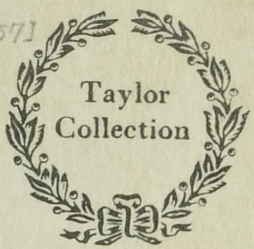

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A

GLANCE AT THE GLOBE,

AND AT

THE WORLDS AROUND US.

Painted by J. Gilbert. Engraved by S. Allen.

A

GLANCE AT THE GLOBE

AND AT

THE WORLDS AROUND US.

BY

JEFFERYS TAYLOR,

AUTHOR OF

"ÆSOP IN RHYME," "THE YOUNG ISLANDERS," "INCIDENTS OF THE APOSTOLIC AGE," ETC. ETC.

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CONTENTS.

CHAPTER XII.

PREFACE.

MANY young persons of considerable natural intelligence, and who are able to give a correct school answer to a prescribed question, have not in reality mastered the plain fact to which that question refers; so that, if required to frame the reply by their own reasoning powers, they are perplexed or silent.

If, for instance, the size, figure, distance from the sun, and so on, of the earth, be demanded, such will perhaps, with scarcely a moment's hesitation, recover from memory the exact words and figures by which the particulars are given in The Key to the astronomical ex-

ercises. And yet they will be without any available idea of the grand scheme of the solar system; or they will be wholly unable to describe it.

Now, it is to put the understanding, as well as the memory, in possession of the world of things above and around us, that this Glance has been undertaken. An attempt has been made to lift the mind from the surface, that it may embrace a portion of the great outline of nature,—to raise the eyelids, and expand the conceptive faculties.

And with regard to the near, but yet vast scene of creative power which our habitable earth displays,—how many, viewing only here and there an inch or two, as through a key-hole, have no idea of the proportions, the relation, the variety, or the magnitude of the whole. The writer has endeavoured to set the door itself open,—he does not pretend to have done more.

And when, at last, the smaller picture of human doings was to be presented, his aim was to show, not details, but general results,—not rows of conquerors, nor the ancient dust or modern smoke of their bootless victories, but to exhibit the gleaming or beclouded canvass, in its length and breadth, throwing a needful ray on the dim horizon of *unclassical* antiquity ; so that even the sweltering labourers of early Egypt may be distinguished.

DESCRIPTION OF THE PLATE.

It may be as well, in the first place, to explain the nature of the engraving which forms the frontispiece of this little book, in order to prevent at once the possible mistake of supposing that we have here a *terrestrial* view with rather a large full moon suspended in the dark sky.

The scene is A LUNAR LANDSCAPE, and the spectator is considered on this occasion to be in the moon itself, surveying the chill and rugged features of that small planet as they probably appear during a lunar night under the secondary light reflected from the Earth. The artist, guided by the best scientific and telescopic authorities, has, I think, in a striking manner, and with entire fidelity, represented the view intended.

The surface of the Moon, we know by observation, is very much unlike that of our own

globe. It abounds, not only in precipitous rocks and mountains of great altitude, but in strange circular pits, the edges of which are but little raised, and whose depth cannot always be fathomed by any sight we can get of them. There are, again, some enormous hollows, which have been ascertained to be not less than four miles deep and forty miles in diameter; whilst there are abrupt chasms, disclosing frightful abysses, of which the earth has no examples. These appearances show that the fair Queen of Night, as the poets call her, whose silvery lustre we so much admire, is anything but a beauty when our optical instruments give us a close inspection. She appears to remain in the roughest state imaginable, and not at present prepared for the residence of living creatures.

Our Earth is seen rising in the heavens, and shedding her own silvery beams on the face of her faithful satellite. A most majestic spectacle must this our globe present to eyes, if any there be, to take a glance at her from the Moon. The sky is made as black as possible, the Moon having no atmosphere to reflect and mingle the rays of light.

INTRODUCTION.

"A Glance at the Globe, and at the worlds around us;"—how must this sound to a blind person? What! are there worlds in existence millions of miles from the reach of our bodies, of which still those bodies have consciousness? "Can you," — a blind person might say — "sitting in your chair, have conveyed to you a something proceeding from those worlds? O the incomprehensible, the glorious gift denied to me!"

To this extent an intelligent person blind from birth, may be supposed to understand his privation; and though such persons are in general cheerful, there must be times when the affliction is the occasion of peculiar grief, and perhaps impatience. It is in vain that the mind struggles to attain even a momentary possession of the precious boon common to others. Shut within its rayless cell, the flood of day is

poured in all its effulgence on his uplifted brow, but is wasted as on that of a marble statue, and the benighted individual cannot by any means understand the loss, of which perhaps he peevishly complains.

But the gift of eyesight is very far from being appreciated or used as it ought to be, even by those who possess it in the highest perfection. For what is it to look with a sheep's optics upon the fields, or with an owl's or a cock-robin's upon the sky? What is it to gaze at passing or collected crowds, to peep in at shop windows, or to stand before a looking-glass? How many a brilliant youthful eye of first-rate visual powers, a microscope and a telescope at once—for which the venerable astronomer or naturalist would give worlds, as we say—has never once been raised intellectually to the heavens,—never perused the bright lesson traced by the finger of God either on the firmament or the flower! How lamentable it is to hear young persons say in a careless tone, "Oh, I have not studied astronomy. I don't understand natural history." By such, too, the works of human genius—the express gift of God—are generally disregarded: they have "no taste for them."

In these cases there is probably *some* taste, some predilection of an inferior—a prejudicial,

but yet of a tempting kind, that is occupying and narrowing the intellect: and on such matters the mind will finally collapse, if prompt remedies be not applied. Happy are the young whose parents see this danger, and resolve at all events to keep the mind open for that which will enlarge it; guarded from all noxious things that solicit entrance, especially from speculative matters, which, acting immediately on the temper, are likely to create a tempest in it. Too often, however, is the youthful constitution dosed and agitated from its infancy with the deadly excitements of the day; until we find the whole soul of juvenility rankling on some envenomed point of party conflict. Instead of a healthful appetite for general knowledge, there will be a feverish craving for the news of the day; and thus we have a small nation of male and female politicians, crazed before they are fifteen about state affairs, "great principles," and all the rest of it.

The mere frivolities usually incident to adolescence, as they are unconnected with the malign emotions, will in general very readily give way to mental culture; for the mind by these has never had either the cramp or convulsions brought on. It is therefore soon made obedient to the higher influences—presuming

the whole solar system, and a few harmless parlour speculations on the probable condition of the globes of which it is composed, have been ventured on, with the assistance of the latest authorities on the subject. Here the mind *may* so expand itself as never to collapse again. Without losing its elasticity, it may acquire dimensions whilst contemplating that which is vast in time and space, which will insure it against the fate of shrinking down to intellectual littleness.

It may be said, indeed, that these contemplations do not always turn the mind the right way in religion; that it may be so overwhelmed with the vastness of the scenes revealed by Astronomy as to forget what God has done in the world of atoms on which we tread, and to doubt its own relation to that Almighty Being. This result is to be guarded against by laying the telescope aside awhile, and taking up the microscope, or employing the unassisted eye to discern the infinite power, wisdom, and goodness which have been exercised, not less in the structure of the animal and vegetable worlds than in the formation and movement of the heavenly bodies.

Astronomy, therefore, will not detain us too long, for it is chiefly a glance at our own globe that is intended. We shall, therefore, peruse

the features of the Earth, and examine, as well as we can, the materials of which it is composed; and having noticed the three kingdoms of Nature, on the ascending plan, Minerals, Vegetables, Animals, we shall inquire respecting Man himself, his history, his operations, his religion, not forgetting the appointed result of all — THE CATASTROPHE for which the vast machine appears to be prepared.

So much of the remote history of our planet as is indicated by Geology is considered in a distinct chapter, at the end. It is no longer possible—it never can be desirable—to veil the startling facts that are daily coming to light from the depths. Truth *has* sprung out of the earth; and geology is now chiefly startling to the infidel, who finds that the foundation of his favourite notion regarding the eternity of the present state of things, is not only dug from beneath him by the miner's shovel, but exploded over his head by volcanoes. The hardiest unbeliever now knows, as surely as himself was born, that mankind had a certain, and a comparatively recent beginning.

I shall take care to revive and impress the convictions of a creating, governing, immediately present Deity, otherwise the study of nature is a painful, harassing, bootless exercise

of the mind. Without a God, the book of Nature is a confused, incomprehensible work, having neither title-page nor conclusion; and the wonder is, that so many persons, not atheists at all, are content to examine the vast machine of the universe, without reference to the power which set it going, and sustains it. The doctrine of a Deity, as proved from all that exists around us, is called Natural Theology,—a science that is too little attended to by young persons in general, and, indeed, by most of us.

You see, therefore, that an account of the world must include brief notices of Astronomy, Geography, Mineralogy, Botany, Zoology; of the nature and operations of Man; the history and antiquities of nations; the rise of civilization and religion; with many other subjects to which distinct names cannot be given.

But let not these terms convey the idea of sets of lessons and a task-book. Such things are very useful, quite needful in their place, and will never be regarded with dislike by reasonable persons, however young, except when they chance to be in an unreasonable humour. This book, however, is not one of that class. It is a nut-shell of knowledge, intended to be cracked, and the contents picked out at leisure, by those

who are at liberty to select their own occupation. So do not let a few school-words frighten you too soon, and deprive you of the *recreation* which the mind may really find in the pursuit of knowledge. I am no schoolmaster; and if I were, the reader is not my scholar, but, as I trust, an intelligent young person, with whom I beg to claim a sort of acquaintance for an hour, travelling, as we really do, in the same charming conveyance, — the rolling, gliding World, of which we are about to speak.

A GLANCE AT THE GLOBE.

CHAPTER I.

ASTRONOMY.

I HAVE just told my readers not to be frightened at the subjects named for notice in this book; and yet, in commencing with Astronomy, I must communicate facts which are in their own nature somewhat awful to contemplate; and if we did not know that He who made the worlds also preserves them, we might lead a life of constant terror or apprehension, from a knowledge of the circumstances in which our world is placed. If I were travelling with a companion in a railroad carriage, which was proceeding only at the usual speed, he would not be much interested, certainly not terrified, by hearing from me all that I could say about the weight and motion of the train and engines.

But if I were to inform him that we were careering at the rate of a hundred miles an hour,—that we should never stop till the whole apparatus was burnt, or knocked to pieces, he would, though not naturally timid, start wildly with dismay and sudden fear.

Now, attend to me, my fellow-traveller,—for such indeed you are at the present moment. Do you hear that clock tick? One—two—three—four—five! Are you aware, that whilst you have been counting those five beats, — five seconds,—you have actually been conveyed that hundred miles? That, you know, is at the rate of 1,200 miles in a minute, or 72,000 miles in an hour; and if your steam-carriage rolled at that rate, it would in an hour's time take you three times round the globe!

Now, does the thought of this almost take your breath away? Do you really wish the earth would go a little slower, abate this dreadful speed, or stop at once, and not fly round the sun at all? What do you think would happen then? I will tell you. Mother Earth would have no choice at all with regard to her next movement, but must proceed, without a moment's delay, in a straight line to the sun! And if she were to proceed in that direction as swiftly as we know she would, she would be there in

sixty-four days and a half. O dreadful thought! and yet it is by no means conceivable in all its awful reality. Let us consider.* Daily should we see the sun expanding in size, increasing in apparent magnitude; and supposing that the earth were not burned, melted, reduced to steam and smoke, in its progress towards the fiery orb, we should, if we could survive so long, observe towards the end of that period, that the body of the sun, now increasing hourly, would occupy the whole heavens from east to west. The enormous radiant mass would extend; our little planet would now rush onward, with a speed inconceivably increased, and in a sudden moment would fall into a burning, molten sphere, and be consumed like a pea thrown into a volcano!

And there is the pretty little Moon, performing her quiet monthly circle round our globe. What would become of us, if she were to forget herself, lag a-while in her present course, and take the next appointed her? She, too, would be attracted in a direct line, and would pay us a speedy visit. If she were to be stopped in her orbit, she would be with us,—say this is Monday, —on Friday next!—an unlucky day, indeed, it would be. Let us consider it. The Moon is

* See p. 36.

about 2,160 miles in diameter; smaller than the earth, to be sure, but still rather too large a ball to come dropping down upon us through the sky with any safety,—not a human being could survive to witness the result! Long before she reached this globe, there would be a mountainous tide of waters, driving all things before it, which would sweep round the world; and there would be tempests of wind contending with the waters; so that both together would probably tumble the mountains from their bases, and the moment the two planets came rolling together, those mountains, everything moveable, perhaps vast tracts of land, and the floods themselves, would be thrown hundreds of miles up into space, to descend again and be dashed into countless atoms by the terrific fall. And if the earth be a shell, as some suppose, then would that shell be broken, and both worlds would be mingled in a shapeless mass of disjointed pieces.

Q. And how do you know that all this would be the case?

A. I have not arrived at these conclusions by guess-work. They are derived from what we already know, with very little aid from the imagination. I will endeavour to explain the matter. In the first place, we know the moon's

size, and present distance from the earth, and we know the rate at which bodies descend in a given time; it is easy, therefore, to calculate what her *speed would be*, and how long it would take her to reach the earth at that rate. Then, as to the effects of her approach, we are aware, already, that at her present distance of 240,000 miles, she attracts the waters of the ocean so as to assault the land, and sometimes to overwhelm it. We are sure, therefore, that as she got nearer, this effect would increase, till at last all the waters would be gathered up under her, and this mountainous flood must, as the earth continued turning, sweep over every part in succession. The air, also, must feel and obey the same attraction, and would rush with the force of ten thousand tempests towards the attracting body. It is little likely that even rocks and mountains could resist the course of the elements in that case, and on the two planets actually touching, having fallen towards each other at the rate of perhaps a thousand miles in a minute, it seems impossible, even if the two enormous balls were solid iron, that they could remain unbroken; and with regard to everything loose or moveable, we are certain that the effect must be to shake them off into space,

whence of course they must return again, for the same reason that a stone falls to the earth.

I had forgotten to mention, that all this would occur in pitchy darkness on the part of the earth next the moon. She would cause an eclipse of the sun, and of every luminary in the heavens; but, as I said, we could never survive to witness such a result. Before nature could be thus convulsed, and her grand machinery fail and fall together, animal life, which exists only whilst certain regular laws are obeyed, would cease. The two worlds might become as one by the dread collision; but not a creature would remain to perish by the stroke.

Now, such awful accidents, not only might, but probably would be continually happening, if things were, as some foolish persons have imagined, governed by chance, or rather not governed at all. The planets, if not ordered and restrained as they are, would rush upon each other like drunken people. There would be crash upon crash, and all things living would be destroyed. And such things *may* be, at any time, for this reason, that the Creator may take that method of bringing any world that He has made to an end; indeed, there is reason to think, that planets and suns have in this way been broken up.

Q. And what has become of the pieces?

A. They seem to be flying through space at all times. It has been thought that certain very small planets, the last discovered, are the fragments of some larger one that has been cracked like a nut-shell. Solid masses of a metallic, or earthy nature, have frequently reached our earth; they are called aerolites, or meteoric stones. We scarcely know what else to think of them than that they are the broken bits you referred to.

Q. Pray, is the earth itself a shell, or is it solid, like a ball of clay?

A. That is just a query that philosophers have puzzled themselves in vain to reply to. The earth, you know, is a nut too large for our crackers, and we cannot conveniently shake it to hear if it rattles, nor thump it so as to know whether it is an empty vessel. I believe the general opinion is, that the whole mass of the earth was once in a fluid—a melted state, and that, excepting the outside crust of it, it is so now. Man has not been able to penetrate more than a mile or two in depth, and it may be lucky for us all that we cannot break into the vast interior, whether it is filled or not.

Q. How are these inquiries respecting the earth connected with Astronomy?

A. That is a natural question. Astronomy, you know, is the science that treats of the heavenly bodies. Now the earth, and the sun and moon, are such bodies. They occupy as shining lights their places in the glittering vault, and contribute to the grand illumination of the skies, although our own two planets are small indeed in comparison with other radiant spheres which garnish the heavens. We must now add a few words respecting these.

On a fine winter's night the sky seems to be filled or studded very thickly with the bright points commonly called stars. Some of these twinkle, and are only faintly visible, whilst others shine with a full, steady splendour, and are seen not always in the same place, but at different quarters of the heavens. I dare say that my reader knows already what is the real distinction between stars and planets; that the former are apparently fixed, and the latter unfixed or wandering bodies.

Q. Does not every book of Astronomy tell us that? We have heard all about the fixed stars and planets, twenty times, at least.

A. Do not be impatient, if you please. I have heard and read a good deal upon these subjects, but if I knew of any book or person that could tell me *all* about them, I would be

happy to attend to them for years to come. By the bye—as you do know all—perhaps you will be kind enough to tell me whether the Dog-star ever *barks*, and whether comets ever wag their tails?*

Q. That information, perhaps, will be conveyed in the present lesson—my tutors have omitted to mention the matter. I do *not* dislike Astronomy, and have been thinking much about our travelling, as you say, 1,200 miles in a minute. Suppose, now, the earth were to spin away without me some day, as the Brighton trains did when I was too late, what would become of me?

A. You would have nothing for it, my young friend, but to curl yourself round in the shape of a ball, and set up for a planet yourself. This I can tell you, that if Mother Earth did not reclaim you very soon, she would quickly diminish to your sight, and appear first like a moon, and then like a distant planet to your eyes. If, however, you could keep your place, she would not fail to call for you in a twelve-month's time, bouncing against you with a vengeance. The fact is, one cannot get away from her, even in a balloon.

But let us imagine something of it. I mean, let us consider ourselves as detached at some

* A vibration has been discovered.

instant from the globe we live on, which we will suppose now speeds away without us, at the rate of nearly twenty miles in a second, or about 70,000 miles in an hour. You must bear in mind that in that case there would be no atmosphere to collect or diffuse the rays of light. The sun and stars would be all shining together. The luminaries of the heavens would appear intensely brilliant, yet all the spaces between them would appear *intensely black*. If your eye were turned from the sun, you could not possibly know he was there by any visible effect of his light. Now bear in mind these things, and then imagination may help you to understand the lines following; at least if you are sufficiently interested in them to attend to their meaning. I believe they are correct as to the general nature of the scene.

THE HEAVENS WITHOUT THE EARTH.

My soul attains her wild desires,
Swift from my feet dim earth retires,
—She rolls a distant ball:
I soar mid heaven's clear globe of fires,
Orbs fiercely kindling all.
No more the clods I used to tread,—
Beneath a starr'd abyss is spread:
Doom'd worlds around me fall!
Say—canst thou dare a scene like this,—
The sparkling vault, the starr'd abyss?
Or rather find thy safer bliss,
On changeful earth to crawl?

For here's no noon, nor arch of blue;
The lights which wane not, nor renew,
Hang in an ebon sphere.
Effulgence pours, but brings not day;
Here Night eternal holds her sway,
Regardless of each solar ray,
And Time forgets his year!

Q. I do not understand what is meant by "the starred abyss?"

A. It supposes the stars, which would then appear, as it were, beneath your feet, occupying the black invisible immensity in the same way as those above your head. You now have the globe beneath you; let the globe be removed, and in place of the green fields, or the clods of the valley, you would see the stars—you would seem to be looking down upon them!

Q. But would there be no day, no noon, the sun shining all the while?

A. Certainly not. It is noon *now;* the sun shines brightly, and he illuminates our atmosphere so that the stars are apparently extinguished; but let the earth and its atmosphere be removed, and the stars would shine forth with inconceivable splendour, and so would the sun; but there would be no change whatever. It would be a continual night scene, with the strange fact of the sun shining brightly at the same time with the stars. Father Time would

be at a sad loss, without the aid of the revolving globes, to set his clock by. He could mark neither hours, nor days, nor seasons; and so we may say, he must "forget his year."

