² Comp. India, p. 07, and England, p. 192.
³ See p. 64. ⁴ See p. 210. ⁵ See p. 118.

have usually furnished at least half the value of the exports, and these along with flax and linseed, wood, hemp, and raw wool have furnished about three-fourths of the total value. Germany and the United Kingdom take together fully 60 per cent, of the exports, and furnish about the same proportion of the imports. Little of the raw cotton¹ and hardly any of the tea is imported directly from India. Nearly all the tea consumed in Russia is Chinese.

Competition of Russian and Indian Products in the British Market.—The principal commodity in which such competition exists is **wheat**. The exported wheat of Russia is mostly the product of the black-soil region, and is hence despatched chiefly from southern ports. The export varies greatly in amount. In the ten years 1881-90, the first year of which period was the first in which Indian competition was seriously felt, the import of wheat into the United Kingdom from Russia was in one year almost as low as 200,000 tons, and in two years rose to upwards of 1,000,000 tons. The import from India, in that period, on the other hand, was never below 350,000 or much above 600,000 tons. In the first half of the period the average amount imported from India was greater than from Russia, in the second half greater from Russia than from India. The greater amount of variation in the Russian export is partly due to the variability of climate above mentioned, but cannot wholly be explained in that way. In India also there are great variations in the amount of rainfall, but in India these variations are in a great measure counterbalanced by facilities for irrigation, which is little practised in Russia. Moreover, the food-crops of Russia are much less varied than those of India, and are all the produce of one harvest, so that Russia has a much more limited stock to fall back on when the yield of any cereal is deficient. Russia is, in fact, obliged to retain wheat for its own consumption when there is a partial failure of rye. The Indian competition in recent years has compelled Russia to make greater efforts to improve its agriculture and provide increased facilities for exporting the surplus produce. Agricultural implements are being largely imported by the Russian peasantry, and railways are being increased in the agricultural region. **Linseed** is the only

¹ See p. 67, *note*.

other important commodity in which Russia competes with India in the British market, and in this article India is far ahead of Russia The British import of linseed from Russia is usually less than half (sometimes only a tenth) of that from India.

Chief Towns.—(1.) Seaports—The capital is **ST. PETERSBURG** (900), on the river Neva, at the head of the Gulf of Finland, founded by the emperor Peter the Great in 1703. The head of the Gulf of Finland being very shallow, St. Petersburg was incapable of being reached by large ships till 1885, when a ship-canal from the port to the deep water of the gulf was opened. Previously, **Kronstadt**, an impregnable fortress on a small island in front of St. Petersburg, and the principal naval station of Russia, was also the port of St. Petersburg for large vessels. **RIGA**, near the mouth of the Western Dvina, on a gulf named from it, is another important seaport, exporting, among other products of the surrounding districts, large quantities of flax and linseed.

The chief seaports on the Black Sea are **ODESSA** (250), between the mouths of the Dniester and the Bug; **Nicolaief**, on the Bug, near its mouth, and **Kherson**, on the Dnieper, near its mouth. They all have a large export trade in wheat and other cereals, that of Odessa, which is the seat of the Russian Steam Navigation Company, being the largest in Russia. **Taganrog**, near the head of the Sea of Azof, can be reached only by small vessels. **Astrakhan**, on the delta of the Volga, is the principal seaport of the Caspian, the place where the raw cotton and other products of Russian Central Asia, and northern Persia,¹ and the petroleum of Baku,² are received for distribution in Russia, and the place where Russian manufactured goods and other products are shipped for the same regions. It is also the centre of the sturgeon³ and other fisheries of the Caspian and the lower Volga. **Archangel**, at the mouth of the Northern Dvina, is the principal port on the White Sea.

(2.) Inland Towns.—The largest is **MOSCOW** (750), the capital of Russia before the foundation of St. Petersburg, and still the chief seat of its manufacturing industry, situated in the heart of the country, on a river belonging to the basin of the Volga. Seen from a short distance, it has a very picturesque appearance, on account of its numerous gilded domes and pinnacles, in particular those of the Kremlin, its old citadel, a walled enclosure full of churches and palaces. **Nizhnei-Novgorod**, to the east of Moscow, at the confluence of the Volga and Oka, is noted for its great annual fairs, at which the products of Asia and Europe are exchanged. **WARSAW** (450), on the Vistula, in the middle of Poland, was the capital of that old kingdom. **KIEF**, on the Dnieper, and **KHARKOF**, midway between the Dnieper and the Don, are the principal towns in the black soil region. East of the Urals, **Ekaterinburg**, an important mining town, stands on the railway across the Ural Mountains.⁴

¹ See p. 67, n. 1.

² See p. 69

³ Sturgeon is the fish from which *caviare*, a favourite condiment, and the best *isinglass* are prepared. **Caviare** is made from the roe of the fish, *isinglass* from the swim-bladder.

* See p. 64.

2. ROUMANIA¹—Position, Size, and Density of Population.—Roumania is a kingdom on the south-west of Russia, mainly between the rivers Danube and Pruth and the Carpathian Mountains, but including also a marshy tract known as the **Dobraja**, which lies between the Danube and the Black Sea, and embraces the delta of the Danube. The part to the north of the Danube corresponds to the old principalities of Moldavia and Wallachia. In extent and population it corresponds very closely with the Indian province of Assam.

Surface, Products, and Foreign Commerce.—The surface of the kingdom is for the most part a continuation of the Russian plain. Its principal products are maize, wheat, and other grains, and maize and wheat make up nearly 60 per cent, of the exports. In the British market it ranks next after the United States in the supply of maize.

Chief Towns.—The capital is **BUKAREST** (220), to the north of the Danube; the chief ports, Galatz and Braila, or Ibraila, on the Danube, about the place where it turns eastwards.

NORTHERN EUROPE.

(NORWAY, SWEDEN, AND DENMARK.)

These three kingdoms have been closely associated in history, and are mainly inhabited by people speaking languages closely allied to one another, and forming the Scandinavian branch of the Teutonic family of languages.² The northern half of both Norway and Sweden is chiefly inhabited in the interior by a separate race, known as the **Lapps** or Finns, who number at most 50,000 (probably much less). Some of these live by fishing (**Sea Lapps**), while others (the **Reindeer Lapps**) travel about with herds of reindeer, which feed on the mosses that cover the plateau, and which supply them with food, drink, and clothing, and in winter drag their sledges³ with great swiftness across the snow.

* The native spelling of the name of the country is *Romania*. See p. 190.

a See p. 190.

» See cut, p. 66.

1. THE SCANDINAVIAN PENINSULA¹ (Norway and Sweden).—The two large but very scantily peopled kingdoms occupying the Scandinavian peninsula are both subject to one king, but are otherwise independent. The peninsula is mainly composed of a tableland almost baro of vegetation. Norway occupies the western half of the peninsula, and its habitable portion consists principally of narrow valleys opening in the west into long inlets bordered by a long string of small islands.



FIG. 12. AN ENCAMPMENT OF LAPPS WITH REINDEER.

Less than one-twentieth of the surface is capable of cultivation. Sweden has a larger area of lowlands, and has nearly an eighth of its surface capable of cultivation. **Forests**, composed chiefly of pines and firs like those of the Himalayas, cover a large area

¹ As to climate, see p. 180 ; for the names of the lakes of Sweden, see p. 188,

in both countries, and in both furnish the chief export. The numerous deep and sheltered inlets of Norway being favourable to shipping, and the forests supplying abundance of shipbuilding material, that country has a larger tonnage of wooden ships than any other in Europe, not even excepting the United Kingdom. The **fisheries** on the coast of Norway are also the most extensive in Europe, the most famous being the cod-fisheries round the **Lofoden Isles** in the north. Next to timber the fisheries furnish the principal exports of Norway. Sweden, on the other hand, is rich in minerals, above all in iron ore. Great quantities of wood charcoal¹ are made for the smelting of this ore, and iron and steel of the finest quality are thus produced, so that iron and steel, and articles made of iron and steel, rank next after timber in value among the exports of Sweden. In both countries the wood derived from the forests is largely used in making matches, which are exported even to the east of Asia.

Chief Towns.—(1.) Sweden.—The capital of Sweden is **STOCKHOLM** (205), beautifully situated on the east coast, at the lower end of Lake Malar. To the north lies Upsala, with a university, where the famous naturalist Linnseus was professor. Gothenburg (Swedish, *Goteborg*) is a manufacturing town, and the chief seaport on the west coast (the Kattegat).

(2.) Norway —The capital is Christiania, at the head of the large inlet to the south of the peninsula. The principal ports on the west coast are Trondhjem,² the old capital of the country, and **Bergen**. They are both great fishing centres.

2. DENMARK.—Exclusive of its distant dependencies in Europe (see below), Denmark is a small kingdom composed of the peninsula of **Jutland**, between the channels of the **Skager Rak** and **Kattegat**, and a number of islands in the Baltic, the principal of which are **Seeland**, between the channels called the Sound and *the Great Belt, and **Fyen**³ between the Great Belt and the Little Belt. In size it is about one-eighth of the Punjab, its average density of population about equal to that of Haidarabad.

Denmark is essentially an **agricultural country**, and above all devoted to the rearing of live-stock (cattle, sheep, and horses).

¹ See p. 119 (large type).

² Pronounced *Trori-yem*. The town is sometimes called in English books Droutheim.

³ Sometimes called Funen, which is a corruption of the German name of the island. *Fyen* means "tine."

Butter is now the leading export. The principal imports are manufactured articles, coal, timber, coffee, sugar, and tobacco.

Chief Town.—The capital and only large town is COPENHAGEN (240), on the island of Seeland and the Sound, which is the shortest route between the Baltic and the Kattegat.

The Faroe Islands, north-west of Scotland, are dependencies of Denmark, and so also is the larger island of **Iceland**. The inhabitants of both maintain themselves chiefly by sheep-rearing, fishing, and the collecting of eggs and eider-down.¹ The inhabitants of Iceland are only 70,000 in number, or about 1J to the square mile. The chief seaport of the island is Beikjavik, on the southern part of the west coast. The island is noted for its active volcanoes (Hecla, &c), geysers,² and hot springs.

THE MEDITERRANEAN PENINSULAS.

1. **THE IBERIAN PENINSULA (SPAIN AND PORTUGAL).**—Position, Size, Density of Population.—This peninsula, situated between the Atlantic Ocean and the Mediterranean Sea and separated from France by the Pyrenees, has an area equal to twice that of the Punjab, a population about one-fifth greater than that of the Punjab, on the whole, accordingly, much less dense.

Divisions.—The peninsula is divided between two kingdoms, Spain and Portugal. Portugal comprises the western provinces, except in the north-west. The remainder, embracing nearly six-sevenths of the entire peninsula, together with the Balearic Islands to the east, forms the kingdom of Spain. The name of Iberian Peninsula is not an official name, but is given to the region from the name of a people, the Iberi, who inhabited a great part of the peninsula in ancient times.

Surface **and** Drainage.—Taken as a whole, the peninsula presents some remarkable resemblances to southern India in surface features, and even in climate and products. It is composed for the most part of a tableland, but rather more uniform in

¹ The small soft feathers of sea-birds, used for stuffing cushions, &c.

² See *Intro.*, par. 57.

elevation and rather higher than that of India. Its average height is about 2,500 feet above sea-level. It is bounde/1 and crossed by mountain ranges and traversed by rivers, most of which flow, as in southern India, through deep narrow valleys. All the principal mountain-ranges, however, trend more or less from west to east, and most of the chief rivers flow to the west—two important points of difference from the Indian tableland. The mountains that have most resemblance to the Western Ghats (bounding the tableland on one side and rising with a steep slope close from the sea-coast), are those on the north of the peninsula, forming a continuation of the Pyrenees. The rivers which have most resemblance in the character of their basins and their beds to those of the Indian tableland are the **Minho**,¹ **Douro**,² **Tags**,³ and **Guadiana**, all of which flow into the Atlantic Ocean, and have their courses obstructed by so many rapids and shallows that they are navigable only in their lower parts. These are mentioned here in their order from north to south. The **Guadalquivir**, still farther south, may be compared to the Cauvery, inasmuch as the greater part of its course is through a broad valley between highland regions on the north and south, and its lower course through a flat plain, but it forms no delta, and its volume is much more constant than that of the other Iberian rivers and the rivers of the Indian tableland, being partly fed at one period of the year, like the Ganges,⁴ by the melting of mountain-snows. The highlands to the south of the Guadalquivir are crossed by the highest of the mountain-ranges of the peninsula (11,500 feet), a range which owes its name of **Sierra Nevada**, or snowy range, to its crown of perpetual snow.⁵ On the Mediterranean side the principal river is the **Ebro**, in the north-east. Like the Narbada and the Tapti, it traverses a wide valley in some parts of the interior, but breaks through a long mountain-gorge near the coast.

Climate.—In Spain, as in southern India, the heaviest rainfall takes place on the western slopes of the tableland and the coast-

¹ Pronounced *Min'yo*.

² **Minho** and **Douro** are Portuguese forms of the names. The Spanish spelling of the former name is *Mino*, which is pronounced in the same way ; the Spanish name of the Douro is *Duero*.

³ The ancient name, modern Portuguese, *Tgo*; Spanish, *Tajo*.

⁴ See p. 98 (near the top).

⁵ See *Introd.*, par. 97.

strips at their base.¹ The surface of the tableland has a much smaller rainfall, and as the rainfall of the west coast is much below that of the corresponding part of India, the same holds good of the interior. In this peninsula, moreover, there are no rains on the east coast corresponding to those of the north-east monsoon in India, so that the Mediterranean coasts have also a very scanty rainfall. On the north as well as the west coast strip the rainfall is ample, but almost in all other parts it is less than 20 inches in the year, and the surface is thus for the most part remarkably arid and bare, except where irrigation can be practised. As in India, the rivers cannot easily be used for irrigation on the tableland, except near their headwaters, where there are facilities for the formation of tanks and irrigating terraces² cut on the hill-slopes. In some of the plains in the south and east, however, the greater part of the water of the rivers is used up in irrigating, by means of canals, considerable districts, as on the plains to the east of the Indian tableland.

Agriculture and Natural Vegetable Products.—In the nature of its products the Iberian Peninsula differs less from that of India than might be expected from the difference of 10 to 18 degrees of latitude. Even in the south, Europe shows the advantage of its westerly situation in the hemisphere to which it belongs.³ The Spanish tableland, like the cooler (more northerly) parts of that of India, produces large quantities of **wheat** and **chick-peas** (*grain*). These, indeed, are the prevailing crops, chick-peas as well as wheat entering into the daily food of the people, though chick-peas are grown nowhere else in Europe to any great extent. Millets are also cultivated, even in certain districts the great millet (*joar*) and the spiked millet (*bajra*) of India. The colder temperature of the Spanish tableland, however, adapts it admirably for sheep-rearing. The merino breed of sheep, which now yields the finest **wool** in all parts of the world in which it is reared, originated in this region. Down to the middle of last century Spanish wool was unequalled for its quality, though now surpassed by the product of other countries into which the merino sheep was introduced.⁴ The irrigated ground is used for the cultivation of vegetables, the fruits of

¹ See Intro., par. 94. - See Intro., par. 59 (3).

³ See Intro., par. 92.

⁴ See p. 311.

the warm temperate zone* (including in the south even dates), mulberries (grown for the rearing of silkworms), rice, and maize. **Oranges**, the principal sub-tropical fruit of Spain and Portugal, are confined to land at no great distance from the coast. Under the protection of favourable fiscal laws, the cultivation even of **sugar-cane** has been attended with no little (though not unmixed) success in the extreme south.* The vine thrives without irrigation. **Wine** is most abundantly produced in the north-eastern provinces, but the only wine for which Spain has a high reputation (*sherry*) is made in the south, in the neighbourhood of Jerez de la Frontera. The chief Portuguese wines (*port, &c.*) come from the valley of the Douro. Of the forest products of the peninsula the most valuable is **cork**, which is chiefly obtained from the mountains in the north-east of Spain, and those on the borders of Spain and Portugal in the south-west. The olive abounds, both wild and cultivated, in the southern half of the peninsula, but the oil is poorly prepared. Esparto, a kind of grass much used in paper-making, is a valuable product of some of the more arid districts.

Minerals.—The mineral wealth of the peninsula has been renowned for ages, though even yet it is far from being fully developed. The principal products are **iron**⁸ and **copper** ores, lead, silver, and quicksilver. The Spanish **quicksilver** mines are the most productive in the world except those of the United States. Coal is not abundant in convenient situations, and the production is small. Bay-salt is largely produced round the southern coasts, as in India, and rock-salt is also abundant.

Manufactures.—Cotton and other textile industries are carried on principally in the north-east of Spain. Iron industries are rising up in the districts where iron ores and coal are produced.

Foreign Commerce.—In both countries wine and fruits form together the principal exports, mineral products ranking next in order in Spain, cork in Portugal. The chief import of Spain is raw cotton (a small portion of which is derived from India). In Portugal the principal imports are wheat and manufactured articles.

* See p. 189.

³ The most northerly latitude in which sugar-cane is cultivated in any part of the world. ³ See p. 197 (under South Wales coalfield).

Chief frowns.—(1.) **Spain**.—The capital is **MADRID** (500), situated in the

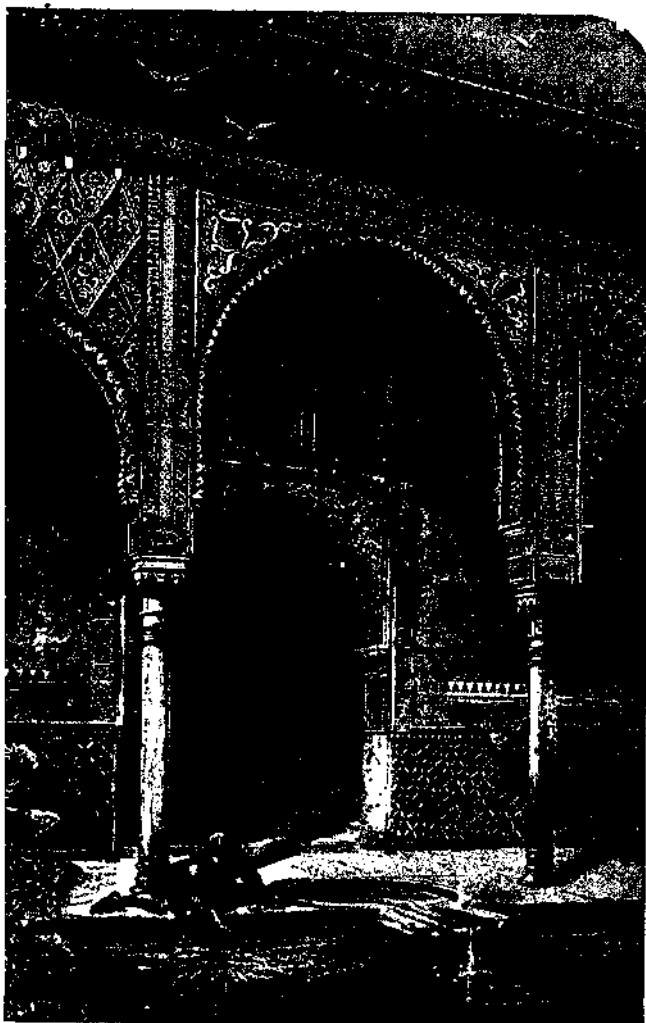


FIG. 43. THE ALHAMBRA. (By the kind permission of Messrs. Huehctte.)

middle of the tableland on a small tributary of the Tagus, in the old pro-

vince called New Castile. It is the highest capital in Europe (about 2,150 feet above sea-level). To the south, on the Tagus, stands Toledo, a famous old city, now decayed. To the north-west of Madrid, in Old Castile, is Valladolid, a former capital of Spain. In the north-east, on the Mediterranean, stands BARCELONA, the capital of the old province of Catalonia, and for centuries the chief seaport and manufacturing town of Spain. On the same coast farther south are VALENCIA, on one of the chief irrigated plains, the only one in which rice is produced in any considerable quantity, and Cartagena, a naval station, strongly fortified. On the south coast the principal seaports on the Mediterranean are MALAGA and Almeria, both well-known for their exports of fruit and wine; on the Atlantic stands Cadiz, which has been renowned as a seaport since ancient times (having been founded by Phoenicians¹ about 3,000 years ago), now well known as a place of export of sherry wine. SEVILLE, at the head of ocean navigation on the Guadalquivir,² is an active seaport as well as a rising seat of industry; Cordoba, higher up on the same river, is a decayed town, having once been a populous and splendid city, when it was the capital of one of the Muhammadan kingdoms which embraced a greater or less extent of the peninsula for nearly eight hundred years. The Muhammadans (the so-called Moors, really Arabs) invaded Spain from Africa in 711, and were not finally driven out till near the close of the 15th century. Granada, on a fine plain, known by the Arabic name of the *vega*, irrigated by water drawn from a southern tributary of the Guadalquivir, was the last seat of Moorish dominion in Spain, and is celebrated for its Alhambra, the old palace of the Moorish kings, and one of the most gorgeous specimens of Muhammadan architecture outside of India. On the north coast, the busiest seaport is Bilbao, near the mouth of a river that falls into the Bay of Biscay. It is the principal place of export of the iron ores of northern Spain.

(2.) Portugal.—The capital and chief seaport is LISBON (200), near the mouth of the Tagus. In 1755 it was almost entirely destroyed by a tremendous earthquake, in which many thousands of people lost their lives. From this port Vasco da Gama sailed on the voyage in which he discovered the sea-way to India round the Cape of Good Hope (1497-98). In consequence of that discovery, Lisbon became for a time the centre of the trade between Europe and eastern Asia. The only other large town and important seaport is OPORTO, near the mouth of the Douro, the place of export of *port* wine, which takes its name from the town. The name of the town is properly two Portuguese words, "O Porto," meaning "the port."

GIBRALTAR, a fortress on an impregnable rock at the east end of the strait of that name, sixteen miles from the nearest point of the African coast, has been in the hands of the British since 1704. It is of importance as commanding the entrance to the Mediterranean.

¹ See p. 73.

² See Introil., par. 112(6).

2. ITALY.—Position, Size, Density of Population.—Italy is a kingdom, the principal portion of which is formed by the middle peninsula of the Mediterranean, but which includes also the two large islands of Sicily and Sardinia. In size it is almost exactly equal to the Punjab, but its population is about one-half greater than the population of that province. Its population is thus one of the densest in Europe. As to the language, see p. 190.

Surface, Drainage.—Enclosed on the north and north-west by the **Alps**, and washed almost everywhere else by the sea, Italy has natural boundaries as well defined as those of India.¹ The **Apennine Mountains**, which in the north-west are connected with the Alps, fill almost the entire area of the peninsula, rising about the middle to the height of 9,600 feet. The rivers of this region are of little service for navigation, and not much used even for irrigation. The longest is the **Tiber**. In the north, between the Alps and the Apennines, there lies a broad plain which may be compared to that of the Ganges, though it is on a much smaller scale. It is seamed with numerous navigable rivers, the volume of which is partly maintained in summer by the melting of Alpine glaciers.² The principal river is the **Po**, which flows eastwards into the **Adriatic Sea**. Most of the others are its tributaries, and some of these drain beautiful lakes (**Maggiore, Como, &c.**) lying at the base of the Alps. Others, the most important being the **Adige**, enter the Adriatic independently. As in the Ganges valley, the rivers of this plain afford large supplies of water for **irrigation**, which has been carried out on a more extensive scale in Italy than anywhere else in Europe. The total irrigated area in these plains is about 5,000 square miles, or fully five times as great as the irrigated area in the delta of the Godavari. The islands of Italy are also mountainous. On the east side of Sicily **Mount Etna**, the highest volcano³ in Europe, rises to the height of nearly 11,000 feet.

Climate and Agriculture.—The rainfall of Italy is more abundant than that of the Iberian peninsula, which is accounted for by the vicinity of the sea on both sides, and by the fact that the **highlands** do not take the form of tablelands with well-marked border-slopes to cut off the rain more or less from the

¹ See p. 82. ² Com p. pp. 98, 244. ³ See Introd., par. 54.

interior.¹ **Wheat** is the principal grain-crop in most parts of the kingdom; **maize** is extensively grown in the north, where' the necessary summer rains are more plentiful,² and in the irrigated area of the northern plains there is a further resemblance to the Ganges valley in the extensive cultivation of **rice**, which is an important Italian export, and is more largely grown in Italy than anywhere else in Europe. Italy is also the leading European country in the production of **raw silk**. **Wine, olives**, and various **fruits** are among its other products.

Minerals.—Sicilian **sulphur**, the **iron ore** of the small island of Elba (between Italy and Corsica), and the **statuary marble** of Carrara are the most noted mineral products of the kingdom.

Manufactures.—Of Italian manufacturing industries, the reeling of silk from the cocoons and the making of silk yarn by the process called throwing is the most important commercially. Among others for which Italy is noted are the making of glass beads and articles artistically wrought in glass, the working of coral and sea-shells into ornaments, the making of fine earthenware and artistic woodwork. The material for the coral industry is the skeleton of a marine animal,³ and used to be obtained by diving close to the Italian coast (as it still is in part), but is now mostly brought from the coast of Africa.

Foreign Commerce.—In the commerce of Italy silk (both raw and thrown), olive-oil, wine, and fruits make up more than 40 per cent, of the **exports**. Among the other leading exports are eggs, animals, sulphur, rice, hemp, and flax. Raw cotton, cotton manufactures, wheat, and coal are the principal **imports** (together above 20 per cent.); hides, timber, and wool, sugar, coffee, and fish being also imported in large amount. It is worthy of note that a very large proportion of Italian export commodities are sent abroad by land—through the Alpine tunnels.⁴ In recent years the tonnage exported by sea has been on the average only about two-fifths of that imported by sea. From India, Italy is taking increasing quantities of wheat, raw cotton, hides and skins, and jute. The total value of **the imports**

¹ See In trod., par. 94.

² Comp. p. 188 (second paragraph under **Climate**).

³ See Appendix, par. 91.

⁴ See pp. 215, 280, and 283.

from India is from $3\frac{1}{2}$ to upwards of 5 crores. The chief commodity which it sends to India is corals.

Chief Towns.—The capital is ROME (300), on the Tiber, which is navigable for steamers up to this point. Though now small compared with many another European city, its history, and its architectural and other monuments of that history, make it without a rival in interest among the cities of the continent. In ancient times it was the capital of an empire which embraced all the countries round the Mediterranean, as well as other parts of western Europe, including the larger portion of Great Britain.¹ Afterwards it became hardly less renowned as the residence of the head of one of the chief branches of the Christian church.

On a beautiful bay, to the south of Rome, stands NAPLES (500), the most populous city in Italy, and overlooking the same bay is Mount Vesuvius, the only active volcano on the mainland of Europe. Its first recorded eruption (A.D. 79) overwhelmed with ashes



FIG. -STREET IN POMPEII: VESUVIUS IN THE DISTANCE.

the cities of *Herculaneum* and *Pompeii*, the disinterring of which in the present day has brought to light many Roman remains of great interest.

The principal town in the great northern plain is MILAN (325), which is situated to the north of the Po, at the meeting-place of several important roads leading northwards across Alpine passes,³ and is now a great railway centre, being the first large town on the railway from Switzerland through

¹ See Introd., par. 107.

