LONGMANS' GEOGRAPHICAL SERIES

Book III.

THE WORLD

FOR SENIOR STUDENTS

WITH 276 MAPS, DIAGRAMS, AND ILLUSTRATIONS

NEW IMPRESSION

LONGMANS, GREEN, AND CO.
39 PATERNOSTER ROW, LONDON
FOURTH AVENUE & 30TH STREET, NEW YORK
BOMBAY, CALCUTTA, AND MADRAS
1918

LONGMANS' GEOGRAPHICAL SERIES.

Book I. THE FIRST BOOK OF GEOGRAPHY. With 21 Illustrations and 52 Maps (38 of which are coloured). Crown 8vo.

Book II. THE WORLD. For Junior Students. With 57 Illustrations and 153 Maps (in colour and in black and white). Crown 8vo.

Book III. THE WORLD. For Senior Students. With 276 Maps (in colour and in black and white), Diagrams, and Illustrations. Crown 8vo.

Book IV. THE BRITISH EMPIRE. With 67 Illustrations and 113 Maps (71 of which are coloured). Crown 8vo.

Book V. A PRIMARY PHYSICAL GEOGRAPHY. By John Thornton, M.A. With 135 Illustrations and 14 Maps (1 of which is coloured). Crown 8vo.

PREFACE TO 1912 EDITION

This book has been partly re-written and considerably enlarged with a view to meeting modern requirements. Great attention has been paid to Physical Geography, and a large number of new maps and diagrams have been added to illustrate such subjects as the rainfall of continents and countries, variations of climate as shown by maps giving isobars and isotherms, vegetable and other natural products, &c. Graphic representations have been given to show comparisons of trade between the different parts of the British Empire and other parts of the World. A Chapter has been added upon map-making, map-projections and map-reading. Sets of questions for practical work have been given upon the new physical maps in addition to the large number of questions with which the book was already provided. Statistics as to population have been brought into accordance as far as possible with the results of the Census of 1911.

NOTE TO 1918 EDITION

As far as possible statistics have been brought to the end of 1913.

PREFACE TO FIRST EDITION

This new Series of Geographies consists of five books, the first three of which have been arranged upon the concentric system both as regards matter and maps.

The first book gives a brief sketch of the chief geographical features of the globe. The second book traverses the same ground, but supplies greater detail. The third book goes still further into detail.

Hence, in studying the first book the pupil learns the most important facts and uses them as centres about which the additional facts in the second and third books are naturally grouped.

The maps have been constructed upon the same principle, and in each book they contain only such names as are mentioned in the text. The maps are so complete that no atlas will be needed for use with these books.

Particular attention has been paid to industrial and commercial geography, and throughout the series special stress is laid upon the close connection between the position, physical configuration, and products of a country with the employments of its people.

CONTENTS

LIST OF ILLUSTRATIONS

LONGMANS' GEOGRAPHICAL SERIES

BOOK III

INTRODUCTION

1. **GEOGRAPHY**, as its name implies, describes the earth on which we live. It may be divided into four branches—Mathematical, Physical, Political, and Commercial.

Mathematical Geography treats of the earth as a planet, its shape and size, its motions and their results, latitude and longitude, and the methods by which its surface may be represented on globes and maps.

Physical Geography treats of the natural features of the earth's surface, such as the distribution of land and water, and the conformation of its crust; of its atmosphere and climate; of its minerals, plants, and animals; and of the causes which bring about changes on its surface.

Political Geography treats of the various countries into which the surface of the earth is divided, their political and social institutions, and the occupations and condition of the people inhabiting those countries.

Commercial Geography treats of the exchange of commodities, the locality and manner of their production, the modes of transport, and the routes by which they are carried.