These things require the exercise of a little thought, and that is the very reason why I have introduced them to your notice. You will find that they repay thought, and that is more than can be said of many subjects which only occupy the mind to baffle it.

But to proceed. So far are the wisest and best informed of our scientific men from knowing *all* about the planets and fixed stars, that they only pretend to know as much as observation and calculation, with the aid of rational reflection, can tell them. If there is a Man in the Moon, with eyes and intellect no better than our own, he could not possibly guess at the real condition of our planet. If he has neither air nor water, which I think is the case, he could not, without a miracle, conceive of such a thing as a fluid, and our moving masses of clouds must be an enigma which a thousand years of observation and thought on his part could not explain.

Now, we are just in the same condition. We cannot, any better than he, conceive of things entirely contrary to experience. And when

we see planets with rings, and comets with tails, and stars of curious shapes and marvellous substance, some of them flat like a plate, others transparent like a cloud, all we can do is to gaze and think, and adjust our telescopes afresh, and take them down, and think again. The stars may be worlds in the process of creation, or in the process of judgment and combustion, such as our own planet has probably undergone and will undergo again.

But though we *know* little of these bodies but the fact that there they are, we may form some reasonable conclusions respecting them. That they are of enormous magnitude and placed at incalculable distances, that they shine by light of their own, and that they are not or have not always been useless glaring orbs, this, I think, we may pretty safely affirm; and, further than this, we may reasonably suppose that they are or have been suns, lighting and warming systems of planets like our own. So much we may readily conjecture; but as to the real nature, condition, and uses of the millions of stars that hang sparkling in the dark vault of heaven, we *know* no more of them than a lobster does of a lucifer match, or a cab-horse of the reasons of a London illumination.

As to the planets, we do know a few more

facts about them. We occupy one of them ourselves, are very near another, and by the aid of telescopes can plainly see that the others, which compose what is called the solar system, are in many respects like our own. We will bestow a thought or two presently on these neighbouring worlds which roll around us, and then take our leave of Astronomy in this little book. But I must refer for a moment to the fixed stars again, which, as we have said, *appear* to be enormous masses placed at inconceivable distances from us and from each other. In fact, our whole solar system (by which I mean *our* sun and the planets circling round him) is, in comparison of the visible heavens, a very little thing. Our planets are only like so many pins' heads amongst the worlds; and yet, compared with man and any of his works, the least of these our clustering planets is vast indeed. The Moon, that beautiful little orb, which looks no bigger than a child's face, is, as you remember, more than two thousand miles in diameter, and would, as we have seen, reduce everything on the earth to ruin if she should fall upon us.

And now with regard to the globes of the solar system, I cannot do better, in the first place, than give you Sir John Herschel's method of showing us their proportionate sizes and distances.

"Choose," he tells us, "any well-levelled field or bowling-green. On it place a globe two feet in diameter; this will represent the Sun. Mercury will be represented by a grain of mustard, at 82 feet distance; Venus, a pea, at 142 feet distance; the Earth also a pea, at 215 feet distance; Mars, rather a large pin's head, at 327 feet; Juno, Ceres, Vesta, grains of sand, at from 1,000 to 1,200 feet; Jupiter, a moderate-sized orange, at the distance of nearly half a mile; Saturn, a small orange, more than three quarters of a mile; Uranus, a full-sized cherry, at the distance of a mile and a half;" and I must now add, what Sir John did not then know, the newly discovered planet Neptune, a small cherry, at the distance of three miles from the globe representing the Sun.

Now these various orbicular fruits and seeds do represent, very nearly, the sun and planets of our system; and from them, as placed, you may obtain ideas of their relative proportions and distances which it will be exceedingly desirable to retain; and remember another thing, that if all the planets were put together, and rolled into one ball, they would not form a globe that would be one five-hundredth part the size of the Sun. So if ever you have thought of the Earth as a world of the chief consequence in

creation, you have now an opportunity of correcting that mistake.

So much for proportions as visible at a glance. I must now state the real sizes and distances of these planets, and of the Sun; and whilst I do so, my readers must bear in mind, that all their magnitudes, and their widest distances, are but as a point in the vast heavens which we survey on a star-light night.

First, for the Sun. The globe of two feet diameter represents him in a sort of way. But I wish I could give my readers an adequate idea of his absolute bigness. It is difficult to conceive of a body of such dimensions; so that, when I say that his real diameter is 892,000 miles, I am afraid I do not convey any proper idea of his actual magnitude. This diameter of the Sun—that is, as I said before, the extent of his bulk from side to side—forms a distance that is four times as long as from here to the Moon, and she is 240,000 miles off. The volume of the Sun—that is, the entire quantity of it, and which constitutes its magnitude—is 1,000,400 times that of the Earth, and the Earth, small as she is in comparison, is very nearly 8,000 miles in diameter.

I shall now give my readers the actual dimensions of the several planets, and from these

figures they can themselves make calculations, remembering that the distance of a planet from the Sun is reckoned to his *surface*, and that the circumference of a circle is about one-sixteenth more than three times the diameter. The diameters of the planets as at present known are as follows, in English miles—Mercury, 3,140; Venus, 7,700; the Earth, 7,925; Mars, 4,100; Jupiter, 87,000; Saturn, 76,068; Uranus, 35,000; Neptune about the same.

Now for the distances at which these revolve round the Sun. I must give you the figures, but I know that the amount is too great to be properly comprehended. The distance of Mercury from the Sun is 36 millions of miles; Venus, 68 millions; the Earth, 95 millions; Mars, 142 millions; Jupiter, 490 millions; Saturn, 890 millions; Uranus, 1,800 millions of miles; Neptune about twice that distance!

These planets and their moons perform regular courses round the same sun, and at various rates. I have already told you that the Earth whisks along with her single moon at the rate of about twenty miles in one second of time, or 1,200 miles a minute. Whilst I have been writing this line they have travelled about 700 miles!

And now, what do you think—did all these

gliding, revolving worlds set themselves a-going? Did they find their own places, so as not to strike against each other? Did *they* chance to find out that the Sun had the light and heat necessary for plants and animals?

Q. Oh, no! I am quite sure God made and moved them all.

A. Yes; you may indeed be quite sure of that; and now, when you hear the solemn words, "ALMIGHTY GOD," you will know a little better what to understand by them.

We must now take a hasty glance at those worlds, during an imaginary flight towards, or amongst them, after which we shall, I dare say, gladly return to our own little globe.

THE SUN.

At the distance of almost a hundred millions of miles, "it is a pleasant thing for the eye to behold the sun"—that is, to enjoy the effect of his diffused and reflected radiance. The rising sun has become proverbially the emblem of advancing blessings; glowing hopes are represented by the kindling dawn, and the quarter of the heavens whence our glorious luminary sheds his earliest beams; the gilded horizon, the mountain-tops, which first blush at his appearance, have made the east almost an

object of worship with many, even in the present day; whilst the sun himself has been adored with the flattest prostrations of Oriental nations in all ages.

This has been so, the Sun being at the respectful—the enormous distance, as we have said, of almost a hundred millions of miles; but I rather think that the case would be altered with all of us, if that distance were suddenly and greatly diminished. There would be no worshipping of the Sun; there would be a speedy and effectual cure for that idolatry, if man were compelled to take a comet's view of him, when it whisks before his face, within, perhaps, a few thousand miles of his actual surface. I do not think that there is a human intellect which could retain its reason, which would not be maddened by terror at the sight, even though it inhabited a body that could survive it. Come, now, let Imagination ply the wing, and Fancy lend us aid, guided by what we know.

At the distance, then, of a few thousand miles, the disc or face of the Sun would appear as large as the whole heavens do now; and even then, only a portion of his immense hemisphere could be seen. But what would be the features—the complexion of that face?

Would it be fair, serene, and still? Certainly not. The telescope informs us, that the surface of the Sun is in a state of violent, and, to us, almost inconceivable commotion, like the furious ebullition of a boiling cauldron, causing that apparently fluid surface to part in many places, by which the inner dark ball is revealed. Those rents, or fissures, in the luminous veil which surrounds the vast orb, called spots in the sun, are many of them large enough to admit a globe three or four times as big as our own. Yet these black spaces are seen continually to dilate, contract, become extinct, and then suddenly to reappear during one observation, so that the driving currents of liquid fire, or whatever it is, must proceed at the rate of fifty or a hundred thousand miles an hour; and there may be rolling billows of the same material equal in height to the diameter of our earth! What say you to the Sun, when you have thus turned the mind's eye upon it at the small distance we have mentioned?

AN APPROACH TO THE SUN.

To venturous thought new wings are given :
I dare the sun to nearest view !
He fills—he fills the circling heaven !
I face his glare as comets do !

Oh, maddening sight !—Oh, scene confounding !
Surge upon surge of whelming flame ;
Whilst lakes of molten worlds surrounding,
The last dread doom of worlds proclaim !

How seethes yon fierce, impetuous ocean !
How fast its glistering waves retire,
As swiftly chased, in wild commotion,
By billows new of eddying fire !

But hark ! some world by tempests hurl'd,
A meteor but projected now,
Has thundering burst, and demons curst
Hear it in ebon caves below !

Oh ! bear me from the scene confounding,
Far from the solar, vengeful flame,
To earth, whose genial skies surrounding,
Kind Heaven's forbearance still proclaim !

After all, some have doubted, and do doubt, as to the Sun being composed of fire at all. They think that his rays, before they enter our atmosphere, have no warmth belonging to them, but that the heat we feel resides in the air, and is merely extricated by the solar beams. If so, it does not seem to be of much consequence whether we are a hundred thousand, or a thousand millions of miles distant, as far as temperature is concerned.

Q. But what is the general opinion of astronomers ?

A. Their general opinion, even now, seems

to be that he is an intensely hot body; that his outer portion is in a state of constant combustion; and that the light and heat of all the planets being derived from him, would be generally in proportion to their distance; but that the different densities and chemical qualities of the fluids surrounding these several worlds, may make the difference in temperature much less than we might suppose. Thus we find it a very comfortable condition of existence to be encompassed by the genial air of a spring morning, but immersion in a pond at the same season would be anything but agreeable to most of us.

Q. And what do wise men say about the probable inhabitants of all these worlds—Mercury and Uranus, or now Neptune? Can the same sort of beings inhabit each of these?

A. I should say not; for the same sort of animals do not inhabit the polar and the tropical regions of our own globe; but there may be a general similarity after all, not that the power of the Creator can be at a loss in forming varieties; but we are to consider that the globes of our solar system have all a kind of similitude and connexion, like the separate currants on a bunch, and it is not unreasonable to conclude, that, as a single bunch, or cluster,

each individual sphere may correspond in more respects than one with the other.

Q. Have philosophers ever imagined such things as creatures totally unlike those found on our own planet?

A. They have tried hard; but, after all, the human mind labours in vain to conceive ideas wholly foreign to its own experience; and I question much whether, if indulged with a view of such things, we could find any words that would give an account of them. St. Paul found it so; he had seen things which it was not possible to utter. The spiritual world, if, after a period, we could return from it, we could probably give no account of, except the bare facts of its joys or anguish.

Taking the planets in succession, and giving a near glance at each, we may say, that all we know of, may be habitable—some appear eminently so.

Q. Surely Mercury must be too hot?

A. I am *not* so sure of that; it must depend on the fluid, if any, with which he is invested, that is, on the sort of garment he wears, and on his natural constitution. A rare atmosphere, and a soil or surface of a very light colour, might bring his temperature down to our own tropical heats, or lower still. We

know, however, that his density is very great; he is so heavy, though small, that he would outweigh a ball of lead of his own size. Unless, therefore, he has a thin coating of some more manageable substance, we cannot conceive of vegetable products existing upon him.

Q. How big does the Sun appear to him?

A. About seven times as large as he does to us; but that must make such a great difference in the intensity of his light, that it is not likely *our* eyes could endure it.

Q. I think that he is a drop of melted metal that has been whisked out of the Sun.

A. Well, that will do for a guess, at all events. He is rather a large drop though, and if of lead, a bullet for which it would be difficult to provide a cannon; but the inhabitants of the Sun, if any, may have managed that.

Q. Well, if I take flight to the planet Mercury, I hope I shall not forget my parasol.

A. It is possible, however, that the inhabitants of Mercury may never see the Sun at all.

Q. Oh! how can that be?

A. In this way. We may suppose that the solar rays are there purposely and permanently mitigated by clouds, which may permit only a certain degree of light and heat to penetrate

them; so that the Mercurians may possibly see no more of him than you do now through the parasol you mentioned. It appears that Mercury is subject to great and rapid changes of seasons; and his inhabitants, if they have wings to their heels, like the god from whom their planet is named, may have agility enough to keep always on the coolest side of him, as I have seen a blue-bottle fly do on a joint of meat roasting.

Q. But that exercise must make them very hot?

A. Not if they are like insects in constitution, or like frogs. But I must proceed. Mercury being 3,140 miles in diameter, and somewhat heavier than a ball of lead of that size, would, if stopped in his orbit, fall into the Sun in about fifteen days and a half.

Q. If that were to happen, I suppose he would make a round hole, and there would be another spot in the Sun?

A. Yes; but one no bigger in comparison than a very small shot in a large target. On the whole, there seems no impossibility to me as to Mercury being inhabited, even by beings not very different from ourselves. Snow may be scarce, and ice a great luxury, but even these articles may exist for what we know.

Q. Are we sure that there are no planets between Mercury and the Sun?

A. By no means; but it is not likely we should discover them. Mercury, too, may have a moon, but he does not seem to have much use for one.

If Mercury *may* be inhabited, the probability that Venus is, is very great indeed. Her size is nearly that of our own globe; and it does not seem likely that the splendour of the light she enjoys should be all wasted on a mere useless ball. Venus evidently has an atmosphere very much like our own. The variation of her seasons is so frequent, that she has two summers, and two winters, in her year; and these minglings of heat with cold, must very much moderate her temperature. Her light and heat are only about double that which the Earth receives,—a quantity which, when averaged, we could very well put up with. The Sun will only appear twice as large as he does to us, and that is a countenance of only moderate dimensions. It has been said that Venus has mountains from ten to twenty miles high; it has been said, too, that she has a moon; but none of our astronomers have positively seen it.

On the whole, the planet Venus seems to be a delicious little world, formed, perhaps, for

beings of a highly intellectual and favoured cast. I think, if I were compelled to choose another globe of our system for a residence, retaining such a body as I have now, I should venture upon this one. It might, however, be the most awful and fatal choice that could be made.

Q. Well, and how soon would Venus pay the Sun a visit, if she had the opportunity?

A. If she had the opportunity, and a most pressing invitation, she could not arrive in much less than forty days; and I may as well just remind you, with reference to the Earth, that it would require, as I have said, sixty-four days and a half to perform the same terrific journey!

The Moon seems near enough to us for such an inspection as might inform us regarding her fitness for the residence of us mortals on her surface. Telescopes bring her within the apparent distance of about 250 miles; but I confess, as far as I can form an opinion from all that I can see or know regarding her, that I should be very loth to make the exchange, and become the Man in the Moon. It does not appear that she is supplied with those first of requisites, air and water. But I have sufficiently referred to the Moon as a supposed residence in the description of the plate representing a lunar night.

Q. But may there not be beings requiring neither air nor water, and caring nothing for other things that are essential to us?

A. Certainly there may, and happy beings too; yet, let me say, that the Moon, having days and nights, each fourteen of our days in length, having one half constantly deprived of the benefit which the light from our earth might bestow; with little variation of seasons, and being destitute, *apparently*, of many other advantages of condition,—does not seem to have been yet fitted for the habitation of superior intellectual beings, if, indeed, she has any inhabitants at all. There is another fact to be noticed, which leads to the conclusion that the Moon is not inhabited by beings having, like ourselves, constructive faculties. Telescopes have been made of such magnifying powers, as to be able to detect buildings, or works, if there were any, as large only as Westminster Abbey; so that anything like cities, or roads, or masses, like armies, for instance, in motion, would easily be seen. But nothing of the sort appears to the keenest eye.

The planet Mars, which is so easily distinguished in the heavens by his red light, seems to be more like our own world than any other of the system. He appears evidently to have a

very dense atmosphere; he has lands and seas, and summer and winter seasons, but his year is equal to about two of ours. He is, as we have seen, a much smaller globe, and his attractive power therefore so comparatively weak, that a body which weighs one pound here, would weigh only about five ounces on the surface of Mars.

Q. Oh! how should we feel if walking there?

A. We should have lost two-thirds of our weight, and should seem scarcely to press the ground. Flying would be very easy, and it is likely that the inhabitants, if any, are all fitted with wings. There, you see, is a matter of great importance in which the creatures of the smaller planets may differ from us. And there is another fact connected with these lesser globes which I forgot to mention when speaking of Mercury and the Moon,—I mean the comparative nearness of their horizon.

Q. I do not quite understand that.

A. Why, consider. You know when you are looking round at the landscape, or rather at the *sea-scape*, when in a boat, your view is constantly bounded by a sort of edge or circle, like the outline of a hill, beyond which you cannot see. Now that boundary line between the earth or the sea, and the sky, is called the horizon, and if you can detect there any object,

such as a spire or the mast of a ship, it will be but a very few miles distant, say eight or ten, supposing your eye is raised only about the height of your own stature. But if our globe were very much smaller, that boundary line would be still more contracted, so that the convex appearance would be still more evident; and as it is, I cannot conceive how the idea could ever have been entertained, that the earth is a boundless plain; on the contrary, it ought to have been called, from all that the eye tells us, a boundless or perpetual hill, that is, a globe.

With regard to the temperature of Mars, we can know little till we are told what kind of an atmosphere he has. It is calculated that he receives only about half the light and heat from the Sun that we enjoy, but his fluids may be of a nature to absorb and retain more heat than those of the Earth. It is pretty evident, by the telescope, that he has flowing seas, and snowy poles, and continents, like our own. We could exist there, I dare say, well enough. We know not that Mars has any satellite. If he has, it is a very small one, and too near him to be distinguished by us.

We are apt now to jump from Mars to Jupiter, forgetting a number of little worlds, or rather, as it should seem, the fragments of some great

one, which intervene and pursue their elliptic courses round the Sun. We cannot say how many there may be, but six or seven have been discovered within a few years, and another seven years may discover as many more.

These do not seem to have been originally what they now are, and I have not curiosity enough to wish myself upon them. They appear to be unequal, irregular masses wandering in the eccentric paths to which some vast explosion or collision has consigned them; and the aërolites or meteoric stones which sometimes descend to our earth, may be the lesser fragments proceeding from that awful crash.

Q. So then the planets are not safe from accidents in their courses?

A. Certainly not; and it has been thought, I may say calculated, that all the worlds now in motion must some day collapse or fall together. One thing, however, we surely know—that they are subject and absolutely obedient to the Divine will. Let us be the same, and it signifies little whether we are, or are not, crushed between two rolling worlds.

And now let us wing our way in thought to the planet Jupiter,—that enormous globe which, though placed at the distance of 485 millions of miles from the Sun, shines with such splendour

in the heavens. Now, let us consider a few things which would surprise us, if in an instant we could be landed there. I am speaking of facts with which science supplies us. In the first place, a man would find his weight increased eight times. He would feel like Belzoni, whom I saw, when I was a child, performing feats of strength in a booth at Colchester, where, with eight men mounted on him or cleaving to him, he walked about the stage.

Q. What should I do with eight persons on my back?

A. Shake them off, if possible; but you could not so rid yourself on the planet Jupiter. No; you would tumble down and sprawl, and find it impossible even to raise your head.

Q. What is the reason of all that?

A. Do you not yet understand? Are you not aware that your weight is regulated by the size and weight of the planet under you? You have heard how light you would feel on the smaller planets; for the same reason you would be attracted with greater force by the larger, and it is known, by exact calculation, that a pound weight here would weigh eight pounds on the surface of the prodigious ball we are speaking of.