³ See Introd., par. 114 (6).

the St. Gothard tunnel.¹ It is the great seat of the Italian silk-trade. To the west, **TURIN** (250), on the Po itself, is the meeting-place of several pass-roads across the Western Alps (leading into France), and is the first considerable town touched by the railway through the Mont Cenis tunnel.⁸ The principal seaport in communication with both these towns is **GENOA**, which is separated from the plain, however, by the Apennines. It gives name to a gulf of the Mediterranean. Before the discovery of the sea-way to India,³ it was one of the principal seats of European commerce with the countries of eastern Asia—a commerce which was carried on by various routes involving land-journeys of different length. In some cases or at some periods this commerce followed the Red Sea route, which required the shortest land journey, through the populous part of Egypt or across the isthmus of Suez. In other cases the Persian Gulf route was preferred, commodities then passing to and from the Mediterranean principally by way of Aleppo.⁴ At one period political circumstances turned the scale in favour of a longer land route still, that, namely, by way of southern Russia and the Caspian Sea, and then into India through Afghanistan and across the Bamian Pass⁵ or other passes of the Afghan mountains. But whatever route was followed, Genoese merchants were for hundreds of years among the chief competitors for this lucrative trade. The greatness of Genoa was **VENICE**, the principal port on the Adriatic. The situation of this town is one of the most remarkable in the world. It is built on a hundred small islands on a lagoon to the north of the mouths of the Po and the Adige, canals between the islands taking the place of streets. The site was originally chosen for the sake of security. Its position makes it the principal port for the neighbouring parts of the great Italian plain, and the valley of the Adige leading up to the Brenner pass⁶ gives it the means of communication with central Europe. A railway now connects it with the mainland and with central Europe by this route. Genoa and Venice are still the leading seaports of Italy, and the commerce of both has been increased considerably by the opening of the Suez Canal as well as the construction of the Alpine railways. Genoa, however, has profited most from these causes, and is now the principal centre of Italian trade with India.

FLORENCE, the capital of the old province of Tuscany, has long been the chief town in the most considerable plain or area of fertile lowlands enclosed by the Apennines between Rome and the Po basin. It stands on the Arno, which drains this plain westwards into the Mediterranean. On the coast to the south of the Arno stands **LEGHORN**,⁷ the chief port of this plain. In the south-east of Italy, on the Adriatic, stands **Brindisi**, a seaport which derives all its importance from being at the end of the railway journey on the land route from western Europe to India and eastern Asia.

In the populous island of Sicily the chief town and port is **PALERMO**,

¹ See p. 230.

⁴ See p. 73.

² See p. 215.

⁵ See p. 81 (2).

³ See pp. 112, 248.

⁶ See p. 233.

⁷ Called in Italian *Livorno*.



Fig. 45.—FRONT OF A VENETIAN PALACE, WITH GONDOLAS, OR VENETIAN BOATS, IN THE FOREGROUND.

on the north coast. **MESSINA**, which gives name to the strait separating the island from the mainland, is also a busy seaport.

Malta and **Gozo**, two islands belonging to the British, situated to the south of Sicily. **Valetta**, on Malta, is important as a fortress and coaling station. The islands are densely peopled, the inhabitants speaking a debased Arabic. The upper classes speak Italian. Of the products of the islands that of most commercial importance is early potatoes, which are exported to England. Wheat and raw cotton are also largely cultivated.

3. **THE BALKAN PENINSULA.**—**Extent and Divisions.**—

Under this name we include the greater part of the region lying to the south of the Danube and Save, together with the adjacent islands belonging to Greece and to European Turkey (and among these Crete).

Surface.—The surface, including that of the islands, is for the most part highly mountainous. The **Balkan Mountains**, which give name to the peninsula, and stretch from west to east in its eastern half, between the basin of the **Danube** on the north and that of the **Maritsa** on the south, form the principal range. Their highest peak, however, is under 8,000 feet, a height exceeded by several other peaks of the peninsula. The principal lowlands are those belonging to the river-basins just mentioned on opposite sides of the Balkans. Elsewhere mountains, valleys, and small plains alternating with one another form the entire surface.

Political Divisions.—1. **Turkey**, which at one time held sway over the entire peninsula, as well as the present kingdom of Roumania to the north of the Danube, still retains under its direct rule the largest portion of it, that portion being the middle tract extending from the Adriatic Sea in the west to the Black Sea and the Sea of Marmora in the east. It also includes the large island of **Crete** to the south of the [^]Egean Sea. Its products are mainly agricultural. Its only manufacturing industry of any consequence is the making of carpets.

Chief Towns.—The capital is **CONSTANTINOPLE** (875), built on a tongue of land between the Sea of Marmora, the strait called the Bosphorus, and an admirable natural harbour called the Golden Horn, opening off that strait. At Constantinople this strait is barely a mile wide, and at its narrowest little more than half a mile. The town takes its name from a Roman

emperor, Constantino the Great, who founded it early in the fourth century A.D. on the site of an older town called *Byzantium*. It remained the capital of the Eastern Roman Empire till it was captured and the empire finally overthrown by the Turks in 1453. Since 1885 Constantinople has been directly connected with western Europe by rail. Since the same date, **Salonica**, the principal seaport of Turkey on the Ægean Sea, has been the terminus of another railway in communication with the railway system of the rest of Europe. **Adrianople**, on the Maritsa, is the principal inland town in European Turkey.

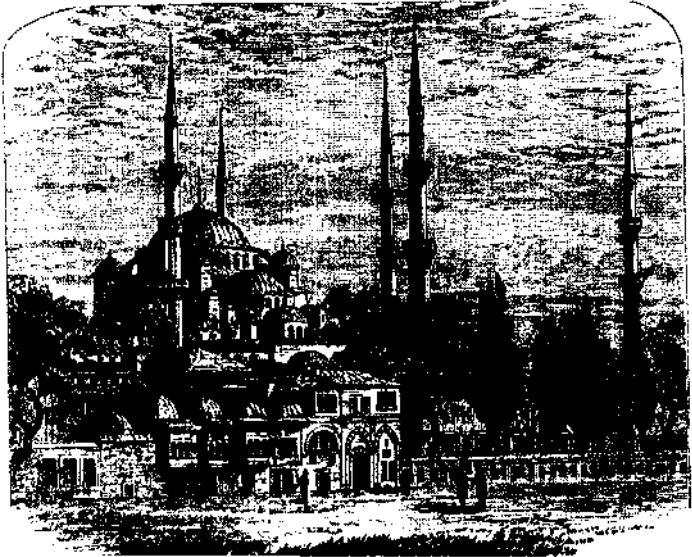


Fig. 46.- MOSQUE OF SULTAN AHMED, CONSTANTINOPLE.

2. **Bulgaria and Eastern Roumelia.**—These two now form practically one principality tributary to Turkey, Bulgaria proper mainly on the north side of the Balkans, Eastern Roumelia wholly to the south of these mountains. The total area is less than two-fifths of that of the Punjab.

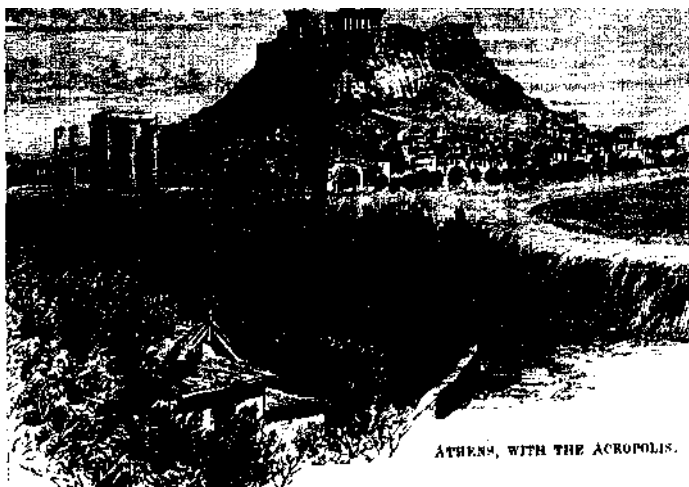
The capital of Bulgaria is **Sofia**, in an elevated valley to the south of the Balkans ; the chief seaport, **Varna**. The capital of Eastern Roumelia is Philippopolis ; the chief seaport, **Burgas**.

3. **Servia** is an independent kingdom to the west of Bulgaria, with an area less than one-fifth of that of the Punjab. It is

rich in minerals, including coal, but the whole mineral production is as yet small.

The capital is Belgrade, a strong fortress at the confluence of the rivers Danube and Save, which form the northern boundaries of the kingdom.

4. **Bosnia and Herzegovina**, in the north-west of the peninsula, form a province now under Austrian administration, although nominally still a part of the Turkish empire. Its extent is rather more than one-fifth of the area of the Punjab. The capital is Serajevo.



ATHENS, WITH THE ACROPOLIS.

5. **Montenegro** is an independent principality to the south of Bosnia, composed mainly of high plateaux, with a total area equal to about twice the British Indian province of Coorg.

6. **Greece**, a kingdom in the south of the peninsula, about one-fifth of the extent of the Punjab, but with a population of little more than two millions. The mainland is divided into two parts by the **Gulfs of Corinth** and **Ægina**. Through the narrow

Isthmus of Corinth, which lies between these gulfs, a canal navigable* by the largest vessels is now being pierced.¹ A large part of the kingdom consists of islands, the largest of which is the long island of **Euboea** or **Negroponte**, separated from the mainland only by the narrow channel of Kuripus. The islands farther to the south-east are known as the **Oyclades**,² those farther north as the **Sporades**,³ while those on the west of the mainland, together with **Cerigo** in the south, are called the **Ionian Islands**—Zante, Corfu (Corcyra or Kerkyra), &c. The most important **products** of Greece are olives, wine, and a small kind of dried grapes, which take the name of *currants* from the town of Corinth. These last form by far the most important export of Greece. Among minerals, ores of silver-lead on the mainland and ores of iron on one of the islands furnish considerable articles of export.

The capital and the only considerable town in the country is **Athens**, in the province of Attica, north of the Gulf of JEGina. Its citadel, called the Acropolis, is still crowned by some fine ruins, relics of the time when this small but famous city was at the head of civilisation, the home of artists, poets, and philosophers, who have been the admiration of all future ages. At the present day it is the seat of a largely-attended university. Its port is the **Piraeus**, with which it is now connected by railway. The anciently celebrated cities of **Aryos** at the head of the bay of Argolis, **Corinth**, on the isthmus, and **Sparta**, on the Eurotas, are now all insignificant places*. **Patras**, on the southern shore of the Gulf of Corinth, is the principal place of export of currants. Of the towns on the islands, the most important is **Hermupolis**, on the island of Sfra, a town with an excellent harbour, which, on account of its central situation⁴ in the *Ægean Sea*, has become a much-frequented coaling station for steamers, as well as a busy centre of commerce. The principal town belonging to the Ionian Islands is **Corfu**, on the side of the island facing the Turkish province of Albania.

¹ A project originally started by the Roman Emperor Nero in the 1st century A.D.

² Gr. *kyklos*, a circle; so called because they were imagined by the Greeks to form a circle round the sacred island of Delos.

³ Gr. —the 'scattered' islands; so called in contradistinction to the Cyclades.

⁴ See In. introd., par. 114.

COLONIAL AND OTHER POSSESSIONS OF EUROPEAN POWERS.

Denmark.—Greenland and the West Indian islands of St Thomas, St. John, and Santa Cruz.

France.—**Immediate Possessions:** Algeria; the territory on the Senegal and Gambia, the territory between the Gaboon and the Congo, the islands of Ste. Marie, Nossibe', and Mayotte (Comoro Islands), near Madagascar and Reunion or Bourbon; Obock and the neighbouring part of the coast of the Gulf of Aden; Pondicherri, Chandernagore, Karikal, Mahe' and Yanaon in India; the Society Islands, including Tahiti, the MaiqutSsas, and some other islands in the Pacific; Saigon or French Cochm-China, Cambodia, and Tongking in Indo-China; New Caledonia, the North American islands of St. Pierre and Miquelon off the Newfoundland coast, the West Indian Islands of Martinique and Guadeloupe, part of St Martin and some smaller islands; French Guiana or Cayenne. **Protectorates:** Tunis, the island of Madagascar, and the empire of Anam. **African Sphere of Influence.** See p 268 (under West Africa, &c).

Germany.—In west Africa, Togo Land in Upper Guinea, the coast of the Bight of Biafra, the coast from Cape Frio to the Orange River with the exception of Walvisch Bay; in east Africa, the territory of Usagaia, &c, behind Zanzibar; in the Pacific Ocean, the north-east of New Guinea, the Bismarck Archipelago (composed chiefly of the islands formerly known as New Britain, New Hanover, and the Admiralty Islands to the north of New Guinea), and the Marshall Islands. **Spheres of Influence in Africa and the Pacific.** See pp 269, 317.

Great Britain.—See pages 201-2.

Holland.—Java, Madura, and other possessions in the Eastern Archipelago; Surinam or Dutch Guiana and the West Indian islands of Curasao, Bonaire, Aruba, &c.

Italy.—Eritrea in eastern Africa on the Red Sea, along with "sphere of influence" adjoining. See p. 274.

Portugal.—The African islands of the Azores, Madeira, Cape Verde, St. Thomas, and Prince's Island (Principe), a small part of the coast of Senegambia, Lower Guinea from the Congo to Cape Frio, the East African coast from Delagoa Bay to Cape Delgado; Goa, Daman, and Diu in India, Macao on the south-east coast of China, and part of the island of Timor in the Eastern Archipelago.

Russia.—Siberia, the Trans-Caspian territory, Russian Central Asia, and the lieutenancy of the Caucasus.

Spain.—Ceuta and several stations known as the Presidios on the coast of Morocco, the Canary Islands off the north-west coast of Africa, the islands of Fernando Po and Annobon off the coast of Guinea, and some smaller possessions on the same coast; the Philippine and Sulu Islands, belonging to the Eastern Archipelago; the Caroline, Ladrone, and Pelew Islands in the Pacific; and the West Indian Islands of Cuba and Porto

Hico. Spain also claims a protectorate over the west coast of Africa (desert of Sahara) from Cape Bojador to Cape Blanco.

Turkey.—Immediate Possessions: Asia Minor, Syria, Mesopotamia, and parts of Arabia; Tripoli. Protectorates: the tributary principality of Samos in the JEgean Sea, the viceroyalty of Egypt.

The British and Russian possessions outside of Europe are the only ones which contain extensive territories suitable for colonisation by the inhabitants of the mother countries. There are a few French colonists in Algeia.

AFRICA.

Approximate latitudes (Cartagena) Cape Blanco, the northernmost point of the continent, $37\frac{1}{2}^{\circ}$ N.; north of Lake Victoria Nyanza (Cape Romania), 1° N.; (Montevideo) Cape Agulhas, the southernmost point, 35° S.

Approximate longitudes. Cape Verde to Cape Guardafui, 17° W.— 51° E.

Position, Size.—Africa is a continent lying to the south of Europe, and bearing some resemblance in outline to the other tropical continent of South America, inasmuch as it is broader in the north, and tapers towards the south, but, having a more northerly situation than South America, its broader part is not so entirely tropical as in that continent. Its total area is about eleven and a half million square miles, or more than three times as large as that of Europe; its population is very uncertain, but it is estimated at about 130,000,000. Misgovernment, internal wars, and the practice of **slavery** keep down the density of the population almost everywhere in the interior.

Outline, Seas and Gulfs.—In outline Africa is the least irregular of all the continents. All the gulfs and seas belonging to this continent alone are very wide in proportion to the depth to which they recede inwards. The largest is the **Gulf of Guinea**, between the coast of Upper Guinea on the north and Lower Guinea on the east. It is divided by the alluvium of the Niger delta into two minor gulfs or bays, known as the **Bight of Benin** on the west and the **Bight of Biafra** on the south-east. On the north coast are the **Gulfs of Oabes** and **Sidra**. On the east coast **Mozambique Channel** separates the large island of Madagascar

from the mainland. Between Africa and Arabia are the narrower seas known as the Gulf of Aden and the Red Sea.

Surface.—The superficial features contrast markedly with those of all the other continents. Africa has no wide plains near the coast, but consists principally of plateaux, varying from about 2,000 to 9,000 feet in height, and surmounted in many places by mountain chains. The principal mountain ranges are those of the Atlas, which run parallel to the western half of the Mediterranean, and the Drakensberg or Quathlamba Mountains, in the south-east; the principal series of plateaux, one which begins in the south of the Red Sea and proceeds southwards almost to the extremity of the continent, interrupted only by the valley of the Zambezi.

Within four degrees of the equator these plateaux are crowned by three lofty volcanic mountains which rise above the snow-line (all more than 16,000 feet high). Two of these, Mount Kilimanjaro (the highest, nearly 20,000 feet) and Kenia, lie to the south of the equator, near the eastern margin of the plateaux; the third, Mount Ruwenzori, is situated about seven degrees farther west, immediately to the north of the equator.

Lakes.—On this series of plateaux lie also most of the great fresh-water lakes of Africa, at altitudes varying from about 1,600 to nearly 4,000 feet above sea-level. The largest and the most elevated of all is Lake Victoria Nyanza or Ukerewe, which is crossed in the north by the equator. Its area is estimated at about 30,000 square miles, a little less than that of the largest lake of North America.¹ To the west and north west are two smaller lakes, Lake **Albert** Edward and Lake Albert Nyanza or Mwutan, connected with the same river-basin (that of the Nile). To the south-west of Lake Victoria Nyanza lies the long and narrow Lake Tanganyika, and still farther south Lake Bangweolo—both belonging to the basin of the Congo. To the east lies Lake Nyassa, the lowest of all those mentioned, belonging to the basin of the Zambezi. **Lake Chad** and **Lake Ngami** belong to a system of inland drainage (see below).

To the east of the plateaux on which the northern lakes of this series lie there is a long depression or trough containing a number of lakes without visible outlets, though some of them contain fresh water.² The largest of these is **Lake Rudolf** or

¹ See p. 278.

³ See *Introd.*, par. 40.

Basso Narok, the water of which, though rich in soda, is drinkable. • Though a depression on the surface of the plateau, this trough is itself at a considerable elevation, Lake Rudolf being about 1,800 feet above sea-level—as high as the tableland of Haidarabad.

Rivers.—All the great **rivers** of Africa except the Nile belong wholly to the tropical portion of the continent, and more than two-thirds of the course of the Nile is within the same area.

The **Nile**, the longest of all, has its head-waters collected by Lake Victoria Nyanza, from which it issues in the north, and then flowing north-westwards, enters the north end of Lake Albert Nyanza. This latter lake receives at its head the **Semliki** river, the outlet of Lake Albert Edward, which lies at the base of Mount Ruwenzori, and collects the most southerly streams of the Nile basin to the west of the Victoria Nyanza. After leaving Lake Albert Nyanza, the Nile winds northwards to the eastern half of the Mediterranean. From Abyssinia it receives two important tributaries on the right, the **Bahr el-Azrek**, or so-called Blue Nile,¹ and the **Atbara**, but in the lower half of its course it does not receive a single tributary on either bank. The other three great rivers of Africa, the Niger, Congo, and Zambezi, all describe great curves among the interior plateaux before making their escape to the coast through the bordering mountains. The **Niger**, rising far west, sweeps northwards, and then south-east and south, before it empties itself by a delta into the Gulf of Guinea. The **Congo** has its head-waters collected by Lake Bangweolo 12° south of the equator, and reaches 2° north before bending southwards again to enter the Atlantic Ocean in about 6° south. In respect of the volume of its water-discharge this river is by far the greatest of African streams. The **Zambezi** has numerous head-waters in a region thickly streaked with rivers, partly belonging to its basin and partly to that of the Congo, between 10° and 15° south, and after describing an S curve enters the Indian Ocean (Mozambique Channel) by a delta opposite the middle of Madagascar. All these rivers are great navigable streams, but all of them have their navigation interrupted, in

¹ *Bahr* is Arabic for a stream. *Bahr-el-Azrek* means properly the turbid stream, as distinguished from the *Bahr-el-ahmed*, or white (that is, clear) stream (of the Nile itself above its confluence with this tributary).

their lower course, by falls and cataracts. In the Nile, however, these are high enough up to allow of nearly 800 miles' of unimpeded navigation from the mouth.

Climate.—The nature of the surface, together with other circumstances, causes Africa, **as a whole, to be very deficient in rain.** It lies in latitudes where the atmosphere is always able to retain large quantities of vapour uncondensed,¹ and consisting, like the Indian tableland, mainly of plateaux with bordering mountains,² its interior is in most parts reached only by winds that have been deprived of the greater part of their moisture. Hence the only regions with abundant rainfall are the western part of the equatorial area and narrow strips on the south and



Fig. 48.—KATRUN, AN OASIS IN FEZZAN, SURROUNDED BY DATK-PALMS.

south-east coasts. Two regions of exceptional drought occur, one in the north and one in the south.

The former is the Sahara, extending from the Nile to the Atlantic, between the Atlas Mountains and the east of the Mediterranean in the north, and the Soudan countries in the south, a region visited elm-fly by dry winds from the Asiatic continent. Much of this vast area, measuring 3,000 by 900 miles, is absolute desert, sandy, stony, or rocky, but, where there are temporary streams³ or underground moisture there are inhabited oases, some of them thousands of square miles in extent. The other region

¹ See Introd., par. 86.

² See Introd., par. 94.

³ Generally known by the Arabic name of *Kadis*.

of exceptional drought is in south-west Africa, north of the Orange River, where the dryness of the air is increased by a cold current which creeps along the south-west coast and reduces the evaporation.¹ This region is known as the **Kalahari Desert**, though it is, in fact, mainly covered with thin grass, and is generally visited by copious dews at night.³

South of Sahara lies **Lake Chad**, a large fresh-water lake, which in times of flood has an outlet on the north-east to a depression incrustated with salt. North of Kalahari is **Lake Ngami**, the outlet of which similarly loses itself sooner or later in salt lagoons.⁸

Vegetation.—The **vegetation** and animal life of Africa answer to the climate. Dense **liana**⁴-**bound forests** occupy the moist equatorial regions, but the greater part of the continent capable of supporting vegetation at all is occupied by **grassy plains** with trees only thinly scattered over them, or without trees at all. On these plains tall, thick-stemmed, leafless, prickly euphorbias⁵ are in many places conspicuous, and in the south there is an immense variety of bright-flowered woody heaths. In the desert almost the only vegetation consists of thorny shrubs or tufts of coarse grass⁶ growing here and there, and in the oases the main dependence of the people is the **date-palm**,⁷ which loves a sandy soil, but can suck up moisture by its long roots from a great depth. The principal cultivated grain is *jodr*, generally known in Africa by the Arabic name of *durrah*.

Animal Life.—The characteristic **animals** of the continent are **fleet footed grass-feeders**, and above all **antelopes**, which are to be seen at certain times assembled in countless herds and in great variety, along with **zebras**, **quaggas**, and other animals, at well-known watering-places, where they are watched at evening by the lion, hyaena, and other beasts of prey. The swift-running bird, the **ostrich**, also scours the plains, and where there are clumps of trees small troops of **giraffes** may be seen grazing the lower twigs with the aid of their long necks, or galloping from clump to clump across the country. Elephants⁸ and rhinoceroses haunt the forests and marshes, and hippopotamuses and crocodiles

¹ See Introd., par. 93. ^u See Introd., par. 95. ³ See Introd., par. 10.

⁴ Lianas are climbing and twining trees, such as are found in great abundance in all tropical forests.

⁵ See Introd., par. 104. The castor-oil shrub belongs to this family of plants, but has not the external characters that distinguish most of the African members of the family.

• See cut, p. 14.

⁷ See cut, p. 262.

⁸ The African elephant is not now domesticated, though it was so in ancient times,

are found in many of the rivers. Monkeys and apes (chimpanzee and gorilla) are found both among trees and among rocks.¹ In the desert the **camel** (single-humped) is no less indispensable as a beast of burden than the date-palm on account of its fruit.

People.—The **inhabitants** of the north and north-east of Africa, including the Abyssinians (a Semitic people), Egyptians, and Berbers, as well as the Asiatic settlers, the Arabs and Jews, are all markedly different from those of the south and west, among whom the Negro features are more or less prominent. %Among these features are protruding jaws, swollen lips, projecting heels, a black or very dark skin, and woolly hair, all of which are most highly developed in the true Negroes inhabiting the region to the south-west of the Sahara. The Jews are settled in considerable numbers in the Atlas states, and the Arabs are more widely diffused, being settled in large numbers in the north and east, and being extensive traders in east and central Africa. The **Muhammadian religion** has been introduced by the Arabs into all north Africa, east Africa as far south as the Zanzibar coast, and into the Soudan states between the Nile and the Niger basin ; and in central Africa Muhammadian ism is constantly gaining ground. Ancient Christian sects survive in Abyssinia and in small numbers in Egypt (in the latter country called **Copts**).

COUNTRIES AND REGIONS OF AFRICA.

1. EGYPT.—This country is nominally a part of the Ottoman Empire, but it has an independent government, which is at present practically under the control of Great Britain.

Extent and Cultivable Area —The country extends from the mouths of the Nile to Wady Haifa in about lat. 22° N. En the east it extends to the Red Sea, and includes the peninsula of Sinai; and in the west the boundary is an indefinite line passing through the great Libyan Desert. The **habitable area**, however, is confined to the tracts capable of being irrigated by the waters of the Nile and a few oases in the desert. Hence, though the distance in a direct line from Wady Haifa to the shore of the Mediterranean is about 680 mile**, equal to the direct distance

¹ Com p. South America, p. 300.

between Bombay and Madras, the entire **area fit for cultivation is less than 10,000 square miles**, or a good deal less than half the area of Mysore. Yet on this area is crowded a population of 8,000,000, almost wholly dependent on agriculture. (Comp. p. 114.)

Irrigation and Agriculture.—What enables this highly productive agriculture to be maintained is the regular annual rise of the water in the Nile, a rise now known to be due to the summer (monsoon) rains¹ on the lofty Abyssinian mountains and on the plains farther south.

In Upper Egypt, that is, from the southern frontier to Siut (Assiut), in about 27° N., the sole method of irrigation is one that has been followed for three or four thousand years. The river on rising is allowed to fill large basins on both sides, the water being run off again by sluices at the end of about seventy days. By this method of irrigation the soil is condemned to sterility for half the year, during which it is either under water or baked to a degree of hardness which makes it impossible to grow anything. By it, too, only such crops can be grown as ripen within a short period—beans, lupines, clover, millets, wheat, barley.

The more valuable crops, **cotton, maize, sugar-cane, rice, indigo, and oil-seeds**, require a longer period to mature, and hence in Egypt demand a system of perennial irrigation.—This system has been practised on a large scale only since the first half of the present century, and is still confined to **Lower and Middle Egypt**—that is, to the Delta, and the region between the Delta and Siut. A portion of Middle Egypt is still irrigated on the old system.

The full supply of water obtainable from a normal rise of the Nile is required for the area of land already under cultivation in Egypt. Since the government of the country has been under British influence the area capable of being irrigated has been increased, and great projects are entertained for its further extension.

The Nile is also of importance as a water-way, being navigable without impediment as far as the rapids at Assuan, in about 24° N. (the "the first cataract").

Ancient Remains.—This fertile valley was in ancient times the seat of a civilised nation whose records carry us back to a time even earlier than

¹ See Introd., pars 67, 90. ² See p 102.

that of the first settlement of the Aryans in the valley of the Ganges, and remains of which are to be found both in Lower and Upper Egypt. In Lower Egypt are the famous pyramids, at the head of the delta opposite the modern Cairo; in Upper Egypt the ruins of the equally wonderful temples of ancient Thebes.