MATHEMATICAL GEOGRAPHY

2. **THE EARTH AS A PLANET.**—In very early times astronomers noticed that, while the vast majority of the stars seemed to maintain their relative position unchanged from year to year, five appeared to change their position in the heavens

with regard to the other stars. These five on this account were called **planets,** while the others were termed **fixed stars.** After a while it was discovered that these planets moved round the sun as a centre; then the discovery was made that our earth was also a planet, moving round the sun in a similar manner to the other five; now we know that numbers of other heavenly bodies, some larger and some smaller than the earth, also revolve round the sun at varying distances and in different times, forming with the sun what is called the **Solar System.**

The path described by one body in its revolution round another is called its **orbit.** The orbits of the planets are not quite circular, but slightly elliptical, the sun occupying one of the foci. It therefore follows that a planet is not always at the same distance from the sun. When nearest the sun the planet is said to be in *perihelion*, and when at the point of its orbit which is most distant from the sun in *aphelion*.

3. **The Solar System** consists of—

(*a*) **The sun,** situated near the centre.

The sun, around which the earth travels at an average distance of nearly 93 millions of miles, is one of the multitude of fixed stars. It appears larger and brighter to us, because it is so much nearer than the other stars. It is an intensely hot body, shining by its own light; while most of the planets and their satellites are cool bodies, and do not, therefore, give out light of their own. Compared with the earth, the sun is a globe of enormous dimensions; its **diameter** being 866,500 miles—that is, nearly 110 times the diameter of the earth; while to make up its **bulk** about 1,300,000 bodies as large as the earth would be required.

When viewed through a telescope, **dark spots** may often be seen upon its brilliant surface. If one of these spots be carefully noticed, and observed again after a few days, it will be found to have moved farther towards the western side of the sun's disc, where it finally disappears. After an interval it reappears on the eastern side, and arrives at the position where it was first noticed in about twenty-five days, furnishing us with a proof that the sun **rotates** on its axis in that time.

(*b*) **Eight large planets.** These, arranged according to their distance from the sun, are:—**Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus,** and **Neptune.**

Each of these planets except Mercury and Venus is attended by one or more satellites, which revolve round it, and accompany it in its revolution round the sun.

The following table shows the number of moons, distances from the sun, and diameters of the primary planets:—

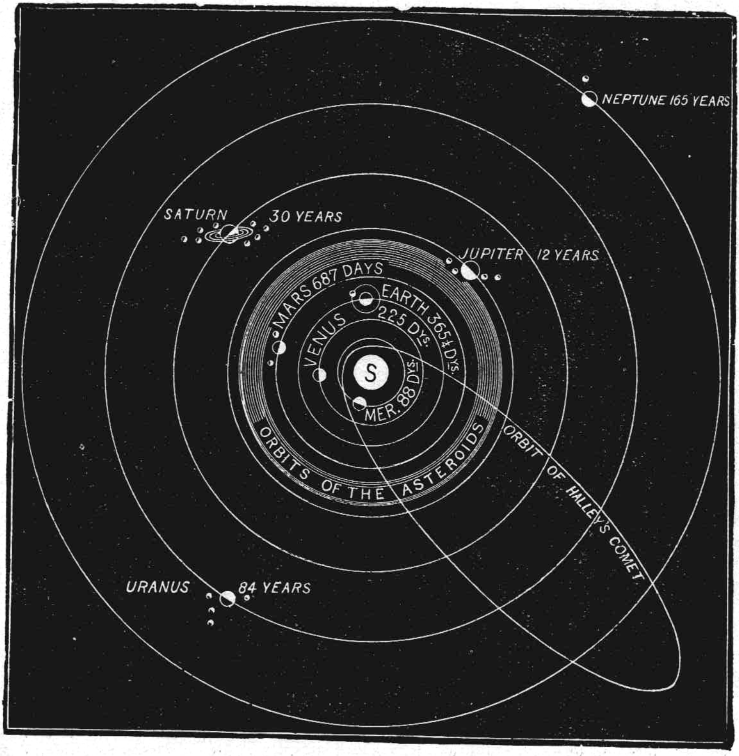
Planet	Moons	Distance from the sun in millions of miles	Diameter in miles
Mercury . . .	—	36	3,030
Venus . . .	—	67·2	7,700
Earth. . . .	1	92·9	7,918
Mars . . .	2	141·5	4,220
Jupiter . .	4	483·5	86,000
Saturn . . .	8	886·5	71,000
Uranus . . .	4	1,782	31,800
Neptune . . .	1	2,792	34,500

Fig. 1 shows the order and time of revolution of the planets. The distances are not to scale, Neptune being really about eighty times as distant from the sun as Mercury.