Well, that is one thing. You would lie like

Gulliver at Lilliput—tied down, as it were, on your back; and there you would be a nice spectacle for the Jovian inhabitants, rolling your eyes about, perhaps. You would see the Sun, very much reduced in size, but his apparent motion so much increased, that he would seem to be rolling visibly through the heavens; in five hours he would have performed his whole day's journey, and then there would be one, two, three, four moons rising one after another, running also a swift race through the skies—new moons, half moons, full moons, and so on: and there also would arise another splendid object—Saturn, with his rings and lunar attendants. But this, too, with all the starry hosts, would swiftly disappear, and after a short night of five hours, the Sun would rise again, and give you another brief five hours' day!

All this we know would be the case, because we see that Jupiter, immense as he is, actually spins completely round in about ten hours! His circumference of almost 280,000 miles has in that time performed its mighty revolution. Now this, the inconceivable speed with which daylight travels and revisits every part of his surface—the number of satellites, equal in bulk to thirteen of our moons, and within a short distance of him, which must prevent anything like darkness

being known—all these facts, which we are sure of, guide us to an inference almost equally sure, not only that this vast orb is inhabited, but that it is the world of worlds in our list: that it is the metropolis of the solar system.

Q. That is a CAPITAL thought.

A. And there can be no doubt that the stature and strength of the inhabitants of Jupiter are suitably proportioned to the world they live on. Jupiter is thirteen hundred times as large as the Earth; so that, if we were to take this measurement strictly, we should have the altitude of a Jovian to be—let us see—about a mile and a quarter!

Q. Ha! ha! ha!—so that he would take about three steps to a mile in walking, and it would be almost half-a-mile from hand to mouth! Now, really, Mr. Astronomer, do you believe it?

A. I see no reason to disbelieve it. Why should it be more wonderful that an inhabitant of Jupiter should be thirteen hundred times bigger than I am, than that I should be thirteen hundred times bigger than a mouse, or thirty thousand times bigger than a fly? If we had discovered a little world thirteen hundred times less than our own, you would not be surprised to find Lilliputians on it. I should not, however, conclude that if the Jovians are as big as

I have supposed, they are thirteen hundred times as clever as we are. They may, however, exceed us greatly in mind, in body, in goodness; or they *may* exceed us, in an equal degree, in depravity.

I have said with regard to Venus, Mars, and even Mercury, that beings like ourselves might perhaps live on them. But this could scarcely be the case in Jupiter. We should be wholly unable, as we have seen, to support the weight of our own bodies. It would not do. But there are many things conceivable, beside what I have mentioned, that would strike us if we could there open our eyes for an hour. I should say, next to the wonders of the heavens, the view of a Jovian landscape would astonish us. I have said how confined must be the horizon line of the smaller planets; but in Jupiter it must be at such a vast distance, as probably not to be visible at all. The boundless expanse must seem to fade away into viewless distance, and the idea of an illimitable plain must there be presented to the mind by the eye, and require science to displace it. The grandeur of such a landscape we cannot conceive. The vast world must seem, as it were, melted into space, at an incalculable distance; when the traveller had reached an object, then the farthest that could

be discerned, the same grey margin fading into nothing would still appear, surrounding a landscape thousands of miles in extent.

And then—not to set you laughing again—if the rational inhabitants, say a mile high, and the irrational ones, say centipedes a mile long, should have used their vast powers in the same proportion as we have done, who can say how enormous may be the visible results of their operations?

Q. Why should the animals be centipedes?

A. Because I think they must want a leg at least, or a foot, to every twenty yards of their body. What would you say to a quadruped which had half a mile between its fore and its hind leg?

Q. That will do.

A. Well, whatever may be the construction of animal bodies in the planet Jupiter, I think it reasonable to conclude that their strength, and their doings, are proportioned, as ours are in fact, to the size of the globe we live on. So they may have piled mountains on each other, they may have wheeled islands in barrows, and have pushed continents here and there a little out of their way! And those belts that we see, may be the mere dust of their doings: they are not flights of crows, for we are pretty sure that

the weight of bodies there, to which I have alluded, would exceed any conceivable powers of wings.

We come now to Saturn; and, as we retire from the Sun, our difficulty becomes greater in conceiving how the existence of animal life can be provided for. In like manner an inhabitant of Mercury may, in his ignorance, pronounce that our globe must be uninhabitably cold.

Saturn's seven moons, and the rings or solid arches by which his skies are spanned, must present an appearance which the human imagination, guided by all that the telescope can teach, cannot possibly represent or conceive. His bulk, though not so large as Jupiter, is very great, and it is doubtful if *we* could stand on our feet even there.

The Sun must appear a dwindled orb indeed, and so very much less than his moons, that these and his rings may seem chiefly to occupy and rule his heavens. Saturn is very irregular in his shape, being not biggest at his equator, but about half way between that and one of his poles. His poles, too, are dissimilar; the northern being flattened, and the southern protuberant. Saturn is nearly a thousand times the bulk of the Earth; and if he were stopped in his orbit, he would start away directly for the

Sun, but he would not reach it in less than five years and seventy-six of our days.

And now I will give you the thoughts of Sir Humphrey Davy on the Saturnian world of beings. He gives them as a sort of dream, and nothing more: the vision, however, is that of a fine imagination, such as has not often been possessed by a chemical philosopher. He considers himself in the presence of some guardian angel or genius, who wafts him to the then supposed boundaries of our solar system; and in their course they make a distinct visit to the planet Saturn. Sir Humphrey, you will see, supposes, what I confess, with all submission, I cannot do, that this planet is the residence of beings of a far higher order of intelligence than we of Mother Earth. His good genius converses with him whilst on their way, and says:—

"'There are creatures far superior to any idea your imagination can form, in that part of the system now before you, comprehending Saturn, his moons and rings. I will carry you to the verge of the immense atmosphere of this planet. In that space you will see sufficient to wonder at, and much more than with your present organization it would be possible for me to make you understand.'

"I was again in motion, and again almost as

suddenly at rest. I saw below me a surface infinitely diversified, something like that of an immense glacier, covered with large columnar masses, which appeared as if formed of glass, and from which were suspended rounded forms of various sizes, which, if they had not been transparent, I might have supposed to be fruit. From what appeared to me like masses of bright blue ice, streams of the richest tint of rose colour, or purple, burst forth, and flowed into basins, forming lakes or seas of the same colour.

"Looking through the atmosphere towards the heavens, I saw brilliant opaque clouds of an azure colour, that reflected the light of the sun, which had to my eyes an entirely new aspect, and appeared smaller, as if seen through a dense blue mist. I saw moving on the surface below me immense masses, the forms of which I find it impossible to describe; they had systems for locomotion, similar to those of the morse or sea-horse, but I saw with great surprise that they moved from place to place by means of six extremely thin membranes, which they used as wings. Their colours were varied and beautiful, but principally azure and rose colour. I saw numerous convolutions of tubes, more analogous to the trunk of an elephant, than to anything

else I can mention, occupying what I supposed to be the upper parts of the body, and my feelings of astonishment were great, and it was with a species of terror that I saw one of them mounting upwards, apparently flying towards those opaque clouds, which I have before noticed.

"'I know what your feelings are,' said the genius: 'you want analogies, and all the elements of knowledge to comprehend the scene before you. You are in the same state in which a fly would be, whose microscopic eye was changed for one similar to that of man; and you are wholly unable to associate what you now see with your former knowledge. But those beings who are before you, and who appear to you almost as imperfect in their formations as the zoophytes in the polar sea, which they may seem to resemble, have a sphere of sensibility and intellectual enjoyment far superior to that of the inhabitants of your earth. Each of those tubes which appears like the trunk of an elephant, is an organ of peculiar motion or sensation. They have many modes of perception of which you are wholly ignorant, at the same time that their sphere of vision is infinitely more extended than yours, and their organs of touch far more perfect and exquisite. Of their

intellectual objects of pursuit I may perhaps give you some notion. They have used, modified, and applied the material world in a way similar to man, but having far superior powers they have gained superior results. Their atmosphere being much denser than yours, and the specific gravity of their planet less, they have been enabled to determine the laws belonging to the solar system with far more accuracy than you can possibly conceive; and any one of those beings could show you what is now the situation and appearance of your own moon, with a precision that would induce you to believe that he saw it, though his knowledge is merely the result of calculation.

"'Their sources of pleasure are of the highest intellectual nature, with the magnificent spectacle of their own rings and moons revolving round them. Their minds are in unceasing activity; and this is constant enjoyment. Your view of the solar system is bounded by Uranus (*not now, Sir Humphrey*), and the laws of this planet form the ultimatum of your mathematical results, but those beings catch a sight of planets belonging to another system and another sun. The comets of which you know so little are to them perfectly familiar, and they possess a magnificent history of the changes which have

taken place in the heavens, and which are governed by laws which the human mind cannot understand. As to those meteoric stones which have tumbled upon your globe from time to time, they can give you an account of every one of them, and they have histories in which the gradual changes of the cloudy matter called nebulæ have been registered.* Their astronomical records go back 200,000 years, and their civil history for the same time.

"'As I cannot describe to you the animal organs of these wonderful beings, so neither can I show to you their mode of life; but as their highest pleasures depend upon intellectual pursuits, so you may conclude that those modes of life bear the strictest analogy to that which on the Earth you would call exalted virtue. They love glory, but it is of the purest kind.'"

Thus far we have followed the flight of Sir Humphrey Davy. After all, you see, the mind of man can create nothing, and whether we sleep or wake whilst we dream, we can imagine little beyond the sphere of our own experience, nor have we language to describe intelligibly other things.

* Sir Humphrey's genius flourished before Lord Rosse's telescope was brought to light, which has rid the heavens of these nebulæ.

Uranus, the next planet in order, at least as far as we know, pursues his twilight path at such a distance as to have escaped all telescopes till about sixty-six years ago, when Herschel detected him, by his motion, to be a planet. Its distance from the Sun being about twice as great as that of Saturn, which in our orreries figured away at such a distance from the Sun, as to seem as far off from the Sun as it would be reasonable to place a planet. Uranus, however, obeys the solar influence, and receives and reflects solar rays at the inconceivable remoteness of one billion, eight hundred millions of miles!

Q. How long would it take Uranus to fall into the Sun?

A. Nearly fifteen years. His light and heat are diminished to a degree that we should perish under, but he may be inhabited notwithstanding. His summer must be a cool one and his winter a sharp one, as we should say, each being forty-two of our years in length. Uranus having six satellites, and as it is thought two rings, all reflecting light, it is not unreasonable to suppose that there are eyes to profit by it. This planet and his moons, though at so vast a distance, have presented a very useful lesson to some of our overwise philosophers, who thought

they had found out an easy way in which all the planets and their satellites had been set in motion. They thought that as all the other spheres of our system move in one direction, they had all been whirled off at some time or another from the Sun; but unluckily for those philosophers, it is found that the moons of Uranus revolve in a CONTRARY DIRECTION. So the sages are quite at fault in the matter, and find that they cannot wind up the watch with their key. The Almighty set them going as it pleased Him, but His ways are past finding out.

I believe that astronomers are now very much cured of the presumption to which they were once addicted: they do not now pretend even to tell us of how many planets the solar system is composed; they only note how many have been discovered. Even Uranus does not approach the limits of our system, and the fact which profound mathematicians had from his irregular motions long suspected, has at length been proved by actual discovery; that there is a rolling sphere performing an assigned course round the Sun at a distance that is twice as great as that of Uranus.

Q. Oh, can there be inhabitants there?

A. Of course there *can*, because God is

ALMIGHTY; but we are not *obliged* to suppose that planets can have no other use than that of sustaining resident beings with such souls and bodies as our own. They may be worlds for the *occasional* sojourn of intelligent wanderers: they may be merely waiting the creative word for life to spring up on their surface: they may have light and heat of their own—the Earth, we know, has the former; and the Moon in a small degree the latter; and if so, even we can have no difficulty in supposing that conscious existence may flourish on the surface of any globe at any distance from the Sun.

Think, oh think of the POWER which *could* make and move these worlds! See what HE *has* done, know what HE *can* do, and fear what HE *will* do, to those who disobey Him. These immense spheres are all obedient to His command; but men—yes, and children too, venture on ways contrary to His will. He says "Do this," *they* say "No, we like something else better;" He says "Come," *they* say "Go, we desire not the knowledge of Thy ways."

Q. But how *can* the Maker of all these vast worlds take notice of such little things as we are?

A. HE *can*, because He is ALMIGHTY. If He

could not do any one thing, He would be mighty, but not ALMIGHTY. We are not beneath His notice, although we are smaller than dust in comparison of His other works; for His power is as much shown in making the smallest, as the largest things, and we should find it as easy to create a planet as to form a pea or a mustard-seed.

Q. Oh! I do not understand you now.

A. Do you not? Think again, then. Do you know that the pea and the other seeds have more in them than the wisest philosopher can comprehend? Nay, a philosopher can much more readily conceive and describe the nature and motions of a planet, however large, than the constitution and nature of a seed, a leaf, or a blade of grass. Astronomers are not nearly so much at a loss in accounting for things as terrestrial naturalists. For these seeds, as you know, are not like shot or bullets, mere little globes of some kind of dead matter: they can change their form, become plants—take from heat, and light, and earth, and air, of each something, and expand into leaves, flowers, fruits. Neither men nor angels could construct such things. The same God that made the pea created the planet; the same God that created the sun made the seed; because nothing less

than almighty power, infinite wisdom, could do either the one or the other.

Q. Well, then, He *must* have made me too!

A. Yes, that is just what I was endeavouring to bring your mind to see. We may contemplate the starry heavens, as David did, and say in astonishment and admiration, but not in despair, "Lord, what is man, that Thou art mindful of *him*, and the son of man, that Thou visitest *him?*" Never let us for a moment forget, that small and insignificant as we seem to be, in comparison of His other works, He is *our* Creator as well as *theirs*. We, as well as the stars above us, may say, "It is He that hath made us, and not we ourselves." We shall, in the next chapter, notice this world of ours more particularly; and so far from finding that we have been at all forgotten in the construction and furniture of this curious dwelling, we shall see, I think, that it has been made what it is, if not on purpose for us, at least with a distinct view to our existence and our comfort upon it.

CHAPTER II.

THE WORLD AS A RESIDENCE FOR MEN AND ANIMALS.

It is very likely that all the worlds—the stars, planets, suns and moons—are inhabited; but this we do not *know*. We are sure, however, that our own little planet is as full of life, nearly, as its surface will admit; and that its motion round its own centre, and also round the sun, is necessary for that life. A very little *alteration* in these matters, a very few *mistakes* in the construction of the machine, or accidents in the working of it, would destroy that life, and leave this planet a bald, useless globe, performing its revolutions for nothing. But we are thankful to know, that He who made the world has made it well, and that the Divine Being who first set it going, is the God who watches it and sustains it, and all that is therein, from day to day. The more particularly and minutely we examine our globe, and the works of creation herein displayed, the more we shall be convinced of this, and that the Maker and Ruler of the most distant star is not far from every one of us.

The first thing I shall notice regarding our

world is its shape. I have said over and over again that it is a globe, and this you knew before. Most of the heavenly bodies are globes also; but did you consider the reason of this? Why should not our earth have been in the shape of a cake or a clod? Suppose it had been square, or long, or hollow;—in the form of a house, or a horse, or what not? To say that such forms would have been *inconvenient*, is nothing,—they would not have been *habitable* to any of the present creatures. Suppose, now, it had been square; that is, like a cube, which has six flat sides. It would have been impossible for us to stand upright, or on any one of those sides, except in the very middle of each, and from that centre it would have been *up-hill* every way! The corners of the cube would have been like so many immense pyramids, or mountains, which if any one had ascended, he would then have looked on these vast sloping plains, down any of which he might, if his foot had slipped, have rolled thousands of miles without stopping!

Q. I do not understand much of that, but I am quite content the world should be a globe.

A. I am glad you are satisfied with these things as they are. I will just add that, if our present earth were to assume any of the forms I have

mentioned, there would be vast portions of it without any water and without any air. The corners I have been speaking of, would have had neither. So much for the globular shape;—what do you think of it now?

Q. I quite approve of it, and am very glad I was not born in a square world!

A. And now for the motions of our globe. I will show you how much better we are off than the men in the moon, if any such there be; or rather, how much worse off we should be if removed there; it would not serve *us* as a residence, though there may be lunar inhabitants whom it suits very well, and who would be killed by coming here.

We, you know, have day and night every twenty-four hours, and we have summer and winter, and the four seasons, in a year. This is because the Earth revolves round her own centre,—that makes day and night; and because that central line, round which, as on an axle, it turns, is a little inclined, or tilted, as it were, from what we might call the upright position. You know how globes are placed in their frames, and have had all that explained to you, which it is impossible to do in this little book.

Now, the Moon has no such advantages as

these. She keeps the same side constantly towards the Earth, round which, you know, she completes her circle once a-month, *and this month makes also her day and night, and her summer and winter!* each of which is about a fortnight in length. The cold and darkness of her fortnight's *night* must be intense; and the darkness to the inhabitants, if any, on the farther side of the little planet, is never relieved by the light with which the Earth supplies her. The Moon does not appear to have any water, nor any air; she has, or has had, a vast number of burning mountains, which have blistered or broken up her surface; and she does not *appear* to have been, *as yet*, prepared as a residence for any living being, or if there should be the solitary wretch existing there, called the Man in the Moon, I should say that he could not

> ——— "come down *too soon*
> To ask his way to Norwich,"

or to any other place where earthly comforts are to be had. Still we cannot be sure. There may be myriads of happy beings in the Moon who do not require or desire to breathe, to drink, or to eat; who can glide on her surface as fast as her daylight, so as always to keep pace with it; or they may not need daylight at all,—

perhaps they have no eyes, and therefore no use for it, and yet they may be gifted with perceptions of other kinds superior to our own. After all, however, I am inclined to think that the Moon is *not yet* inhabited; and that, if it should please the Creator to place living beings there, and to fit it up for their use, the difference in the appearance of the planet would be immediately visible from the earth, even to the naked eye.

Here we find, not only that the condition of our globe *has* been calculated for the existence of creatures, but also for their enjoyment, for their independence,—yes, and their amusement; and, more than all this, provision has been made for the wants, for the healthiest appetites of *the mind of man*,—for the hunger and the thirst of a mind craving after knowledge. Yes, Man, ungrateful as he is, insensible as he is, has been greatly indulged. Let us understand a little more of this.

The Earth being lighted and warmed by its course round the Sun, and being provided with things merely requisite for existence, might have been left with nothing more for man's use or enjoyment. He might have been restricted, as are many animals, to one kind of food, such as acorns or lettuce-leaves: he might have had the sense of taste in his stomach, his eyes in

his arm-pits, limbs without knee or elbow-joints, and the hair of his head growing down his throat! He might have been compelled to labour for the very air he breathes, and to buy the light of heaven of those who could sell it to him, and so on. In this way he might have crawled in animal misery from his first day of life to his last; and if he had, he would have had no right to say to his Creator, "Why hast Thou made me thus?" Or he might have had his bodily and mental faculties, and hungerings, and various desires, as at present, and nothing to satisfy them with. The taste of every thing might have been that of chalk; the only sound might have been the howling of the wind; the colour of every thing fiery red. He might have been constantly poking about for information, like a cat in a bag, and never able to find out anything beyond it. Or, worse than all, he might have had all earthly things richly to enjoy; he might accordingly have enjoyed them all, but have been denied a reasonable soul, as we *suppose* is the case with brutes. He might have cared no more to know who made the world, or whether it was made at all, than does a bat or an owl.