Foreign Commerce.—Cotton and cotton-seed make up about three-fourths of the value of the exports of Egypt. Egyptian cotton is of excellent quality, and in the British market is of higher value on the average than that imported from any other country. Among other exports of importance are beans, sugar, and wheat. The principal import is cotton manufactures, and among those next in value are iron manufactures (including machinery), coal, wood, woollen manufactures, indigo. The United Kingdom receives fully three-fifths of the value of the exports, and supplies nearly two-fifths of the imports. In the import trade Turkey, France, and Austria-Hungary rank next after the United Kingdom. Grain and pulse, rice, indigo, and other articles are imported in considerable quantity for local consumption from India, but the great bulk of the imports from India are merely in transit, and are ultimately exported to other countries.

Chief Towns.—The capital is CAIRO (375), at the head of the Delta. Its suburb of Bulak is a busy river-port. The bulk of the foreign commerce is centred at ALEXANDRIA (230), the ancient port at the north-western extremity of the Delta. Minor ports are Rosetta and Damietta, near the mouths of the arms of the Nile, which take their names from these towns. Bars¹ obstruct the mouth of the river at both places. Port Said is a busy port at the north end of the Suez Canal, which leads from the Red Sea to the Mediterranean across the Isthmus of Suez.

The name of Egyptian Soudan has been given since 1821 to vast regions in the south of Egypt, which, when the power of the Khedive was at its highest, almost reached to the equator.

These regions (Nubia, Kordofan, Dar-fur, &c.) are extremely arid in the north, but rains begin to be more abundant about the latitude where the Nile is joined by its lowest tributary, the Atbara; and the rainy season increases in duration as one goes southwards. The commercial and political centre of this region is Khartum, at the confluence of the White and Blue Nile; and Suakim (Sawdakin), on the Red Sea, is the chief port. At present the government in these regions is wholly unsettled, the tribes having risen in rebellion against the rule of Egypt. Suakim is still held by the British for Egypt.

¹ See In trod., pat. 31.

2. INDEPENDENT SOUDAN.—The term **Soudan** also embraces all the states south of the Sahara between the Nile and the sources of the Niger. A race called the **Fulbeh**, the most energetic of the tropical races of Africa, is rapidly spreading in these countries.

Many parts of this vast area are thickly inhabited, especially near the angle on the Gulf of Guinea, where the rams are more abundant. Throughout this region a kind of palm called the *deleb* is almost as important for the food it yields to man as the date-palm farther north. But the people also grow various kinds of grain and rear cattle. **Kuka**, the capital of Bornu, near the west coast of Lake Chad, is the laigest town in the Soudan ; but Timbuktu, situated on the edge of the desert,¹ a few miles from the Niger north of its great bend, is better known outside of Africa from the fact of its being the centre of trade between western Soudan and north Africa, the focus of numerous caravans which take their way thither between November and January.

3. WESTERN MEDITERRANEAN STATES.—(a.) **Tripoli**, a vast region opposite Sicily and Italy, mainly desert, a province of the Turkish Empire. Population about one million.

On the whole line of coast (700 or 800 miles) there is only one seaport of consequence, that of Tripoli, which is chiefly important as the centre of the trade across the desert, the point of arrival and departure for camel caravans through the oases of **Fezzan** to Bornu, and south-westwards to Timbuktu.

(b.) **Algeria and Tunis**, the former a French colony since 1830, the latter under French control, are both traversed by the parallel chains of the **Little** and **Great Atlas**. The inhabitants are mainly Berbers, Arabs, and people of mixed race. There is now also a considerable number of European settlers. The climate and products of the lowlands are similar to those of southern Europe. The production of wine is rapidly increasing. **Alfa** or esparto,² the only product of the arid plateau between the chains of the Atlas, is one of the chief exports of the country, and is mainly sent to Great Britain for use in paper-making. Algeria also exports excellent **iron ores**. Since Algeria has been occupied by the French, much has been done for the development of the country, chiefly by the making of roads and railways, but also by the sinking of **Artesian wells**.³

¹ See Introd., par. 114

(c).

²

See p. 246

³ Known in this region, however, long before the arrival of the French. See Introd., par. 89.

The whole population of Algeria, which, exclusive of the portion belonging to the Sahara, has a much larger area than the Punjab, is under 4,000,000. Tunis, with a much smaller area (less than half that of the Punjab), has about two millions, and is hence much more densely peopled.

The town of TUNIS is the only one in the two countries with a population above 100,000. It stands on the Gulf of Tunis, about ten miles from the ruins of ancient *Carthage*. The coast towns of Algiers (in the middle) and Oran (in the west), and the inland town of Constantine (in the east), give name to the three civil provinces under French rule in Algeria.

(c.) Morocco, a country subject to a Muhammadan despot. Its area can only be vaguely estimated at three or four times that of the Punjab, but, as in Algeria, the bulk of the population is confined to a limited extent of fertile and comparatively \oil-watered land. To this country belong the Atlas Mountains proper, or the High Atlas (highest summit 14,000-15,000 feet). The total population of the empire is roughly calculated at about six millions; but nothing but good government and proper cultivation are wanted to make it much more numerous.

Almost all kinds of grain might be grown in abundance, and the country is also rich in minerals and timber. All the chief town*, FEZ, the capital, and Mekinez in the north, Morocco in the south, lie at some distance from the West coast among the mountains. They are all manufacturing towns, and the preparation of the kind of leather to which Morocco gives name is still an important industry. Fez makes and exports great quantities of led cloth caps, which take their name from that city, and are almost universally worn in Muhammadan countries.

4. WEST AFRICA FROM THE SENEGAL TO THE CONGO.

—Along the whole coast in this region English, Fiench, and Germans have established at intervals trading stations and protectorates. The French have pushed their influence up the whole of the Senegal to the upper Niger, and have commenced the construction of a railway which is to connect the navigable puts of both rivers. They also claim a protectorate over most of the region between the lower Congo and the Atlantic, from the Gaboon River southwards. British influence prevails in Upper Guinea, the chief centres being Sierra Leone, on the surf-beaten west coast, Akra and Cape Coast Castle, on the Gold Coast (the whole of which is now British), and Lagos, farther east, on the

Slave Coast. A British company known as the Royal Niger Company possesses sovereign rights along the whole course of the lower Niger and that of its great left-bank tributary, the Benue, from Yola. The German stations are principally in the neighbourhood of the Cameroon Mountains, opposite the Spanish island of Fernando Po, in the angle between Uppey and Lower Guinea; but Germany has also another small settlement to the east of the Gold Coast called Togo Land. Two native states of some importance, Ashanti and Dahomey, also touch the coast, and the Pepper Coast, which runs from north-west to south-east, belongs to the republic of Liberia, which was founded early in the present century by some philanthropists as a home for freed slaves (negroes from the United States).

Agriculture is generally neglected, but where pursued, rice and ground-nuts are the chief products. The principal exports of the region are palm oil* (especially from Lagos, the chief centre of trade on the whole of the Guinea Coast), gold (especially from Cape Coast Castle), ivory, and india-rubber; and the articles taken by the natives in exchange are chiefly coarse cotton and other cloths, iron, firearms, and gunpowder.¹ Coffee plantations, under the supervision of Europeans, have been tried in some places with success. For Europeans, the coast, as everywhere else in tropical Africa, is very unhealthy.

5. THE CONGO FREE STATE—Till 1877, when the Congo was descended by Stanley, the course of that river was unknown. The descent of the river on that occasion made known the fact that this magnificent stream affords nearly 1,000 miles of uninterrupted navigation between Stanley Falls (just before the river first crosses the equator) and Stanley Pool, about 300 miles from the mouth. On the next 200 miles numerous falls and rapids occur to interrupt the navigation. After Stanley's descent an Association was founded, under the head of the King of the Belgians, for the exploration of central Africa, and more particularly for the opening up to commerce of the Congo basin.

With this view a road has been conducted to avoid the rapids, and a railway is now projected. Numerous European stations have been set up at various points along the course of the river and its chief tributaries, which are now regularly navigated by steamers. The Congo Free State,

¹ Used for soap-making, greasing the axles of railway carriages, &c.

² The trade is largely carried on by barter, in which glass beads have a high value with the natives. A kind of shells called *cowries* circulate as money.

comprising the greater part of the Congo basin, with an area equal to about eight times that of the Punjab, was founded in 1885. It is now a dependency of Belgium. The trade of the region, at present small, is in the same articles as the rest of western Africa.

6. PORTUGUESE LOWER GUINEA, from the Congo to 18° S. In the north, the left bank of the Congo belongs to Portugal for ninety miles up, and Portuguese territory extends about 300 miles inland to the Kwango, a southern tributary of the Congo.



FIG. 49.—A TEMBE, ONE OF THE COMMONEST FORMS OF DWELLING IN CENTRAL AFRICA.

Here, as in most parts of Africa, there is a comparatively rapid rise from the coast to the interior. At a distance of about 100 miles from the coast lie some of the richest and healthiest regions of west Africa, at an elevation of several thousand feet above the sea-level.

On these higher parts coffee is an important product. The oil-palm is met with only in the north of the region, but india-rubber is obtained in considerable quantity, and cotton and sugar are grown for export. Tim number of whites among the population is only about 12,000, some hundreds of whom are Portuguese convicts. The chief seat of the Portuguese government is **Loanda**, on the coast.

The coast regions of Portuguese territory become more and more* arid as we advance southwards, no rivers in that region flowing all the year round to the sea, so that the population consists only of a few hunting and pastoral tribes. The British have founded a whaling-station on this coast at **Walvisch¹ Bay** (now a dependency of the Cape Colony), about 1° N. of the Tropic of Capricorn; but all the rest' of the coast is now a German protectorate.

7. BRITISH SOUTH AFRICA.—The British possessions in South Africa, including the protectorate of Bechuanaland and the territories under "British influence" on both sides of the Zambezi, embrace an area of upwards of 900,000 square miles—more than eight times that of the Punjab.

A. The Oape Colony, mainly south of the Orange River, but including also Griqualand West, north of that river, has an area equal to about twice that of the Punjab.

Surface, Climate, and Drainage.—In the southern and more populous part of the colony the rise from the coast to the interior takes place in well-marked terraces, the edges of which face seawards. The tablelands formed by these terraces vary from one to four thousand feet in height. They are called **karroos**, from a native word signifying "dry," the whole of the interior being extremely arid, so that large tanks for water are a prime necessity in inland settlements. The **Orange River**, though longer than the Godavari, is, on account of this inland drought, a shallow stream, navigable only for boats, and even for these only a few miles up.

Products.—With such a climate Cape Colony as a whole is more suited for the rearing of live stock than for agriculture. **Sheep-rearing** is, in fact, by far the most important industry of the colony, and wool (including the hair of the Angora goat²) forms the principal export next to diamonds. The rearing of **ostriches** (for the sake of the valuable feathers) is now likewise largely carried on. The arid plains of Griqualand West contain the most important diamond-field in the world (discovered in 1867), and **diamonds** now form about two-fifths of the value of the exports. Among other minerals are coal and **copper ore** (the latter **also** an export).

¹ Dutch = Whale-fith.

² See p. 70.

People —About two-thirds of the inhabitants (numbering in all about 1,300,000) belong to native races, the chief of which is that of the **Kaffirs**,¹ a very dark-coloured race, which under British rule is increasing rapidly. The inhabitants of European origin are mainly of **Dutch and** British descent. The colony was acquired by the British from the Dutch in 1806, and since then the British element has been rapidly increasing, and the English language (that of legislation and commerce) is gradually spreading over the whole colony.

Chief Towns —The capital and principal seaport is Cape Town, which lies under the shelter of a flat-topped mountain called Table Mountain, on a bay on the west coast in the south of the colony. Port **Elizabeth**, on Algoa Bay, is the chief seaport, and Grahamstown the chief town in the east. Kimberley is the chief town on the diamond-field.

B. **BaSilitola**id, a British Crown colony, is a fertile and healthy plateau on the north-east of the Cape Colony, inhabited chiefly by native races.

C. **Bechuanaland** is a vast territory, half as large again as Great Britain, bounded on the west by the meridian of 20° E., and on the north by the parallel of 22° S. A part of this territory in the south-east is a Crown colony, the remainder under British protection.

D. **Natal**, on the east coast, is a British colony rather smaller than Ceylon, with a population of less than half a million, the great majority being Zulus and other Kaffirs. It grows **sugar** and other subtropical products upon a low strip next the coast, cereals higher up, and the mountain slopes are clothed with dense forests. Sheep, cattle, and ostriches are reared. Capital, **Pietermaritzburg**, in the interior; seaport, **Durban**.

E. **British Zululand, Amatongaland**.—These are territories under British protection on the east coast between Natal and Delagoa Bay.

P. **Zambezia**.—This is merely a popular name applied to a vast region on both sides of the river Zambezi, upwards of half a million square miles in extent, declared to be under British influence. To the south of the Zambezi it includes the tablelands of **Matabeleland and Mashonaland**, and part of **Mani-**

¹ **Kaffir** is not a native, but an Arabic name, meaning 'infidel'—that is heathen or non-Muliammadan.

caland, which, though within the torrid zone, are high enough (in places nearly 5,000 feet) to be capable of cultivation by Europeans. In 1890 a British settlement was formed there, with the view of carrying on mining for gold (which is known to be abundant) as well as agriculture. North of the Zambezi the sphere of British influence extends to the Congo Free State, the south end of Lake Tanganyika, and the western shore of Lake Nyassa. A large tract of this area, in which British

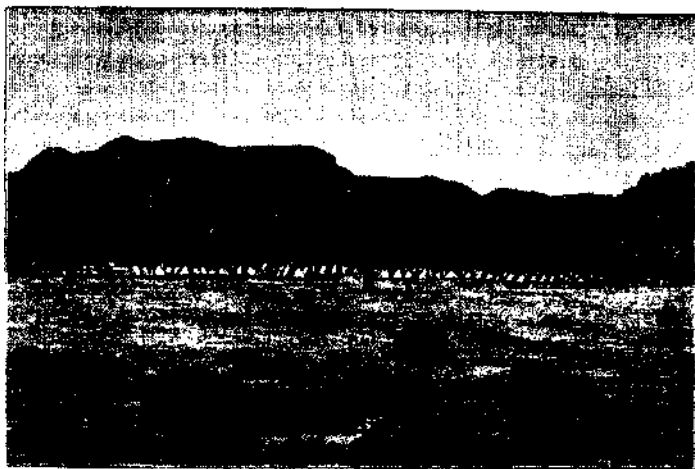


FIG. 50.—SHOSHONG, BECHUANALAND, SHOWING THE ABRUPTNESS WITH WHICH MOUNTAINS RISE FROM LEVEL PLAINS IN ARID REGIONS.
(By the kind permission of Mr. C. G. Oates.)

settlements were formed at a much earlier date, has been erected into a British protectorate under the name of the Nyassaland District. The principal British station is **Blantyre**, to the south of Lake Nyassa.

8. THE SOUTH AFRICAN REPUBLICS.—Two republics founded by Dutch settlers, but also inhabited mainly by Kaffirs, occupy high tablelands to the north of the Cape Colony and the east of Bechuanaland. One, called the Orange River Free State, is situated between the Orange River and its principal tributary called the Vaal. The other, situated to the north of the Vaal, is commonly known as the **Transvaal**, but officially called The

South African Republic. Both countries produce wool, hides, and grain. Within recent years the Transvaal has become well known for its gold-mines.

The capital of the Orange River Free State is Bloemfontein; that of the Transvaal, Pretoria. The chief town in the most productive gold-mining district of the Transvaal is Johannesburg, in the south of the republic.

9. EAST AFRICA.—From Delagoa Bay northwards the whole coast opposite the island of Madagascar, along with the lands adjacent to both banks of the Zambezi as high as about 31° R, belongs to the Portuguese. The chief centres of Portuguese influence are Sofala, Quilimane, and Mozambique.

North of these regions nearly the whole area between the coast and the territories of the Congo Free State is now divided into tracts declared to be under the German, British, and Italian spheres of influence respectively. The German sphere of influence extends from the Rovuma River to a point on the coast in about 4° S. The British sphere of influence extends from about 4° S. to the River Juba, and embraces also the Arab sultanate of Zanzibar, which is now a British protectorate. The Italian sphere extends from the Juba northwards to about 13° N. on the Red Sea, thus including Somaliland in the eastern angle of the continent, and Abyssinia, over which Italy claims to exercise a protectorate.

The chief seaports in the German sphere of influence are Dar es-Salam and Bagamoyo; in the British sphere, Mombasa, on the mainland, a place with an admirable natural harbour, and Zanzibar, on the west coast of the island of the same name, the capital of the sultanate, which is now practically confined to this island and the island of Pemba. This port has long been the centre of trade for the neighbouring region, a trade to a large extent in the hands of Indian Baniyas. The trade with India is considerable, Zanzibar exporting thither chiefly spices (above all, cloves and pepper), and receiving thence cottons, rice, and other grains. The Italian sphere of influence has no port worth mentioning on the Indian Ocean, but includes the port of Massaua on the Red Sea. On the Gulf of Aden, Berbera and Zeila belong to the British; Obock and the Gulf of Tajurra to the French.

Abyssinia is a country about one-half larger than the Punjab, composed of an assemblage of more or less isolated plateaux, difficult of access, and in many places bounded by

precipitous sides. The inhabitants, a dark-coloured Semitic race, received Christianity at an early date, and have ever since retained at least the forms of that worship.

10. ISLANDS.—A. In the Indian Ocean.—Mauritius (British) and **Reunion** (French), the most important of all African islands commercially. They are both covered with plantations of tropical products, of which **sugar** is the chief, the labourers being mostly Indian coolies. Mauritius (capital **Port Louis**) annually exports sugar to the value of nearly three crores, chiefly to India, the Australian colonies, the United Kingdom, and the United States. Rum, vanilla, aloe fibre, and coco-nut oil are among its other exports. The **Seychelles**, a dependency of the Mauritius, exports **coco-nuts and coco-nut oil**, besides a few minor articles. The palm producing the remarkable double coco-nut, which is often found drifted by currents to the coasts of the Maldivé Islands, is confined to this group. The **Ohagos Islands**, with the harbour of **Diego Garcia** sometimes used as a coaling station on the voyage between Australia and Aden, are another dependency of the Mauritius, situated about fifteen degrees to the east of the Seychelles. **Socotra**, off the eastern extremity of Africa (British since 188G, and now annexed to the Presidency of Bombay), is principally known in commerce for its **aloes**.

The large island of **Madagascar** exports rubber, cattle, hides, wax, and a few other products, but has a very small commerce compared with its population of three millions or thereabouts. Its mountainous but well-grassed and well-watered interior is said to be admirably suited for cattle-reaving. Since 1885 the island has been a French protectorate, and the harbour of Diego Suarez, in the north-east, has been ceded to the French.

The chief native seaport is **Taraatave** (on which improvements are now contemplated); the capital is **Antananarivo**, in the interior.

B. In the Atlantic Ocean.—The **Azores** (Portuguese), commercially next in importance to Mauritius and Reunion, furnishing oranges (St. Michael), pine-apples, &c.; **Madeira** (Portuguese), exporting wine and fruit; the **Canaries** (Spanish), exporting chiefly cochineal; the **Cape Verde Islands** (Portuguese), with tropical and subtropical plantations on Santiago; **St. Thomas** (Portuguese), in the Gulf of Guinea, with plantations of cinchona, cacao, coffee, &c ; **Prince's Island**, in the same gulf; **Ascension**

and St. **Helena**, both British, now of little value commercially, but used as Government coaling stations. On St. Helena Napoleon Bonaparte was detained a prisoner by the British for the last six years of his life (1815-21).

AMERICA.

Comparative Dimensions.—America, or the New World, is less than half of the aggregate size of the three great continents of the Old World, Europe, Asia, and Africa, and the smaller size is due to the comparative narrowness from east to west. The length of the mainland of America from north to south is much greater than the corresponding dimension of the Old World; for though the most northerly point of the mainland of North America (in latitude 72°) is 6° farther south than the corresponding point of Asia, the most southerly point (in 54° S., two degrees north of the island Cape Horn) is 19° farther south than the southernmost point of Africa, 15° farther south than the southernmost point of Australia.

People and Products.—The **original natives** of the continent, known as Indians,¹ are believed to be all of one stock. They now form only about a fourth of the entire population, and are most numerous in the south. The whole population is estimated at about 125 millions, or less than a third of that of Europe, which has an area only one-fourth as great, and America has no considerable extent of territory with a population comparable in density to Europe, China, India, or the Nile valley in the Old World,² even though there are large tracts fitted by nature for the maintenance of a dense population. The explanation of this contrast is to be found in the history of the continent. Compared with the Old World, America, **before its discovery by Europeans** at the close of the fifteenth century, was **very poorly famished with the cultivated plants and domestic animals** that

¹ A misnomer due to the fact that when America was discovered by Columbus, the discoverer believed, not that he had touched on a new continent, but that he had sailed round the world and come to the East Indies.

* At the census of 1890 not one of the United States of America had a population of as much as 300 to the square mile, not one with an area of more than 5,000 square miles had a population of as much as 200 to the square mile.

favour the growth of civilisation. America had only one kind of cultivated grain, **maize**,¹ to take the place of rice, wheat, millets, and other grains of the Old World; and, what is even more serious, it had no animal that could be used for the labours of the field, no animal except the reindeer of the far north yielding milk, and North America had not even any beast of burden. Hence civilisation was little developed among the natives, and indeed only two important civilised nations existed before the advent of Europeans, one on the tableland of Mexico, and the other on that of Peru.

NORTH AMERICA.

Approximate latitudes. Quebec (Nantes), 47° N.; St. Paul, Montreal (Bordeaux), 45°; (Hakodate), New York (Naples, Constantinople, Tashkent), 41°; (Niigata), San Francisco (Palermo, Athens), 38°; (Kioto), Memphis, 35°; (Hangchow), New Orleans (Cairo, Lhassa), 30°; (Canton), Havana, 23°; Mexico (Bombay), 19°.

Approximate longitudes of mainland, 5G°-168° W,

Comparison with Eurasia.—This continent corresponds to Europe and Asia, or Eurasia, in the Old World, and extends as far south as the southernmost point of India. The resemblance even includes the possession by both of a large archipelago in the south-east, but in the case of North America this archipelago reaches no farther south than the mainland. As regards the **configuration of the surface**,² the two agree in having a vast plain traversed by great rivers sloping to the north, but they differ in the arrangement of their great mountain chains and tablelands. Instead of east and west, the principal mountains of North America run more or less north and south. The great system is that of the **Rocky Mountains**, which stretch through the entire length of the western part of the continent, rising from a tableland, which at its widest (between the **Sierra Nevada**³ and **Cascade Mountains** in the west and the main chains of the

¹ Hence the name *Indian coin*, by which it is sometimes known.

⁹ See section across North America. p. 51.

¹ A Spanish name; see above, p. 50.

Rocky Mountains in the east) extends over one-third of the breadth of the United States. In this part the Rocky Mountains are composed of numerous short parallel chains, leaving openings between their extremities. The highest summits here reach the height of the higher Alpine peaks of Europe (14,000-15,000 feet). Still higher peaks are found in the extreme north-west. Active volcanoes occur only in the north-west (Alaska) and in the south (Mexico and Central America).

The only other great mountain system of North America is that of the Appalachian, or Alleghany Mountains, which extend in long parallel chains in the same general direction as the Atlantic coast.

Lakes.—A chain of magnificent lakes (Lakes Superior, Michigan, Huron, Erie, Ontario) lying between the two great mountain systems is drained by the St. Lawrence into the Atlantic

Lake Superior is the Largest body of fresh water in the world, its area (31/200 square miles) equal to two-thirds of that of Assam, its length (350 miles) about equal to the distance from the mouths of the Ganges to the base of the Himalayas. Farther north are numerous lakes, large and small, often very irregular in outline, the principal being Great Bear Lake, Great Slave Lake, Athabasca, and Winnipeg.

Rivers.—The great rivers of the plain (the St. Lawrence and the Mississippi) are of the highest importance as water-ways,¹ and the minor rivers of the east are likewise of great service to internal communication, inasmuch as their valleys intersect the chains of the Appalachians, and so form a number of gaps, which have facilitated the laying of roads and railways across these mountains.

Climate.—In accordance with the general correspondence between North America and Eurasia, the climate of the west of the former continent answers to that of western Europe, that of the east to that of eastern Asia; but the climate of the east of North America is not so severe as that of eastern Asia, while, in consequence of the superior warming effect of the Gulf Stream Drift as compared with the Kuro Siwo Drift, the west coast is not so mild as in corresponding latitudes of Europe.² Hence the most populous (warm temperate) regions of the east in America are somewhat farther north than the corresponding regions of

¹ See pp. 280, 284.

² See *Introd.*, pars. 79, 91.

eastern Asia, those of the west of North America somewhat farther south than the corresponding regions of Europe.¹

Important differences in climate are due to the direction of the mountain chains. First, the Rocky Mountains, shutting off the moisture from the Pacific, cause a large part of the interior of the north of the United States to be too dry for agriculture without irrigation. Second, the open plain between these mountains and the Appalachians allows even the most southerly points of the United States, as well as the east coast of Mexico, to be swept from time to time by icy winds from the north,² so that ice forms at the mouth of the Mississippi, in lat. 30° N.; and even in the extreme south of Texas (lat. 26° N., about the same latitude as that of Patna, in Bengal), as much as nine degrees of frost has sometimes been experienced.

Vegetation and Animal Life.—The dry plains of the interior, the prairies, are almost treeless except near the river-banks. In some parts, however, the true prairies, there is an abundance of rich grasses which once afforded food to vast herds of the American bison, the so-called buffalo, an animal ruthlessly shot down and now nearly extinct. The still drier parts of the plains are the home of another misnamed animal, the burrowing prairie-dog, and where it haunts the scene, thick-stemmed, fantastic-looking, leafless but bright-flowered cactuses, resembling the African euphorbias, generally form the most conspicuous vegetation. In these drier regions clouds of locusts and other noxious insects not infrequently commit their ravages, and now and then their devastations extend even into the regions of cultivated fields

COUNTRIES OF NORTH AMERICA.

1. GREENLAND AND THE ARCTIC ARCHIPELAGO.—

Greenland is a large mass of land or group of islands (it is uncertain which), almost completely buried under ice, which reaches in some parts to more than seven thousand feet above sea-level,

¹ Note the latitudes mentioned at the head of this section

² Called in the United States, 'Northerers;' in Mexico, 'Nortes.' Comp. Intiod., par. 94 (a).

and which in the numerous inlets of the coast has its ends broken off to form icebergs.¹ There are a few Danish settlements on the west coast.

The inhabitants are mostly Eskimo, who live, like their unsettled kinsmen of the more northeily parts of Greenland and on the north coasts of the mainland of America, chiefly by seal and whale fishing, pursuing these animals in peculiar boats called *kayaks*. Between Greenland and the Arctic Archipelago lies Baffin's Bay, with Smith Sound and its continuations, by means of which the nearest approach has yet been made to the North Pole.² Only one or two of the islands of the Archipelago are inhabited (by Eskimo). Between them a north-west passage to eastern Asia was sought for centuries in vain, and though a passage was at last effected by McClure between 1850 and 1853, the route is too encumbered by ice to be of any use for commerce.

2. BRITISH NORTH AMERICA—A. The Dominion of Canada, north of the United States, from which it is separated partly by the middle line of Lakes Superior, Huron, Erie, and Ontario, partly (west of the Lake of the Woods) by the parallel of 49° N. Below Lake Ontario the boundary for about 275 miles is formed by the River **St. Lawrence**, but the remainder of the St. Lawrence (more than 1,000 miles) is wholly Canadian. The Dominion embraces a territory upwards of three millions of square miles in extent, but the more populous portion of this vast area is confined to a region of less extent than the Punjab, lying between the eastern shores of Lake Huron and the city of Quebec on the St. Lawrence.³

Surface, Climate, and Products.—The **surface** east of the Rocky Mountains is generally level or undulating, and **tundras** similar to those of northern Russia and Siberia⁴ cover large tracts in the north, descending in the east to the southern shores of Hudson's Bay, and still farther east along the whole coast of Labrador. There next follows a region of vast **forests**, chiefly of pines and firs, yielding immense quantities of **timber** as well as **furs**.