(*c*) A number of smaller planets, termed **planetoids** or **asteroids**, revolving between the orbits of Jupiter and Mars.

(*d*) **Comets.**—These are bodies usually moving in an elongated

FIG. 1.—THE SOLAR SYSTEM.



orbit, at one time very near and at the other an immense distance from the sun. They vary much in appearance, but generally consist of a more or less bright **head**, followed by a train of dimmer light called the **tail**.

Some comets have a regular period of revolution, and move round the sun in an elongated elliptical orbit. Others move in a curve like a parabola, and after passing round the sun vanish into space.

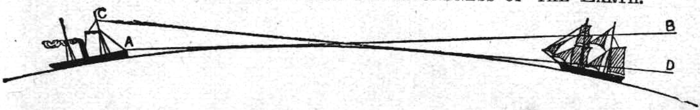
(*e*) **Meteors.**—These are small bodies travelling round the sun like comets, with which they possibly have some connection. Under the term are included **shooting-stars, fire-balls,** and **aërolites.**

When one of these bodies in the course of its revolution strikes our atmosphere, the friction caused by its rapid motion generates so much heat that it burns, and we see it as a streak of light.

4. **THE SHAPE OF THE EARTH.**—Owing to the action of certain well-known laws, the earth is not a perfect sphere. Careful measurements show that it is slightly flattened at the poles and slightly bulging at the Equator. Such a figure is termed an **oblate spheroid.** The following points, among others, are adduced as reasons for concluding that the earth is spherical in shape.

1. When a ship is approaching the shore, the first parts to be seen are the top-sails; as she nears the land the lower sails and rigging come into sight, and lastly the hull appears. If the earth's surface were flat, the hull, being the largest part, would be visible first. The look-out in the crow's nest sees the whale spouting before it can be seen by the men on deck, because he looks over the curved surface which intercepts their view. If two vessels

FIG. 2.—DIAGRAM TO ILLUSTRATE THE ROUNDNESS OF THE EARTH.



approach each other (fig. 2), the observer at A sees only the portion above the line A B, while the look-out at C sees all above the line C D.

These appearances are noticeable in all directions, objects of the same height coming into view at the same distance. This shows that the surface must be spherical, as, if round in one direction only, these distances would vary.

2. The shadow thrown by the earth on the moon in a lunar eclipse is *always* circular in shape, which could not be the case unless the earth were spherical in form.

3. The sun, moon, and the other heavenly bodies are globular in form, and therefore it is only natural to assume that the earth is also a globe.

4. Numbers of ships circumnavigate the globe every year, sailing eastward round Africa to Australia, and returning by Cape Horn to their starting-point. This could only be accomplished upon a body having a round surface.

5. The sun rises earlier for places east and later for places west. If the earth's surface were flat he would be visible at all places on the surface directly he appeared above the horizon.

6. The Pole Star is seen on the horizon at the Equator; as the observer goes north it gradually rises above his horizon at the rate of 1° for every 69 miles (approximately) traversed, until at the North Pole it appears directly overhead. This would not be the case on a plane.

5. **THE SIZE OF THE EARTH.**—By the aid of the stars the various dimensions of the earth have been accurately deter-

mined. In round numbers the **equatorial diameter** is 7,926 miles, while the **polar diameter** is 7,900 miles. The difference of $26\frac{1}{2}$ miles between the two diameters in so large a body is so slight, that for all practical purposes we may regard the earth as a globe. The earth's **circumference** at the Equator is 24,899 miles; and the **area of its surface** 197,000,000 sq. miles.