But see now what God's world, which is man's estate, really is. That estate has been planted,

watered, and stocked abundantly for the use of man. Treasures beneath the soil have been placed purposely within his reach. By treasures I mean, not so much gold, and silver, and precious stones, which he could have done without, but the common and indispensable metals, and mineral fuel, which are the grand materials God has provided to enable man to make an artificial world of luxuries for himself. Without iron, and without coal, the arts of life must very soon cease,—men would probably become savages again, and before many centuries nations must perish.

Q. Surely we could do somehow without iron: could we not have brass instead, and copper,—yes, and silver and gold? Who would not change an iron spoon, or an iron fork, for a silver one?

A. You have really made me think again upon the matter. See the benefit of asking explanations, and not taking things for certain, as soon as they are asserted. We should, as you say, gladly exchange our iron things for gold ones, so long as we were not *restricted* to the use of the precious metals on all occasions. A man who had a gold razor, for instance, would beg and pray of another man to lend him his common steel one, just to shave with. We

know that gold and silver, however beautiful, and however excellent their peculiar qualities, are totally unfit for *use*, where work is to be done. Those who choose to have silver knives find that they will scarcely cut at all, unless they have steel edges. The fact is, that nations have always been entirely barbarous,—in a rude, ignorant, and savage state,—who have not known the use of iron, though they have had gold and silver in abundance. Brass, which is a mixture of metals, will do very well for many purposes; but, besides being poisonous, neither that, nor any other metal but iron, will perform the office of *tools* in the hand of the workman. Trees could not be cut down, nor the wood sawn or planed, —mines could not be worked,—we may say, nothing could be done in arts and manufactures, or even agriculture: men would eventually become ragged, houseless, hungry vagabonds,— princes and peasants would be brought to one condition; and, as I said before, nations must perish without the use of iron; deprived of this, other metals could not be procured in any needful quantity, and they would only tantalize and baffle the workman if they could.

Q. Well; but as to coals, many people never use them, but burn peat and wood, and other things.

A. True, many people do so; but what should *we* do? Where are *our* wood and peat to come from? and could iron be melted in the quantity we need it, by a wood fire? Already is wood, as fuel, rapidly disappearing everywhere. In the wilds of America the inhabitants are consuming it in immense waste, merely to clear their lands; and when their lands are cleared, they will sit down and shiver, if they cannot procure coal. As for Britain, it would be finally ruined without its coal-mines. We might burn our trees and hedges, and chairs and tables,—yes, and our houses too; and should do so probably, to get warm in winter, but all would not suffice. This was foreseen by the bountiful providence of God, who has therefore laid up for our use incalculable, but still not unlimited, stores of fuel and of metals.

Q. And what is to be done when all the coal is burnt and the metals used?

A. That is a matter I am glad to be reminded of. The question points to the end of the world as truly as do the limited stores of a ship to a limited voyage. The vessel is fitted out as comfortably as may be, and is supplied in abundance with all things needful for a numerous crew, and a long, long continuance afloat; but every one knows that neither the stores nor the voyage

can last for ever. And the time will come, if the human family is not previously swept from the globe, that the grand materials of life will be exhausted. The fuel will be all consumed, the last iron used up, the mines emptied, the fields and the trees, and every green thing, will be eaten off or trampled down by the overwhelming millions; and then, at least, the end of the world, a fact in which wicked, and perverse, and stupid men will not believe, *must* come, and settle all for judgment!

But your questions have led me away from the subject I was treating of. Let us return to it for a moment. I said that God's world, which is, by His permission, man's estate, has been bountifully, luxuriously planted, and watered, and stocked, and provided with materials not merely for his absolute wants, but for his enjoyments, his recreations, his amusement, and instruction. The estate is not only planted, but *ornamented*, as if to suit every caprice of man's fancy. He has not only fruits, but flowers; the grassy carpet is not only spread for his feet, but it is embellished to the eye. The fruits are, indeed, wholesome; and, more than that, they are delicious; every variety of taste is provided for. Animals are made obedient to his call, whose flesh and whose

clothing are freely offered to his use; and Nature herself condescends to assume new forms and improved qualities at the hand of man, that her productions may please him the better; and, as this is not enough to satisfy the insatiable demands of human life, she has provided him materials of infinitely various kinds and qualities, on which he may work his will to please himself, if possible. Yes, God Himself has provided the materials for the arts of life. He who formed the eye has given the painter colours for his pencil, and the most exquisite patterns for imitation. He who formed the ear has made the air to be not only a medium for transmitting certain needful sounds, but has constituted it an exquisite instrument of universal music, susceptible of all that the ear can demand, or the ingenuity of man devise for harmony and song!

Then what do you think of odours? It is not enough that the eye is presented with the colours of the flowers, that the gorgeous splendours of sunny climes are spread before it, but another sense is to be regaled — fragrance is to be added to the splendours of the flower, to the delicious juices of the fruit. The breeze of eastern groves moves not but with its charge of perfume, which is borne alike to be inhaled by the monarch and the slave.

Q. And yet people are always saying what a miserable world this is.

A. They say that sometimes truly, but very often thoughtlessly and ungratefully. Very true it is that there is a great deal of misery and suffering in the world, because there is a great deal of wickedness. Generally, there is the greatest misery in countries where Nature is the most munificent in her gifts. Eastern treasures of the garden, and the field, and the mine, and Eastern oppression, go together. Lands the most fruitful, doubly blessed as are many, in their soil and their skies, have been laid bare, and made nearly desolate by ruthless, wicked despotism; and this is nearly the case with Persia at the present time.

But many persons, when they say "what a miserable world this is," speak, as I have said, thoughtlessly or ungratefully; and yet such are not commonly the individuals who have the most reason to complain. They are very often persons who are full of everything, but forget to give God real thanks for anything. These are the very people to be unhappy, and very wicked they unquestionably are. On the contrary, there are those who lead a life of almost constant privation, but who never complain at all. They rise in the morning not knowing

how the meals for the day are to be provided; supplies perhaps unexpected—perhaps scanty—do arrive; they are instantly thankful, and almost happy. And persons who only occasionally have a day free from ill health or pain, when that day comes how pleased and grateful they are; and when the pain is less than usual they will be placid; when severe, they will pray, and live on hope, and be less miserable than healthy, and wealthy, and ungrateful self-tormentors, who are continually murmuring at the very hand that spreads their table. I have known persons calling themselves religious who have appeared as unthankful as bears for the daily things supplied to them.

But I must notice one or two other matters which show not only the power and wisdom, but also the goodness of God in preparing this globe as a residence for man. We are, it is true, lighted and warmed by the sun; and if that light and that heat were withdrawn, we should very soon perish. But still that is not enough; something is wanted and has been bestowed on man in addition to the light and heat of the sun. This is what we call artificial fire. What should we do without it? The sun will not cook our food, nor light us at night, nor warm us sufficiently in winter. I have already spoken of fuel,

but that would do us no good if we could not set fire to it; and God, who provided both, no doubt showed man the way to obtain ignition. Having fire at our command, we can prepare our food, warm our bodies, fuse the metals, drive our machines, and make the darkest night and the coldest winter as light and as warm as we please!

Still, as we could not take fire about with us, we should neither be warm, nor otherwise comfortable when abroad, without clothing of various kinds. Man must face the weather, and therefore he must fence his body against it as well as he can. This want also is provided for; and here not only comfort, but ornament, have been considered by Him who hath given us all things "*richly* to enjoy."

Animals have more clothing than they require, that man may be supplied from their superabundance; and the silkworm spins more of that beautiful material than seems necessary for the creature's protection housed within it, that man may obtain a material for the most splendid garments of his wardrobe. These, indeed, he must weave and dye to his fancy; and the invention of these arts of weaving and dyeing, though very ancient, could not have been discovered and brought to perfection for some centuries.

The skins of animals, therefore, were no doubt

formed for the double use of the brute and of man; perhaps we may say, they were ornamented for man alone. With these he first learned to clothe himself; and even now that the loom supplies its delicate and splendid vestments, the furs of many animals are considered more splendid still, whilst their warmth generally exceeds that of other clothing.

There are many particulars well worthy of remark, as showing the care and kindness of the Creator in the elements around us, which I cannot bring into my nut-shell if I would leave room for that which must follow. I will just notice the four, formerly called elements—fire, air, earth, and water.

Fire, as you know, might have been denied us; or it might have been, as it will be one day, totally unmanageable. So easily is it procured and understood, that people the most ignorant and savage have used it in all ages. Then it might not have been luminous, or we might have had the light without the heat. It might have been the case, that the natural heat of our bodies decreased with labour, and this in cold countries, where labour is most required; there would have been an addition to the suffering of toil, far beyond that contained in the sentence, "In the sweat of thy face shalt thou eat bread."

The labourer leaves his chill cottage in the morning and begins his work, and with it comes, how mercifully, a genial glow, more comfortable and more healthful than that experienced in the mansions of the rich.

As for the air, we are apt to think too little of it because we do not *see* it. Let us only notice a fact or two. Are you aware, in the first place, that air is a sort of *fuel to the fire*, which burns with it, and without which it would not burn at all? And do you know, too, that it is the air—the atmosphere—which diffuses the light of day; in fact, gives us light where otherwise it would be pitchy darkness? There would be *no* light, for instance, in a room into which the sun did not actually shine. There would be dazzling streams of radiance where he could shed his beams in direct lines, but every other place would be perfect night; shadows at noonday would be unmixed blackness; the sky itself would be dense blackness, except just where the luminaries would appear.

And without air there could be no clouds, no vapour, no rain or dew. Water would have been water alone, and land would have been dry land indeed! So that the air is as needful for our existence in other respects, as it is for

the breath we draw. The air, too, is the sole medium of sound. Mountains might fall, but it would be in perfect silence; neither whispers nor thunders could be known.

And as to earth, that is, the loose soil, of which the ground is composed, it is made up of ingredients necessary to vegetable, and therefore also to animal life. It is powdered, as it were, or reduced to small particles, that moisture may freely enter it, and the tender roots of plants penetrate it in all directions. Earth affords, besides, clay to the potter, dyes to the artist, and medicines to the physician. It is the reservoir of fresh waters, and the grand storehouse of the metals and the fuel of which we have been speaking. This earth, or mould, or soil, on which we tread, yields us all our provisions from first to last, and then receives us—"ashes to ashes, and dust to dust"—till we are transformed, and earth shall be our dwelling no longer.

And water is equally with the other materials of our world formed and constituted with regard to the wants and comforts of the living. It is the food and the drink of vegetables, and the sole beverage of animals when they leave the nurture of the mother. It is, too, the grand purifier and cleanser of this our home creation, and the salt of the sea is nothing

else than a vast provision against the effects of the constant decay of animal and vegetable matter.

The world, then, *is* a fit and comfortable residence for man; and I may say that infinite wisdom has been employed, and has been *needful*, to make it so; and with this, infinite power and infinite goodness have been combined. And have the comfort, the enjoyment, of the teeming myriads of inferior animals of all kinds been forgotten? Do not the gnats that dance in the sunbeam rejoice in that sun as well as we; and have not the wants, the animal happiness of every race of creatures, been cared and provided for by the same infinite Creator, in whom we live, and move, and have our being? Doubt it not. The world is a residence prepared for them also; and if this had not been so, the earth would have been a very imperfect residence for us. Man is, more or less, dependent on countless tribes of animals, to whom, by the just rule of nature, he is compelled to render service in return, by supplying sustenance, shelter, and protection.

David wrote—and they seem to have been the last words of his inspired pen—"Let every thing that hath breath praise the Lord;" and Moses, so far from calling the world a miserable one, breaks out with exulting thanksgiving in

these beautiful words, "Blessed of the Lord be his land; for the precious things of heaven, for the dew, and for the deep that coucheth beneath; and for the chief things of the ancient mountains, and for the precious things of the lasting hills, and for the precious things of the earth and the fulness thereof."

CHAPTER III.

A GLANCE AT THE EARTH'S SURFACE.

It is very likely, that if the wisdom of man had been consulted with regard to the formation of the earth, he would have advised that it should be a perfectly smooth ball, covered with a coating of grass or lavender, for men or angels to look at or to smell. Would any man have thought of placing a mountain on the globe? On the contrary, if on the face of the unfinished world he had detected such a thing as a projection, a slope or a valley, would he not have exclaimed, "O see! here is an ugly lump, we must scrape away this ruggedness, we must raise that hollow part." And if man had been told that water would be needful, he would,

perhaps, have made round holes here and there to contain it. Seas there would have been none; rivers he could not have imagined or supplied; ponds would not have been thought of, until too late for the ducks and geese!

The surface of the globe does appear vastly irregular and contrary to any thing that man would have imagined. We have seen what his taste and notions are in the instance of air-balloons, the largest bodies approaching the spherical shape which he has made. Gay stripes of blue and green, and red and yellow, reach from pole to pole of that machine; and earth, perhaps, if she had been submitted to his fancy, would have been made a very pretty ball, as seen from the moon, but a glaring and desperately ugly and inconvenient one for crows to look down upon.

It is because in all things we must say of the Creator, "His thoughts are not as our thoughts, nor His ways as our ways," that this globe is a habitable world. Nothing less than INFINITE power and wisdom, and knowledge and goodness, could have made it so, or have conceived what would be required. The waters occupy about two-thirds of the entire surface of the globe. They are exactly enough to supply, by evaporation, the clouds needful to water the

land, which is the remaining third part. Again, the face of this land, so far from being levelled, is, as it were, tossed, and torn, and swelled, and roughened up almost everywhere, so that rivers and rills of all dimensions pour their fertilizing streams through the garden of the world, like the innumerable veins of the human body. Thus lakes are collected, and the food with which the waters are charged is distributed over the globe.

Mountains appear to have been thrust up from beneath by "some great convulsion of nature," as philosophers say. Glad enough may we be that Mother Earth had those convulsions; for they have borne to the surface with the rising mountains mineral treasures which would otherwise have been inaccessible to man. Most of these have been volcanoes at some time or another; and such, dreadful as they are when burning and overwhelming the country round with their melted rocks and ashes, and the lava which runs down their sides, have not been without their use. The most fertile soils in the world are those which have been thus formed on the sides of volcanoes. Materials of the globe, formerly remaining in a solid impenetrable state, have been thus reduced to a finely pulverized earth, scarcely

requiring the human hand to till it. And now, my young friend, what do you say to it all?

Q. I have a great deal to say, and have thought of a good many things as you have gone on praising the world at such a rate. I know there are very fine countries, where there is beautiful weather, and where they have most magnificent flowers, delicious fruits, and gold and silver, and precious stones. And there, too, they have snakes, and tigers, and scorpions, and horrible tempests, and whirlwinds, and earthquakes, and vampires, and the plague; and no water to drink, and blistering hot weather, and roaring lions, and poisons of all sorts, and starvation sometimes. Is it not so in the East Indies, and elsewhere?

A. I dare say it is so to some extent; but I know those who have lived there delightfully enough, and who, therefore, were never swallowed by a tiger, nor bitten by a snake, nor stung by a scorpion, nor struck by a tempest, nor caught up by a whirlwind, nor tossed into the clouds by an earthquake,—persons, too, who never caught the plague, nor were starved or poisoned, even in the East Indies. Certainly it is there very, very hot, and here it is often very, very cold; still men live, and live comfortably here and there. In the tropics, you know

almost always what weather to expect; here, indeed, we are sure of nothing but uncertainty.

And I think I hear my young grumbler thus going on: "Uncertainty, indeed!—Yes, think how I was served in the winter. It was rather a nice morning for December, when papa and I set out to drive to Aunt Crosse's, at Frostwick. The horse slipped down, and we both rolled out on the snow; and when I came back, my veil was frozen to my nose. Besides, I know that there are such terrible things as I have mentioned, in countries hot or cold, and people have perished by them, or else all the books are wrong, and travellers tell fibs. As to our own country, I know well how it is—miserable, and cold, and wet, and *sure* to rain on a holiday,—no uncertainty in that. The blossoms are cut off by the frost, and the hay washed away by the floods, and the corn spoiled and mouldy for want of a little fine weather. And we have thunderstorms, too, to kill people, and all sorts of diseases to do the same; and I had a wasp in my ear last August; but I dare say we deserve it all, because of our misdoings. I like the earth being a globe very well, and am glad it is not square, and so on; and I don't object to mountains, and rivers, and seas, and lakes; but all these do not seem to make it a

happy world, though there are some good things in it, but such as I cannot get hold of."

"And think," continues another objector, "what a dreadful world it is in the North, and all round the Pole. I have read Parry's and Franklin's Voyages. Oh, it is horrid!—obliged to eat shoe-leather, and drink lamp-oil, and starved for the want of that: and the cold so awful, that people's noses and fingers freeze and split off like glass: not so much as a hot roll, or a stewed oyster, or a raspberry tart to be had; no peaches even in summer, and no night in summer to go to bed by! There's a place!—there's a beautiful world! What do you say now, Mr. ——?"

Hear my answer. I never said that this world is all alike. You never heard of a fine estate, a great house, that was alike in every corner. Such is not the case in Windsor Park or Palace, nor in any residence, great or small. I never said that earth is HEAVEN, though millions of mistaken beings dream of no other. What I mean is, that our earth is a residence beneficently fitted for the abode of such creatures as are placed in it; a world in which the power and wisdom—yes, and the goodness of God are abundantly manifested; and this latter especially towards those who have no good deserts,

but the contrary, who are the unthankful and the evil.

As to the ills that have been spoken of as belonging to hot climates, how many are living there, and were born there, who have scarcely experienced them! Earthquakes, and tempests, and other dreadful visitations, do indeed occur at times, to teach man a lesson he is slow to learn, and to punish him for his sins; and the wonder is, not that they break forth as they do, but that they are restrained as they are. We are called to marvel, not at the vengeance, but at the forbearance of God!

But do not suppose that the inhabitants even of the most inclement regions are as unhappy as we should be in their place, or even as we are—some of us at least—here in England, when our wishes are crossed (regarding a holiday), or our fingers are pinched in a cold wind. The men and women who swallow lamp-oil with avidity, would turn with loathing from our spiced soups, plum-pudding, and fragrant wines. They have what they like best, and are happier than those, who for want of any real experience in want, know not what they would have, and are contented with nothing.

I am not, you know, a schoolmaster; and I add now, that I am not a preacher, and do not

profess to make sermons. But I do profess a regard to religious considerations all through this Glance at the Globe; and I thought it proper, therefore, to notice objections which might arise as I have done. As to the evils and dangers which beset and threaten our world, they all point to the end of it, and I shall have more to say on that subject. I now mention a few particulars, chiefly remarkable in describing the surface of our world.

I have said that the waters cover about two-thirds of that surface; and it will immediately appear, on examining a globe whereon the sea and land are represented, that there is no sort of regularity in the figures or forms of either the one or the other. They say, indeed, that Italy is in the shape of a boot, and Europe in that of a lady sitting. I confess I cannot see the resemblance. It does not appear to me so near as that of North and South America to a shoulder of veal and a leg of mutton. This, however, is rather an idle use to make of geography. It is quite certain that in the plan of the world, as it is laid out, uniformity, or symmetry, or correspondence of forms, cannot be traced; and one might almost think that chance had ordered the disposition of land and water, until, on thinking again, we find that this

very irregularity is better by far for the world than any mathematical or other configurations that we can conceive of.

There is now, by means of the intersecting waters, a navigable communication with every continent and island,—a way by water round the globe. We might say, indeed, that if the lands and seas were in alternate strips or squares from pole to pole, they would have shown *design* of some sort; but the want of this symmetry shows a better design, and therefore greater wisdom by far, in contriving a world for man. The ocean is not locked up in square holes, like the water in a tan-yard, but is accessible from east to west, and nearly from pole to pole.