South of the forest region there lies in the west, between the

¹ See Introd., par. 100.

² By the British expedition under Nares in 1876, 83° 20' N. ; by the United States expedition under Greely in 1883, 83° 24' N. In both cases the highest latitudes were reached by dragging sledges over ice.

³ Even here the density is far below 100 to the square mile.

⁴ See pp. 64, 237.

Rocky Mountains and the Great Lakes, an area of level plains or gently rising table-lands almost destitute of trees—the commencement of the American prairies. These plains, containing at present the merest sprinkling of inhabitants, comprise tracts of the highest importance for the future development of the Canadian Dominion. The soil is in some places¹ of the richest description, and the climate, though very different from that of



FIG. 61.—TIMBER (LUMBER) FLOATING ON A CANADIAN RIVER.

any part of India, and even of England, is admirably adapted for the cultivation of wheat. Two feet of snow may cover the ground from December to March, but the warm though short summers are sufficient to ripen wheal in three or four months.-

Methods of Agriculture.- The state of agriculture in these

¹ See below, under Manitoba.

² Comp. Siberia, p. 237.

regions, in which the greater part of the produce is grown for export, is very different from that which exists in India or in Europe. Compared with India, the variety of crops is small—as small as in Russia.¹ But the region differs both from India and Russia in the cheapness of the land, and, in consequence of that, the large size of the farms. There are still vast tracts of land belonging to the Government, which offers 160 acres (equal to perhaps thirty times the size of an average Indian farm) free of cost to any one who will undertake to settle upon the land thus granted and bring it into cultivation. The population being scanty, however, labourers are few, and every possible means is employed to save human labour by the use of machinery in all the operations connected with growing and exporting the crop—in preparing the land, sowing the seed, reaping and storing the grain, and despatching it to seaports

Communications—For the development of this region, so remote from the markets* of Europe, the natural water-ways are of the highest importance. From the mouth of the St. Lawrence it is possible for ships to ascend, with the aid of a few canals, to the head of Lake Superior, and thence with little interruption the journey by water may be continued to the head-waters of the Saskatchewan, a distance of 4,500 miles in all. One of the interruptions to navigation (avoided by a canal) on this system of water-ways is formed by the Falls of Niagara, at which a river more than half a mile wide, forming the connection between Lakes Erie and Ontario, is precipitated over a cliff upwards of 150 feet in height. The water-ways are, of course, supplemented by railways, and since November 1885, when the Canadian Pacific Railway was completed, there has been railway communication across the entire Continent within the Dominion. This railway is now (1891), part of the quickest mail-route from England to China and Japan.

The chief **mineral products** are coal and gold. (See below under Provinces).

Foreign Commerce—Timber, agricultural produce, and dried fish make up the bulk of the exports; manufactured articles, coal, and sugar, tea, coffee are the principal imports. The United States and the United Kingdom are the principal countries with which the trade is carried on.

People.—The inhabitants of Canada are **mainly of British origin**; but about one-third of the population is of French descent.

¹ See p. 238.

This portion of the inhabitants is found principally in the east (Quebec, &c), these regions having been originally colonised by the French, from whom they were gained by the English in 1759. There are about 120,000 Indians, most of whom are hunters, roaming over the forest regions of the north-west, and living by the sale of furs to the fur-trading companies. •

Government.—The Dominion, though having a general government and parliament for the common affairs, is divided into a number of provinces, each of which has a parliament of its own, to deal with matters of local interest; but there is a large territory on both sides of Hudson's Bay which is not so organised. The seat of the general government is Ottawa, a small town on the river of the same name about ninety miles above its confluence with the St. Lawrence.

Provinces and Towns.—(1.) Nova Scotia, a province including both the peninsula of that name and the island of Cape Breton, in the north • in all, rather smaller than the island of Ceylon. It is rich in coal (which furnishes an export to the United States), and has gold-mines and extensive fisheries. Capital, Halifax, on the east coast.

(2.) Prince Edward Island, about one-third larger than Coorg, in the bay between New Brunswick and Nova Scotia, south of the Gulf of St. Lawrence. Capital, Charlottetown.

(3.) New Brunswick, rather larger than Ceylon, a province rich in forests, and with valuable fisheries and extensive shipbuilding. Capital, Fredericton, in the interior; largest town, St. John, on the Bay of Fundy.¹

(4.) Quebec, on both sides of the St. Lawrence, mostly east of the Ottawa, the principal tributary of the St. Lawrence; a province three-fourths larger than the Punjab, but with less than 1,500,000 inhabitants. Capital, Quebec, on a commanding promontory jutting into the St. Lawrence; the headquarters of French Canada,² MONTREAL (210), about 200 miles (by river) higher up the St. Lawrence, at the head of the ocean navigation of that river,³ and the eastern end of the canals which avoid the rapids of the St. Lawrence; it is the chief seaport of the Dominion, and is rapidly growing in prosperity.

(5.) Ontario, a province of about the same size as Quebec, but with a larger population (nearly 2,000,000). Capital, TORONTO, on Lake Ontario, another highly prosperous town, about 300 miles above Montreal. Ottawa, the capital of the Dominion, lies in this province.

(6.) Manitoba, a province somewhat more than half the size of the Punjab, but with a population of little more than one to the square mile,

¹ See Intro., par. 73.

² The capture of Quebec by General Wolfe in 1759 secured for the English the possession of French Canada

³ See Intro., par. 112.

accordingly not half so great as that of the city of Delhi or Lahore. The province is, nevertheless, important in the commerce of the world, on account of the rapid extension of wheat-cultivation on the rich soil of the Red River valley within the province. Capital, **Winnipeg**, on the Red River.

(7) **The North-West Territories**, of vast extent, but still more scantily peopled. Capital, Regina.

(8.) British Columbia, four times the size of Great Britain, occupying the dry table-land of the Rocky Mountains, with the moist mild strip of coast, and the islands to the west. The principal wealth of the province consists in its minerals (gold and coal) and forests. Victoria, at the southern end of Vancouver's Island, is the capital.

B. **Newfoundland**, a separate colony, to which also belongs the dreary and scarcely inhabited Atlantic coast of Labrador. The island is less than twice the size of Ceylon. The inhabitants (less than 200,000) are chiefly fishermen, settled on the coast. The seal and cod fisheries in the surrounding waters are the largest in the world. Capital, St. **John's**, on the east coast.

C. **The Bermudas**, a group of small islands about 750 miles south of Nova Scotia, producing tropical and temperate fruits, and frequented by invalids for the sake of their equable climate.

3. **UNITED STATES**.—The territory belonging to the United States comprises an area of three millions of square miles between Canada and Mexico, besides an area of nearly 600,000 square miles, forming the territory of Alaska, in the north-west of the continent.

Surface, Drainage, and River Navigation.—A brief account of the surface is given in the general description of North America, and here it need only be added that almost the whole of the vast plain between the Rocky Mountains and the Appalachians is drained into the Gulf of Mexico by the **Mississippi** and its tributaries, all of which **are** of the highest importance as channels of commerce.

The **Mississippi** itself is navigable from St. Paul, in Minnesota; and all its great tributaries—the **Tennessee** and the **Ohio** on the left bank, and the **Arkansas** and the **Missouri** on the right—are navigable for hundreds of miles (the Missouri for more than two thousand miles) above their confluence with the main stream. The rivers of the Atlantic coast, with the exception of the **Hudson**, are of less importance as navigable streams, but, nevertheless, are of great value to commerce, as forming, like the rivers of Great Britain, fine harbours in their estuaries.

Products.—The principal products are **food supplies and raw materials of manufacture**, both for the use of the people of the country and for export to the industrial countries of Emope, and above all to the United Kingdom. From one-half to two-thirds of the **wheat, flour, maize, raw cotton**, and live cattle, and nearly four-fifths of the meat imported into the United Kingdom, come from the United States. In the parts of the country where most of the agricultural produce is grown for export, the conditions of agriculture are similar to those above described under Canada. The variety of crops, however, increases as we go southwards.¹

The **mineral wealth** of the United States is also enormous. **Coal, iron, petroleum, copper, quicksilver, and the precious metals**, are all found in extraordinary abundance, and in the amount of the annual production of all of these, except coal, the United States are now ahead of all other countries in the world. The annual production of coal is still below that of the United Kingdom, but at the rate at which it is now increasing, the United States will in a few years stand first under this head also.

The total area of the productive coalfields of the United States is estimated at nearly 200,000 square miles, or from fifteen to twenty times as much as that of the European coalfields. At present the production of coal is most abundant in Pennsylvania³ and along the west of the Appalachian Mountains from Ohio³ to Alabama.³

In keeping with the rapid increase of the coal production, **manufacturing industries** of all kinds are growing vigorously. The products of these industries are, however, mainly required to meet the home demand.

Government.—The government is republican, the head of the state being an elected president, and the legislative body an elected parliament called the Congress, which meets at Washington (p. 288). Each of the States, however, is a separate republic so far as its own local affairs are concerned (whence the term United States). Originally British colonies, the communities constituting the nucleus of the present United States declared their independence in 177C, and ultimately formed thirteen original States. There are now **forty-four States**, besides **five**

¹ See p. 288.

² Names of "states," see below under **Government**.

Territories, which have not the same amount of local independence as the States.

People.—As in Canada, the people are mainly of British descent, but the population is becoming every year more mixed owing to the large numbers of immigrants from all European countries. The majority of these immigrants come from the British Isles and Germany. The English language prevails over the whole of the United States, and in all the states is the official language. About one-eighth of the people are negroes, originally introduced as slaves. The descendants of the native Indians are now few in number.

Foreign Commerce.—Agricultural products of all kinds make up, as in India, the great bulk of the exports, mineral oil being the most important which does not come under this head. The principal imports are sugar, coffee, and manufactured articles (chiefly silks and woollens). The country that has the largest share in the commerce is the United Kingdom. Indigo, hides, and oil-seeds are the most important commodities derived from India,¹ and mineral oil (kerosine) is the only great export to India. Tea is a much smaller import into the United States than coffee, and the tea drunk in the United States comes almost entirely from Japan.

With regard to its climate and productions, the territory of the United States may be divided into four regions, two east and two west of the meridian of 100° W.

A. The North-East.—North of the Ohio and Delaware Bay. In this region the inhabitants are almost all of European origin, and the products are similar to those of Europe. The eastern portion of it is the most densely peopled part of the United States, and that in which manufacturing industries are most highly developed, so that a large part of the agricultural population is migrating hence to the regions of the west, whither the surplus population of Europe is flocking.

Town*.—(a.) On or near the Coast.—At the mouth of the Hudson, opposite the lower end of Long Island, NEW YORK, in the state of the same name, the largest town in the New World, containing, with its suburbs of BROOKLYN² (on Long Island, also in the state of New York)

¹ Com p. p. 124.

² Now connected with New York by a bridge.

and JERSEY CITY (New Jersey),¹ on opposite sides of its harbour, a population of above two millions. As a seaport it ranks next after Liverpool and London. At the head of sea-navigation on the Delaware, ninety miles south-west of New York, **PHILADELPHIA** (Pennsylvania; with suburbs

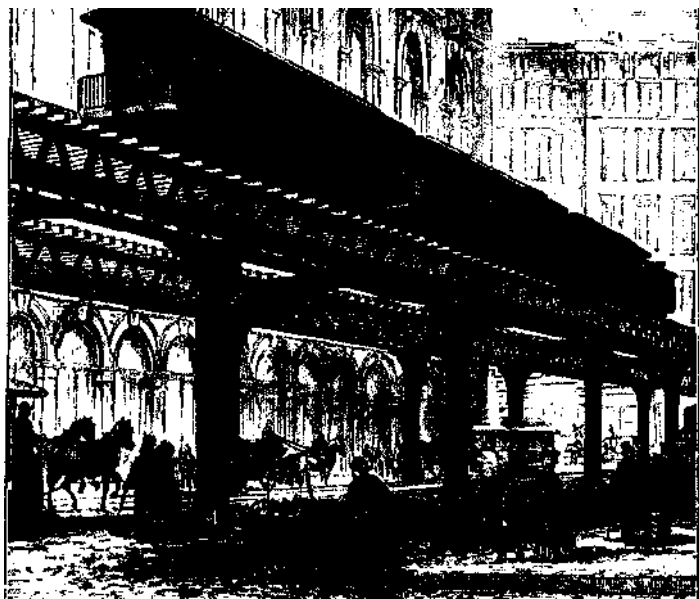


FIG. 52.—AN ELEVATED STREET RAILWAY, NEW YORK.

1,000), the second largest town, and the principal manufacturing town in the United States; on Massachusetts Bay, 200 miles north-east of New York, **BOSTON** (Massachusetts; with suburbs 450), another great seaport and manufacturing town.

(b.) On or near the Great **Lakes**.—At the east end of Lake Erie,

¹ The names in brackets are those of the States to which the towns belong.

BUFFALO (New York), the terminus of the Erie Canal, which connects the great lakes with the Hudson River, a town with a large trade in grain* and timber; DETROIT (Michigan), opposite the extremity of the lake peninsula of Canada; CHICAGO (Illinois, 1,100), at the head of Lake Michigan, unrivalled for its trade in grain, animal products, and timber, and remarkable for its rapid rise, its site having been occupied in 1830 by only about a dozen families; MILWAUKEE (Wisconsin), on the west coast of the same lake, with a trade similar to that of Chicago.

(c) On the Mississippi and its Tributaries.—In Minnesota, at the head of continuous steam-navigation on the Mississippi, ST. PAUL, a rapidly rising seat of trade, and close beside it MINNEAPOLIS, an equally prosperous city, which owes the rise of its vast flour-milling industry chiefly to the water-power afforded by the falls of St. Anthony; a little below the confluence of the Mississippi and Missouri, ST. LOUIS (Missouri, 450), another town remarkable for the rapidity of its rise, situated at the lowest point at which the Mississippi is bridged.¹ At the point where two headwaters unite to form the Ohio lies PITTSBURGH (Pennsylvania), in the centre of a region yielding coal, iron, petroleum, and natural gas² in great abundance, the town with the largest manufactures of iron and glass in the country. Near the most northerly point of the great northern bend of the Ohio,³ at the head of navigation for the larger Mississippi steamers, stands CINCINNATI (Ohio, 300 with suburbs), a great centre of trade and manufactures.

B. The South-East, a region in which tobacco and cotton are grown as staples, and in which the negro population is very numerous. Among other characteristic crops are rice in the swamps of Carolina, sugar-cane in Louisiana, and oranges in Florida. The rainfall of this region, at least in the south-east, is much heavier than to the north of the Ohio, and occurs mainly in summer; the prevailing winds having a monsoon character,⁴ in summer from, in winter towards, the Gulf of Mexico.

Four towns in this region have a population exceeding 100,000. Near the head of the fine inlet of Chesapeake Bay, BALTIMORE (Maryland, 460); at the head of the estuary of the Potomac, which opens into Chesapeake Bay, WASHINGTON, the seat of the general government of the country, in a small district called the District of Columbia, not belonging to any state; near the mouth of the Mississippi, NEW ORLEANS (Louisiana, 240), the chief cotton port of the United States; on the left or south bank of the Ohio, LOUISVILLE (Kentucky), centre of the tobacco trade.

¹ See *Introd.*, par. 113 (a) and (c)

² This gas, which issues from holes in the ground, and can be used without preparation for light and fuel, is extensively employed in the smelting of iron and other manufactures.

³ See *Introd.*, par. 118 (b).

⁴ See *Introd.*, pars. 67 and 90.



FIG. 53.—SCENE IN THE CANON REGION OF THE UNITED STATES

Richmond (Virginia), on the James River, Charleston (South Carolina), and Savannah (Georgia), all on the east coast, are important seaports, the first exporting chiefly tobacco, the other two cotton.

C. The region between 100° and 120° W., comprising an area of about 1,200,000 square miles (about ten times as great as the British Isles), may **fee** known as the arid region of the United States, inasmuch as throughout this area (except in the neighbourhood of mountains)¹ the rainfall is too scanty for agriculture without irrigation. The region is hence extremely thinly populated, containing on an average only about one person to the square mile, and, except in the mining districts, the inhabitants are chiefly employed in the rearing of sheep and cattle. The principal mines in this region are of silver, in Colorado and Nevada.

A large part of the region between the Sierra Nevada in the west and the Wahsatch Mountains in the east is an area of inland drainage known as the Great Basin, near the east of which is the Great Salt Lake (Utah), at the height of 4,200 feet above sea-level. Adjoining this lake the Mormons² have their settlement round Salt Lake City. Vast tracts of this region are absolutely desert, these being situated principally in the southwest, on different bides of the Rio Colorado (Mohave, Gila, and Painted Deserts). The last mentioned desert takes its name from the extraordinary-character of the scenery. There the river* Colorado and its tributaries have their beds sunk in tieinendous gorges with precipitous sides (canons), such as are represented in the cut on p. 289 ; but the effect of the scenery there delineated is enhanced by the dazzling colourning of the rocks, on which 'we behold belts of fierce staring red, yellow, and toned white, which are intensified rather than alleviated by alternating bands of dark iron grey/ Farther north is another remarkable area known as the Yellowstone Region, in which tremendous geysers³ and numerous boiling springs are found along with canons and 'painted' rocks.

D. **The Pacific Coast.**—In this section of the United States the climate is like that of western Europe—with mild winters and moderately warm summers.⁴ Gold, which first attracted a large population to this part of the world, is still an important product; but the fine **Californian valley**, between the Sierra Nevada in the east and a range of mountains near the coast, ifbw teems with wheat, maize, wine, and fruits such as are grown in the Mediterranean countries.⁵

¹ See Introd., par. 94.

² A peculiar religion feet which sarilctions polygyny.

³ See Introd., par. 57.

⁴ See Introd., par. 01.

⁵ See p. 189.

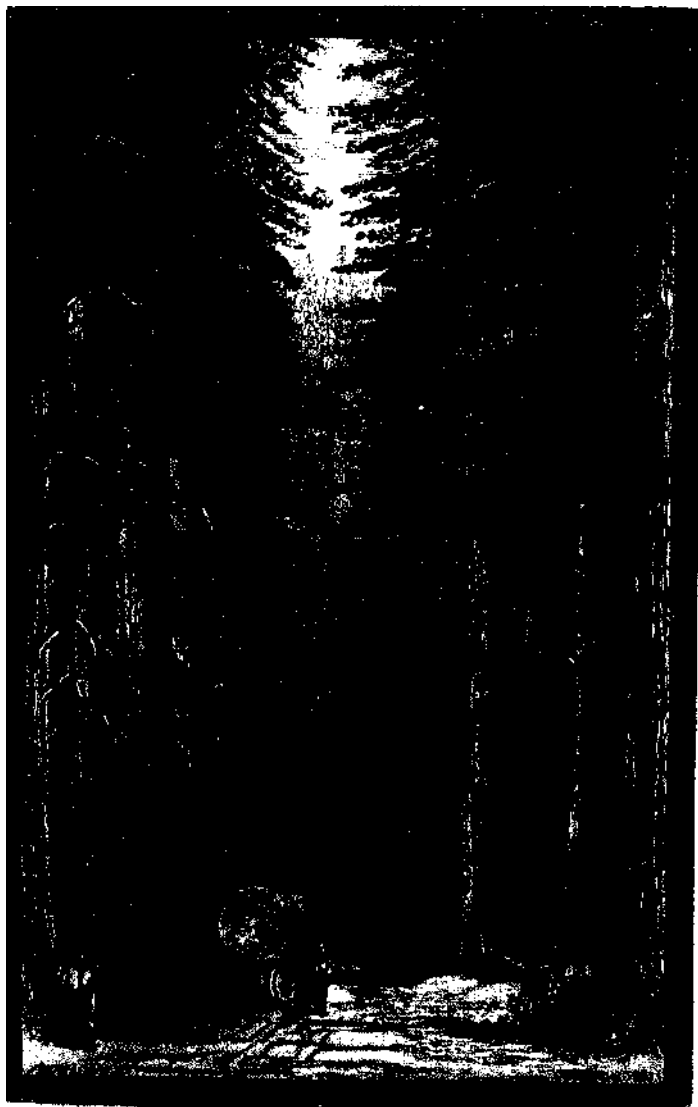


FIG.. 54.-SCENE IN A FOREST OF GIANT CONIFERS ON THE SIERRA NEVADA, U.S.

On the mountains the **forest scenery** of this region is highly remarkable. Favoured by copious rains, the western slopes of the mountain[^] are crowded with gigantic cone-bearing trees—firs and pines, besides two species of Sequoia, the red-wood, and the mammoth tree, the latter of which is rivalled in height and girth only by some of the gum-trees or Eucalypti of Australia. An enormous **timber-trade** has grown up round the fine inlet of **Puget Sound** in the state of Washington, in the north of this region.

The only large town is **SAN FRANCISCO** (California, 300), situated on a bay which forms a break in the coast range of mountains, and affords access to the middle of the Californian valley. The bay forms one of the finest natural harbours on the west coast of America, and this fact, together with its situation has made San Francisco the principal seaport on the west of the continent. San Francisco is the western terminus of the first of the Pacific railways, that is*, the railways connecting the Atlantic and Pacific Oceans across the broader part of the continent.¹ This railway was completed in 1869.

E. Alaska is a thinly-peopled territory on the north-west of Canada, producing chiefly furs. It is traversed by a magnificent river, the **Yukon**, which pours into the sea half as much water again as the Mississippi. It is principally valuable on account of the **fur-seals**, which are slain in immense numbers on two small islands to which they resort in Bering Sea.

4. MEXICO, which lies to the south of the United States, between about 32° and 15° N., has a total area equal to about seven times that of the Punjab, but the northern part forms a continuation of the arid and desert region of the United States.² The densest population is found in the section to the south of the Tropic of Cancer, and more particularly on a portion of the **plateau of Anahuac**, which lies at an elevation of 7,500 feet above sea-level. Here, on an area about equal to that of the Punjab, is settled at least two-fifths of the entire population.

This elevated table-land, surrounded by mountains, many of which are the cones of active or extinct volcanoes, forms what is called the **cold region** of Mexico, and **temperate** and **warm regions** are successively entered as one descends the outer slopes of the mountains that bound it. On the table-lands the **products**, in consequence of the elevation, are not unlike those of Europe—**maize** (the principal food of the people), wheat, and barley; but there is one product that has always formed a very marked

¹ The Panama Railway (see below, p. 302) was completed in 1855.

² See p. 290.

feature of Mexican agriculture. This is the agave or American aloe,* grown chiefly for its sap, which, when fermented, yields the favourite drink of the Mexican people, called pulque. On the well-watered mountain slopes and lowlands outside the table-land are grown tropical fruits, coffee and cacao, sugar, tobacco, vanilla. The arid and low-lying peninsula of Yucatan yields



Fig.- 55 AN AGAIN. PLANTATION, MEXICO, WITH AN

(by the kind permission of Mr. Cuius, Curator of the **Map** Department, Itoyal Geographical Society.)

a great abundance of fibre-plants, one of which (allied to the agave), furnishes a fibre called henequen. which is used for the same purpose as jute, and is becoming every year a more valuable export. On the tableland irrigation is necessary, and the Spanish settlers have constructed great aqueducts similar to those which have existed in Spain since Roman times. **Silver** is tound in great abundance in many places, and gold is also an

important product. Together these form about seven-tenths of the value of the exports.

Among the people the dominant race consists of Europeans of Spanish origin (Creoles), but these are greatly outnumbered by natives and mixed breeds (Mestizoes).

Hundreds of years before the arrival of Europeans the plateau of Anahuac was the centre of powerful native empires—first that of the Toltecs, then that of the Aztecs—and monuments of both still remain scattered over Mexico and Central America. The empire of the Aztecs was overthrown by the Spanish adventurer Cortez in 1521, and till the present century Mexico remained a Spanish dependency, but ultimately the people threw off the yoke of the mother country, and founded a federal republic (1824). The capital of the republic is MEXICO (300), situated on the tableland of Anahuac.

5. CENTRAL AMERICA.—The territory to the south of Mexico is chiefly divided among five small republics, Guatemala, San Salvador, Honduras, Nicaragua, and Costa Rica, the largest of which have an area equal to about half that of the Punjab, while the population does not in any case exceed 1,500,000.

The general character of the surface is similar to that of Mexico, but the elevation is on the whole lower. The elements of the population are also much the same as in the latter state. The products are those of the tropical parts of Mexico, coffee being the chief, though indigo, india-rubber, and various drugs, are of importance. Valuable timber and dye-woods are obtained from the forest, and Belize, in British Honduras, the only place with a good harbour on the Atlantic coast, is a great place of export for mahogany. British Honduras is a crown colony, with an area equal to less than one-third of that of Ceylon, and a population of about 25,000. Guatemala is the largest town in Central America.

6. WEST INDIES, a group of islands with a situation similar to that of the Eastern Archipelago, but differing from the latter in that they all lie to the north of the equator, and in having a much smaller aggregate area.

Their whole area is less than that of Great Britain, or only about one-third of that of the island of Borneo. Their total population is about five millions, the two largest islands, Cuba and Hayti, being very sparsely peopled.

The group is divided into the Greater Antilles in the west, the Lesser Antilles in the east

All the islands except the Bahamas, which are flat coral islands,¹ are more or less mountainous. The mountains and

¹ See Introd., par. 45, n. 1 (p. 22).

higher parts of the islands generally are covered with dense woods, to which palms and tree-ferns give the prevailing aspect, though mahogany, ebony, and other valuable timber trees are also numerous. The rainy season coincide,s pretty nearly with that of India, During the month of September, when the sea is at its hottest, the winds are very variable, and hurricanes¹ are then most frequent.

The chief food of the people is derived from the fleshy underground parts of three different plants, manioc,² yams, and sweet potatoes, and the chief plantation crops (grown for expoit) are sugar, coffee, tobacco, and tropical fruits (principally bananas). Except iron ore in Cuba, mineral products are of little importance, and the only important product from the animal kingdom LS sponges.³

The population is entirely descended from natives of other continents—Europe, Africa, and Asia At the time of their discovery by Columbus,⁴ the West Indies weie inhabited by a pretty dense population, but on most of the islands the natives were speedily exterminated through the barbarities of the invaders. Hence a large proportion of the inhabitants are the descendants of negroes, originally slaves, but now all free. Indian and Chinese coolies have been introduced as labouiers since the liberation of the negroes, in consequence of the unwillingness of free negroes to work.

With the exception of Hayti, which is now divided between the Republic of Hayti in the west and that of San Domingo in the east, all the islands now belong to European Powers; Spain still holding the largest area, Great Britain the next largest, while Prance, Holland, and Denmaik possess the remainder.

1. To Spain belong : (1) Cuba, noted for its tobacco as well as its Migar. Its most populous pait is in the west, where there are several railways, and where on a tine bay on the north coast is situated the capital, HAVANA, the only large town in the whole archipelago. (2) Porto Rico, in which coffee is the product next in importance after sugar.

¹ See In trod., par. 66.

² See the top of p. 301.

³ Sponges consist of a horny skeleton of a kind of animal, the living part of which consists of a slimy substance investing the skeleton

⁴ The first laud reached by Columbus in the New World (in 1492) was one of the Bahamas, probably Watling Island.