6. **THE MOTIONS OF THE EARTH.**—The earth has two motions—

(*a*) **Rotation**, *the daily* (*diurnal*) *turning* on a line which passes through its centre, and is called the **axis.**

(*b*) **Revolution**, the *yearly* (*annual*) *motion* round the sun.

The first motion, rotation, gives us the length of the day, and, by bringing the various parts of the earth's surface successively into sunlight, causes the alternate light and darkness which we term **day** and **night.**

The sun appears to rise in the east, pass across the sky, and disappear in the west every day. If certain stars be observed at night, they will be found to follow a similar course. These appearances must be due either to the fact that these bodies are moving round the earth, or that the earth turns on its axis. This latter fact has been accepted for several reasons, among which may be mentioned: the flattening of the earth at the poles, and the bulging at the Equator (due to a rotatory motion); the incredible velocity the heavenly bodies would possess in order that they might revolve round the earth in twenty-four hours; the improbability that larger bodies would revolve around smaller ones.

The term day is used in two senses: first, to denote the time of the earth's rotation on its axis, and, secondly, the time from sunrise to sunset.

The time of the earth's rotation is easily found by observing when a particular fixed star is exactly south, and then noting when the same star reappears in the same position. This time is found to be 23 hours 56 minutes 4 seconds, and is called a *sidereal day*. The ordinary day, which is measured from the sun, is 3 minutes 56 seconds longer than the time of the earth's rotation, and is called a *mean solar day*. Its greater length is due to the fact that, while the earth has been making a complete rotation, it has also been moving onwards in its orbit, and hence must continue to turn nearly four minutes longer, to bring any given place to the same position with regard to the sun as on the previous day.

7. **The second motion, revolution,** determines the length of the year. It takes the earth $365\frac{1}{4}$ days to make one revolution round the sun. This revolution is made with *the earth's axis inclined to the plane of its orbit at an angle of* $66\frac{1}{2}°$, *and constantly pointing in the same direction.* This causes the variation in the length of day and night and the difference in the altitude of the sun at noon, and thus brings about the **change of seasons.**

The exact time taken by the earth to complete one revolution round the sun is 365 days 6 hours 9 minutes 9 seconds. This is called the *sidereal year*, because it is the time which the sun appears to take to go round from one fixed star and return to the same. The *tropical*, or *equinoctial*, *year* is the one used for ordinary purposes. Its length is 365 days 5 hours 48 minutes 46 seconds, and it is the time occupied by the sun in moving from one tropic or equinox back to the same again.

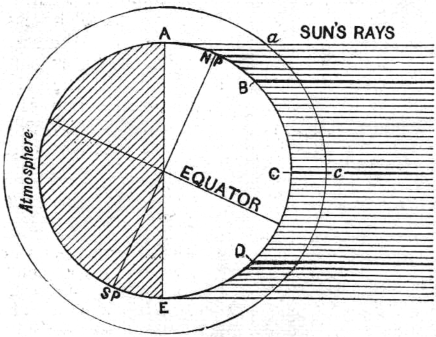
The **reasons** for concluding that the earth revolves round the sun are also drawn from observations of the heavenly bodies. If in the Northern Hemisphere we watch the rising of the sun from December 21 to June 21, he will be found to rise farther and farther north each day; while from June 21 to December 21 he appears to rise farther and farther south. Because this apparent motion stops at these dates, they are called the **Solstices**; June 21 being the **Summer Solstice**, while December 21 is the **Winter Solstice.** If the earth remained in the same position, the sun would rise and set in the same points each day.

Certain stars also, which are visible at one period of the year, pass out of sight and appear again after a year's interval in the same place, while other stars come into view and then disappear again in their turn.

These constant changes, which occur every year under exactly similar circumstances, tell us that the earth is continually changing its position in the heavens.