It is observable, that of the whole dry land, by far the greatest part, or about four-fifths, are situated in our Northern Hemisphere. The cause or design of that I do not pretend to understand. The land, in general, seems to consist of three great tracts or masses: the *old* continent, which includes Europe, Asia, and Africa; the *new* continent (new to us because more recently known), and New Holland. In the old continent the general direction is from west to east; in the new, from north to south. Then, again, all the great peninsulas, or masses of land nearly surrounded by water, point to

the South Pole. We may observe these things, but the cause of them is, and perhaps always will be, unknown.

But the ocean is broken or separated by islands, some of them of large extent, and it is studded by innumerable small ones. In these favoured spots, both the cold and the heat of extreme climates are mitigated and tempered. The ocean hastes on all sides to spread its bounties on their shores, and there is formed by the same circling wave a natural and powerful defence from the trampling hordes which have devastated continents from coast to coast. Happy is Britain in this respect. She has been, as it were, nursed and guarded by the wave, until she has been called the Mistress of the Seas; and has, besides, obtained an empire in distant climes the largest known in history, and on which the sun never sets,—that is, there is always some part of it under the eye of day. So much for the most conspicuous features of the earth, such as might be visible from the moon. We must now inspect her face a little more closely.

Mountains are very numerous, and they very seldom stand singly. They are almost always in rows or chains, as they are called, and these follow generally in the direction of the great

continents in which they are found. Their height varies from something above that of a hill to about five miles from the level of the sea. This elevation would appear greater than it does, if the sides of mountains were flat and perpendicular. No building reared by human hands has yet reached the tenth part of one mile in height. And yet a tower, if such there were, which should measure 500 feet to the summit, would seem a giddy height indeed, such as we could hardly venture to look down from, unless well fenced round. This tall tower, however, would look like a mere candlestick by the side of many mountains; and these loftiest mountains, again, are no more than the small roughnesses on the coat of an orange compared with the size of the globe.

The highest mountains in the world are those of Himalaya, in Asia, a vast chain which separates Hindostan from Tartary, and extends to the borders of China. Of these, the chief in altitude measures 26,862 feet, or rather more than five miles from the level of the sea. There are many other mountains in Asia which are from three to four miles in height. In the Sandwich Islands there is a peak of more than three miles elevation.

The mountains of Europe are not generally

so high as those of Asia. Mont Blanc and several of the Alps are nearly 16,000 feet. Etna in Sicily is about 11,000 feet. In Africa the mountains do not exceed some in Europe. In South America, again, are some of the highest in the world. Those of Britain make a poor figure in such high company. The tallest are in Scotland, but they are none of them a mile in altitude.

I have said that the loftiest of these mountains are extremely inconsiderable,—scarcely observable indeed, when compared with the size of the globe. But if some of these, of a five-mile stature, were set down in England, we should almost be frightened lest they should sink us in the ocean. They would be visible from sea to sea.

Mountains are of the greatest use in various ways. They intercept the clouds, and cause them to distil and pour down fruitful showers, and therefore they form the source of the chief rivers in the world. They protect many a sunny valley from cold or tempestuous winds, and form natural boundaries or fortifications to nations. Thus, the Alps, the Pyrenees, the Appennines, although they have passes, and have been crossed by armies, have yet held in check mighty hosts, and have prevented many an invasion.

But the little hills, the gentle slopes, the smiling valleys, so beautifully noticed in the Psalms, and which abound in our own country so much as seldom to have acquired a name, these may be truly said to ornament the landscape. They give a character and an interest to every scene; and from their gushing sides issue many a little rill and sparkling fountain which the plains very seldom supply. And it is owing to this constant inequality of the surface, tilting often insensibly this way or that, that we are enabled to get our lands and dwellings drained and purified. Without this arrangement even a transient shower would incommode us, and we should have stagnant water everywhere. Perhaps now you have some questions to ask before we proceed.

Q. Only this,—how far is it to the end of the chapter?

A. How far? Here, if you please, let us rest awhile.

CHAP. IV.

THE SUBJECT CONTINUED.

We have glanced at the earth's surface, but have not taken sufficient notice of several things thereon, which would probably very much surprise the inhabitant of another planet. I mean our burning mountains, and our vast oceans, seas, and rivers.

First, as to volcanoes. We read in the Scriptures a distinct assurance that the earth is to be consumed by fire, or melted with fervent heat; and we find that in more places than one the flames are already kindled. Yes, there is reason to believe that the interior of the globe is, and always has been, in a state of combustion, and that the burning sphere is only cooled at the surface—crusted over, that man and beast may walk upon it for a space. The deeper we go, the hotter we get; so it is probable that, in two or three miles, if we could descend so far, we should come to the reddened mass of inner heat. That is rather an awful thought, I confess.

And this is quite certain, that subterranean

fires to a vast extent exist, which have burst through in numberless places, and are now pouring forth vast columns of flames, and discharging cinders and melted minerals from their summits. Mount Hecla, in Iceland, is at this time in a state of violent eruption, and the column of fire proceeding from it is more than two miles high. The whole body of the mountain has become heated, and the ponds and pools in the neighbourhood are made to boil. Besides this, Etna in Sicily, and Vesuvius in Italy, have been frequently in the same state, overwhelming the country round, and burying cities beneath the fiery floods which have poured down their sides.

To the question, Whence come these flames, and by what power is it that the earth trembles, and heaves from below, so that edifices tumble, and seas are made to retire from their ancient boundaries, there is but one answer, and it is a fearful one. The unconquerable element which is to subdue all things is now at work, and thousands have already perished by the beginnings of that "horrible tempest" which is to summon all to judgment.

Scientific men, who have examined the earth's surface very attentively, have discovered that volcanoes have existed almost in every land

and in every sea. Numbers of little islands that stud the ocean are, in fact, mountain-tops that have been thrust up with their spouting fires from below. Some such islands have appeared and sunk down again: such as Graham's Island, in the Mediterranean, which appeared and disappeared about fifteen years ago. It is pretty evident that this globe *has* been all on fire; that it was very slowly and partially extinguished, and several flaming proofs remain to convince man that all things have not been, nor will continue, as they are.

Amongst the results of the heavings and expansions of the earth's surface, we may notice the grottoes and vast caverns which exist in rocky countries. Here may be found some of the most gloomy, and also some of the most splendid, of Nature's operations. Some are enclosed so nearly as to have no light at all from without; others are partially open, so that the thundering wave traverses them from end to end; and others, though the sea is excluded, present the appearance of vast gulfs, with unfathomable waters at the bottom. Some of the most celebrated caverns are, Oakley Hole and Fingal's Cave, in Britain; and the Grotto of Antiparos, one of the Grecian islands. These are famous on account of their extent and the

splendour of the decorations which they exhibit. I shall only describe the Grotto of Antiparos, lest my chapter should become a longer one than will be approved of.

Spacious and magnificent as these natural temples are, they are not, like those constructed by human hands, ornamented by very capital door-ways. The cavern I am speaking of is approached by a dark, ugly aperture, exceedingly discouraging to the curiosity of the traveller, and forbidding to all but determined Paul Prys, especially as the place had long the reputation of harbouring a giant of most dreadful aspect, who was the guardian of the cavern.

About one hundred and fifty years ago, however, some persons plucked up courage to enter at all hazards, resolved to burn the beard of the monster if necessary. They entered, and, holding their torches as near as they could to the figure, they found it to consist of an immense mass of glittering gems and crystals, suspended from the roof of the grotto, and which were formed, as such always are, by the oozing out of water from the crevices of the rock, and congealing into crytals as it descends. These substances, being exceedingly brilliant, reflect the rays of torches in all directions, and give the appearance of a vast temple illumed

by myriads of sparkling lights, and paved with precious stones.

The Grotto of Antiparos is, in fact, an assemblage of caverns,—a suite of apartments,—some of them of such vast dimensions as to be scarcely reached by the eye; and here, too, the glittering petrifactions take the form of trees and groves, and every fantastical figure, realizing more than the wildest dreams of fancy could imagine. To complete the idea of an edifice, the largest chambers exhibit columns of very beautiful marble and other seemingly architectural forms; but it is quite certain that all is the work of Nature, as we say, or rather of the God of Nature, as we should say.

I am not sure that these splendours were not created, like those that adorn many a flower, to gratify the eyes of beholders,—myriads of beings perhaps, all invisible to man, who was last to fix his eye upon them. There are no doubt thousands of these subterranean chambers as yet unexplored,—their ancient silence unbroken by human footstep. It does not appear that caves were ever *designed* as a residence for our race; or that Nature has furnished him with any dwelling. No; she has furnished him with head and hands, and materials, combined with a most sincere desire on

his part to make himself comfortable. The result is, that we have houses of all sorts and sizes to reside in.

I must now notice the watery surface of the globe, which forms by far the greatest part of that surface, as we have seen. This is one of the things in which our earth differs from the only planet to which we are sufficiently near, to enable us to make an observation. The moon has long been supposed to have no atmosphere, and it is, we may say, proved by the very recent observations made with Lord Rosse's telescope, that she has no water. The dark patches and spots we see by the naked eye are seen distinctly to be mere hollows or shadows, and there is nothing in the shape of a river, or having the similitude of a lake of any sort. And this kind of evidence makes it reasonable to conclude that the moon is at present a solitary silent world, without inhabitant or movement of any kind upon it. The period *may* come when the Creator shall exercise His power there, and say, "Let it bring forth the herb yielding seed, and the tree yielding fruit, and the living creature after his kind."

The waters of the earth are chiefly rivers, lakes, and seas, or oceans. The largest river in the world is the Amazon, in South America,

which it nearly divides, and makes two islands of. It takes its rise in Peru, not far from the Pacific Ocean, and running east, it enters the Atlantic after a course of more than 4,000 miles, during which it receives nearly two hundred rivers, some of them larger than any in Europe. At its mouth the Amazon is 150 miles broad, and 1,500 miles from its mouth it is sixty yards in depth. In the rainy season this majestic river overflows its banks, and fertilizes an immense extent of country. Compared with this, our famous river Thames is like such an one as you may make by drawing your stick along the ground in wet weather.

Q. Oh, is not the Thames bigger than that?

A. Well, let us see:—Yes, it is larger in proportion than such a mark on the sands. The Amazon, I find, discharges about 400 times as much water as the Thames. The next river, in length, to the great South American one, is the North American St. Lawrence, whose course is about 4,000 miles; but in quantity of water, the Mississippi greatly exceeds it. Then there is, in Africa, the Nile; in Asia, the Ganges, the Indus, the Wolga, the Euphrates; in Europe, the Danube, the Don, the Rhine, and many others of a far mightier flood than the Thames,

which, however, has borne perhaps more wealth upon its bosom than all the other rivers put together.

There has been in all ages a great deal of sentiment and superstition connected with rivers. In the sacred and the classic histories, and in the records of savage nations, this has conspicuously appeared. Thus we find the river of Egypt (the Nile), the Jordan, the Euphrates (the river of Babylon), are celebrated in the Scriptures in language beautifully poetical and touching; whilst the heathen poets make their rivers' banks swarm with deities, whom they scruple not to transform into rivers on some occasions. In Asia, the Indus and the Ganges are deified by the besotted nations on their banks, and to these rivers millions of the human race have been committed as sacrifices. In our own times, streams and fountains have caused the most elegant and splendid effusions of the gifts of genius, whilst songsters, of low degree and humbler muse, have made the blue gliding flood their constant theme.

Lakes are inland collections of water, generally fresh, soft, and clear, and almost always abounding with fish. The northern parts of England are abundantly ornamented with these still, broad, landscape mirrors, encircled gene-

rally by mountainous scenery, which very much enhances their beauty. But these are mere ponds compared with the lakes of North America, which are extensive enough to experience the most dreadful tempests. These, again, are but small when measured with the Caspian Sea, in which Great Britain might be drowned. Many rivers run into this vast mass of water, which has no visible outlet. They must, therefore, find their way underground by some secret channels to the deep.

And now, what shall I say of the ocean, not to be tiresome? And how much room for this is there in our minds?—Will it wash away the knowledge which is there already?

The ocean, according to geographers, is contained in five great basins—not one of them a nut-shell, you see. They are rather sizeable dishes which hold the Atlantic, the Pacific, the Indian, the Arctic, and the Antarctic Oceans! We may add that they are all earthen basins, and that the Eastern Sea is contained in *a China one.* The Pacific Ocean, so called from its general quietness, is larger in extent than all the dry land of the world. I am to consider that you know where to find all the oceans and seas on the artificial globe, and need not my instructions in such matters. You will not

look for the Pacific Ocean amongst the lakes of Westmoreland, nor for the Antarctic at the North Pole. I shall therefore notice only such particulars as belong to the sea in general.

And, first, as to the tides. I fancy you would think it a very odd thing if you were to see the water in a hand-basin lifted on one side at twelve o'clock,—down again at six,—mounting then at the other side,—subsiding as before; and this always occurring regularly, without any shaking of the vessel containing the water. You would call others to look at it, and ask of everybody what *can* occasion this flowing backwards and forwards of the fluid?

And you would not wonder the less if you were to find that the moving of an orange, or any other body, at a great distance from the water, seemed to cause and command these motions. But I do not know that this would be more really marvellous than the tides of the ocean, which cease not, four times a-day, to rise and fall in this way, obeying as they do the attraction of the moon, which is, you know, 240,000 miles off. This ebbing and flowing of the great mass of waters is observable on all coasts, and its times are known beforehand to a minute. If you ask me to explain what attraction is: by what means of communication all

the materials of the universe are drawn towards each other—I cannot tell you: nor have the wisest heads in the world found it out. You have often heard of this *attraction* of *gravity;* —now, of the two words, the former is an intelligible one so far as this, that it means the drawing of one thing towards another; but the other term—gravity—just stands for that of which we know nothing. As if one were to see a machine pulled along by an invisible power,—it might be a horse hidden by a wall, or a donkey behind a hedge. When we are asked, What is that machine moved by? we answer, by the attractive power of—ay, what? say magic,—say botheration,—say gravity,—it is all one; but if you could peep over the wall and say, "Oh, it's a horse, or a donkey!" we should understand you. If you were to perceive that the waggon, for instance, were merely running down-hill; then, again, you might think you clearly understood the matter—but, not so fast,—the hill does not draw the waggon. No, you will tell me, it is its own weight; but what is weight?—the effect of the attraction of gravity;—What is gravity? There we are again at a *nonplus*, and so must be as long as we are not willing to accept the one explanation which belongs to everything we see

around us—It is the will and the power of God, which is the First Cause of all these effects. I press my two hands together by means of muscles and bones, and so on; but what is it moves my muscles and bones? It is the will of my mind, the act of my soul: —gravitation is the act of God.

The tides, then, are the effects of this attracting, gravitating power, and which is excited by the moon as she revolves round us, and also by the sun as we revolve from day to day. The tide wave in some parts of the ocean moves at the enormous velocity of 700 miles an hour. It is thought that this constant and powerful disturbance of the immense ocean of waters is needful to preserve its purity; if unmoved, it might become corrupt like other stagnant waters. The sea, however, is constantly agitated by other causes—such as winds, and the enormous discharge of fresh waters, by the great continental rivers, which make currents in various directions. It seems, too, that the bottom of the sea has some holes in it, through which the mighty deep finds its way, causing those most dangerous of all perils to the mariner —I mean whirlpools. You may see the thing exactly represented, and safely enough, in a common funnel.

The bottom of the sea seems as uneven as the land, and has evidently its hills, valleys, lofty mountains, and deep unfathomable gulfs. Its actual depth, therefore, must, as you may suppose, be various. In some places no bottom could be found by lines almost two miles long! But, perhaps, the chief wonder connected with the ocean is its saltness. It takes a good handful of salt to make a pail of water as briny as the sea. Where, then, does all the salt come from which flavours the vast briny wave?—We cannot tell. Is there any other question before I close this chapter?

Q. Yes; I have something to ask about the tides and the moon. Why should not she attract water in the hand-basin you mentioned, or in a pond, as well as the sea-water? Perhaps she does, and I have not happened to observe it.

A. It is a very reasonable question, but soon answered. I am not prepared to say that the moon has *no* effect on any portion of water, however small; and perhaps if your basin of water were emptied into the sea the whole level of the sea would be a *little* higher; but it must be *so* little, that neither eyes, nor instruments, nor thought itself, could conceive of so small a difference: so, of course, it is with the tides in a tea-pot!

CHAPTER V.

TERRESTRIAL PRODUCTIONS.

HAVING now taken a glance of the world as a planet and a residence for living creatures, having inspected its surface, perused her features, as we may say, we must take a little notice of the things that exist and grow upon it; and, in so doing, we must give some account of "the three kingdoms of nature," as they are called; that is, of Animals, Vegetables, and Minerals,—the three sciences connected with them being known as Zoology, Botany, and Mineralogy. I shall take the last first, but shall not have much to say about it, as I have already alluded to it when speaking of the provision made for the wants of men in the form of coal and iron.

Shall I be thought tiresome then, whilst I say a few words about the substances of which such common things as pokers, candlesticks, warming-pans, tinned saucepans, leaden pipes, pewter dishes, and so on, are made? or shall I speak of nothing but gold and silver mines, whence come sunny sovereigns and bright half-

crowns? And then for stony minerals: Shall I tell only of diamonds and other gems? What says my reader? Hark! my reader replies:—

"I think we do not want to be told much about these very common things, because we all understand what they are for. As for gold, and silver, and diamonds, it is impossible that any body can ever be tired of them."

I wish, my young friend, you may never experience the misery of those whose bags and boxes are full of these things, and whose hearts are set upon them. Such are amongst the most pitiable beings existing in this various world. The poor wretch who surveys and reckons up his hoards from day to day, scarcely knows what it is to *enjoy* even the consciousness of his wealth. Fortune, perhaps, heaps up new masses of money in his treasure-house, — suddenly his thousands are made millions, and with these new riches come new anxieties of possession— new agonies of appetite and apprehension. But make poor houseless wanderers, sheltering under a hedge and a blanket, a present of an iron kettle, a tinned saucepan, a copper pan, and such things, to the value of a few shillings, and their dark faces will brighten up like some of those new implements in the sun. They will go to rest happy—they will rise rejoiced; and, perhaps, if

kindly instructed, such will return thanks to God with tears of gratitude in their eyes.

The commonest metals, abundant as they are, do not lie in general ready for use on the surface of the ground, nor are they found in their pure state in mines. We obtain neither iron bars nor yellow bullion by just digging for them, nor would these or other metals be recognised at first sight in the dusky lumps of ore which contain them.

Those ores from which are obtained the metals most needful for us are bountifully scattered over the earth, or laid by in vast deposits easy of access. Iron, which is everywhere wanted, is almost everywhere found, and has been procured from the earliest ages of the world; but as it is melted with the greatest difficulty, and requires the utmost energies of a wind-furnace for that purpose, the wonder is how the first artificers therein obtained it. When once procured, it accommodates itself to all our wants, our wishes, and even our caprices; it is equally serviceable to the arts, the sciences, to agriculture, and war. The same iron ore furnishes the sword, the ploughshare, the pruning-hook, the needle, the graving tool, the spring of a watch, the chisel, the chain, the anchor, the compass, and the cannon-ball. It

is a medicine of great utility, and the only metal friendly to the human frame.

Tin is a metal that was known and appears to have been in use even in the time of Moses, Numbers xxxi. 22. It is believed that it was from the first procured from Britain and Spain: it is still obtained from Cornwall, more than from any other country. It is, as we all know, white, and sweet, and clean: it is easily melted and applied to other metals, and renders the most poisonous of them harmless when they are plated with it; but tin is too soft a metal to be used alone. Its valuable qualities are its bright silvery appearance, its wholesome cleanliness, its capability of being applied as a coating, and its cheapness.