2. To Great Britain belong. (1) Jamaica, south of eastern Cuba, in which tiopical fruits, sugar, coffee, and pimento¹ are the most important product; chief poit, Kingston, on the bouth coast. (2) The Bahamas. (3) The Leeward Islands,- composed of all the British islands between Porto I?ico and Dominica, and including the latter. The principal products of the group are sugar, limes, tamaiinds, and arrowroot. (4) **The** Windward Islands,² including all the islands between Maitmique and Trinidad; principal, Grenada. (5) Barbados, the most densely peopled of the island^, where accordingly the negioes are obliged to work in oidei to gain a subsistence. (6) Trnidad and Tobago, opposite the delta of the Orinoco. Trinidad has a rich soil in the west, producing **sugar** and cacao, and is remarkable for the possession of a large asphalt lake in the interior.

3 To France belong the islands of **Guadeloupe** and Martinique, besides some smallei islands

4. To Holland belong the three consuleiable islands of **Curacao**, **Aruba**, and Bonaire, or Buen Ane, along the north coast of Venezuela, besides two smaller islands and half of a third among those of the British Leeward group.

5. To **Denmark** belong Santa Ciuz, St. Thomas, and one or two other islands among the Virgin group.

SOUTH AMERICA.

Approximate latitudes: Caiacas (Saigon), 10° N. ; Quito (Stanley Falls, middle of Sumatra), 0°; Rio de Jaueno, 23° S. ; Buenos Ay res (Adelaide), 35°.

Approximate longitudes : 35° to 82° W.

Position, Area.—South America has an area about twice that of Europe, and has its broadest part, in all four-fifths of its area, within the torrid zone.

Surface, Drainage.—The **Andes or Cordilleras**, the longest chain of mountains in the world, traverses its whole length parallel to the west coast. The southern part of this system is single, unless the mountains of the islands that here fringe the Chilean coast be considered as belonging to the Andes; but

¹ Also known as *Jamaica pepper* and *allspice*.

² This use of the terms Leeward and Windward Islands is confined to Britain, and is quite inappropriate to the facts of the case. There is better justification for other two uses of the names adopted elsewhere. Some geographers apply the name Windward Islands to the Lesser Antilles, as being directly exposed to the trade-winds; that of Leeward Islands to the Gi eater Antilles. By others, again, the latter name is applied to the islands along the north coast of Venezuela.

north of that fringe two chains can generally be made out more or less distinctly, and about the point where the coast begins to trend north-westwards the main chains diverge most widely and enclose a tableland varying from 11,000 to 16,000 feet in height, and about 400 miles in breadth.¹ The chains again converge towards the equator, a little to the north of which the system divides into three, enclosing elevated valleys which gradually slope towards the north. These are drained by two rivers, the **Magdalena** and **Cauca**, which unite before falling into the **Caribbean Sea**. The greater part of the system is highly volcanic, and the whole coast which they face is subject to earthquakes.² The highest summit in the chain is believed to be **Aconcagua**, about 32° S., which attains an elevation of nearly 23,000 feet.

Two tablelands crowned with mountain ranges, whose general direction is also parallel to the nearest coast, occupy the north-east and the east of the continent, the first forming the highlands of Guiana and eastern Venezuela, the other those of Brazil. Between these highlands and the Andes stretch the great plains of South America, drained by the three great rivers, the **Orinoco**, the **Amazon**, and the **Paraguay** (of which the lower **Parana** forms a continuation). These rivers are all magnificent navigable streams. The **Orinoco**, the upper half of which describes a somewhat semicircular course, is navigable for nearly 1,000 miles; the Parana and Paraguay are navigable continuously to the interior of Brazil; and the Amazon is more important than either in this respect, being navigable without interruption for 2,600 miles from its mouth, while 6,000 miles of navigation in all are afforded by the main stream and its tributaries. All the main tributaries of this river and of the Paraguay, including the upper part of the course of the Parana, have their navigation more or less interrupted by falls and cataracts.

Climate and Vegetation.—The climate of South America is greatly affected by the chain of the Andes, the two sides of which present striking contrasts as regards rainfall and vegetation everywhere, except in the extreme north. In the north copious rains with a rich tropical vegetation occur on both sides. The eastern plains of this region, forming the **Llanos** of the lower

¹ See section in diagram, p. 51.

³ See *Introd.*, par. 53.

Orinoco, are flooded during the rainy season (about the same period as that of India), and during the dry season, before they become quite parched, present to view chiefly vast expanses of grass.

The contrast of climate begins about 4° S. Thence to about 30° S. the east (trade) winds,¹ which blow from the Atlantic for the greater part of the year, deluge the eastern slopes of the Andes with rain,³ and cover them with dense forests as high as trees can reach. Dense tropical forests (selvas) likewise occupy the valley of the Amazon to its mouth. This region is like a vast Sundarban, the chief differences being due to the fact that everything is on a grander scale. In extent it is probably more than a hundred times as great as the Sundarban. The forest trees are loftier. Some of the innumerable streams by which the forest is everywhere threaded appear more like grand inland seas than rivers, so that on emerging from any of the smaller channels, the forest gloom is exchanged for brilliant sunshine.

South of the Amazon, however, the Brazilian coast mountains deprive the Atlantic winds of much of their moisture,² so that the tablelands and plains intervening between them and the Andes (the campos of Brazil and the northern part of the Gran Chaco) have only a scanty rainfall. On the west of the Andes, between the latitudes mentioned, no rain whatever falls except high up on the mountain sides, and moisture appears on the low grounds only in the form of mist (**garua**). Vegetation is consequently scanty except beside the rivers, and for six or seven degrees north of 28° S. the stop of coast is a desolate wilderness. South of latitude 30° S., the contrast is opposite to that just described. There the prevailing winds are from the north-west,³ and bring plentiful rains from equatorial seas to the western slopes of the Andes, and still farther south to the lowlands at their base; while on the eastern side, the plains (the treeless Pampas of the Argentine Republic and the bleak steppes of Patagonia) get drier and drier as one goes southwards. In this southern part, the western slopes of the Andes are as densely clothed with forests as the eastern slopes farther north; but the abundance of moisture has the effect of suddenly depressing the snow-line, which is between 8,000 and 9,000 feet lower behind the island of Chiloe (about latitude 40°) than it is seven degrees farther north.⁴

Animal Life.—The animal world of South America is surprisingly different from that of the rest of the globe, even from that of the neighbouring continent on the north—one proof among others that the two halves of the New World were separated from each other by water down to a comparatively recent geological period. Here and there alone are to be found

¹ See Introd., par. 62.

³ See Introd., par. 65.

²

⁴

See Introd., par. 94.

See Introd., par. 07.



great numbers of monkeys living entirely on trees and provided with tails which can be used in grasping, blood-sucking «bats, sloths, armadillos, llamas,¹ and alpacas,¹ a large number of gnawing animals like the rabbit (one of which, the vizcacha, burrows underground like the prairie-dog, and is as abundant in the plains of the south as the latter animal is in parts of North America),² besides a greater variety of parrots and humming-birds than are found elsewhere. The latter birds are absolutely confined to the New World. The **rhea**, a peculiar kind of ostrich, is to be seen on the southern plains.

People.—The population is still very scanty; according to the best estimate that can be formed, only about 36,000,000, or less than one-tenth of that of Europe. Four tenths of the population are estimated to be native Indians, two-tenths whites, one-tenth negroes (chiefly in Brazil), and the remainder mixed races, so that on the whole the Indian element still largely predominates. The white population in Brazil is of Portuguese origin, but elsewhere, except in Guiana, chiefly of Spanish descent, almost the whole continent having been divided between Spain and Portugal early in the sixteenth century.

SOUTH AMERICAN STATES.

1. BRAZIL, on the east side of the continent, formerly an empire, but since 1889 a republic. In size it is the rival of the United States and Canada. (See table, p. 349.) The population is about 12,000,000, the great majority of whom are either negroes or partly of negro descent. Many of the negroes were slaves down to the year 1888, when slavery was abolished. The population is densest in the coast provinces south of the equator. The interior is occupied chiefly by wandering native tribes. In tropical Brazil are grown all kinds of tropical products, but the **great staples** are **manioc, coffee, sugar, and cotton**, the three latter grown for export. Half the coffee produced in the world, though not the best, is grown in Brazil.

¹ Animals belonging to the same family as the camel, though differing considerably in appearance. They have no hump.

² See *Introd.*, par. 101.

The poisonous tubers of the manioc, when bruised and heated, yield tapioca, the principal food of large numbers of the people. Cacao and india-rubber,¹ are important products of the north. Among the hills in the portion of Brazil outside of the tropics (only about one-fifteenth of the whole), numerous colonies of Germans and Italians have been founded.

The principal towns of Brazil are on the coast. The capital is RIO DE JANEIRO (with suburbs 275), situated on one of the most beautiful land-locked bays in the world, forming an excellent harbour. On both sides of the equator the portion of the coast of Brazil exposed to the south-east trade-wind is flat, surf-beaten, and in many places bordered by sand-dunes - On this part of the coast BAHIA, or San Salvador, and PERNAMBUCO are the only important seaports.

2. Colonial **GUIANA**³ consists of three portions—one British, about equal to Great Britain in size, one Dutch (Surinam), and one French (Cayenne), each of the two latter rather more than half the size of Great Britain.

They are all engaged in the production of sugar, rum, and molasses. The labourers are negroes, mulattoes, and coolies. The capital of British Guiana is Georgetown, at the mouth of the Demerara.

3. **VENEZUELA**, a federal republic in the north of the continent, consisting chiefly of the basin of the Orinoco; population more than 2,000,000, the majority of whom are settled on a small area in the north-west, beyond the basin of the Orinoco, along the north and north-western slopes of the branch of the Andes which here runs north-eastwards through the territory.

People of Spanish, Indian, and negro descent, all now free, make up the population. The staple product is coffee; but cacao, cotton, tobacco, and sugar, besides other tropical products, are grown. Gold and copper are important minerals. The llanos of the Orinoco are devoted to cattle- and horse-rearing, but the number of the live-stock has greatly declined compared with what it once was. Capital, Caracas; chief ports, La Guayra and Porto Cabello.

4. **COLOMBIA**, a federal republic in the north-west, extending as far south as the equator, with a population of about 3,000,000, chiefly settled in the upper parts of the valleys of the Cauca and Magdalena, where, in consequence of the high elevation, the grains of temperate climates are grown.

¹ Obtained here chiefly from a tall tree allied to the manioc shrub, not from the species of fig-tree from which the tubers of India are mostly obtained, or the twining plant from which the substance is derived in Africa.

² See Introduction, par. 29 (1).

³ Part of Guiana belongs to Brazil and Venezuela

Bogota, the capital, at the height of 8,000 feet, has, though less than five degrees north of the equator, a very healthy climate, with a temperature like that of the valley of Kashmir. The **mineral wealth** is great, and gold and precious stones take a leading place among the exports, which also include cinchona bark, coffee, cacao, &c. The great channel of communication is the Magdalena, which is navigable as high as **Honda**, between 500 and 600 miles from its mouth. As yet there are few railways, but one of these is of high importance as forming the shortest connection between the shipping of the Atlantic and Pacific. The **Isthmus of Panama** belongs to Colombia, and here a depression in the mountains has allowed of the construction of a **railway** across the isthmus, at the height of 260 feet at



FIG. 57.—SCENE IN HONDA, COLOMBIA. (By the kind permission of Messrs. Hachette.)

the highest point, from **Colon**, or **Aspinwall**, on the Atlantic side, to **Panama**, on the Pacific side. Through the same **unhealthy** depression an attempt is now being made to pierce a **ship-canal**.

5. **ECUADORE**,¹ a republic chiefly south of the equator, but which owes its name to the fact that its capital, Quito, is almost under that line. The population is little more than 1,000,000, most of whom settled on the plateau between the chains of the Andes.

¹ **Spanish** = Equator.

Quito, situated at an elevation of between 9,000 and 10,000 feet, has a temperature all the year round like the winter months in the north of the Punjab. The only port is Guayaquil, whence cacao, grown on the western lowlands, is exported. To Ecuador belong the Galapagos, or Turtle Islands, a group situated on the equator, about 700 miles to the west.

6. **PERU**, a republic lying to the south of Ecuador, with a population of about 3,000,000, at least half of whom are pure Indians. It is composed of three zones—(1) a barren coast-strip, fertilised only here and there by rivers from the Andes, on the banks of which sugar-plantations are tended by Chinese coolies;



FIG. 58.—FRAGMENT OF AN OLD PERUVIAN WALL, CUZCO.
(By the kind permission of Messrs. Haehette.)

(2) the **sierra**, or valleys and tablelands of the Andes; on one of the highest of the tablelands lies **Lake Titicaca**, the largest lake in South America, at the height of 12,600 feet above the sea; and (3) the **inontana**, the region on the eastern slopes of the Andes, containing the head-waters of the Amazon, a region largely covered with impenetrable forests, of which the most valuable product is cinchona bark.¹ There are valuable silver mines and deposits of nitrate of soda - and guano.³

¹ Hence sometimes culled Peruvian bark. The cinchona tree was originally confined to the eastern slopes of the Andes. ² See p. 305, note.

³ Guano consists of the droppings of sea-birds.

The guano and nitrate of soda, which are both used for manure, are found on the coast-strip, the rainlessness of which¹ has allowed of the accumulation of these deposits. The silver mines belong to the Andes, the principal being at Cerro de Pasco, the highest town in the world—upwards of 14,000 feet above sea-level.

The capital is **LIMA**, an unhealthy city on the coast strip, a few miles from its port, Callao.

Before its conquest by the Spaniards under Pizarro in 1532, the empire of Peru, now one of the worst governed republics of South America, was the centre of the empire of the Incas, which extended over a large part of South America, and was in some respects even more remarkable than that of the Aztecs of Mexico. Under it the country was provided with fine roads, aqueducts and irrigation works (some of which can be utilised at the present day); and the government, though highly despotic, regulating the whole life of the people, was yet a mild despotism, and one that ensured the well-being of its subjects. Remarkable architectural monuments of this empire still survive at Cuzco, the residence of the Incas, as well as round Lake Titicaca and elsewhere.

7. BOLIVIA, formerly called Upper Peru, takes its present name from Bolivar, the leader in the movement by which the Spanish states in South America threw off the yoke of the mother country. It is now entirely an inland state, occupying the broadest part of the tableland of the Andes, with a **montana** to the east. The Bolivian **montana** is drained by the **Madeira**,² the principal tributary of the Amazon on its right bank, but this tributary has its navigation interrupted by falls and rapids for about 200 miles between Bolivia and Brazil.

The silver mines of Potosi, which made Peru so valuable a possession to the Spaniards, belong to this state and are still productive, though they no longer yield such enormous quantities of the precious metal as they supplied in former times. The capital is **Sucre**, on the part of the tableland drained to the east.

8. CHILE, a republic possessing the whole of the coast strip south of Peru, together with the islands that fringe that coast, including part of Tierra del Fuego and all the land on both sides of the Straits of Magellan. The northern portion of the country is part of the desert strip of South America. The middle portion (between about 33° and 38° S.) contains the bulk of the population, among whom whites predominate. Wheat forms a considerable export. The mountains yield metals, especially

¹ See p. 298.

² Portuguese = wood, so called on account of the forests which it traverses

copper; the northern desert furnishes **guano** as well as **nitrate of soda**.¹ The population is about 2,500,000.

The capital is **SANTIAGO** (200), on a fertile plain **VALPARAISO**, built on a line bay looking towards the north, is the leading seaport and commercial city on the west coast of the continent.

9. ARGENTINE REPUBLIC, a state occupying a territory of more than 1,000,000 square miles, with a population of about 4,000,000. Its territory consists of a vast plain sloping down to the Atlantic from the mountains in the west and north-west, and the provinces in which the population is most considerable and most rapidly increasing are chiefly those in the neighbourhood of the estuary of La Plata and along the banks of the lower Parana. Large numbers of immigrants settle in the republic every year, most of them from Italy.

In the pampas of the province of Buenos Ayres, south of that estuary, in **Cordoba** to the north-west, and in **Entre Rios**,² between the rivers La Plata and Uruguay, the dominant industry of the whole Republic, the rearing of sheep and cattle, is chiefly carried on. In the production of **wool**, the Argentine Republic ranks next after Australia. Along with wool, dried flesh (charqui), hides, &c., are the principal exports. In the **province of Santa Fe** on the right bank of the La Plata, tillage is rapidly extending, through the foundation by immigrants of agricultural colonies, which have of late years raised the republic to the rank of a wheat exporting state.

Patagonia, which is included in the territory belonging to the Argentine Republic, is mainly a stony desert, on which a few Indians (known for their high stature) live by hunting the rheas and guanacos³ and by fishing.

The capital of the Republic is **BUENOS AYRES** (435), on the shallow nearly tideless estuary of La Plata,⁴ which has silted up so rapidly since the foundation of the city by Mendoza in 1535, that large vessels have to anchor several miles out. Great works are now in progress with the view of providing a navigable channel to large docks that are to be constructed close beside the town.

¹ Known also as **cubic nitre** and **Chile saltpetre**. The saltpetre of Bengal is nitrate of potash, which is now, however, manufactured from the South American product, so that the price of the Bengal saltpetre has been reduced. See Appendix, par. 94.

² A Spanish name meaning "between the rivers."

³ A wild llama; see p. 300.

⁴ Even at the mouth of the estuary, to the south of Montevideo, the depth is nowhere **greater** than thirty-six feet. The rise of the tide is from four to six feet.

The islands of Tierra del Fuego, in the extreme south of the Continent, are divided between Chile and the Argentine Republic. They have a cold and dripping climate, and are inhabited by a small number of natives all formerly in the lowest stage of barbarism, though some of them have now been partially civilised by the efforts of Christian missionaries. The Straits of Magellan,¹ by which they are separated from the mainland, are stormy and washed by strong tides, and hence difficult of navigation, so that sailing vessels still prefer the equally stormy, but, for them, less dangerous, route round Cape Horn.

10. URUGUAY, a republic lying on the north of the estuary of La Plata, in which the chief occupations of the people are the same as in the Argentine Republic. The inhabitants are mainly of European origin, with little admixture of negro or Indian blood.

The capital is MONTEVIDEO, which has the best accommodation for shipping on the La Plata, but is less favourably situated than Buenos Ayres for internal trade. The small towns of Fray Bentos and Paysandu, on the Uruguay, have both become well known in Europe through their exports; Fray Bentos being the seat of manufacture of Liebig's extract of meat, and Paysandu of immense quantities of preserved meat.

11. PARAGUAY, an inland republic lying mainly between the Paraguay and Parana rivers, with a very sparse population, chiefly of native Indians.

Its chief product is the so-called Paraguay tea, or mate, which is generally used in the southern parts of South America as a substitute for tea and coffee, and is also grown in the neighbouring states to the south.

12. THE FALKLAND ISLANDS, situated to the east of the Straits of Magellan, belong to the British.

They have a damp, foggy climate, and are largely covered with peat, but are inhabited by a small number of settlers, engaged in the rearing of sheep and cattle. They are frequently visited for repairs and supplies by vessels that have made the passage round Cape Horn.

¹ So called because discovered and first navigated by a Portuguese navigator named Magalhaens in the first voyage round the world (1519-21). Magellan is the Spanish form of the name, and has been generally adopted because at the time of the voyage this seaman was in Spanish service. Both sides of the strait belong to Chile.

AUSTRALIA AND OCEANIA.

AUSTRALIA.

Approximate latitudes (mouth of Rovuma River, Africa), northernmost point, Cape York (mouth of San Francisco, South America), 11° S ; Adelaide (Buenos Ayies), 35° S. ; southernmost point, Wilson's Promontory (Bilna Blanca, South America), 39° S.

Approximate longitudes . 113° to 153° E.

Position, Size.—This vast island or continent, situated in the southern hemisphere between the Indian and Pacific Oceans, is about three millions of square miles in extent, and thus almost exactly equal in size to the United States exclusive of Alaska, and a good deal more than three-fourths of the size of Europe.

Outline.—Its **coast-line** is remarkable for its long stretches of uniform character, without inlets that can be made use of by shipping even for shelter. The part of the coast which is on the whole richest in inlets and natural harbours is that in the east and south-east. On the south coast, on the other hand, the long, gently curving coast-line which forms the **Great Australian Bight**, is one unbroken stretch of sandy beach, backed by barren cliffs a few hundred feet high. Between **Spencer Gulf**, which is the principal gulf on the south coast, and **Cape Leeuwin**, the first cape sighted by vessels coming from Europe by Suez or the Cape of Good Hope, the only good natural harbour is that of **King George's Sound**, about 200 miles from that cape. Equally uninviting is a large part of the west and north coast. On the shores of the warmer seas, within and near the tropics, there are long stretches of mud-flats covered with **mangroves**.¹ Such, for example, is the character of a large part of the coast-line that borders the shallow waters of the **Gulf of Carpentaria**, the **great gulf of the north coast**.

¹ See cut, p. 45.

Coral Beefs.—Off the whole of that part of the east coast of Australia which trends from south-east to north-west and ends in **Cape York**, numerous **coral reefs*** rise to the surface of the water, making the seas somewhat dangerous to shipping; and about one degree north of the Tropic of Capricorn there begins a series of coral reefs such as are to be seen nowhere else in the world over the same extent of sea. These form together the **Great Barrier Reef**. The whole length of the reef is about 1,200 miles, for it advances into the latitude of Torres Strait, which it nearly closes. The widest part of the reef is in the south, where it extends for about 100 miles from east to west, and in that part also it lies farthest from the coast. At low tide the surface of the reef is just about the level of the surface of the water, and at all states of the tide the edge of the **reef** can be distinguished by the strong breaker that wash over it. The reef, however, is not continuous. It is broken up by many deep channels, some of which are narrow, others from 10 to 12 miles wide. To seamen these channels are of importance, as allowing a choice of routes (an inner and an outer) between the seaports in the east of Australia and Torres Strait.

Torres Strait itself is greatly encumbered by the work of the coral-builders. The hundred miles of shallow sea here left between Cape York and the coast of New Guinea, besides being studded with numerous small islands, are crowded with coral reefs and sandbank*, amongst which there are only one or two safe channels for shipping.

Surface.—The chief feature of the surface of Australia, as of that of South Africa, is a range of highlands running from north to south near the east coast, and then turning westwards. In Australia it ends in that part of the continent that juts out farthest to the south. Throughout its length it is known as the Dividing Range, and it is a dividing range in more senses than one.² It varies in character in different parts. In some places it is a plateau, and presents the appearance of a steep mountain range only on its outer or eastern face. In some places the plateau is crowned by mountain ranges running in different directions. In the south-east, where the highest elevations occur, it forms a true mountain range, the Australian Alps, sinking down to plains on both sides.

Climate.—This structure of the land, together with the situation in warm latitudes, causes the interior of Australia to be one of the most arid regions of the earth. In winter, when the pressure of the air is high over the interior, the winds blow chiefly from the land seawards, and in summer, when the winds blow from the sea towards the land, the hot air retains as vapour

¹ See note to *Introd.*, per. 40 (p. 22).

³ See next paragraph.

such moisture as is not condensed on the edge of the plateau.¹ Nevertheless occasional rains do fall in the interior, and in such quantity as to fill wide watercourses, which have been met with in different parts by explorers. This accounts for the occurrence in the interior of great quantities of underground water, which in some places it is possible to bring to the surface by means of Artesian wells.² The east coast strips are those which are most plentifully supplied with rain, which is brought by east, north-east, and south-east winds, chiefly in the Australian summer. In the north and north-east of the island, the rain-bringing winds are true monsoons,³ and the rains are as abundant as in other tropical countries. The south-west of Australia is the only part that receives winter rains, brought by north-west winds corresponding to the south-west winds of western Europe.

Rivers.—An account of the Australian climate was necessary to explain the character of the Australian rivers. The Murray River, in the south-east, is the only important river of the interior which reaches the sea, and though about twice as long as the Godavari, it is not navigable for any great distance above its mouth, except during the rainy season, and then only for vessels of light draught. Its tributaries, the **Darling** and **Murrumbidgee**, both on its right bank, are also navigable for only a portion of the year. Most of the rivers of the interior are only temporary torrents, and dry up in salt plains or terminate in shallow salt lakes, some of which entirely disappear at times by evaporation.⁴ The coast streams on the east side are mostly short mountain torrents, liable to floods like those of the Western Ghats in India.

Vegetation and Animal Life.—Both are highly peculiar, so different from those of the rest of the world as to show that this great island cannot have had any land connection with the Asiatic continent within a recent geological period. The characteristic **trees** of the island are many different kinds of **eucalyptus**,⁵ some of which grow to a greater height than even the tallest giants of the Sierra Nevada.⁶ They do not, however, grow, like these

¹ See *Intro.*, pars. 86, 94. ² See *Intro.*, par. 39.

³ See *Intro.*, part. 67, 90.

⁴ See *Intro.*, par. 42.

⁵ Popularly called in Australia 'gum-trees.'

⁶ Some specimens of one kind of eucalyptus have been found to measure nearly 600 feet in height, which is higher than the pinnacles of the loftiest buildings erected by man. See *out*, p. 291.

latter trees, *in* dense forests, but are somewhat thinly scattered over the surface. Their roots are long, so as to be able to tlaw up moisture from a considerable depth ; their leaves narrow, and are attached in such a manner that their edges are above and below, instead of sideways. In this position they are not so apt to give off vapour as the leaves of trees of moister climates, and their texture also fits them in several ways to retain moisture.¹ In many parts of the interior dense thickets of bushes or low trees (**scrub**), sometimes thorny, form an almost impenetrable barrier to progress. On some of the salt plains grows a shrub known as the **salt-bush**, a valuable fodder-plant.

Some forests (mostly with a dark and gloomy foliage) are found chiefly on the well-watered slopes of the eastern mountains.

Among **animals**, Australia possesses, in place of the mammals of the great continents, a great variety of **marsupials**, a group scarcely met with outside of the Australasian region.² From other mammals this group is distinguished by the fact that in most species the female has a pouch in which it cairies about its young for some time after birth. The best known member of the group is the kangaroo. The native Australian dog, the **dingo**, is not a marsupial, but was probably introduced at some remote period by man. There are no monkeys oven in the tropical parts of Australia, but **parrots** and **cockatoos** abound, and a running bird, the **emu**, resembling the ostrich of Africa and the rhea of South America, scours the plains.

People and Products.—The **native Australians**, a dark-coloured race, are said to be gifted with no little intelligence, but owing to the entire absence of cereals and other plants suited for agriculture, and of domestic animals yielding milk before the arrival of Europeans, were condemned to live as hunters, and hence never made any advance in civilisation. They appear to be dwindling away. Their total number is now estimated at about 200,000. The present inhabitants are mainly British (partly German) colonists. The colonisation of the island began in 17fc8, after the eastern coasts had been surveyed by Captain Cook, and the first people settled hero were convicts. Free

¹ Comp. the Mediterranean region, p. 189; alio Introd., par. 104.

² The opossum* of America belong to tint group, which, however, has no living lepiesentativ* in Ania, Europe, or Africa.

colonists first began to settle in great numbers after the discovery of rich **gold** deposits in the south-east in 1851, but the great and growing wealth of Australia consists in its **sheep pastures**, no other part of the world being so well adapted for the production of **wool**.

Sheep rapidly improve in quality when introduced into Australia. On an average, the Australian sheep are calculated to furnish nearly twice as great a weight of wool as those of Europe. It is in Australia and Tasmania that the finest **merino sheep** in the world are now found. The seven Australasian colonies (see the table below) are estimated to produce on an average fully one-fourth of the wool supply of the world.