8. **THE SEASONS.**—As the earth flies on its journey round the sun, the direction at which the sun's rays strike any part of its surface undergoes constant change, and the amount of heat received at any particular place consequently varies. The relative effect of the sun's rays upon equal portions of the earth's surface may be seen from fig. 3. When the sun is higher in the heavens, its rays strike the ground more nearly perpendicular, and the amount of heat received is greater, for the following reasons:—

FIG. 3.—DIAGRAM TO ILLUSTRATE THE SEASONS.



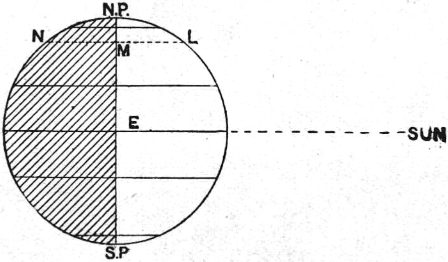
(*a*) When the sun is higher, the number of rays falling upon any part of the earth's surface is greater than when it is lower. If A B, B C, C D, and D E represent equal parts of the earth's surface, it is evident that B C, where the sun's rays fall more perpendicularly, receives a much greater number of rays than A B, where the rays strike the surface in a more slanting direction.

(*b*) The rays pass through less atmosphere when the sun is higher, and consequently do not lose so much of their heat. The rays at A pass through the atmosphere for a much greater distance than those at C, A *a* being greater than C *c*.

9. The **cause of the change of seasons** is best understood from a consideration of the following diagrams:—

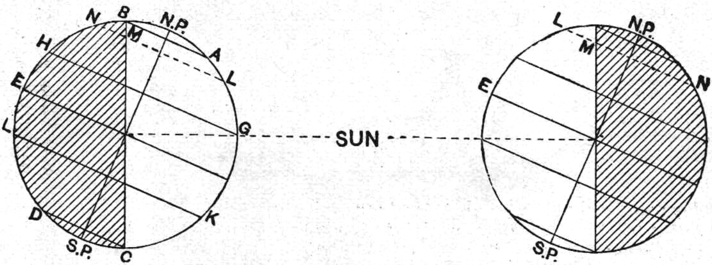
If the earth's axis were perpendicular to the plane of its orbit, as in fig. 4, then it is evident that every place on its surface would have 12 hours day and 12 hours night. The regions about the Equator would have, as now, the hottest climate (par. 8), while towards the poles it would grow gradually colder. There would be no difference in temperature at any given place throughout the year, and consequently none of the changes which we call seasons.

FIG. 4.—DIAGRAM TO ILLUSTRATE THE SEASONS.



If we now incline the earth's axis to the plane of its orbit as in fig. 5, we get an explanation of the **variation in the length of days and nights** which brings these changes about. It will be seen that when the earth is in this position the sun's rays reach a considerable distance beyond the North Pole, and that, although the earth rotates on its axis, a considerable area around the North Pole (from A to B) remains continuously in the light, while a similar area around the South Pole (from C to D) does not receive any light from the sun. This is the position of the earth with regard to the sun at midsummer for the Northern Hemisphere, while for the Southern Hemisphere it would be midwinter. If in fig. 4 L marks the position of London, then it is clear that one rotation gives an equal length of day and night, L M being equal to M N; but in fig. 5 the point

FIG. 5.—DIAGRAM TO ILLUSTRATE THE SEASONS.



L would be in sunlight for a much greater part of the rotation, L M being now much greater than M N.

The distance beyond the North Pole at which the sun's rays strike the earth's surface is $23\frac{1}{2}°$, and is determined by the inclination of the earth's axis to the plane of its orbit. This gives the position of what is called the **Arctic Circle**, while a similar distance from the South Pole marks the position of the **Antarctic Circle**.

10. Fig. 6 shows the earth at four points of its orbit. At A, the earth's position at the *summer solstice* (June 21), the North Pole is turned towards the sun, which is now overhead at noon on a line $23\frac{1}{2}°$ north of the Equator, called the **Tropic of Cancer**. This line is called a **tropic** because the sun appears to turn south after reaching it. The Northern Hemisphere is now in the midst of its summer, while the Southern Hemisphere is in the midst