Copper, *cuprum* or *æs Cyprium*, so called from the island of Cyprus, whence it was formerly brought, is a metal that was well known to the ancients. It is thought that the brass of which we read so frequently in Scripture was in fact copper, which was in use before iron was known. It was employed in remote ages very much for common utensils and instruments of war. Copper being a poisonous metal, must have made most deadly wounds when formed into swords and spears. It is an abundant article, and has been procured in immense quantities from Cornwall

at the earliest known periods of commerce. Copper is with difficulty melted, but submits to the hammer with wonderful constancy; so that a piece no bigger than a halfpenny may be formed on the anvil almost to the shape of a hollow globe. It does not rust readily, and is therefore very durable, so that it is much used not only for the kitchen, but also for the roofs of buildings, the bottoms of ships, and as coin.

Lead is also a very abundant metal, whose softness, pliability, and readiness to melt, recommend it very much to young artificers, who are working after the most difficult of patterns, their own curious fancy and caprice. It has little tenacity, that is, it is soon pulled asunder; so that a leaden wire is not so strong as a bit of twine; but as it is not apt to rust, it makes a good, though a very heavy covering, to buildings, and forms pipes and cisterns of great utility. But we are indebted to lead for other things. Preparations of this metal form what is called white lead, which is the chief ingredient in all house-painting; it is very poisonous; but lead is most fatal in the shape of bullets.

Zinc may be called a modern metal, and has only of late years been brought into use. It is of a lighter colour than lead, is much harder, and not nearly so heavy; it is therefore very

often used now for water-troughs and on roofs, as it resists the weather well. Zinc and copper mixed, form brass.

Mercury, or quicksilver, I cannot say is easily melted, because it is exceedingly difficult to procure a solid piece for the experiment. Water will freeze long before mercury will become solid. It is named mercury because it seems to resemble that god in activity, being, as you know, hard to catch and difficult to hold. This curious metal is much used for scientific purposes, and that most beautiful instrument, the barometer, is by its means so constructed as to enable us to weigh a column of air fifty or a hundred miles high; it is, in fact, the same thing as if the column of air were in one scale, and the mercury in another. Preparations of quicksilver are much used in medicine, and we are indebted to this bright metal for such representations of our precious selves as a looking-glass will afford.

And now for gold and silver. These are unquestionably noble and most splendid metals, and they have always been regarded as representing the highest value, except in savage nations. Gold is much heavier than lead; it is indestructible in the fire, and is durable and unchanging to a surprising degree. It may be

hammered into leaves that are no more than the two thousandth part of an inch in thickness, and one pound of gold may be drawn into a wire that would go round the world!

We are told, you know, that "evil communications corrupt good manners." Good qualities may be damaged or turned into bad ones by the contact of base tempers and examples, and this instructive fact is aptly exemplified in the instance of gold. If only a thousandth part of lead be mixed with it, the splendour, the colour of the precious metal, are dimmed or gone—it becomes brittle, frail, and unserviceable; it is a tarnished, faded thing, and has, we may truly say, "*lost its character*" and value. So, be careful, when you are disposed to melt down a shovelful of sovereigns,—that none of your former lead castings are hanging about the pan!

Gold, however, will take mixtures or alloys of silver and copper, which are needful to harden it for use as coin. It is often procured from the sands of rivers, in the form of small grains, which are separated by washing. It is about fourteen times more valuable than silver, which is the next precious metal.

Silver has not indeed the sunny splendour of gold, yet its pure lunar effulgence is scarcely

less beautiful. It takes a most exquisite polish, and its whiteness cannot be imitated by artificial mixtures, notwithstanding the pretensions and the endeavours of those who would counterfeit the thing. Silver excels the inferior white metals, not only in appearance, but in the truly precious qualities of hardness, durability, freedom from rust, and from any noxious qualities. These particulars of its nature render it a most munificent gift of Providence to civilized man: without this the tables of the opulent would lose their magnificence, for gold is almost out of the question even for them, and is too weighty to be at all convenient as plates and dishes; but there is many a board, not indeed groaning with the stores of wealth and luxury, yet where superior ease and comfort may preside, whose whole garnish depends on the radiance derived from the few implements of silver that are displayed. Even such common and unpretending things as silver spoons and forks, and a pair or two of old-fashioned candlesticks of the same material, give an air of cheerful brightness to the scene which is unattainable without them.

But as coin, silver perhaps is more useful than for any other purpose. What should we do with a gold sixpence or a copper half-crown?

One would be as big as a flattened pin's head, the other the size of a frying-pan—very convenient for an old ploughman's canvass bag or for a lady's pocket! Business, we know, could not thus be carried on, and we should have perhaps paper sixpences, and so on, but that silver is at hand to accommodate both the rich and the poor with this smaller money; and for the same reason that silver is needful for certain small sums, copper is required for smaller sums still. The takings of some trades are almost entirely in pence and halfpence, whose value, if represented by silver, would give us an almost invisible coin.

There are various substances beside those we have just noticed which are called metals, and have their peculiar uses in the arts and in medicine, — such as antimony, bismuth, arsenic, cobalt, nickel, manganese, tungsten, platinum, and above thirty more, with fine names, all ending in *um*, and chiefly known to chemists and scientific persons. Many of them are highly poisonous. Arsenic is sufficiently celebrated for its destructive qualities, and nickel, of which German silver is composed, contains it. Arsenic, however, is used as a medicine; and so is antimony, which, mixed with tin, forms the material called Britannia metal.

And now for stones. Shall I speak first of diamonds or millstones?—which are the most precious? I know which we should call so, if we must part from one or the other. We will, however, begin with the gems. The diamond, so called from adamant, is the hardest substance known. It is most valuable when it is perfectly clear and colourless. It can only be polished by being rubbed with its own dust, and this can only be procured by grating two diamonds together. Its splendour, when thus brightened, is dazzling beyond conception: it seems to emit sparks and beams of light of its own, and all other brilliants fade by the side of the diamond.

Nevertheless, the coloured gems are exceedingly beautiful, and defy all imitation. The emerald, the sapphire, the ruby, the topaz, the amethyst, and many others of distinct or blended hues, seem like drops gathered from the rainbow, that they may adorn in a solid form the brows and the vestures of sumptuous royalty, and lend their radiance to the starry thrones of Eastern magnificence. And now, after a long silence, my readers or auditors may be disposed to speak. Perhaps they would ask me, since I have said so much of the utility of things, What is the real use of the so-called precious stones? They are not used as money—cannot be made

into implements — have no place amongst medicines — do not ease an aching brow or a gouty finger: with all their radiance they will not light us in the dark, but will themselves borrow the rays of a tallow candle!

Well, all this is true enough, and I cannot deny that the world might have gone round as well had no such things been created. And it is equally true that grass might have been the colour of cinder ashes, birds might have been as unsightly as toads, and every insect as ugly as a house spider,—every being of the human race might have had an appearance as disgusting as that of the vilest ape. But it pleased Him who made the eye also to form beauty, to create splendours, and to suit the beautiful forms and splendours to the taste and apprehension of the beings who are to regard them. Jewels, indeed, are rare, and can only be possessed by few, but the magnificence of Nature—the fields, the flowers, the glittering heavens—these are spread before every eye: we are taught to regard with admiration and delight this rich magnificence of creation—the strictly ornamental parts of it, by many passages of Scripture: not only are the landscape and the sky commended to our view, but gold, silver, precious stones, fruits and flowers, are there set forth in the charming

language of praise and gladness. It has pleased God not merely to prepare the world as a convenient and comfortable habitation for man, but also to adorn it,—to make it resplendent with the fittings and finishings of a palace.

But now, leaving these bright things to their possessors, let us inquire concerning those coarser earthy substances, or stony ones; those masses of material with which the earth is overspread, and which form the supply of man for the various purposes of agriculture, building, manufactures, food, medicine, the arts, for the memorials and the sepulture of the dead.

The earths may usefully, but not exactly or scientifically, be roughly comprised under the common names of clay, gravel, sand, and chalk, or lime. To these we must add a mineral of the last importance to human food and therefore to human life—I mean common salt. This is not a chemical arrangement nor a complete list, for the earths used in manufactures, medicine, the arts, and philosophical pursuits, could scarcely be named in many pages of a book, nor their nature and uses explained in a dozen volumes. We must attempt only as much as we can manage conveniently, and give a glance at principal things.

Now, with regard to the substance commonly

called earth, or the soil of our fields and gardens, it consists of various ingredients mixed together, no one of which unmixed would produce us food or anything we want. Clay and sand, and lime and decayed animal and vegetable substances and salts, are some of those ingredients; and it is the skill of the agriculturist and gardener to find out which of these substances must be in the greatest proportion to suit the plants he cultivates. It is well for us all that for every vegetable there are earths provided suitable to its nature. And, consider that it has been by the powers of Nature acting constantly on the surface of the globe,—the action of the winds and waves, that materials once solid and hard have been triturated—ground to powder, to make the soft mould which vegetation requires. This process is farther continued by man, whose industrious spade and plough give the stubborn clods no rest, but break and pulverize and mix them for the purposes of the fruitful field or garden. To these he adds constant supplies of manure, and in some countries he is compelled to undertake the labour of copious waterings, without which his crops would fail. We may say with regard to earths, that their first use is to supply the means of life to plants and animals.

Their next important use we may say is the material they afford for building. Here we want chiefly clay for bricks and lime and sand for mortar, and man finds them accordingly ready to his hand: clay for bricks was found out by the builders of Babylon and Nineveh, and the ancient Israelites were well aware of the labour of making them. They were not baked in kilns as with us, but dried in the sun, and became so hard and durable that specimens of the bricks are now to be seen in the British Museum uninjured by time.

But man having moulded this clay to the fashion of a brick, soon bethought him that it would be very easy to hollow it out into the shape of a drinking vessel. Pottery is as old as brick-making for anything I know. For ornamental pottery of all sorts there are fine clays—some of them forming vessels of the most exquisite delicacy and whiteness, and in this manufacture that half-barbarous people the Chinese seem to have excelled all the world—at least in the texture of the ware, and the colours with which they adorn it. I have only time to hint at the various uses made by manufacturers, chemists, artists, and the medical profession, of earths in a natural or artificial state: our houses are whitened, our

woollen cloths are scoured for the dyer, and innumerable other objects accomplished connected with the business of life, by means of earths, or minerals, exclusive of metals.

These substances, as we have seen, are for the most part in a soft, crumbly, or powdered state, almost ready for the use of those who want them in that condition. But man needs materials of this sort in a solid form, and there is plenty left for his use in the shape of stone, from the kinds called free-stone, because readily wrought, to that called granite and flint, which can scarcely be worked at all. Here the architect and the engineer may readily find materials for their structures, whilst the statuary, looking out for a stone that will take the last finish or polish, finds marble, of the purest white, on which substance he may exercise his genius, and bid his chisel rival the forms of Nature.

But amongst the artificial substances procured from earthy materials, there is certainly none of such importance to us all as glass. This was known and manufactured in the very early ages of antiquity, as glass beads and trinkets, many of them, dyed of beautiful colours, have been found in Egyptian tombs. Its use however, and perhaps the method of making it,

seem to have been lost for many ages, and, when first revived, glass was considered to have nearly the value of the precious stones. Glass windows in England were a luxury confined for a long period to the mansions of the nobility, and at Alnwick Castle the windows were always taken out when the family were from home: this was in the sixteenth century. So long were people in discovering the use of the abundant and otherwise almost worthless materials from which glass is made.

Q. There are stones in great numbers not yet mentioned: speaking of glass windows reminds me of them, for through a window I have sent a stone before now. What is the supposed history or use of those quantities of pebbles and gravel stones that seem to be scattered about everywhere, and are dug from every hole in the ground?

A. That is a very interesting inquiry, and one that has often occupied the attention of naturalists. Gravel and flint stones form indeed a very large portion of the ground beneath our feet, and the question is, Did they *grow* in the form in which we see them, or are they reduced to that size and shape by external causes? I think there is no doubt that they are the remains of larger and rougher portions of various

kinds of rock that have been detached by the ancient movements in nature to which we have referred, and have been rolled about for ages by the action of the sea, till they have acquired that oval or roundish figure which is so convenient for the hands of young gents, intent on ventilating apartments by breaking windows.

The use of stones of this kind in the soil at considerable depths, especially in the shape called gravel, is very great, because it is to earths of this kind, or thus separated, that we owe our gushing fountains and springs of water. Clay forms a basin for ponds and stagnant pools, which are of great utility, but gravel filters off the land floods; and, depositing them in reservoirs below, yields them again in sparkling purity from the skirts of the wood or the hill-side. The skirts of the wood remind me that I have approached the subject of the next chapter, which is "the vegetable kingdom." But let us recollect what man owes to earths and minerals. The processes of vegetation itself depend upon them. Buildings thus rise from the earth, and the domestic vessels constantly in hand are chiefly formed of earthy materials, and without the house and its pottery an Englishman would be scarcely better lodged or accommodated than a savage.

Q. Are there not very comfortable wooden houses and convenient wooden vessels, and would not iron supply the place of all others very well ?

A. Not very well, I think. The usefulness of iron I have noticed abundantly already, but it could not occupy the place of tiles and bricks, and drinking jugs, and glass windows, neither are wooden mugs and tumblers much to be desired. Wooden buildings, to be sure, may be made well, where timber is plentiful, but boarded roofs would not be very durable, nor wooden chimneys very safe. But the question proves the very thing I wish to impress in this general view of things I am taking; which is, the bounty, the munificence of the Creator in giving us all things, not only essential for use, but "richly to enjoy." The genius of man could not have been exhibited as it has been without the innumerable *extras* scattered around us:—He who imparted genius, has provided materials for its exercise.

CHAPTER VI.

VEGETABLES.

Let us—forgetting for a moment what we have hinted on the subject of lunar inhabitants—suppose for an instant, that there are in the moon plenty of men and women, and pigs and lobsters, and of everything that can squeak and crawl, but no plants—not a tree—a leaf—a blade of grass—in fact, all sorts of animals, but no vegetables, in which case we must also suppose that the creatures either live without eating, or eat one another. Conceive, again, that one of the wisest of us were to go there, and begin talking about the products of our planet, and were to say,—

"We, too, have multitudes of creatures that live and move on the surface of our earth, though they are not exactly like those lunar jumpers in all respects. Your pigs, I see, have only one eye a-piece, which is at the end of their nose, and they grunt through their ears. Your lobsters again have wings, and also tusks like an elephant; they have no shells, and live naturally in a boiled state, always smoking hot, with salt on their tails ready for use—all very

convenient. You have, besides, various animals, or gliding beings, of which I cannot conjecture the nature or uses. We, too, have myriads of animals of which you could form no idea if I were to describe them.

"But more than all this, we have in our creation things of a totally different nature from animals, and yet in many particulars they resemble them. They live and grow, and take food and drink, and attain enormous dimensions. All that their necessities require, is brought to them by the elements around them. They cannot advance an inch; have neither feet to walk, hands to hold, mouth to receive, nor stomach to digest their food. They are fond of light, yet have no eyes to behold it—of warmth, yet do not feel it. If buried in the earth they rise again—still remaining on the same spot; from the same sustenance these curious living things produce other things entirely unlike themselves: such are plants, and the fruits or seeds of plants."

I think Mr. Moonish, if that is his name, would be sure to say that he could not conceive of such things as these. A vegetable world must be incomprehensible to him, if unknown to his own little planet. And it is the fact, that with all our own knowledge and

experience of the thing, we cannot tell how it is that a plant exists or a blade of grass grows. One thing, however, we know very well, which is, that *we* could not exist without them. But the silent powers by which the wondrous operations of the world of plants are conducted have to this hour remained entirely hidden from our eyes.

Leaving those inquiries which are too deep for us, let us examine what we can understand. Let us regard the vegetable kingdom in respect of its apparent nature and services to man and beast. Notwithstanding all the use that could be made of the earths and metals, and of animal bodies as food to themselves and us—of which we shall say something in the next chapter—all would be unavailing without the aid of plants. We have food and physic, and fire and clothing, from the things that live and grow, but which know not that they exist. The animal substance that is so needful for us—it is but vegetable matter, transformed by a rapid process from the grass or grain of the field to the flesh, and blood, and bones, of our horses and cattle, and sheep and pigs, and birds of all sorts.

We will attend for a moment to the grasses—the graminaceous kinds, as they are called. Of the fertile plant that spreads over our meadows,

skirts the road-side, and even carpets the common and the wilderness, wherever it is possible to live; there are perhaps fifty different species, with more than as many names, which it will not answer our purpose to record. In the family of grasses, too, our botanists include not only the corn tribes of all sorts, but sedges and reeds—the bamboo and the sugar-cane—so that a walking-stick is but a straw of a stronger kind, a cane in the tutor's hand is a grass stalk rendered tough and pliable for its peculiar office!

Q. Those botanists and other learned naturalists tell us often, that certain very different things belong to the same tribe or family—pray what do they mean by it? Is it really true that a cat and a tiger, and a hay-stalk and a bamboo, are related to each other?—If I were old and wise enough, I think I should say that it is all nonsense.

A. Perhaps you will not say that it is *all* nonsense when your ideas have expanded and your brain is ripe. There are things even more unlike than those you have mentioned, which are classed together. What do you think of charcoal and the diamond? As to these classifications, some of them are obvious and reasonable enough, some are for the convenience

of our inquiries amongst the world of things contained in the vast museum of nature, and some are ridiculous and absurd. The words genus and species have been adopted to denote the larger and smaller classifications. Thus *Canis* is a genus of animals of which the dog, the wolf, and the jackal are species. Again *Felis* is a genus of which the lion, the tiger, and the cat are species; and I think you will, on paying attention to the peculiarities of these kinds, see that there is some reason in alleging relationship. But to return to plants.

There are such facts as resemblances amongst things that differ, or differences amongst things that resemble one another; these resemblances and these differences do in fact class and arrange themselves in the mind before we are aware of it, and a sort of relationship is there adjusted by us all. Thus, every one can see that a carrot is more like a parsnip than it is like a currant-tree; that a pea is more like a bean than an apple; and that a cherry blossom is more like an apple blossom than a horse-chestnut. Without some sort of classification the student would be lost in a wilderness of things, which he could never describe nor understand. But by the knowledge that one species has a certain form of flower, he has a know-

ledge of very many. For instance, there is a tribe of plants whose blossom leaves, or petals, are always in the form of a cross, and therefore called *Cruciferæ*—such as the common radish, mustard or cress, and of this family, consisting of 900 species, he has thus a sort of information regarding not merely the flower, but the constitution of the plants besides. As to the hay-stalk and the bamboo, they seem to have rather more to do with each other than *the first of August and Westminster Bridge*, and that is nearly as much as we can say.

This brings us back to the family of grasses. It is evident that as grass itself is the main food of flocks and herds, and as corn is the seed of plants of this kind, we should be deprived at once of our bread and meat if they were to cease amongst us,—in plain terms the nations must quickly perish.

Q. Would not other vegetables remain, and also fish?

A. It is true, there would be several roots and fruits and fish, which we are very glad of now, and should be desperately in want of then. Lettuce-leaves and herrings' gills would be in vast request, but all would not do. The cattle would first find out the want of things, for it would be of no use to offer a sheep a dish of

sprats, or a cow a cup of tea; pigs would grunt at coffee-berries, and calves would not suck cucumbers, nor could those animals be long maintained but with the graminiferous blade convenient for them, because grass is their natural food; it is the express provision of the Creator for the support of the creatures on which we constantly feed, and it is therefore almost literally as well as figuratively true, that "all flesh is grass."

We see, then, why it is that this precious plant is almost everywhere to be found, and is so determined to grow that it becomes an inveterate weed where we do not want it. The principle of life and increase is so incessantly active in the roots of common grass, that after the turf has been pared away—the surface bound hard for months in iron frost or even burnt up, it springs again in a very little time, and where it has its chance to strive with other plants for the mastery it commonly prevails and occupies the field: its green carpet it *will* spread in spite of all.