Government.—Politically, Australia is now divided among **five British colonies**, the government of which is modelled on that of the mother country. Along with these five colonies belonging to Australia, the island colonies of Tasmania and New Zealand (which have each a similar constitution) make up the seven Australasian colonies.

The following table gives the names of the Australasian colonies, including Tasmania and New Zealand, with other particulars relating to them :—

	Area in Thousand of Square Mile-, i	^ 5	Population in n.ou«uifl«*			Number per 100 Persons living in 1889-90		
			I sti m.ited Dec 31,	!	!	I Sheep	Cattle	Horses
Victoria	88	1	732	1,118	53	1,973	125	29
New South Wales	309		504	1,122	123	1,466	155	38
Queensland . .	068		120	407	238	3,555	1,197	87
South Australia.	903	10"	186	324	75	1,971	100	53
Western Australia	1,060		25	44	72	5,410	272	98
Tasmania . . .	20	*	102	151	400	1,027	99	20
New Zealand. .	104		250	020-	142	2,500	144	30

External Commerce.—The great feature of Australian commerce generally consists in the export of the staple productions of the different colonies, mainly to the United Kingdom directly or indirectly, and the import of British manufactures and the products of other countries, for the most part from Great Britain.

1 See p. 245.

- Exclusive of Maori.

Wool is the leading export of all the colonies. In South Australia wool has a rival among the exports in wheat, in Tasmania in $\pounds$. In Victoria, Queensland, New Zealand, and New South Wales gold is the second export in aggregate value. New Zealand also exports considerable quantities of grain—wheat and oats. The chief commodity imported from India is gunny-bags. Though the consumption of tea in the Australasian colonies relatively to population is greater than anywhere else in the world, the import from India is comparatively small, but it is now increasing rapidly, and ranks next in total value to gunny-bags. The principal Australasian exports to India are horses, copper, and coal.

THE AUSTRALASIAN COLONIES.—"A. Victoria, the south-easternmost colony, separated from New South Wales in 1851, produces, besides wool and gold, wheat and wine.

Capital, MELBOURNE (including suburbs, 460), on the Yarra Yana, a sjjort distance above its mouth, in Port Phillip Bay. It was founded on an uninhabited site in 1835, just aftei the discovery of rich pastuies in the neighbourhood of that inlet. In the interior, north-west of Melbourne, lies Ballarat, the centre of what was at one time the principal gold field of the colony, and Sandhurst, the growing centre of the principal district in which gold is obtained by the crushing of quartz.

B. New South Wales, north of Victoria, the chief wool-producing colony, produces also gold and coal, maize as well as wheat, besides wine and a little sugar. It is the greatest coal-producing country in the southern hemisphere. The amount of its annual production of this fuel is fully one-half larger than that of India, and is rapidly increasing. Having its principal coalfield close to the sea, the colony exports great quantities of coal (a small quantity even to India).

Capital, SYDNEY (including suburbs, 380), founded in 1788, and hence the oldest city in Australia. It occupies a number of small peninsulas running out into the magnificent harbour of Port Jackson, an inlet about fifteen miles in length with sinuous rocky shores, and with a mouth about a mile wide. This harbour thus has the aspect of an inland lake, and is not Surpassed in beauty even by the tropical harbour of Rio de Janeiro, which is to some extent its counterpart. To the north, Newcastle, centre of the coal trade of the colony.

0. Queensland, north of New South Wales, has its population mostly gathered in the south-east, where sheep and cattle-

rearing and the cultivation of maize are the chief industries, but has other settlements farther north, where sugar and other tropical products are grown on plantations cultivated by labourers introduced from the small islands of the Pacific.

Capital, Brisbane, on the river of the same name, at the head of navigation for sea-going vessels.¹

D. South Australia does not answer to its name, but extends from south to north to the west of the three colonies already mentioned. Wheat is more extensively grown here than in any other colony, but produces a small return (only about seven bushels to the acre). The quality is however, excellent. There are valuable copper mines in the barren peninsula between Spencer and St. Vincent Gulfs.

Capital, Adelaide* situated on a plain near the east side of the Gulf of St. Vincent, seven miles from its port (Port Adelaide).

E. Western Australia has its small population settled chiefly in the south-west, and even there it is very sparse. In the northern parts pearl-fisheries are carried on along the coast, a gold-field has been discovered in the interior, and good pasture-lands are now attracting settlers.

The capital is Perth, near the west coast, situated about twelve miles above its port, Fremantle. A railway 260 miles in length is now being laid to connect Perth with Albany on King George's Sound, on the south coast, one of the finest harbours in Australia.

P. Tasmania, an island somewhat larger than Ceylon, separated from Victoria by the shallow Bass Strait. It is in great part mountainous, and an uncultivated tableland from 2,000 to nearly 4,000 feet in height occupies the middle and a large part of the western half of the island. Besides the staple agricultural products of Victoria, it produces great quantities of orchard fruits. Tin and gold are important minerals, and coal-mines are also worked. Its native population has died out.

The capital is Hobart, on a fine harbour formed by the estuary of the Derwent, in the south of the island. It is connected with Launceston in the north by a railway running through a line of \ alleys dividing the island into two unequal portions.

i See Intro., par. 1X2(6).

G\ New Zealand, a group of islands lying to the east of Australia, and forming the Groat Britain of the south seas* In latitude they correspond with Italy in the northern hemisphere; hut their climate corresponds more nearly with that of Great Britain, as is shown by the fact that oats is the principal crop grown in addition to wheat.¹ The total area is about one-sixth larger than Great Britain. There are two principal islands, **North Island** and **South Island**, separated by the tempestuous **Cook's Strait**. The North Island is to a large extent volcanic, having active volcanoes from 8,000 to 9,000 feet in height, and remarkable hot springs and geysers.² The South Island is traversed from north to south by a chain of mountains called the Southern Alps, with peaks above 12,000 feet in height, and, like the Alps of Europe, rich in glaciers.

In the vegetation of the islands, ferns, including **tree-ferns**, are very conspicuous, and before the arrival of Europeans to a largo extent took the place of the grasses of other temperate countries.

The **New Zealand flax** plant yields a strong fibre, which is difficult to work, but is nevertheless much used in making ropes. The **kauri pine**, a native of the North Island, yields fine timber and a valuable resin. The minerals include **coal** and **gold**. Since 1840 the islands have been in the hands of British colonists, but about 44 000 **Maori**, an intelligent native race of Malay type, occupy land reserved for them, and have been partly Christianised. **The** principal occupations of the colonists are sheep-rearing, the growing of cereals, and gold-mining.

All the islands are under one government. The capital is **Wellington**, in North I&land, on Cook's Strait. **Auckland**, on the narrowest part of the same island, is a great centre of shipping and marine commerce. In the South Island are **Christchurch** and **Dunedin**, both *on* or near tho east coast; the former to the north of the Canterbury plains, a strip of low-lands about a hundred miles in length rising in terraces to the base of the mountains, the latter on a fine natural harbour to the south of these plains.

¹ See pp 193-4.

² See In trod., par. 67.

THE AUSTRALASIAN ISLANDS.

(*Excpjd Tasmania and Now Zealand.*)

1. **New Guinea**, which is nearly 300,000 square miles in extent (about 3A times the area of Great Britain), is the largest island in the world except Australia. It stretches obliquely from near the equator in the north-west to nearly 11° S. in the south-east. Its western half, as far as the meridian of 141° E., has long been claimed by the Dutch, but till recently its eastern half was independent. Now, however, this portion has also been declared to be under the protection of European powers. In May 1885 tho southern portion of the eastern half was declared under British, the northern under German influence. In September 1888 tho section under British influence was formally erected into a British crown colony. The German section is now called **Kaiser Wilhelm Land**.

The surface of the island is in many parts mountainous. The whole of tho narrow south-eastern extremity (which lies almost entirely within tho British territory) is traversed by a chain of mountains, known as the **Owen Stanley Range**, with peaks rising to upwards of 13,000 feet high. Two great navigable rivers have been ascended for hundreds of miles into the interior. One of these is the **Fly**, which forms a great delta on the western side of the Gulf of Papua in British territory. The other is the **Kaiserin Augusta**, which enters the sea near the middle of the coast-line of the German protectorate.

The natives are known as **Papuans**, and are a very dark-skinned race with black curly hair, often growing in numerous tufts. They dwell in villages, the houses of which are built on stakes along the margin of the sea-coast or the rivers, and are frequently placed in the water and connected with the shore by a bridge. The food-plants which they grow are mainly such as require but little cultivation—bananas, yams, sugar-cane, coconuts, and taro.¹

Pile-dwellings similar to those inhabited by the Papuans of New Guinea are very widespread. They arc in very gencial iibe among the

¹ A plant similar to the *kachu* of Bengal.



FIG. 59.-PILE DWELLINGS AT SAMBOANGAN (PHILIPPINE ISLANDS).

Malay races, and have been met with also in New Zealand, in central Africa, on the coasts of both North and South America; and remains of similar dwellings belonging to prehistoric times are known in Switzerland, Scotland, and Ireland. The example shown in the cut belongs to the Eastern Archipelago.

The trade is very trifling; the chief exports are trepang, a marine animal eaten by the Chinese, pearl-shell, and copra.¹ The supplies of the two former are becoming exhausted. The difficulty of obtaining labourers will probably prove a great obstacle in the way of creating export products of a more lucrative kind, such as are produced in Ceylon and Jamaica.

No plantations belonging to Europeans as yet exist in the British colony, or are even allowed, since the land belongs to the natives, and none but natives are at present permitted to acquire it. The residence of the British (governor of New Guinea is at Port Moresby, which

¹ See p. 219, n. 1.

lies to the east of the Gulf of Papua, and has regular steam communication with several ports in Queensland.

2. The name of Melanesia is applied to several groups of small islands to the east of New Guinea, also inhabited by Papuans.

The islands of New Britain, the Solomon Islands, the New Hebrides, and New Caledonia, follow one another in succession. New Britain, and the other islands now forming the Bismarck Archipelago, belong to Germany, and New Caledonia has been used for upwards of thirty years by the French as a place of deportation for convicts and political offenders. Under an agreement concluded between the British and German Governments in 1885 part of the Solomon group is declared to belong to the British, part to the German sphere of influence.

POLYNESIA.

This name (meaning "many islands") is applied to all the small islands of the Pacific Ocean except those already mentioned. They are mostly coral islands, and hence flat,¹ but some (those generally of greater size) are of volcanic origin and mountainous. They are all situated within the tropics, and the chief food of the people is bread-fruit,² in addition to the products already mentioned as used for food in New Guinea. The people belong to a race with a clear brown skin and smooth hair, and are a branch of the great Malay stock.³

1. The Fiji Islands are a group mainly volcanic in origin, lying to the north of New Zealand, mostly between the parallels of 16° and 19° S. Their total area is less than a third of that of Ceylon. The islands were ceded by their native king to the British in 1874, and now form a crown colony. Even before that time people of European origin had established plantations of tropical crops on several of the islands, and since that date the products of such plantations (chiefly sugar, but also coco-nut, maize, tobacco, coffee, and cotton) have increased very greatly, and a large trade has thus grown up.

The plantation labourers are partly natives of the islands themselves; but as these are not enough, labourers from other islands (principally the

¹ See Introd., note to par. «, n. 1 (p. 22)

² A fruit little known in India, though common in Ceylon, and closely allied to the jack-fruit or *kanthal* of Bengal. ³ See p. 172.

New Hebrides and the Solomon Islands) are introduced to work for the planters for a period of years, like the coolies of India. The introduction of these labourers and their treatment on the plantations are entirely under the control of the Government. The chief towns of the group are beaports with fine harbours protected by coral reefs. The capital is Suva, in the south-east of Viti Levu. The next in importance is Levuka, the former capital, on a small island to the east of Viti Levu. The small island of Rotumah, to the north of the Fiji group, is now also British, and is annexed to the colony of Fiji. The total population of the group is about 130,010.

2. The **Tonga** and **Samoan**, or **Navigator Islands**, lie to the east of the Fiji group, and still farther east are the **Cook** or **Hervey Islands** (largest, Rarotonga), **Society**, and **Low Islands**.

The British flag was hoisted on the Fency group in 1888. To the N. of the group, in about 9° S., lies Penrhyn I., now also British. The port of **Apia**, on one of the Samoan Islands, is the centre of the German trade with the Pacific Islands, the chief product of which for European markets is copra.¹ The Society Islands, of which the most important is the charming volcanic island of **Tahiti**, are under French protection, and so also are the Low Islands, and the Marquesas group to the north of the latter.

3. Between the equator and 15° N. are the **Pelew**, **Caroline**, and **Marshall Islands**, in that order from west to east, and south of the last-mentioned group the **Gilbert Islands**.

The first two of these groups belong to Spain, which possesses also the **Marianne** or **Ladrone** Islands to the north of the Carolines. The Marshall Islands have been taken possession of by Germany. Between 0° and 5° N. and E. of 160° W. lie the British islands, of **Fanning** and Christmas, on the route of the projected telegraph cable from New Zealand to Vancouver.

4 The **Sandwich** or **Hawaiian Islands** are an important group of volcanic islands nearer the coast of North America, between 19° N. and the Tropic of Cancer. In area they are about equal to the Fiji Islands, which they resemble in the nature of their products.

The chief island is **Hawaii**, on which the extinct volcano of Manna Kea rises to the height of nearly 14,000 feet. Farther south is the active volcano of Manna Loa, with the vast so-called crater of Kilauea—a depression about 3½ miles in length by 2½ miles in breadth, formed by the dropping in of the roof of a cavity filled with molten lava. The population is under 100,000, a considerable proportion of whom are of European origin, and own sugar, cotton, and other plantations, which they cultivate by means of Chinese and native labourers. The natives chiefly cultivate taro on

¹ See p. 219, n. 1.

terraced hill slopes. The government is a constitutional monarchy, under a native king, but subject to foreign influence. The capital is **Honolulu**, on the island of Oahu.

ANTARCTIC REGIONS.

Compared with the Arctic regions, those round the Antarctic pole are remarkable for the uniformity of their low temperatures. To the south of 62° S. the mean temperature of both sea and air is at or below the freezing-point of fresh water even in summer. Still nearer the south pole, ice barriers have stopped the advance of explorers at a latitude about five degrees lower than that attained in the Arctic regions. The highest latitude ever reached in southern seas was $78^{\circ} 10' \text{ S.}$, the latitude at which the progress of Sir James Ross was arrested in 1842, after he had sailed along an icy barrier about 300 miles in length and from 150 to 200 feet in height. He had previously sighted land, the coast of which he traced from the parallel of 72° . To this land, the most extensive that has been seen in the Antarctic regions, he gave the name of **Victoria Land**, and on it he observed in the course of his voyage an active volcano, **Mount Erebus**, nearly 13,000 feet in height. But though Victoria Land is the most extensive piece of Antarctic land that has actually been seen, the swarms of icebergs in Antarctic seas, and the deposits of terrestrial origin that have been found in the vicinity of the ice-barriers of the south, afford the clearest evidence of the existence of an Antarctic continent.

APPENDIX.

FACTS IN PHYSICS, CHEMISTRY, AND BIOLOGY, OF MOST IMPORTANCE IN GEOGRAPHY,

1. **Definitions.**—*Physics*, from the Greek φυσικά, literally means "things pertaining to Nature." As the name of a science, it denotes that science which treats of the properties of matter and the forces which act upon matter in the mass, as distinguished from that which treats of the composition of matter. This latter subject is the province of *Chemistry*, which is based on the discovery of the fact that most substances are compounded of others having totally different properties, as shown in par. 76. The name is derived from the Greek χέω, "to pour," because the earliest chemical observations were made on liquids. *Biology*, from the Greek βίος, "life," and λόγος, "speech," "discourse," means the "science relating to life."

2. **The three familiar forms of matter.**—The outer parts of the earth, which are those with which geography deals exclusively, are composed chiefly of various solid matters, water (a liquid), and air (a gas). These three forms of matter all have properties which it is important to understand in studying geography. In some of these properties they agree, in others they differ. Those in which they agree will first be considered here. They form, accordingly, the subjects *M* the next paragraphs (5-20).

3. **Properties in which the different forms of matter agree, and in virtue of which they are called matter.**—First, **they all occupy space.** That they do so needs neither proof nor illustration, but with regard to this fact one thing has always to be borne in mind. When any matter occupies space, no other matter can occupy the same space. We may say that a vessel is full of rice, and yet know that there is air in the vessel at the same time. But the air does not occupy the same space as the rice. It fills up the intervals between the grains. When a vessel containing air is filled with something else, the air is driven out in the process. Usually the air passes out so easily that we cannot perceive that it is driven out; but it is easy to show, in some cases, that it must be forced out, in order to give place to other matter.

If you have a plug that fits tightly in the bore of a metal tube closed at one end, you will find that it becomes more and more difficult to force the plug down to the end of the tube, and that you cannot force it quite to the end unless the air manages to make its escape by the sides of the plug, or, it may be, through pores in the plug. The air may be compressed, but it cannot be made to occupy no space at all. This property is known as the impenetrability of matter. It will be seen, later on, that it is not without importance in geotaphy (paragraph 37).

4. Second, all forms of matter have weight.—It is not so easy to show this in the case of air as in the case of other forms of matter, but it can be shown quite plainly with the aid of an air-pump. This is a machine for taking the air out of vessels. If with the aid of it we take the air out of a vessel fitted with a stopcock, we may weigh that vessel in a balance without the air that usually fills everything that contains nothing else. Suppose, then, we have accurately balanced the weight of the vessel in one scale (or attached to the end of one arm of the balance) by the weights put in the other scale, and that we then open the stopcock and admit air to the vessel, we shall see that the arm of the balance holding the vessel begins to sink. Obviously that sinking is due to the weight of the air admitted. When the vessel is filled with air, and that arm of the balance sinks no farther, the weight of the air admitted can be measured by adding weights to the opposite scale until the vessel is exactly balanced as before.

5. Mass, volume, and density.—When we use a balance with scales to weigh anything, we find that the same quantity of matter always appears to have precisely the same weight wherever we weigh it. The quantity of matter, which is known in scientific language also as the mass, may differ greatly in the amount of space occupied by it, that is, in bulk or volume. This is a quite familiar fact in a great many cases. Thus tufts of cotton-wool when laid loosely in a heap occupy much more space than when tied up in a bundle, but every one understands that the tying up in a bundle makes no difference in the quantity; neither does it make any difference in the weight. If some loose cotton-wool, along with some string to tie it up, were weighed, no one would expect to see any difference in the weight when the tying up was actually done. So also some kinds of matter are more tightly packed than others. When the bulk or volume is greater for a given quantity of matter in one case than in another, the density of the matter is said to be less where the volume is greater, greater where the volume is less. In any case, the same individual mass of matter, whether more or less dense, always appears to have the same weight when weighed with scales,

6. Difference of weight at different elevations.—But we may also weigh things by means of a spring-balance, in which the weight

depresses a spring, and its amount is shown by an index pointing to a scale at the side. When we use this instrument for weighing, we find that the same quantity of matter does not weigh exactly the same amount in every place. If we put a certain weight in a spring-balance, and then carried this balance up in a balloon to a great height, we should find that the index gradually rose so as to mark a smaller weight. If we had a quantity of small shot, each pellet exactly of the same weight, and, after putting 3214 pellets in the pan of a spring-balance at the level of the sea, rose to the height of Simla (7000 feet), we should find it necessary to put five more pellets in the pan to make the index mark exactly the weight shown by it at sea-level.

7. Gravitation.—The fact just mentioned is one indication of the true nature of weight, as we know it at the surface of the earth. By observations made on the movements of the moon and other heavenly bodies, men of science have found good reason for believing that when we say that all forms of matter have weight, we express only part of a great law of nature, which is stated thus :—

Every particle of matter in the universe attracts every other with a force which varies directly as the mass and inversely as the square of the distance,

When we say that the force varies directly as the mass, we mean that the force is greater in the same proportion as the mass is greater—twice as great for a mass of twice the amount, three times* as great for a mass three times the amount, and so on. The meaning of the phrase^M "inversely as the square of the distance," will be best understood from the manner in which we write numbers as fractions. When we write 4 as a fraction, we write it thus— $\frac{1}{4}$. If we invert that number, or turn it upside down, it becomes 4. When we say that a force acting between two bodies varies inversely as the square of the distance, we mean that if the distance between them is four times as great at one time than at another, the force at the greater distance is equal to the square of one-fourth, that is, one-sixteenth of what it is at the less distance. To say that a force causes an attraction of this nature, is equivalent to saying that it tends to make two bodies move towards one another at a rate which varies in the way described, and that they will so move unless prevented by other causes. The force that tends to cause such a motion is called the force of gravity, and the law above stated is called the law of gravitation.

8. Whatever the size of bodies attracting one another under this law may be, the whole force seems to act as if it were centred in one point of each body. This point is called the centre of gravity. This is the centre of the mass of matter in the body, but it may not be near the centre when we consider only the shape. If the matter in the body varies in density, and the densest matter is not in the middle of the body, then the centre of gravity will be shifted more or less to the side. In the case of the earth, however, it is known from many facts* that the

centre of gravity is at or near the actual centre. The attraction of the earth accordingly appears to draw all bodies above its surface towards its centre, and to cause all bodies on it to press on the surface towards the centre. This attraction it is that gives bodies their weight, and we now see why a spring-balance shows a smaller weight for the same matter at a great height above the surface than at sea-level. The attraction is reduced at high altitudes in consequence of the greater distance from the centre of the earth. We can now also understand why the scales of a level-balance show no such difference, for the attraction on the weights in the one scale is reduced exactly in the same proportion as that on the article weighed on the other scale.

9. Even at the surface of the earth the same quantity of matter has not at every place precisely the same weight. At the equator the weight is less than nearer the poles. For this there are two reasons. One is that the rotation of the earth (see *Introd.*, par. 5) causes the surface to move more rapidly at the equator than anywhere else. In consequence of this greater velocity, everything upon the surface has a greater tendency to fly away in the same manner as a stone whirled round the head with a string tends to do so, and does fly away when the end of the string is let go. The attraction of the earth is like the holding of the string. The force with which it attracts is enormously greater than the force with which anything tends to fly away from the surface, but this latter force causes the attraction of the earth to seem less. Things have a smaller weight in proportion to the amount of this force.

10. The other reason for the reduced weight at the equator is that the earth is not an exact sphere (*Introd.*, par. 4). Its diameter being greatest at the equator, objects on the surface are there farthest from the centre of gravity, and for that reason have their weight diminished in the same way as when they are raised to a great elevation. It is partly by means of such variations in the earth's attraction at different places that men of science have endeavoured to determine the precise form of the earth,

11. We thus see that in speaking of weight as observed on the earth, we cannot, if we wish to be quite accurate, say that the same quantity of matter has always the same weight. All that we can say is that at the same place the weight is always the same for the same quantity. The difference at different places is, however, very slight

12. The term **specific gravity** can now be explained. It means the ratio of the weight of a given volume of any substance to that of another substance which is *taken* as the standard when both are weighed at the same place and under the same conditions. It will be shown in subsequent paragraphs (40, 48) what conditions have to be observed. Specific gravity thus corresponds exactly with density, for though, as we have seen, the weight may differ while the density remains the same, yet when different bodies are removed to places where their weight is altered, the weight of all is altered in the same proportion. The **ratio**

between their weights thus remains the same. In weighing solids and liquids, water is the standard usually adopted; in weighing gases, atmospheric air. In each case the standard is expressed as 1, the specific gravity of other substances as multiples or decimals of 1.

13. Thirdly, **All forms of matter offer resistance** to external influences. A moving body, for example, suffers resistance from any kind of matter it strikes against. Even the resistance of air, which is the least resisting of the familiar forms of matter, is readily perceived when we are walking fast or running, still more when we wave an expanded fan or anything flat through the air, keeping the flat side in the direction of movement

14. The resistance to any cause producing motion, so far as that is due merely to the matter on which the cause acts, is in proportion to the amount of matter in the body acted on. Equal forces acting on two bodies, one of twice the mass of the other, will move that which contains the greater quantity of matter in a given time only half the distance that it will move the other. In other words, that which contains the more matter of the two will be set in motion with only half the velocity of that which contains the less matter. On the surface of the earth it is impossible to produce motion without overcoming resistance due to other causes than the quantity of matter in the object moved. The resistance of the air and the resistance arising from friction and other causes have to be overcome also; but were it not for these circumstances, then a force which pulled a railway train at a certain rate would pull a train of twice the weight at only half that rate. The quantity of motion calculated as proportional to the mass and the velocity combined is, however, in both cases the same. The product obtained by multiplying any mass into any velocity is the same as the product got by multiplying twice the mass into half the velocity or half the mass into twice the velocity. The velocity may be expressed in feet moved over per second, in miles per hour, or in any similar manner. Quantity of motion calculated in this way is called **momentum**. The resistance of matter to forces producing, accelerating, retarding, or arresting motion is called **Inertia**.

15. Any moving body has the power of setting in motion any other body against which it strikes if the body struck is not too firmly fixed. In thus imparting motion, it must always overcome resistance, and in doing so it is said to do **work**. The amount of work done is measured by the amount of resistance overcome (or, which is the same thing, the strength of the force acting) and the space through which the resistance is overcome. This power of doing work is called **energy**. Wherever, therefore, there is momentum there is energy, but the energy is not proportional to the momentum. In the case of the same body the momentum increases, as we have seen, in proportion to the velocity; but the **energy increases in proportion to the square of the velocity**. When the

speed of a moving body is increased twofold, its energy is consequently increased fourfold ; when the speed is increased threefold, the energy is increased ninefold. If a running stream, in consequence of its velocity, were just able to lift 60 gallons of water in buckets attached to a water-wheel up to the point at which the highest bucket began to be turned over and emptied ; then it would be able, when running at twice the rate, to lift four times 50, or 200, gallons to the same point.

16. Moving water and moving air are the chief sources of this kind of energy to be seen constantly at work on the surface of the earth. Tremendous energy is sometimes imparted to solid matters, even when soft like snow,¹ set in motion by nature, as in earthquakes,² landslips,² and avalanches ;⁴ but the aggregate results due to such occurrences are much less than those due to the energy of moving air and moving water.

17. The energy of moving water in the action of waves on the sea-coast, in the action of currents in distributing sediment at the sea-bottom, especially in the neighbourhood of the land,⁶ and above all in the action of rivers. The importance of this last action has already been dwelt on in the Introduction.⁸ What has now been said will make it plain why the action of rivers in wearing away the land is so much more rapid when their speed is greatest (usually in their upper or mountain track) than where it is less. The following table shows the carrying power of rivers at different rates of flow, according to the calculations of a distinguished engineer (Mr. D. Stevenson) :—

A river running at the rate of—

Inches per second.	Miles per Hour.	
3	0*17	will just begin to work on fine clay.
6	0*34	will lift fine sand.
8	0 45	will lift sand as coarse as linseed.
12	0 68	will sweep along fine gravel.
24	1*36	will roll rounded pebbles one inch in diameter.
36	2 05	will sweep along slippery angular stones of the size of an egg.

Rapid torrents have been known to throw stones 15 feet into the air.

This table enables us to understand also why a river wears away its bed in one place and raises it in others.⁷ The amount of matter which it can just carry onwards at one rate of speed is more than it can carry at a slower rate.

18. When definite estimates are made of the amount of work quietly done by rivers in this way, the results seem enormous. It has been calculated that the discharge of silt by the Ganges at Ghazipur, in the North-West Provinces, is equal to 6368 millions of cubic feet every year.

¹ See below, par. 04. ² See Introduction, par. 01. * See below, par. 38.

⁴ See Introduction, par. 07. ⁵ See Introduction, par. 31, 46. * Pars. 31-0.

⁷ See Introduction, par. 81.

This amount would suffice to cover to the depth of one foot an area of about 16 miles square (225 square miles). Near Lucknow a boring has been made through the alluvium, or matter thus deposited in the course of ages, and the bottom of the deposit was not reached at a depth of more than 1300 feet.

19. The energy of running water is made use of by man in various ways. In some places water is actually raised for irrigation by water-wheels in the manner indicated in par. 15. The energy of flowing or falling water is frequently employed to turn mill-wheels, and thus drive machinery. An interesting and important use of this form of energy is exemplified in the control exercised over the Nadiya rivers so as to keep their beds from being blocked up with silt, and thus also to preserve the bed of the Hugli itself.¹ It is found by experience that a velocity of 14½ inches per second is enough to keep the channels of these rivers from silting up, and one of 18 inches per second enable* the rivers to scour their own channels to a certain extent. Each November, accordingly, "training" operations are commenced on these rivers, so as to maintain in them, if possible, a velocity of 18 inches per second or more during the dry season. These training operations consist chiefly in making a number of simple constructions with bamboo, so as to narrow the channels in which the rivers flow. The narrowing of the channel tends to raise the water to a higher level, thus making up in height for the loss of space in width; but the weight of the water is always pulling it down again to the level of the river above and below, and thus compels it to flow on at a more rapid rate. The energy of moving air or wind is made use of by man in sailing vessels and wind-mills.

20. Both forms of energy sometimes act destructively, where man is unable to keep them under control. The destructive action of river floods is referred to in the section on India, p. 98. The destructive action both of wind and water is experienced from time to time on the Indian coast in consequence of the violent cyclones² to which the Bay of Bengal is specially subject. By the great storm-wave that overwhelmed Masulipatam on the 1st of November 1864, and by which 30,000 persons are said to have lost their lives, great numbers of the less strongly built houses, as well as shops and stores, were thrown down, and on receding, the wave, which rose 13 feet above high-water, and penetrated 17 miles from the coast, seemed to uproot and carry everything before it. Even huge blocks of masonry were moved to a distance of 60 feet

21. Properties in which the three familiar forms of matter, solid matter, water, and air, differ.—Solid matter differs both from water and air in the greater amount of resistance it offers to a

i See p. 120.

¹ See In introd., par. 66.

change of shape. This difference is due to a greater force of cohesion among the particles of which solid matter is made up. In water, or any liquid, the cohesion between the particles of which it is made up is so slight that, if left to itself, the liquid will sooner or later assume a quite level surface. The weight of even the smallest particle of the liquid raised above that level is enough to pull it down to the level of the rest, if there is no other force to keep it up. Soipe liquids, like water, when left to themselves, become level at the surface at once ; but others, like treacle, acquire a level surface more or less slowly. Such sluggish liquids are said to be viscous. However viscous liquids may be, they are nevertheless all unable to offer a permanent resistance to the action of gravity. On the other hand, all solid matter maintains a surface to some extent independent of the action of gravity. Even the loosest solids, such as dry sand, are composed of small particles, each of which retains a shape of its own, which causes one part of it to be at a different level from another.

22. Further, the action of friction is greater between solids than between liquids, or between liquids and solids. This force varies greatly with different substances. It is greater between rough surfaces than between smooth surfaces, and is greatly reduced by putting oil or grease between the surfaces, as every one knows by experience. For the same surfaces it is increased in direct proportion to the pressure. In consequence of the friction between the different particles, even the loosest forms of matter in the heap never acquire a perfectly level surface like that of water in a tumbler. Loose matter falling or washed by rain down a hill or mountain-side tends to form a curve which gradually becomes less steeply inclined towards the base.

23. The cohesion of certain solids, such as earthy matter, is reduced by being mixed with water. On this account rain-water, which percolates into the ground, is frequently the cause of landslips, that is, of the fall of masses of earth and rock. It was after heavy rains that the great landslide occurred at Ndini Tal on the 18th of September 1880, when 150 persons lost their lives. Every year portions of the Darjiling-Himalayan Railway are carried away during the rains.

24. The cohesion of solids varies not only in degree or strength, but in its nature in other respects. In some solids the cohesion is greater in some directions than in others, so that they can be broken or divided by cutting along certain surfaces more easily than along others. In a piece of bamboo, for example, the particles of each fibre cohere together very firmly, making it difficult to cut the bamboo across; but the fibres are comparatively feebly held together among each other, so that it is easy to split up the bamboo lengthwise. Many minerals are most easily broken up into parts of a definite shape, with surfaces always inclined to one another at the same angle or angles. Such definite shapes are known as crystals, and the minerals so formed are said to

have a crystalline structure. One of the commonest examples of this kind is salt, which is made up of crystals of cubical shape, that is, crystals with six sides, all of the same size and at right angles to the adjacent sides.

25. Though the cohesion between particles of water is slight, it is not altogether wanting, as may be seen by holding up a drop of water at the end of the finger. This cohesion is also illustrated when we pour water in a single stream from one vessel into another. If, in falling through a considerable height, a stream of water breaks up first into smaller streams, then into large drops, and finally into spray, that is no proof of the entire absence of cohesion, but a further proof of the resistance of the air (*par. is*).

26. As the cohesion between particles of water is not sufficient to sustain any of its own substance above its own level, it is still less able to sustain any substance that is heavier than water in proportion to its bulk or volume, in other words, any substance of greater density. Substances of less density than water sink in the water till they have displaced as much water as is equal to their own weight. The density here referred to, however, is the average density of the whole object plunged in the water. The depth to which a ship sinks in the water is determined not by the weight of its sides, or any part of it, but by that of the whole ship and its contents, including the air between its decks and sides.

27. This last fact shows that water presses upwards with exactly the same force as it passes downwards, for the only force to counteract that of the ship's weight is that of the water pressing upwards, and that weight is exactly the same as that of the water that pressed downwards in the same place before the ship was there. But **water also presses equally on any object immersed in it in all other directions**, as well as on the sides of any vessel or hollow containing it. On no other condition could it always maintain a level surface, for the force that pulls any particle that rises above the surface downwards, must cause the exercise of a pressure acting sideways to make room for it, and this latter pressure must be exactly balanced by another in the opposite direction. In consequence of this equality of pressure in all directions, water rises to exactly the same height in the two arms of a U-shaped tube.

28. This fact is of great importance with regard to the movements of water underground, or what is called the underground circulation of water. Water does not merely sink into the ground. It presses sideways through porous earth and rocks, through innumerable cracks, fissures, and natural channels; and wherever it forces its way it rises to the same level in one place as in any other place in free communication with it. If it meets with hindrances to its onward course, it travels in that direction in which the resistance is least. There may thus be a **steady flow underground, like that of a river above ground, but the**

underground flow is not necessarily in the same direction as that of the rivers in the same region. The direction of the underground flow depends on that of the slope of the stratum of rock that makes it easier for the water to flow laterally than vertically downwards. In any case, water may travel in certain conditions to an even greater horizontal distance underground than it is carried in rivers above ground.

29. Hence it is that in some places springs¹ issue from the ground, that in other places water can be found by digging wells, but the depth at which it is thus reached varies in different places ; and hence also that the working of deep mines is nearly always hindered by the inflow of water, which has to be pumped out at greater or less cost.

30. But the processes just described are not all that go on in the underground circulation of water. There is a force of the greatest importance in geography that acts so as to raise water above the level of the main supply of water, though it does not raise it in sufficient quantity in any one place to form springs or wells. This force is called capillarity, from a Latin word (*capillus*), meaning a hair, because its action is best seen in thin hair-like glass tubes. If such a tube were dipped into a gla^s of water, the water would be seen to rise in it to a certain height above the level of that remaining in the glass, and the narrower the tube the higher would it rise. Now, a quantity of loose earth, or finely porous matter of any kind, contains a great multitude of such small tubes running in different dii^ection3; and this force seems to drag water along these tubes, and thus to diffuse itself through such matter. This is the process you see going on when you pour a little water in the bottom of a cup, and then put in enough sugar to bury the water ; or when you dip blotting-paper into a bottle of ink, and watch the ink rising up out of the bottle. In the same way enormous quantities of water are brought up from the deeper layers of the soil in dry weather, so as to renew the supply of moisture within reach of the roots of plants when that originally nearest the surface has been used up. This is the reason why moist soil can nearly always be reached by turning over the earth with a spade. At the surface the earth may be quite dry, because the moisture is dried up faster than it can be drawn from beneath by this force, but a little way below the surface the moisture is renewed as quickly as it disappears.

31. The nature of the process makes it plain why this force of capillarity cannot furnish water for wells or springs, for the force that raises the water in this way serves also to retain it in the narrow tubes or pores of the soil. Water is furnished for wells and springs only when its weight exceeds this force.

32. Every one is familiar with the fact that some solids, such as salt or sugar, sooner or later entirely disappear in water, if the quantity of the solid is not too great. In such cases the substances are said to bo

¹ See Introd., par. 33.

dissolved. Substances capable of being so dissolved are described as soluble in water, and the mixture of the water with the dissolved substance is called a solution. It would make no difference as to the nature of the action, if a certain colour were imparted to the water by the process, provided the water were not rendered turbid or cloudy. When turbidity is the result of mixing solids "with water, the solid matter is said to be suspended, or held in suspension in the water. Thus, while salt is dissolved in water, silt is held in suspension. Underground water always dissolves some of the substances through which it passes, and is thus never pure. Most of the substances dissolved are salts, and have more or less of a salt taste.¹

33. Whether dissolved or held in suspension, solid matter in water always alters the specific gravity of the water. Hence the method commonly adopted for determining the amount of salt in a given quantity of sea or other salt water is to ascertain the specific gravity of the water, as it is found that a certain specific gravity corresponds to a certain proportion of salt.

34. Gases.—It has been shown above² that solid matter differs from both liquid matter like water and from air by having a considerable cohesion between the particles of which it is made up. With the air of an air-pump (par. 4) a simple experiment can be performed to show the difference of the behaviour of air and water. If a paper bag containing only a little air (that is, not blown up) had its mouth sealed and were then put under the receiver of an air-pump along with a dish of water, and if the air in the receiver were then exhausted, the paper bag would be seen gradually to swell out till it became fully expanded, and finally perhaps burst; whereas the water in the dish, so far as the eye could observe,³ would continue to occupy the same space. Obviously, the air in the bag, on the other hand, has come to occupy a much larger space. The explanation is that the pressure of the air outside the bag at first confines the air within the bag to a small space, but as this pressure is reduced, the particles of air inside fly away from one another in all directions with a force that works with more and more effect in proportion as the counteracting force outside is diminished. The water, however, exerts no upward pressure at the surface except such as exactly serves to counteract the downward pressure of the air upon it under the action of gravity. The behaviour of air in the circumstances described is that which characterises all **gases**. Gases, accordingly, are composed of particles that tend to fly away from each other in all directions with greater or less force.

35. The experiment just described shows that **pressure diminishes the space occupied by air**, and it is easy to show that it does so **in direct proportion to the amount** of the pressure. Twice the pressure

¹ See In trod., par. 40. ³ Par. 21. ² See, however, par. 58,

reduces the air to half the space previously occupied. As the force with which the air resists compression must exactly equal that which is exerted in producing compression, it follows that that force is doubled when the space occupied by the air is halved, trebled when the space is reduced to a third, and so on. In this respect air and other gases differ from water, which is nearly **incompressible**. When water is enclosed in a confined space, and the pressure usually acting on its surface (that of the atmosphere) is increased by a pressure of 15 lbs. on the square inch, the volume of the water is reduced by only one twenty-thousandth part.

36. It is easy to show likewise that the **pressure** of **air** is **equal** in all **directions**. If a cubical vessel made of tinned plate, but having one side formed by paper sealed to it and made air-tight, were put under the receiver of an air-pump and the air exhausted, and if the paper burst at a certain degree of exhaustion, another similar covering of equal strength would burst at exactly the same degree of exhaustion, in whatever position the cube were placed, provided the weight of the cube itself were not allowed to rest on the paper.

37. Hence the pressure of air in all directions is proportional to its density, and hence, too, in any space in free communication with the atmosphere the pressure of the air is equal to the weight of the whole column of air in the atmosphere above the area on which the pressure is exerted. It is less, accordingly, the shorter the column; in other words, the higher one is above the surface of the earth.

38. The force set in action by the compression of air must be recognised as one of the agents that modify the earth's crust. A sudden pressure upon air in any confined space leads to compression even when there is an outlet for the air, if the air cannot escape as rapidly as it is compressed. Thus great waves may compress to a considerable extent the air in hollows in rocks on the sea-coast, and the increased pressure of the air thus caused may serve to break off the rock in larger or smaller fragments.

39. **The barometer.**—The equality of the pressure of the air of the atmosphere on all sides is what prevents us from feeling that pressure under ordinary circumstances. The pressure on one side of the hand exactly balances that on the other side. The weight or pressure can, however, be made observable in various ways. The commonest way is by means of a tube closed at one end, exhausted of air and inverted over a basin of mercury. The mercury then ascends the tube, in consequence of the pressure of the atmosphere outside, unbalanced by any corresponding pressure inside. It rises till the weight of the column of mercury is exactly equal to the weight or pressure of a column of air of the same diameter. A tube like this, with a scale marked on it to show the height to which the mercury rises, is called a **barometer**. The average height at sea-level is nearly thirty inches, which corresponds

to a pressure of nearly 15 lbs. (more exactly $14\frac{7}{8}$ lbs.) on the square inch. Hence the pressure of 15 lbs. on the square inch (par. 135) is frequently spoken of as that of one atmosphere. Another kind of barometer is made by exhausting the air in a flat metallic box with flexible sides, which are kept distended by a spring in such a manner that they can be pressed mwards by the slightest increase of the pressure of the atmosphere, and move outwards under the action of the spring when that pressure is reduced. These movements are shown, by a revolving index on a dial marked with figures to indicate the height of mercury in a mercurial barometer corresponding to the pressure on the sides of the box. A barometer of this kind is called an aneroid **barometer**, and is very convenient from the fact that it can be made small enough to be carried like a watch in the pocket.

40. Measuring of altitudes by the barometer.—The differences in the height to which the mercury rises in a barometer at different levels above the surface of the earth are sometimes taken advantage of to measure the elevation of mountains and plateaux (see par. 37); but such measurements are not very trustworthy, because the height of the barometer, or, in other words, the pressure of the atmosphere, varies at different times at the same place, as it varies at different places at the same level. On account of these variations, when the specific gravity of any body is determined by weighing under the pressure of the atmosphere, it is necessary to see that the pressure of the atmosphere under which the different bodies are weighed is the same, or to make allowance for any difference in this respect.

41. Different gases differ in density at equal pressures.—Though all gases have the property of expanding in proportion to the diminution of the pressure on them, and thus appear to have no mutual cohesion among the particles, nevertheless gases of different kinds differ from one another in density under equal pressures. This can easily be shown by weighing certain heavy gases at the pressure of the atmosphere. If hydrochloric acid or some other strong acid is poured over some pieces of marble or limestone at the bottom of a vessel, a violent effervescence will be seen to take place. This is due to the formation of a gas which in course of time will fill the vessel. That such a gas is formed, and that it is different from and heavier than common air (though equally colourless), can easily be demonstrated by pouring it into an "empty" vessel exactly balanced at the end of one arm of a lever balance. That arm of the balance will then be seen to sink in consequence of the heavier air from the vessel in which the acid was poured on the marble, displacing the common air which filled the vessel suspended to the balance.

42. Diffusion of gases.—Notwithstanding this difference of density, however, different gases in the same space always become, in course of time, equally diffused among each other.

43. Like certain solids, certain gases can also become diffused to a greater or less extent in liquids like water, and without altering the transparency of the liquids, and when so diffused they are, as in the case of solids, said to be dissolved (par. 31).

44. Heat—Two senses of the word.—All bodies, whether solid, liquid, or gaseous, contain more or less heat. In one sense the nature of heat is familiar to every one, but it is important to observe that the word is used with two meanings. One of these meanings is the sensation that we feel on coming in contact with, or being exposed to the influence of, anything warm; the other is the cause which produces such sensations as well as other effects. The second is the sense in which the word is used by men of science.

45. Heat in the scientific sense of the term.—The nature of heat in this sense was long a subject of dispute among men of science. It was sometimes supposed to be a kind of matter, but if so, it was necessary to recognise a kind of matter without weight, for heat adds nothing to the weight of any body, and loss of heat does not diminish weight. From various observations and experiments that have been made, it is now believed that heat consists in a vibratory or up and down and side to side movement taking place in bodies containing heat. This view of the nature of heat makes some of its effects, apart from the production of the familiar sensation, easier to understand. Light is due to similar movements, but much more rapid.

46. Heat is imparted from one body to another in various ways. All bodies can communicate it more or less rapidly in two ways—by conduction and radiation. By the process of conduction heat slowly travels along from the hotter to the cooler parts of the same substance or other substances in contact with it. Different substances vary greatly in the rate at which they impart heat in this way, and are hence distinguished as good and bad conductors. Metals are generally the best conductors. "Wood and stone are inferior in this respect, and loose matters, such as straw, cotton-wool, fur, and snow are worse still, and all the worse the more air they have entangled amongst them.

47. By radiation is meant the discharge of heat through space, or through gases, liquids, or solid bodies intervening in space. It is the process by which we receive heat from the sun or fire. All bodies are constantly giving out heat in this way to others in their neighbourhood, and their temperature rises or falls from this cause according as they receive more heat in this manner than they give out, or give out more than they receive. Heat thus emitted travels in straight lines with immense velocity. The amount of heat radiated in a given time, however, varies greatly, according to the nature of the surface from which the radiation takes place. The best known radiator is lamp-black, whereas the metals, which are the best conductors of heat, are the worst radiators. The power of absorbing radiated heat varies with the power

of radiating. The rapidity of the radiation also varies according to the nature of the medium through which the heat passes. When radiated **heat** strikes against any solid or liquid in its course, part of it is radiated back, or **reflected** in the same manner as light is reflected by a mirror. Just as in the case of light the reflective power varies with the character of the surface.

48. Differences in temperature and changes in volume due to heat.—The differences which we perceive through the well-known sensation of heat are called **differences of temperature**. Among other effects produced by heat, in the scientific meaning of the word (the meaning in which it will be used in all the following paragraphs of this Appendix), are **changes** in the bulk or **volume** of bodies to which heat is imparted or from which it is taken away. Such changes are always accompanied by changes of temperature, and it is therefore necessary, in determining specific gravity, to weigh the bodies compared at the same temperature. Nearly all bodies are expanded on receiving heat, and they are generally expanded in the same proportion as their temperature is raised. The same amount of expansion, in such cases, indicates the same rise, the same amount of contraction, the same fall of temperature.

49. The thermometer.—Advantage is taken of this fact to construct an instrument for measuring temperature, and thus indirectly measuring heat. The instrument for this purpose is called a **thermometer** (from the Greek *θερμη*, "heat," and *μετρον*, "a measure"). Most usually the liquid mercury is employed in making this instrument, in which the amount of expansion or contraction of that liquid is measured by degrees, marked on or beside a narrow glass tube within which the expansion takes place. The bulk of the mercury is in a widened portion of the tube called the bulb, at the bottom, and the part of the tube in which the amount of expansion and contraction of the mercury is observed is made narrow, so that the changes in the volume of the whole may be spread over a greater length, and thus more easily seen. Obviously the change in the position of the mercury in the tube, corresponding to a certain change of temperature, is greater when the amount of mercury in the bulb is increased and the width of the tube diminished. The interval marking a degree may therefore be made larger or smaller according to convenience.

50. Thermometers are marked with degrees on different scales. Two **scales** are most commonly adopted, the **Fahrenheit** and the **Celsius**, so called after the men by whom they were proposed. The temperature marked as 32 degrees on the Fahrenheit thermometer (written 32° Fahr. or 32° F.) is marked on the Celsius thermometer as 0°; the temperature of 212° F. is marked on the thermometer of Celsius as 100°. On the Fahrenheit scale, therefore, 180 degrees are equal to 100° on the Celsius; and as these numbers are in the ratio of 9 to 5, the

degrees of the Celsius scale (distinguished by the initial C.) may be converted into those of the Fahrenheit scale by multiplying by 9 and dividing by 5, and adding 32 to the product if the temperature is above 0° C. If the temperature is below 0° C. (when the temperatures are written - 10° C, - 15° C, and so on), the product found by multiplying and dividing must be subtracted from 32 if less than 32, and must have 32 subtracted from it if it exceeds that number. In the latter case the temperature is below zero Fahrenheit, and is written with the same sign before it as that which is written before temperatures below the zero of Celsius. In converting from the Fahrenheit to the Celsius scale, these processes must, of course, be reversed.

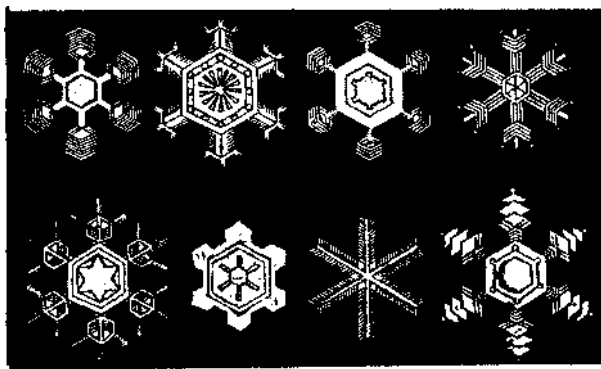
51. Some bodies are contracted by heat, or are contracted at certain temperatures. The behaviour of water is peculiar. When heat is withdrawn from fresh water, contraction takes place down to the temperature of 39° F. (4° C), but after that, when still further cooled, it begins to expand again, and continues to expand with a lowering temperature as long as it remains liquid. On this account the bottom waters of fresh-water lakes in cold regions, where the temperature remains long below 39° F., are always at that temperature.

52. **The freezing of water.** — The expression in the preceding paragraph, "as long as it (water) remains liquid," points to changes of another kind that are due to heat. When the temperature of fresh water sinks to 32° F, the water begins to change from the liquid condition into a solid, called **ice**. This change is called freezing, and the temperature at which the change takes place is called the **freezing-point**. In undergoing this change of state the water expands even more than it does in sinking from 39° to 32° F. It expands, indeed, with such force that an iron ball an inch thick, filled with water which is not allowed to escape, is burst into fragments in the process of freezing.¹ The freezing of salt water takes place at a lower temperature than that of fresh—about 29° Fahr. instead of 32°.

53. When the temperature of the air is as low as 32° F., the moisture that would otherwise form rain is changed into innumerable particles of ice, which in the mass form **snow**, a very porous and light substance of a pure white colour. It generally falls to the ground in irregularly-shaped little flakes, but this is due to the fact that in falling the particles are driven about by the wind, so that they strike against one another and adhere together, as they very readily do. As originally formed, the particles of snow have definite shapes. Snow is, in fact, formed like salt, in crystals, but the crystals of snow are not, like those of salt (par. 24), exactly of the same form. In details they present an endless variety of beautiful forms, all agreeing in this, however, that they have six rays proceeding from the centre at equal angles, that angle being accordingly 60°.

¹ See Introd. par. 28 (3).

54. On the surface of the earth snow has the appearance of a vast sheet of salt enveloping everything to a greater or less depth, completely covering up the smaller plants, clinging to the branches of shrubs and trees, and also to the leaves of such shrubs and trees as retain their leaves during the period when snow falls.¹ The depth to which the ground may be covered varies according to circumstances. On flat plains snow is seldom more than a few inches deep, but in some parts of the world it may attain even on plains a depth of two or more feet.² There is no limit to the depth to which hollows may be filled with snow. Though the aspect of a snow-covered country is remarkably uniform, the texture of the snow itself varies considerably. Sometimes it is fine and compact, at other times coarser and more cellular or open. Hence no general statement can be made as to the relative volume of snow and water. In some cases 12 inches of snow are aliot equal to



Fro. 60.—SNOW CRYSTALS.

one inch of water, in others less, in others again more than 12 inches. When the cold is intense the snow is almost as dry as sand, and the particles do not so readily adhere together. On the other hand, when the temperature is near the freezing-point the snow is nioister, and the particles cling together in such a manner that large lumps may be lifted from the mass and held in the air without breaking. Under pressure snow is then easily converted into an ice-like mass. As long as it remains snow, however, it is soft and yielding.³ It offers little resistance to motion, so that "sledges," a kind of vehicle without wheels, but mounted on runners made like the keel of a boat, can be drawn over snow-covered ground with great ease. Being a bad conductor of heat

¹ See Introd., par. 103, and the passages referred to in the note.

² See p. 281.

³ Nevertheless, see above, par. 16.

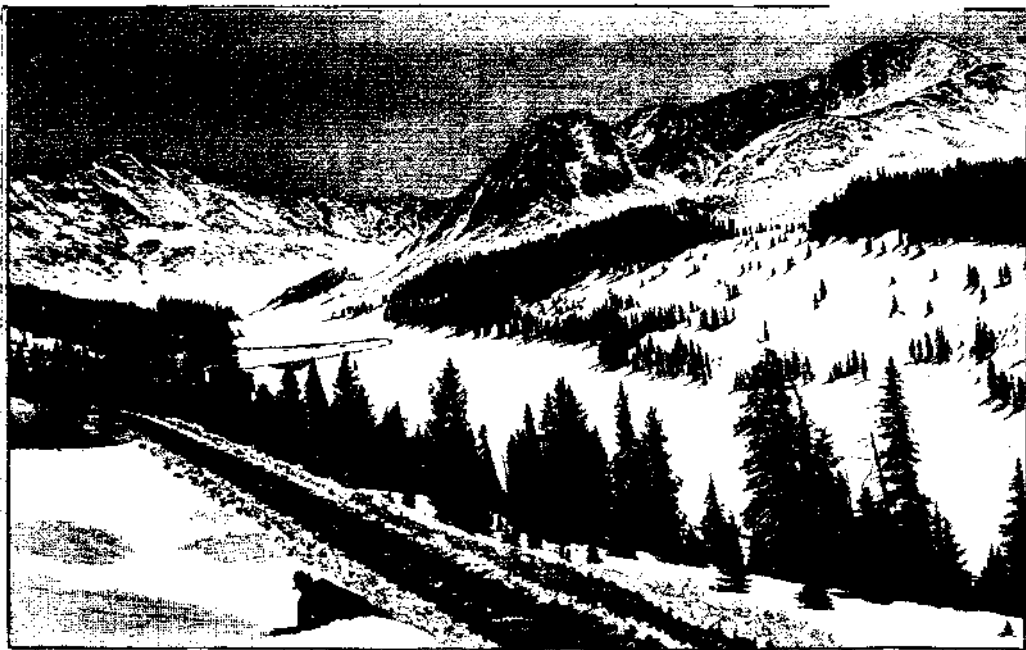


FIG. 61.—SNOW-SCENE IN NORTH AMERICA. (A Railway Pass in the Rocky Mountains.) The trees are pines or similar cone-bearing trees (see pp. 105-4).

(par. 46), snow, though cold itself, protects the ground underneath from greater cold in the air above.