How beautiful—how bountiful is Nature—or rather, how infinitely wise and good is the Creator, thus to provide for man and beast,—to say, as it were, to the weeds, "You *may* grow;" but to the grass, "You *must* grow, and

though man and beast trample you down and continually despoil your verdure, you must forgive them—you must still feed and sustain them!" Let *us* then forgive this perpetual plant when we find it again and again shooting up its fine spiry blade, radiating its thrifty little leaves in all directions on our gravel-walks. Let us admire the marvellous vitality of so apparently tender an herb, which can exist and flourish in situations where other plants would perish for want of nourishment. If grass did not thus grow, thus survive—if it had not power to spread as it does, there would not be enough of it for the demands of men and animals.

It is true, however, that the grasses, numerous, varied, and invaluable as they are, do not constitute by any means our whole supply of vegetable food; but if they do supply what is called the staff of life, still they could not alone fulfil the beneficent designs of the Creator, who has been pleased to appoint us additional provisions, and to bestow *luxuries* upon us: the luxury of variety in our common food and of exquisite flavours in other kinds. So we have roots and fruits. Amongst the former, the potato is a surprising instance of the ways of HIM whose thoughts are not as our thoughts.

This lowly plant, whose treasures are hidden in the darkness of the soil, was placed by Providence originally in the seclusion of the Western World. There its vast powers of production and nutriment lay unsuspected for ages, being a store kept in reserve for the time when the enormous wants of the human family, overspreading the Old World, should demand new means of subsistence. We have been lately taught the value of the potato by the want of it.

Scarcely more than a hundred years have passed, since this plant was regarded as a mere garden curiosity or table delicacy. Now it has become the food of nations, and the kindly root which the American savage abandoned to animals more sagacious than himself, has under the care and culture of civilized man yielded a supply of sustenance which has stayed the advance of famine over half the globe.

The roots of importance next to potatoes are turnips, and beet-root, or mangel-wurzel, which form an invaluable supply for cattle in the winter months. Then for man, chiefly as garden produce, there is also the small white turnip, the onion, the carrot, and parsnip; and to flavour his broth, when flesh is scanty, there are the pot-herbs, whose leaves impart so va-

rious and potent a relish, that the presence or absence of the lump of meat can scarcely be ascertained. Those, accompanied by the onion, are a special gift to the poor man, who is happy indeed when his good wife is such an excellent homely cook, that she understands and can make full use of these luxuries of the cottage garden. When corn-meal as well as meat may run short, then they have peas and beans to thicken up the mess.

As for fruits, the produce of trees and shrubs, it is quite impossible for us to find room even for their names. Here we have the confectionary of Nature. Flavour, adapted to the caprice of appetite, is by the fruit-bearing tree varied and enriched beyond all description. In fruits, the acids and the sweets, with the specific taste of each kind, are deliciously combined; so that they cannot be separated or distinguished, or imitated at all. They are, according to the soil and the power of the sun, ripened and elaborated to the last degree of luscious richness or fragrant delicacy, so as not to admit any help from art; whilst some are left, as it were, half-finished by Nature, that man may try his skill upon them. The rhubarb stalk and many kinds of apples are of this sort. They are ripened by cookery,

and thus also is the luxury of change in diet increased.

But amongst fruits there is none so celebrated as the grape. "*The pure blood of the grape*" is a Scriptural expression, implying the invigorating excellence of the juice, and it is remarkable that the best gifts of the Gospel are represented by the produce of the vine, and by the vine itself.

You see, then, that not only substantial nourishment is provided in the vegetable world, supplying the needful materials for the support of life, but the bounties of variety and distinct delicious flavours have been added, and the juices of plants have been endowed with special qualities, causing them to cheer and recreate the spirits, which are saddened by toil or sorrow, or, as the Scripture says, to make glad man's heart.

Now what more can you think of to give a further delightful quality to vegetable productions? To all that we have mentioned *fragrance* must be added; the richest fruits are for the most part rich in odours; but when we talk of these we are more especially reminded of the gay world of flowers. So wide is this world, that we can scarcely glance at it—we can only stay a moment to inhale the perfume,

and survey the splendours, of Nature's garden; but let us not forget to consider WHO has been at work here,—who gave to each flower its form, its colours, its perfume! Oh, let us call to mind what God has done for man—how He has provided for and indulged him! The general hue of the vegetable leaf is green—exactly the colour that relieves and soothes the eye. Other colours astonish by their almost fiery radiance: in tropical countries the most splendid of them seem, as it were, to flame with an effulgence of their own, but for the sweet repose of the eye, there is nothing so congenial as the verdure of our spreading meads and dancing foliage.

Remember, however, that all we have noticed might have been reversed. The most needful food *might* have been as nauseous to the palate as needful physic, or we might have had no palate—no sense of taste at all; and thus, insipid food—a sort of prison allowance—would have been the only fare for the monarch on the throne.

Nor are those favours withdrawn from wicked and ungrateful persons, and such we all are to some extent, so that we may truly say, "God has not dealt with us after our sins, nor rewarded us according to our trans-

gressions." No. The infirmities, the diseases of man, many of them the consequences of those transgressions of intemperance in the use of the gifts bestowed upon him, are cared for, and the herb that is useless as food—repugnant to the taste, becomes the medicine to remove his disease, or assuage his pain.

A word or two now as to vegetable clothing. In the earliest ages of the world, it is evident that animals must have supplied the covering of which man stood in need, and the poor beast, whether he could or could not spare it, must resign his fleece, or his hide,—a far more serious transaction,—to his imperious customer, man. And this to a great extent has continued to be the case, and will, no doubt, so long as the animal can produce that which man requires.

But as human wants, and skill and industry increased, the world of plants was examined, and made to yield its materials for clothing. It appears, on unrolling the wrappers in which Egyptian mummies were enclosed, (and those are the most ancient specimens of human art that are in existence,) that these wrappers were spun and woven from vegetable substances. The Scriptures also make frequent mention of fine linen. Still it does not appear that this

formed the garments of the people generally; nor does it now, for the cotton plant has to a great extent superseded not only linen, but wool also for apparel. British skill has fixed on this flimsy down, apparently so little adapted for the purpose, and has, by its millions of spinning reels and wondrous looms, produced the fabric called calico and cotton goods in general for dresses, all of great durability, and when required, of beautiful delicacy and whiteness; or if otherwise designed, it receives the impress of the artist's fancy, and is printed to suit, if possible, all pockets and every eye.

There is still another vegetable material which our ancestors never thought of using as a covering for their bodies, reserving it for their houses, but with which the most delicate of the moderns roof in their brains. I mean straw. By the happy device of some original thinker, this feeble stalk was first platted whole, and made into bonnets of an inferior sort; but it is now split, cleaned, bleached, or dyed, so as to form the most elegant, cheap, and acceptable covering for the head that has been ever used by females. There is a lightness, and at the same time a firmness and cleanliness in the fabric of plaited straw, that will always recommend it, combined also with a cheapness

that places the same material on a hay-stack or a barn!

Talk of barns—now we come to buildings. Man having procured an abundance of corn and other food for future use, requires store-houses to receive "the goods laid up for many years," and not only barns but dwellings wherein he may comfortably enjoy these fruits of his labour and his skill. "O Dame Nature, what shall we do? We have obtained all these precious fruits of the earth from your bounty, but you have not provided us with covered dwellings wherein to place in security either them or ourselves. You have indeed constructed a few dens and caverns, but they are already occupied by growling tenants who do not advertise for lodgers!"

"Well, Man," replies the dame, "you are not forgotten in this respect; you have no need to go through the woods wet and shivering, and envying the poor beasts their dismal habitations. Lift up your eyes to the tall leafy pillars which surround you. Take as many as you please—rive and rend them, and make lightsome dwellings to your liking."

And has not man taken the hint? The lofty monarchs of the wood have fallen all around, that they may rise again at his bidding

as stately dwellings. The tropics yield the deep umbrage of their mahogany forests, and the snowy wastes of the North give up the tall dark pine, and the woods of old England their ancient oaks and elms, that man may not remain unhoused or uncomfortable.

But timber supplies other fabrics of the first importance to human civilization, and the intercourse of nations. Man observes that wood floats upon the flood, and he constructs edifices to glide on the green wave from shore to shore. Navigation has become the evidence and the means of the advance of man from barbarian sloth and ignorance to civilized activity and science. The seaman, blest with a faithful guide, treads with fearless foot the plank which, borne on the billow's crest, tosses him onward towards distant climes; and the British heart of oak, after having thus traversed the circling world of waters, returns to its native shores laden with the treasures of every sunny land.

Thus we have seen that the vegetable world ministers to the necessities, the luxuries, and the intellectual activities of man. The root, the leaf, the seed, the juicy fruit, the medicinal sap—the sturdy substance of the timbered forests—all have evidently been created with

the qualities needful for him, and have been placed at his disposal; whilst myriads of inferior beings, from the tiny insect that pierces the leaf with its invisible tooth, to the mighty elephant who uproots the oak-tree in his path, find also their sustenance from the same perpetual source of enjoyment and supply.

Q. Suppose, now, that such a thing could happen, as that every particle of vegetable substance should be destroyed, or somehow removed from the earth—every tree and plant forbidden henceforth to grow; what would become of us all—how long would men and animals last after that?

A. That question will certainly help us to form an idea of the value of plants in our creation. If every particle derived from them were suddenly annihilated, the inquiry would be first, how long would it take for animals to eat one another; how long could most of them live without food of any kind? Again, which of all the tribes of feeders would continue the longest, and partake of the last meal?

Now with regard to the innumerable tribes of animals whose food is of a vegetable kind, and which could be nothing else, we may say that the strongest of them could not linger

more than a few days. A fine time it would be then for the regular flesh-devourers during another few days; perhaps we may say a few weeks for those that could live on carrion. As for man, I consider that the most unbelieving would soon make up his mind for the end of all things. Cattle and pigs, and sheep, and perhaps horses too, would be put in pickle until rivers flowed with the brine. The ocean to be sure would be full of fish, but man would have neither boat nor plank, net or line wherewith to procure a fish. So man might fight awhile with the wolf and the vulture for a portion of their revolting meal; but all would soon be over with him. The beast of prey would for a short time survive him, and the earth in a brief month or two would be a desolate habitation, a vast silent cemetery of the unburied dead! Oh, let us wake from this horrid dream, and breathe again, and bless our eyes by looking on the broad expanse of verdure that is still before us!

CHAPTER VII.

ANIMALS.

Man is an animal, strictly speaking, but not in the common acceptation of the term, nor in the sense in which I now use it. We shall consider him presently, but shall first notice the inferior or irrational creatures, — so we call them.

The science of Animated Nature is called Zoology, and it may seem very easy at first to separate this study from that of Botany. Everybody can see the difference between a cow and a cabbage, or between a caterpillar and the leaf on which it feeds. It is, however, the fact, that there are animals so like plants, and plants so like animals, that eminent naturalists scarcely know how to distinguish one from another. The kinds I now mean are called zoophytes; and if I were to describe them as well as they could be described, you would understand the distinction between animal and vegetable little better than you do now.

The fact is, there are substances consisting of fibres or fluids of so doubtful a kind, that

the curious in these matters remain ignorant and unsatisfied after all their trouble. Not being able to decide, after the nicest examination, they will pour acids upon, or burn these questionable substances, in order to know whether it is animal or vegetable, by the colour of the liquid or the smell of the smoke!

Then as to any *limits to littleness* in the animal world, these we cannot discern. The microscope discovers millions of living creatures (so they seem) in a single drop of water; and some tell us that the air we breathe, as well as the water and the earth—nay, that the entire bodies of plants and animals, are peopled with, or composed of, living atoms. The animals thus discovered by the microscope, are generally called *animalcules*, or now very frequently *infusoria*. Some of these have neither head nor tail that can be distinguished; it is evident, however, that they can move. Others have head and eyes, mouth and stomach, limbs and legs, as duly as ourselves, beside other appendages which we could find no use for; and though a million of these creatures could repose conveniently under the shadow of a grain of sand, they appear to have, in some cases, innumerable legs, bunches of eyes, and awful accompaniments, which make one glad that their dimensions are not those of

the elephant or the horse. It is known that the coral reefs, which have become islands of vast extent, are composed of minute animals and their constructed dwellings; and that solid terrestrial rocks are formed of the shells of creatures far too small to be discerned by the unassisted eye.

But of the animals that we can see well enough without any glasses at all, the kinds are so many, that we cannot possibly find room for a list of them here; and it is very difficult to class the world of living creatures so as to obtain even a glimpse of the whole. We all know, however, that animals in general consist of five principal and widely-differing kinds; namely, Beasts, Birds, Fishes, Reptiles, and Insects. Of these last, it is said that there are more species than of all the others put together.

It seems, however, that insects contribute less than the others to the use of man, and they are only to a very small extent under his dominion. Insects live, as it appears, chiefly on their own account, and have their portion and natural inheritance amongst the tenants of the globe as free occupiers, enjoying with little interruption the existence God has appointed them. Many of these creatures are arrayed in the utmost splendours of colouring; and, floating on the indefati-

gable wing, they are borne by the breeze, or hover in the sunbeam, at their pleasure.

But insects, even when gorgeously arrayed, are, for the most part, repulsive to man, and would be objects of the most hideous and fearful appearance, perfectly intolerable as sharers in our sunshine, if their size were not as diminutive as it is. They are commonly armed with active weapons of offence; and if an ant, a gnat, and others that now puncture the skin with sensible pain, were as big as dogs or donkeys, there would be no living in their company. As it is, a swarm of bees will kill a horse; and the mosquitoes, though scarcely larger than a gnat, will torment and goad a man almost to madness. The only remedy against these hostile swarms is, for persons to enclose themselves in muslin curtains, or encircle their resting-place with fire or smoke.

We are thus taught very plainly and repeatedly, that the earth, full as we see it is of things convenient for us, is not made entirely for man, but that other beings have their home here also, and are allowed or appointed to torment him not a little. Thus myriads of beings float in the air we breathe, glide in the waters, infest us in various ways, and sometimes fiercely incommode us.

Q. Perhaps the insects, thinking the world is made for them, complain of man as the incommoding intruder.

A. They may well do so, if they consider that we tread thousands of them to death with our feet, and destroy them in other ways by myriads.

We must not forget, however, that we are indebted to some classes of insects for productions of considerable value. The bee and the silk-worm supply, the one a delicious food and an elegant lustre, and the other a splendid vestment: you know that I refer to honey, wax, and silk. Insects of certain kinds are used extensively in medicine and the arts; but, besides this, there are millions of those creatures, always in fact at work in our behalf, by devouring decayed substances of a noxious kind, and by consuming swarms of other insects which might otherwise devour us.

We come now to another class of animals which intrude somewhat more disagreeably than insects on the presence of man. Reptiles we should rather have been without, and should, I dare say, have forbidden them our world altogether if we could. Man, however, was not consulted, and so here they are—frogs and toads, and snakes of all sorts, and scorpions, and crocodiles, and lizards, and efts, and turtles and tortoises.

Q. Is it not very strange that tortoises, which have shells, and toads, that have no shells; that creatures that have four legs, and snakes that have no legs at all, should all be called by the same name—reptiles: what can that disagreeable word mean?

A. It means, in fact, nothing that is peculiar to this class of animals. It comes from the Latin, *repo*, I creep; but as a spider creeps, and an earwig creeps, those insects might just as well be called reptiles. They are, however, otherwise distinguished than by the nature of their progression. They are very different from other creatures in many respects. In the first place, they are *cold-blooded;* that is, their blood is no warmer than the air or water that surrounds them. If you wish to prove the coldness of a toad compared with the human body, take one in your hand, you will find that it feels like dead flesh!

In the next place, reptiles are almost all amphibious; they are internally constructed, so as to inhabit land or water with equal convenience. Being thus cold-blooded, they are in general much more torpid than other animals. They pass a greater portion of their time in sleep, which is of so sound a kind, that it is often difficult to tell whether they are alive or dead. Their move-

ments are commonly slow, and confined to swimming or crawling: their digestion is slow too, and a single meal will sometimes serve them for six months. The brain of a reptile is very small indeed in proportion to that of other animals; nor does even this small quantity seem by any means essential to them, since they can swim and crawl without it! In fact, the limbs seem to be all equally charged with such life as they have, so that reptiles will continue to move after they have lost head, and heart, and intestines!

Reptiles being more disgusting to us than insects, have fortunately a retiring disposition; they seek not to obtrude their unsightliness upon us. The poor toad swells not with pride, but with terror, when we draw near him, and the frog palpitates and blows out his cheeks with fear when suddenly uncovered in the grass; whilst the newt, or little lizard in the cellar, lifts up his head and stares with all his eyes when the candle-bearer approaches, equally disturbed at the luminary and at the being who brings it in. I believe these poor creatures are for the most part harmless—their sheer ugliness being their protection. They probably have a good deal of pastime, enjoyment, and cool complacency.

But there is a class of reptiles by which we

are inspired with a shuddering disgust, mingled with very reasonable fear. I mean the serpent tribe. Of these, though many are harmless, some are the most dangerous and terrible creatures that inhabit the earth. The vipers of this country inflict envenomed wounds of a very painful and threatening kind, but such are as mere gnat-bites compared with those produced by the attack of tropical serpents. Of these, the *cobra di capello*, or hooded snake, the rattle-snake, and the boa-constrictor, are most awful creatures, armed with the sure weapons of death against any who fall in their way.

The boa-constrictor is an enormous snake, a native of South America, whose method of destruction is to coil itself round its victims, and when thus fully enclosed within its spiral folds, it crushes the miserable animal into a soft, shapeless mass, which it then swallows at a mouthful.

As to serpents generally, I believe that man has not ceased to feel that embittered dislike which was originally promised: you know where to look for an account of this. The science of reptiles is called Erpetology, under which word in modern works you will find the subject treated. I must mention that there is one at least of the reptile class, the turtle, which is not only

eatable, but is regarded as the greatest delicacy by those who are eminent for their knowledge of that which it is good to sit down to. Then, again, frogs are very much enjoyed in France, and I believe that snakes are devoured by men in some countries.

The largest animals, as far as we know, that have ever existed on the earth, have been reptiles of the lizard kind. Of these geologists have discovered the imbedded bones, which must have belonged to animals nearly 100 feet in length. It appears, too, that there were flying lizards existing at the same distant period. The race of these monsters has been extinct since the memory of man has recorded things. Some reptiles of the present period have a sort of gills, and very much resemble the next order of creatures we must notice—I mean

FISHES.

The science which treats of these is called Ichthyology. The first peculiarity of fishes is, that they breathe water by means of gills. You know what curious red things these are, almost resembling combs, and inserted in a large cavity on each side of the head. The water taken in by the mouth of the fish, instead of being swallowed, passes through the fine

interstices of the gills, and escapes by the apertures. The air, which is always mixed up with water, is separated by this wonderful apparatus, and is then made to act upon the blood for the life of the animal.

The blood in fishes is propelled without the aid of such a heart as warm-blooded creatures possess. As fishes are made to be suspended in water with very little effort of their own, they require little more than to be able to move therein by the means of a slight muscular power, and this is accomplished by the fins. Some have an air-bladder to enable them to rise or fall at pleasure; whilst others, as the whale, have the tail fin placed horizontally, by which they can plunge or rise with great rapidity.

Whales are, you know, enormous animals inhabiting the sea, but yet they are not reckoned properly amongst the fishes, because, in the first place, they are warm-blooded animals like ourselves; and, secondly, they suckle their young: for this latter reason they belong to the order of Mammals, of which we shall speak presently. The seal, too, is a creature of this kind.

We have remarked, that to the tribes of insects and reptiles, man is but little indebted

comparatively. They are for the most part intruders on his peace and comfort, and many of them are deadly enemies. The case is wholly different with regard to fishes. They supply man with wholesome and delicious food in vast abundance, and yet annoy him not; and, by a merciful arrangement of Nature, those which are most fitted for man's use attend his demands from shore to shore. Pilchards, herrings, mackerel, and salmon, are migratory, and wait upon us at regular seasons in shoals that extend, some of them, for miles.