55. The boiling of water.—When snow or ice changes back, under the influence of heat, to the liquid state, it is said to melt. At a high temperature a change of another kind is made in water. At 212° F. (100° C), water under the ordinary pressure of the atmosphere is changed into vapour or steam so rapidly, that the vapour, as it is formed, causes a rapid bubbling of the water. The water is then said to boil, and the temperature at which the change takes place is called the **boiling-point**. (It may here be mentioned, that as there are just a hundred degrees in the scale of the Celsius thermometer between the freezing and the boiling point of water, this scale is frequently known also as the centigrade.) The vapour so formed is a gas, which occupies at the pressure of the atmosphere a space about 1700 times as great as the water from which it is formed. A cubic inch of water would thus form at that pressure about a cubic foot (1728 cubic inches) of steam. In expanding into this volume great force is exerted, and it is this force that is made use of in the steam-engine, in which motion is produced by causing steam to press first on one side then on the other side of a flat plate (called a piston), working in a cylinder, and having attached to it a rod by means of which, along with other rods, joints, and axles, the motion is changed in direction in any way that may be desired.

56. Measuring of altitudes by the thermometer.—The temperature at which water boils varies with the pressure of the atmosphere, being higher the greater the pressure. Accordingly the boiling-point is lower the higher the elevation above the earth's surface, and advantage is taken of this fact to measure altitudes by determining the boiling-point of water by means of a thermometer. The fact that the degree on the thermometer may be made as long as one pleases makes it possible to determine the boiling-point, and hence the pressure of the atmosphere, by this method with great precision.

57. Variations due to heat in the density and pressure of gases.—When steam or the vapour of water has once been formed, the effect of further heat upon it is the same as in all gases, namely, to expand or rarefy it, in other words, to reduce its density. As the pressure is thereby also altered (par. 37), local variations in any volume of air bring about movements to restore an equality of pressure. To this cause we owe the winds (Introd., par. 61).

58. Evaporation at ordinary temperatures—Condensation.—It is not merely when boiling that water gives off vapour. The process by which the formation of water-vapour goes on at ordinary temperatures is known as **evaporation**, and is one of the most important phenomena in physical geography. Evaporation goes on even at freezing temperatures, so that even snow and ice may disappear in this way, and the air thus **always contains** more or less water-vapour. The pro-

cess goes on, however, all the more rapidly the higher the temperature, and the less water-vapour there is already in the air into which evaporation takes place. It is also hastened by a diminution of pressure, and therefore takes place, under similar conditions otherwise, more actively at higher than at lower elevations. When air is exhausted over a dish of water, evaporation proceeds briskly, and that is why it was stated, in describing the experiment in par. 34, that the water continued to occupy the same space "so far as the eye could observe." At any given temperature, a certain volume of air at a certain pressure can contain only a certain amount of vapour. When it contains this amount, the vapour in it is said to have reached the point of **saturation**, and when that point is reached, any diminution of the pressure or the temperature leads to **condensation**, that is, to the return of the invisible vapour to the condition of a liquid. It is this process that we see going on when a thin film of moisture is formed on the sides of a glass of water to which ice is added. The formation of clouds and dew is a process essentially similar. The principal effects of evaporation in the distribution of moisture and temperature over the globe are mentioned in the Introduction (pars. 86-7 and 90, and the third section of par. 95).

59. Deposition of solids on evaporation.—On the evaporation of water containing solids in solution the solid matters remain behind. The first effect of this is to increase the proportion of the dissolved solids to the liquid. If the process is continued, so that the quantity of liquid remaining is no longer able to retain all the solids in solution, the excess of the solid matter above the quantity that can be dissolved by the water resumes the solid form, and is deposited at the bottom or on the sides of the vessel, or hollow on the surface of the earth, containing the water; and if the water evaporates or dries up entirely all the solids are thus deposited. In this way crystals of salt are deposited in evaporating pans, to which sea-water is admitted along the sea-coast in warm countries such as India, and in the beds of salt lakes like Lake Sambhar, when the lakes contract during the dry season. In sunny regions, where the rainfall is enough to dissolve the salts in the ground, but not enough to wash them away, the moisture on rising to the surface, through the action of capillarity (par. 30) and evaporation, leaves the salts behind as an efflorescence or crust on the surface. In this manner are formed the extensive incrustations of salt in the North-West Provinces, and under peculiar conditions the saltpetre of Behar (par. 94). The same processes of solution and evaporation have also led to the formation of the numerous deposits of *kankar* or lumps of carbonate of lime, which are met with in so many parts of India.¹ Substances deposited in this manner from solutions are said to be **precipitated**.

¹ See text, p. 121, and Introd., par. 87.

60. Latent heat.—When ice or snow at the temperature of 32° F. is melted, and when water is converted into steam by boiling, these effects of heat are not found to be accompanied by any rise of temperature. The water formed from the snow or ice retains the temperature of 32° F.; the steam formed by boiling under the pressure of the atmosphere retains that of 212° F. In both cases the heat by which the change is brought about is wholly employed in maintaining the state in which the substance exists after the change—in overcoming the attraction between the particles, in virtue of which they cohere into a liquid or a solid. In overcoming the resistance due to such attraction, the heat does work just as when a moving body imparts motion to another body (par. 15); and when wholly consumed in doing work in this way, it cannot at the same time have the effect of raising the temperature. But the heat thus employed is not lost. It is given out again when water, for example, returns from the state of vapour to the state of liquid, or from the liquid to the solid condition, and it then serves to raise the temperature of surrounding bodies. For this reason the heat employed in doing work in liquids and vapours is said to be **latent**, because it disappears in the form in which it produces the well-known sensation.

61. Cooling by evaporation.—The heat required to convert ice or snow into water or water into steam or vapour is generally derived from some constant source of heat like the sun or a fire, so that the amount of heat consumed by the work cannot readily be detected. But in certain circumstances it can be shown that the required heat is derived from surrounding bodies, and that their temperature is in consequence lowered. The cooling effect or evaporation allowed to take place in rooms is well known in all hot countries. Advantage is taken of this fact, for example, to make ice in the Punjab. Water in shallow pans placed in pits partly filled with straw is exposed during the night to the air, and when the nights are clear and the air comparatively free from moisture, ice is formed during the night on the surface. In these circumstances evaporation takes place with exceptional rapidity. As straw is a bad conductor of heat (par. 46), the heat required for the process cannot be got from the earth. It is, therefore, partly derived from the water itself, which becomes so lowered in temperature that freezing takes place. Ice may also be formed by exhausting air over water (see par. 58).

62. From this illustration it will be understood that the evaporation constantly going on over the surface of the earth is constantly tending to reduce the temperature, and the effect of this reduction becomes sensible during the night. On the other hand, in the regions of the atmosphere where vapour is condensed into rain-drops the temperature of the surrounding air is raised by the process.

63. Specific heat.—The account just given of what takes place in

the conversion of ice into water and water into steam will enable one to understand better some other facts of importance in geography with regard to the action of heat. Heat, we have just seen, is not solely a cause of raising temperature. When producing certain changes in the condition of substances it does not raise temperature at all. Knowing that, one need not be surprised to find that even when it does raise temperature the same quantity of heat does not serve to raise the temperature of all bodies equally. Some require more, some less, heat to raise their temperature one degree. If, for instance, balls of equal weight but of different metals are put into boiling water, they will all ultimately acquire the temperature of the water, but they will not all do so at the same rate ; and it afterwards plunged into equal quantities of cold water at the same temperature, those which took longest to heat will raise the temperature of the water into which they are plunged highest. If plunged when at the temperature of the air into boiling water which was not kept boiling, those which took longest to heat would lower the temperature of the water most in rising to the same temperature. We may suppose that in those substances which require much heat to raise their temperature the heat is partly consumed in bringing about some change in their internal condition, even though that change is not so manifest as in the melting of ice or the boiling of water, and though the nature of it may not always be known.

64. Such differences are known as differences of specific heat, which is defined as the ratio of the heat required to raise the temperature of any substance one degree to that required to raise the temperature of an equal weight of water one degree. Most of the substances that have been tested in this way have only a small traction (less than a fourth) of the specific heat of water, and none has a specific heat as great as water. If, therefore, the specific heat of water is expressed as one, those of all other substances are expressed as decimals of one.

65. The fact that the specific heat of water is so large is of supreme importance in geography. It is on this account that the ocean, being slow to heat, equally slow to cool, and giving out so much heat for every degree of temperature it loses in cooling, has so much effect in moderating extremes of temperature.¹ Its specific heat is more than four times that of air,² and as air is 770 times as heavy as water, the volume of air which will be raised one degree in temperature will be more than 3000 times the volume of the water which would lose one degree of temperature in raising that of the air. The smallness of the specific heat of mercury (0.0333, or one-thirtieth of that of water), is one reason why this liquid is so suitable for use in thermometers. It is a substance that acquires very readily the temperature of surrounding bodies.

¹ See In trod., pars. 69, 89. * The specific heat of which is 0.237.

66. Differences in specific heat likewise explain, at least partly, why some soils are so much more easily warmed by the rays of the sun],haii others—sandy soil?, for example, as compared with clay soils. But this is not the whole explanation. Clay soils are moie apt to contain moisture in them than those composed of sand, and part of the heat of the sun is employed in evaporating tins moisture, and accordingly is not available for warming the soil (par. 60).

67. Gases cooled by expansion, warmed by compression —

Another fact of hardly less importance in geography than that considered in the preceding paragraphs is this, that gases (such as air) are cooled by expansion and have their temperature raised by compression. This also is to be explained as a change in the nature of the work done by heat, which, when air expands, for example, in consequence ot the reduced pressure experienced on rising to higher levels in the atmosphere, is partly employed in keeping the particles of the air at a greater distance from one another. It is in this way that winds are cooled so rapidly when forced upwards by mountains in their course, and are thus compelled to discharge their moisture in lam or snow. The rapid loss of temperature through the rising of the winds is a different thing from the low temperatures which prevail at high altitudes, and the explanation of which is given in the Introduction (par. 95). in accordance with physical facts already stated in this Appendix.

68. Melting and evaporation of substances that are solids at ordinary temperatures.—The changes induced in water by heat in consequence of which it is sometimes in the liquid, sometimes in the solid form, sometimes in the form of vapour, are not peculiar to water. Water is, in fact, only a substance that melts at the ordinary temperature of the atmosphere. Many of the other substances found on the surface of the earth are also capable of existing in the three states—solid, liquid, and gaseous ; but in many cases a very high temperature is required to bring fusible solids even to the state of liquids. Tin, the most easily melted of the metals, requires for the purpose a temperature equal to more than twice that at which Mater boils.¹ As shown in the Introduction (pars. 54, 56), many of the hardest rocks forming the crust of the earth have existed at one time in a molten condition, either at or below the surface.

69. Reconsolidation of melted solids — Crystalline rocks.—

Rocks that have consolidated from the molten condition mostly behave like water in turning into snow. They form crystals, and those which do so are called **crystalline rocks**. In general, however, these rocks have been formed under such pressure that they are not made up of perfect crystals, but for the most part of crystalline fragments. Even without being melted the heat to which some rocks have been subjected

* Its melting-pomt in 230° O. (446° F.)

has been enough to give them a crystalline structure, and in some cases this structure is due (like the crystals of salt) to other causes. Crystalline rocks, however, are not generally uniform in texture, for rocks are mostly composed of different minerals, and each mineral has its own way of crystallising.

70. Thus granite is composed of three minerals, quartz, felspar, and mica, the crystals of which are mingled together without order. *Quartz* is one of the forms of silica, one of the commonest minerals in nature. Pure sand is another of the forms of this mineral, and so also is pure sandstone, which is merely consolidated sand. *Felspar* is essentially the same as clay, converted into a hard mineral by the action of heat and pressure. *Mica* is less common in nature as a separate mineral in any form, though very widely distributed in fragments, not merely in granite, but in many other rocks. It is distinguished by its metallic lustre and the ease with which it can be split into thin leaves. In the form in which it is most commonly present in rocks, its lustre is somewhat silvery, more glossy, however, than silver, but somewhat duller in hue. Granite is a rock which seems always to have consolidated at a considerable depth below the surface of the earth under great pressure.

71. *Gneiss* is a rock composed of the same minerals as granite, but having these minerals differently arranged. In the first place, gneiss occurs not in irregular masses like granite, but in strata; not very regular, it may be, but sufficiently regular to show that the rock in its original form must have resembled other stratified rocks in its arrangement. Secondly, the crystallised minerals are not mingled together without order, but are arranged in wavy and generally crumpled layers, varying in thickness at different places. These layers, indeed, generally thin out at both ends being thickest in the middle. Crystalline rocks having this arrangement are said to be schistose, and are very common among the archæan¹ or earliest stratified rocks. In particular, they are very abundant among the ancient rock* of the Indian tableland. *Mica** schist is another common rock of this class, differing only in being without the felspar.

72. Among crystalline rocks of another class, two of the most widespread are basalt and trachyte. They are both volcanic, and both contain felspar in some form or other, but are composed of many other constituents. Basalts (which cover an enormous area in India²) are generally fine in texture and of a rather dark colour. Not uncommonly they have hardened in the form of prismatic columns, such as are shown in the view of Fingal's Cave on p. 205. Trachytes, the name of which is derived from the Greek *rpaxvs*, "rough," are generally of a rougher texture than basalts, and for the most part of a light tint, sometimes

* From the Greek "the beginning."

* See p. 100.

even of a bright colour (yellow, red, and greenish). They are all derived from volcanic outpourings of a recent date in a geological Bense.

73. Many limestones are crystalline in structure, and these are the most important crystalline rocks composed of only one mineral (called carbonate of lime). When the crystals or crystalline fragments of limestone are in fine grains, the rock is known as marble.

74. Most crystalline rocks are conipaiatively hard, and this is specially true of those ancient rocks of the class that have been formed undei great pressure, though some of these lose their hardness entirely when long exposed to the weather.

75. Chemical changes.—The changes which water and other substances undergo in fieezing or solidifying, evaporating, melting, and crystallising, do not change the nature of the substance. Water m any of its forms, whether in the liquid state commonly known as water, or in the form of ice or steam, is still water. But many substances can be subjected to changes of another sort. They can be broken up into other substances having totally different properties from those from which they are formed.

76. An example o(this mode of breaking up substances is afforded by the experiment described in par. 41, by which it was shown that a gas heavier than air could be formed. The gas that escapes with effervescence when the acid is poured on the marble is formed from the marble ; but when no more gas can be formed, the weight of the gas does not equal the weight of the marble, which shows that the gas does not represent the whole of that mineral. Moreover, the gas has none of the properties of the marble. It can, though with difficulty, be made first liquid and then solid, but the solid so formed is quite unlike marble. And the gas has distinguishing properties of its own. One of these can readily be shown by putting a lighted taper into the gas. The taper is at once extinguished, just as if it had been plunged into water.

77. Substances that are capable of being broken up in this way are called chemical compounds. They are different from mixtures, in which the substances mingled together retain their own properties. Thus there may be mixtures of gases with gases, as when water-vapour or the gas formed in the manner referred to in the last paragraph is diffused through the air. Solids in liquids, whether suspended like silt in rivers, or dissolved like salt or sugar in water, form only mixtures if no other action takes place. The salt retains its saltness, the sugar its sweetness, when dissolved, in exact proportion to the quantity present. Gases dissolved in water are likewise merely mingled with the water. Mixtures of solids with solids need no illustration.

78. The substances into which chemical compounds are resolved or decomposed by any particular action (such as the pouring of acid on marble) are not necessarily in their simplest form, in other words, incapable of being broken up any further. A substance which there

is no known process of decomposing, and which is hence assumed (in the present state of our knowledge) to be incapable of decomposition, is called an *element*. The elements already known to exist are some solid, some gaseous at ordinary temperatures, and two are liquid. All the metals, gold, silver, iron, lead, &c. (when pure), are elements, and all except mercury are solids. Mercury is one of the two liquid elements.¹ No gaseous element has yet been mentioned. Common air, even apart from water-vapour and other gases diffused through it, is not an element. It is a mixture of two elements, called oxygen and nitrogen, in the proportion of 20.9 of oxygen to 79.1 of nitrogen by volume. Oxygen, however, being rather the heavier of the two, makes up 23 per cent, of a given weight of air. The gas formed by the action of acid on marble is a chemical compound of oxygen and a solid element called carbon, which is known in various forms as charcoal, graphite (or so-called black-lead), and when melted and crystallised in the form of diamonds. The gas is generally known as carbonic acid, but chemists sometimes prefer to call it carbon dioxide, in accordance with the analogy of other names used in chemistry, to distinguish it from another gas (carbon monoxide) compounded of the same elements, but containing only half the proportion of oxygen. Water is another chemical compound of oxygen with another gas called hydrogen, the lightest of all the elements.

79. The gases now mentioned are the most important in nature, and the first place may be claimed for *oxygen*. It is essential to animal life in all its forms. It combines very readily with many of the other elements. When it combines rapidly a great deal of heat is produced, and the substance with which it combines burns. Oxygen is the great supporter of combustion. Hydrogen burns in air or in oxygen with a blue flame, and as it does so forms water. It was by burning hydrogen in pure oxygen, and then ascertaining that the weight of the water thus formed was exactly equal to the hydrogen and oxygen consumed, that water was first proved to be a chemical compound of these two gases. But the combination of oxygen with other substances by slower processes is constantly going on in nature, the process being known as oxidation, and the compounds thus formed as *oxides*. By such processes silver, tin, lead, and other metals are discoloured, the discoloration being due to thin films of oxide on the surface. The action of oxygen is often hastened by the presence of water. In the case of iron, for example, water, as is well known, soon causes rusting, but rust is merely an oxide of iron.

80. The generality of this process of oxidation causes oxygen to be present in greater or less amount in all the commoner rocks. It is a constituent of all the three minerals which constitute *granite* and *gneiss*,

¹ The other is bromine.

and is accordingly present also in *basalt* and *trachyte*, which always contain more or less felspar (par. 70), and in sand and sandstone, which, as we have seen (par. 70), is of the same composition as quartz. *Silica*, of which quartz and pure sand are different forms, is a compound of oxygen with an element called silicon. As oxygen enters into the composition of carbonic acid, it is likewise a constituent of limestone in all its varieties. In conjunction with iron, oxygen is the great colouring matter of nature, nearly all the reds, greens, yellows, and browns which we see in rocks and soils being due to the presence of oxides of that metal. Much of the oxygen that enters into combination with rocks is separated from the hydrogen with which it is combined in water, and thus the quantity of water belonging to the globe is being gradually, though very slowly, reduced.

81. The principal function of *nitrogen* in the air is to weaken the action of oxygen, just as vinegar is weakened when diluted with water.

82. Carbonic acid combines chemically with a large number of substances. These are called *carbonates*. In chemical language *limestone*, *mat bit*, chalk, and other forms of rock are all known as carbonate of lime, lime being the substance with which carbonic acid is combined to form these rocks. Among other common substances with which it combines is magnesia, and this compound, along with carbonate of lime, forms a variety of limestone known as *dolomite*.

83. Chemical changes in living bodies.—Chemical changes are constantly taking place within the bodies of all living organisms, whether plants or animals, on substances introduced from without; and it is in virtue of these changes that the organisms live. The living bodies are constantly taking in substances of certain kinds, and giving out products of other kinds. When a living body is growing, it is because it thus takes in more than it gives out, and from what it takes in it builds up structures of the kind peculiar to the organism (leaves, flowers, woods, &c, in plants; muscle, skin, bone, &c., in animals). Even when a living body has ceased to grow, it is constantly replacing part of its structure from matter introduced from without, as long as it continues to live.

84. In breathing, all animals take in oxygen from the medium in which they live—land animals from the air, aquatic animals from water. In return they give out the compound gas already frequently mentioned as carbonic acid. The oxygen required by animals must be in what is called a free state, that is, not chemically combined with anything else. Animal life would accordingly be impossible in the ocean if oxygen were not present dissolved in the water in addition to the oxygen combined with hydrogen of which water is composed. This free oxygen is derived from the air at the surface of the water, and hence the sinking of the surface waters to the deeper parts of the ocean¹

¹ See In trod., par. 70.

is of importance in the maintenance of animal life there at great depths. Anything that hinders the access of water charged with free oxygen is consequently adverse to animal life.¹

85. Most plants (all those which have green parts) **take in carbonic acid**, and give out oxygen under the influence of light. Plants thus take from the surrounding medium what animals restore to it, and animals take what plants restore.

86. Many other substances are required to carry on the internal chemical changes necessary to life. In animals they are introduced in the form of solid and liquid food ; in the case of plants they are mostly introduced by the roots, and then always dissolved in liquid. This last circumstance explains why **moisture in the soil** is so **essential to plant-life**.

87. A certain amount of heat is also required by all plants, and by all, with few exceptions, a certain amount of light. The requirements of different plants vary in all these respects ; but, on the whole, plant-life is most diverse and abundant, and vegetation most rapid, where there is the greatest amount of moisture, heat, and light.

88. The food required by the higher plants is as varied as that required by animals, and as plants have not the same power as animals of going in quest of their food, it is necessary that all the essentials should be supplied in the soil in which they grow. We say that plants " have not the same power as animals of going in quest of their food," for it would be a mistake to suppose that plants have no such power. Plants have at least the power of sending out their roots in various directions, and thus seeking out all the needful food that may be within reach where they grow. Still the soil must supply what is wanted, and the more abundantly the food of particular plant* is supplied, the more vigorously (other things being equal) do such plants grow. Hence the importance of supplying to cultivated crops in the form of **manure** the food proper to them when it is lacking or deficient in the soil.

89. We may now recognise two reasons why **great deltas or alluvial plains** like those of the Ganges Valley are so **remarkable** as they are **for fertility**. First, as the soil is so finely divided, the plant food contained in it is all the more easily dissolved (par. 32); and, second, as this soil is washed and blown down into the valley from an enormous area of higher ground, it is all the more likely to be varied in its composition, and thus **to** contain every substance that plants require as food.

90. Chemical changes after death.—After death chemical changes still go on in the bodies of plants and animals, but these are of a nature to break down, not to build up. For the most part, the constituents of the dead body disappear without trace in the surrounding mineral

matter or in the form of gases; but there are certain cases in which the relics of living organisms, more or less changed, are of geographical importance.

91. One case is that in which the hard shells or inner skeletons of certain animals, principally marine, such as corals, composed of carbonate of lime, and similar incrustations on certain marine plants, are preserved to form limestone rock.¹ It is in this form probably that remains of living organisms continue to exist in a recognisable form on the most extensive scale.

92. A second case, that which leads to the formation of coal, is even of greater economic importance. Coal is the final result of various chemical changes which have taken place under certain conditions in vegetable remains, and which consist for the most part in getting rid of oxygen and hydrogen, and increasing the proportion of carbon in the substance that remains behind. Some kinds of coal contain as much as 94 per cent of carbon.

93. Phosphates are another deposit of great economical value derived to some extent from the remains of living organisms, but in this case the bones and other parts of animals have been the chief source of the formation. Phosphates are of great value as manure, and consequently form a valuable export in many places where they are found.

94. Nitrates are another class of compounds having a similar origin. Among them may be mentioned the saltpetre of Behar,² saltpetre being in chemical language nitrate of potash. The substances that give rise under the action of the air and other influences to this saltpetre were probably various kinds of animal and vegetable refuse derived from old villages that occupied the region in which the saltpetre is now collected.

¹ Introd., par. 45.

^a See p. 127.

*LENGTH, ETC., OF THE PRINCIPAL RIVERS OF INDIA.
(From the Contour Map of India, Calcutta^ 1886)*

A. RIVERS BELONGING TO THE DRAINAGE AREA OF THE
BAY OF BENGAL.

			1 Length in Miles from Source		Height of Source above Sea-Level.	Area Drained, in Square Miles.
			To Sea.	To Main bteam.		
Ganges			1455		Foot. 13,800	397,300
Jumna			1480	765	10,850	
Chambal			1558	514	1,800	
Banas			1518	243	3,000	
Gumti			1079	365	520	
Gogra			1176	570	13,000	
Son .			1033 (?)	425	3,300	
Brahmaputra			1742 (?)		Unknown	Unknown
Subaruarekha			240		2,150	9,400
Mahanadi .			512		2,300	52,637
Biahmani .			410		2,100	20,169
Godavari .			795		3,500	121,375
Wamganga			670	405	3,600	
Kifttna			740		4,700	98,150
Tungabhadru			643	370	5,000	
Bhima .			747	394	2,000	
Penner [Northern]			325		3,000	22,211
Cauvey			415		5,000	37,417
1 Palar .			205		3,000	8,847
B. RIVERS BELONGING TO THE DRAINAGE AREA OF THE ARABIAN SEA.						
Indug .			1650 (?)		Unknown	Unknown
Chenab .			1146	590	14,000	
Ravi .			1065	365	Unknown	
Sutlej .			1198	600		
Jehlam			1181	430	12,000	
Luni .			300		1,600	24,975
Mahi .			815		1,700	20,644
Tapti .			410		2,500	26,173
Narbada .			735		2,300	39,200

**AREA AND POPULATION IN ROUND NUMBERS OF THE
PRINCIPAL STATES OF EUROPE AND THE MORE
POPULOUS COUNTRIES OF OTHER CONTINENTS.**

	Area in Thousands of Square Miles (1890).	Ratio to Great Britain.	Population in Mil- lions about 1880.	Population about 1880 per Square Mile.	Population in Mil- lions about 1890 ¹	Population about 1890 per Square Mile.
Australasian Colonies. See p. 311						
Austrian Empire	242	2½	38	157	39·7	164
Belgium	11½	½	5·5	487	6·0	523
Brazil	3,200	36	12	4		
Canadian Dominion	3,470	39	4·3	1·3	4·9	1·5
Cape Colony	233	2½	1·2	5·1	1·5²	7
China (proper)	1,550	17			430	278
Denmark	15·4*	½	2	128	2·2	141
Egypt	13½	½	6·8	5·30	8·3	650
France	206	2½	38	185	38·7	188
German Empire	209	2½	45	217	49·4*	237
Bavaria	29	½	5·3	180	5·6*	191
Prussia	134	1½	27	200	30·0*	223
Saxony	5·8	⅙	3·0	515	3·5*	604
Württemberg	7·5	⅙	2·0	260	2·0*	271
Greece	25	½	2	80	2·3	91
India ⁶	1,380	15	250	194	277*	201
British India ⁷	944	9½	199*	227	220*	233
Italy	111	1½	28·5	257	30	271
Japan	150	1½	37	247	40	267
Mexico	750	8½	10	13	10·5	14
Netherlands ¹⁰	12·5	½	4	315	4·6	364
Norway	128	1½	1·9	16	2·0	16
Portugal	34	½	4·1	120	5·2	150
Roumania	51	½	5·4	106	5·5	108
Russia ¹¹	2,045	23	85	41	99	48
Servia	19	½	1·8	97	2·1	112
Spain	196	2½	17	88	17·8	90
Sweden	174	2	4·6	28	4·8	28
Switzerland	16	½	2·8	177	3·0	185
Turkey in Europe	59	½	4·5	70	...	
Bulgaria and Eastern Roumelia	40	½	2·8	70		
United Kingdom	121	1½	35	200	37·7*	310
United States ¹²	3,000	33½	50	17	62·5*	21

¹ Mainly estimates.² Preliminary returns, census 1891.³ Exclusive of Iceland, but inclusive of Faroe Islands.⁴ Exclusive of desert.⁵ Preliminary returns, census 1800.⁶ Exclusive of Burma, Nepal, Bhutan, and Manipur.⁷ Inclusive of Burma.⁸ Preliminary returns, census 1891.⁹ Exclusive of Upper Burma.¹⁰ Exclusive of Luxemburg.¹¹ Including Finland*¹²

Exclusive of Alaska.

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Aust Austria.	exp exports	N North,	Rus Cent As. Russian
Braz. Brazil.	For Pos. Foreign Posses-	n note	S Central Asda.
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