In all ages of the world, fish appear to have been a favourite part of man's subsistence; and there have been, and are, nations residing on wild coasts, or scattered islands, which have scarcely any other food than that which the sea affords them. Britain, as we all know, is largely supplied with the finest fish in all the world. Our salmon, mackerel, soles, and oysters, are luxuries in abundance; and the fisheries not only find employment for thousands of families, but food also for tens of thousands.

There is certainly no division of creation around us, in which man takes his benefit so directly from the hand of Nature. The shoals of the ocean wait not on man to receive any thing at his hand: they acknowledge not his

sway, and admit no kind of interference with their habits—they owe him no thanks, yet they flock gaily round his coasts, and almost offer their glittering bodies to his grasp.

Nature has not forgotten her ornaments, whilst displaying her wonders in the ocean, and has imparted to many—the mackerel for instance—the most delicate pencillings and splendid hues; and in the rude shell of the oyster she has encased her choicest gems to deck the brows of queens.

It seems that the finny tribes, having very little exertion to make for the purposes of existence, are only gifted with the slender portion of mind that is needful for them. Their few but commanding instincts readily guide them to all that they require; they have no expedients to resort to, as their food floats in the same element with themselves, and the laws of their condition are very easily complied with. Fishes are therefore apparently below reptiles, and far below insects, in the scale of intelligence: insects, indeed, surpass many quadrupeds in the faculties whereby they complete their complex operations. The ant, the bee, the wasp, the spider, excel perhaps all animals but the beaver in their constructive powers; but the fish, always at home, always reposing softly, subject to no

vicissitudes of weather, has scarcely any need of *brains*, and accordingly it has very few.

Q. I wonder what the fish thought of Noah's ark?

A. Most likely they thought it an enormous dead fish, but one of which they found it very difficult to make a meal.

BIRDS.

The study of these animals is called Ornithology. And now we rise from the waters, and the miry pools, and from the earth itself, and accompany the feathered tribes awhile.

These are creatures very different from any we have considered, yet resembling them in some points. Like the chief tribes of insects, birds are, with few exceptions, formed for flight; like them too, and most reptiles and fishes, they are oviparous—produced from eggs; but then, *un*like all those, they have warm blood, which circulates by means of a heart like our own; and they are provided with a covering, which is almost always of a very beautiful kind, and which does not at all resemble that of any other animals.

Feathers are a distinct contrivance for particular purposes. You know they are required to retain heat, to exclude wet, to assist flight, to

be as light as possible, and to present the least resistance to the progress of the bird through the air. Feathers besides are of such a nature, that scarcely any substance with which they come in contact adheres to them: if birds were much soiled by earth or soddened by water, their weight would be too much increased for flight; the water-fowl would be chilled and paralyzed if his plumage absorbed or retained the fluid in which so much of his life is spent.

Birds resemble man himself, in being placed by Nature upon two legs, and in having musical organs; and in some species, those capable of articulating words to a certain extent are added. It does not seem, however, that the birds which have this faculty, approach nearer in intellect to man than the dumb creatures that cannot mock him. You may teach a parrot to repeat words and sentences, but you cannot converse with him, nor can he make you understand his natural speech. I am not sure, however, that a parrot has not a slight sense of the comic, and more than a little touch of vanity, whilst exercising his talents.

We have noticed the splendours in which Nature has arrayed many of the orders of animals before mentioned. But I think there is nothing that equals the gorgeous plumage of

birds. In the peacock, there is an apparatus expressly formed for the display of feathered magnificence; whilst the bird of paradise and others, natives of the tropics, seem like flaming meteors as they pass. But there is scarcely a British bird, however common, whose plumage is not very beautiful when attentively examined.

Now, as to the uses of this order of creatures to man, it cannot certainly be said that they supply us with as large an amount of food as fishes; yet the supply is very great and of a delightful kind. Let us see—eggs at breakfast; chicken at lunch; goose or duck, game or turkey, at dinner. These are something, for those who can afford them; whilst the wild-fowl of some countries form an important article of diet to the natives. In England, the people in general do not derive much of their subsistence from the feathered tribes.

We must not, however, forget another kind of support derived by us from birds. In health, in sickness, at the point of death, on their soft plumage we repose—some of us during how many hours out of the twenty-four? I have known those who have slept fourteen hours! so do not the birds themselves—not even geese.

Feather-beds are the indispensable furniture

of the cottage and the palace. It has been found by long experience, that there is no material in nature so light, so elastic, so cleanly, as the plumage of birds, for the purposes of a bed; none which retains those qualities for so great a length of time. Old housewives will tell you, that they have had the same feather-beds in use for fifty years, and still their children and grand-children will be expecting to inherit them.

But can I forget one thing more? Between my fingers and thumb at this moment, there is, pursuing its dotting course, the scribbling instrument plucked from the wing of some reluctant goose.

Q. Do not authors use steel pens?

A. If they could be constantly supplied with good pens from quills, I believe they would use no others; steel pens will not deliver the ink, page after page: no—geese and authorship are still connected! From the mere pinions of a bird have proceeded nearly all the works, great and little, and wise and unwise, that have been written.

CHAPTER VIII.

ANIMALS.

And now we must take a view of a vast and most important division of the animal world. Neither science nor common speech have invented a term which comprehends exactly the class of creatures we refer to. There is, to be sure, the word Mammal; but whales are mammals, and so are all *the people* of Wales! Then there is the frequent word quadruped; but a toad is a quadruped, and so, in a sort of sense, is a four-legged stool. The name of beast has in a very rough way been applied—as beasts, birds, and fishes; but it seems rather odd to call a cat a beast, and a mouse a beast.

Well, never mind. We must do as well as we can by explaining. Hear what the great books say: "All vertebrate animals—that is, all having a back-bone or spine, with four extremities fitted for terrestrial progression, were formerly called quadrupeds; reptiles being distinguished, as oviparous, from the hairy, warm-blooded, four-footed mammals; but as there are

both reptiles and mammals, which have only two legs a-piece, the term quadruped is no longer used in a strict zoological sense."

Well, again—never mind, I say; the word will do very well for us, restricted and explained as has been stated: we mean by quadrupeds, warm-blooded animals having four feet. This, you see, not only excludes reptiles, but also chairs, tables, and bedsteads. It is some comfort to find ourselves out of the way of the crawling acquaintances we have already dismissed. We shall now be in the company of noble lions, sagacious elephants, sprightly horses, useful donkeys, and so on: creatures all of a respectable cast, and of a nature corresponding in many respects with that of man.

There is, indeed, in almost all this order of animals, not only an internal structure resembling our own, but a brain, and organs of sense, and limbs, much more like those of the human frame than other orders possess; and consequently these superior creatures have mental faculties—for such we must call them—corresponding in degree to some extent. The elephant, the horse, the dog, the cat, have not only faculties but mental feelings—*sentiments* we might call them, resembling those of human nature. Sensibility, gratitude, attachment, joy,

and grief, they undoubtedly exhibit. They have not only instinct, the blind governing power of their nature, but they have a discretional judgment, and a sort of reasoning ability, which enables domestic animals to suit themselves to artificial circumstances.

Animals of the kind mentioned succeed in letting us know, without speech, that they are aware of our superiority. They accept our aid as it seems thankfully. Many animals understand not a little even of our speech, though they cannot imitate it. The shepherd does not urge his dog by a cudgel—he *tells* him what to do; and ploughmen and waggoners, in like manner, direct their horses by word of mouth.

In fact, animals, civilized as we may say to this degree, are not only the fellow-workers, but the companions of man. Sharing his labours, enduring with their superior strength toils to which he is unequal, they become, as it were, apprenticed to his business, and faithfully do they perform even the severe tasks appointed them. Pity it is that man should so often forget his boasted reason and his humanity together, and exact of these invaluable creatures more than is right or just—more than even their great strength, and their patient willingness, can without suffering, accomplish. The labouring

horse is put to work beyond his fair powers: he is denied the share of rest and food to which he is justly entitled: he is not treated with that righteous consideration which Nature intended, and of which she reminds man to his cost, when the valuable animal sinks beneath his load, and perishes at his feet.

Of the quadrupeds, in general, there are only a few species that render man this sort of service, or that minister directly to his wants; but these, the useful kinds, are so peculiarly adapted to those wants, that they are quite sufficient. It is impossible for man to require in a beast of labour qualities superior to those of the horse. Man does not wish to eat him; he needs the horse's strength and swiftness,—but these he might continue to want and wish for in vain, if that beautiful animal had not docility—if he had not a readiness to enter into the service of man, and a constitution and habits to be improved under his care.

The horse performs his part with a generous cheerfulness—enters into his rider's contests with ardour—will bear him round the race-course, or to or from the field of battle, with all the vehement effort which he could exert if his own life were to be saved instead of lost by the effort.

Q. Do you really think that the poor horse knows when it is a race or a battle?

A. It appears as if he did, by the elastic spirit and impatience of delay with which he engages in them. Full credit for this sort of understanding is given to the noble horse in the beautiful book of Job. Read there the poetical account of him, where the high endowments of the animal are set forth, and in language that had never been equalled nor approached by other writers.

And now we must descend, and, leaving the back of the stately charger, if indeed we have had courage to mount him, we must notice his humble relative, the ass.

Q. Relative? Is the horse related to the ass?

A. Yes, we may say so; and if you consider, you will find that there is reason for classing the horse and the ass in the same family. The mouth, the feet, the form and set of the head, the food, the internal structure, and certain qualifications as a beast of labour,—all justify us in recognising the ass at least as *a poor relation* of the horse. The ass even excels the horse in patience, in hardiness, in the power of subsisting and retaining his strength on inferior food, and he is more sure

in his step. His small feet scarcely ever stumble, and in hot or cold countries he bears extremes of weather without injury or implied complaint. The ass must not be despised, at least by those who wish to look at things, not with prejudice but with judgment. The ass is the poor man's great helper. Toiling along the rough road with the shattered vehicle, he brings the treasures of the cottage-garden to the market; there he waits patiently without a meal, and on his return he is happy enough to be discharged, that he may find one where he can. This animal has few diseases, and does not die for a trifling cause. The remark has often been made, that the dead body of an ass is a rare spectacle. I know not the reason of this, but I can state as a fact that I have seen but two deceased donkeys in all my life!

The camel is indeed a nobler animal, but more limited as to the range of country it inhabits. In England this creature is only known as a curiosity, sometimes exhibited in our streets. The camel presents us with one of those peculiar instances of providential care and kindness which ought to call forth the special gratitude of man. The horse, with all his powers, would be of no use where the yielding sand of the desert would not support his foot, and where

the water he so continually needs is not to be obtained but at long intervals. Neither is the horse, strong as he is, able to sustain the weight under which the camel plods on patiently with little distress.

This invaluable animal, persevering and gentle as he is strong, has a foot so long and broad, that it does not sink far in the dry ocean on which he is appointed to labour. He will travel at the rate of about three miles an hour for about sixteen hours, without once stopping, and with a burden of half a ton upon his back. Now this is nearly fifty miles in a day, and thus loaded, it is the greatest amount of labour that man can obtain of any animal.

But this surprising capability of exertion would still be of little use if the poor beast could not endure abstinence for a very long time;—if the camel could not wait till he could reach the far-distant supply of water, the deserts could not be crossed by him or any other toiling labourer. This difficulty, therefore, is provided against. The camel has within him a sort of water-stomach, capable of containing a very large supply of drink beyond that which he needs for his immediate use; so that when once fully replenished, he is able to continue and to work on without a fresh draught during a period that

would kill another animal. Sometimes, however, this reservoir is fatal to the poor camel, as, in a case of extreme necessity, his master kills him to allay his own thirst with the supply.

And now for SHEEP and OXEN. Perhaps we may say that these afford, upon the whole, the greater part of his animal food and clothing to civilized man. Aided by human care, they will live and thrive under great extremes and vicissitudes of climate, so that the riches of eastern and of northern nations have consisted of their flocks and herds. Oxen were anciently used much in field labour, and they are so still in some countries; but it is to their bodily substance, and that of sheep, that we chiefly look for what we need.

There is, in fact, scarcely an atom of the bodies of these animals but is of some use to man. They seem to be composed of materials, and put together, on purpose for us. But it is no small advantage to them, as well as to ourselves, that they can yield us much before we deprive them of life. You will see, in a moment, that I refer to milk and wool. Here we have a rich nutriment and a portion of clothing rendered in constant abundance, without any injurious loss to the animal at all: on the con-

trary, they are relieved by that which we take of those commodities. So we have milk, cream, butter and cheese, and woollen clothing, constantly provided by the living animals.

I believe I need not say much to remind my readers of the value to our tables of beef and mutton, veal and lamb; and, be it remembered, that not only the flesh, but the bones, and the skin, and the blood, and intestines, the hoofs and the horns, all have their use. And with regard to that which is due to the creatures themselves, they also have their natural rights to advantages, in consideration of the value they yield; and these are rendered to them. The beast, even when it has surrendered its body to the knife, has been a decided gainer by man: it has gained its constant and abundant food, its shelter and protection against every foe, and its very existence—as millions of them are reared, because they are of service to man, which otherwise would never have had a being.

Again, there is no doubt that animals thus pastured and fed, and secured from every danger, have all the enjoyments of which their nature is capable; we only want their bodies when dead, and we may as well have them as the crows. If cruel men were ever so much disposed to torment or starve these creatures, they

cannot do so without injury to themselves—without losing their beef and mutton in proportion. Our flocks and herds, therefore, have a fine time of it.

Q. But does not the dreadful death spoil it all? Who would like to be fed and fattened for the sake of being killed?

A. It would be entirely a different affair in our case; and if these animals had a constant knowledge and dread of it, so it would be in theirs. But the knife cannot be so dreadful a death as the natural one which must overtake them by old age, decrepitude, and want, or the fangs of beasts of prey. No. It is expressly arranged by Providence, that the account between man and beast shall show a gain to both.

But sheep and oxen are not the only quadrupeds that supply our table. There is another class of creatures to which we are indebted for a large portion of our animal food,—I mean, the noisy generation of grunting hogs and squeaking piggies. Swine are a peculiar race, very little like other animals. They are nearly omnivorous—devouring almost everything that is eatable. They would willingly take their food with us, and they have fewer likes and dislikes. Tea too strong, and soup too hot, would possibly

cause a twist of the nose and an expression of discontent; but as for buttered muffins, sugared strawberries, mutton-chops, plum-pudding, and even pork-pies—these grunters would take them readily with all their faults. Cows, cats, dogs, and donkeys, would be more difficult to please.

The readiness with which the flesh of swine takes salt, and the length of time that it continues good in a cured state, render it extremely valuable as store provisions. The habits of the animal are just such as to fit it for the poor man's possession; a pig will thrive in a solitary condition, and will eat up, and fatten upon, such refuse as others would not touch. The sundry leavings of the rich man's kitchen and scullery, and the poor man's garden, find in the hog a beneficial customer, always ready for business. Pork and bacon form the best relish of the peasant's table. There are thousands of the labouring classes who scarcely taste any other meat from year to year; it is evident, therefore, that Providence considered the poor in sending them this useful animal.

Having supplied us with food, there is little more that piggy can do for us. There is an old proverb truly representing the ungainful and noisy results of an endeavour, even by a determined operator, to shear the scanty apparel of

the living hog; and when his hide, as well as his bristles, are taken from him, they are, in England at least, of small value.

Pigs, though rather unrefined in their manners, are not to be despised on the score of intellect. They have a great deal of sagacity and cunning, which have been made to perform wonders, and have a capability of attainment which was never yet heard of in sheep and oxen. They are teazed by bad weather, and have a forecast of it, and will squeak tumultuously in a high wind, and before it comes.

Did it ever strike you, that there is a sort of resemblance between a hog and an elephant? It has me. The pig, to be sure, has not a trunk like the elephant, but he has a snout reaching far beyond his lower jaw, and which seems to say—"To be continued." The wild boar has protruding tusks, large dusky ears, scanty hairs, a thickened skin, a small whisking tail; and pigs in general have a sort of knowing look, a squint at possibilities, which show a respectable likeness, at all events.

I have said nothing of other quadrupeds very serviceable to man, such as deer and goats, hares and rabbits, and a multitude beside, because this is not a book of general and descriptive natural history, but only one in which

certain principal things can be pointed out. For this reason I cannot notice the hostile, mischievous, or indifferent kinds: they are too numerous to be thought of just now. Indeed, we must have had a Noah's ark to contain them all.

And, now, two things strike me again in glancing at the whole animal kingdom: one is, as we have said before, that man has been therein specially considered,—abundantly and luxuriously provided for as a resident on the earth; and another is, that the great object of animal life and enjoyment has also been kept constantly in view by the Creator.

Millions of millions of beings have been made to enjoy existence; their food has been provided, their day of happiness secured: they have their portion as well as man.

But there is a curious class of beings, supposed by some to be intermediate between man and brutes, which I must now attend to. We must not forget the grimacing tribes of apes and monkeys!

Q. Are they indeed wild men, as some say, only a little lower than the savages?

A. They are not men at all. There is nothing about them to bring them nearer to the human race than other animals. In intellect they are

below many brutes. Do not frighten yourself by thinking that you are, or ever can be, one of their number. If you were to go mad, or become an idiot, you would not descend to their level. The nearest that people can come to it, is, when they wilfully play the fool. Apes and monkeys do, in a sort of comical way, represent rather a numerous class of nonsensical persons amongst us, and they copy idle tricks from any; still, they are not men or boys — they are monkeys: they are, indeed, grinning mockers of the majesty of man; and perhaps they were sent amongst us to burlesque our dignity, and mortify our pride a little.

Naturalists have given the name of *Simia*, or flat-nosed, to these creatures; and they reckon up more than thirty species of them. They are all mischievous, ludicrous, and filthy: it is honouring them too much almost to state farther, that they are dishonest;—yet, like many of their superiors in rank, they are sad thieves. Some of the larger sort are highway robbers, and plunder people of their provisions; they, however, do not commit forgery nor turn impostors.

These curious creatures are undoubtedly very amusing and comical in their ways, yet there is not the least reason to think that they understand such a thing as fun at all. I believe

that the imitative principle is a mere instinct with them, in the exercise of which they are as serious, as a donkey eating a pine-apple out of a silver dish. They copy the actions of men, but without making the smallest advance towards their own improvement. In their native woods, they only exist upon such fruits and insects as come in their way. They have no idea of acting in society, and they have not the intellect of a bee or an ant.

We may, however, learn something from this class of beings, and see how possible it is to be very funny, very busy about trifles, and yet to be extremely ridiculous, horridly disagreeable, and worthy of all contempt.

These animals are called Quadrumanes, because the four members, that in others are feet, in these resemble hands; and the ape's best hands are his lower ones—those on which he walks when he stands erect. The largest of the tribe, the Orangotang, is from five to six feet high, walks upright most frequently, and uses his hands to feed, fight, and climb withal. He is very strong, and dreadfully ferocious. There are tiny little monkeys, no bigger than a two-penny doll, full of tricks, but exceedingly mischievous and disgusting.

Having now dismissed these nut-crackers, I beg to introduce,

CHAPTER IX.

MAN—HIMSELF.

As nothing is more easy or usual than for persons to overrate their own rank and importance, it may not be amiss to inquire what are the true grounds on which man rests his claim to be considered the chief of the vast world of creatures inhabiting the same planet. Is it a mere mistake of his own vanity which has placed him above all that walk, swim, creep, or fly? Is he to be the head amongst those that go on four legs, and those that go on two?

Is it not the fact, that man is excelled in strength, in swiftness, in acuteness of the bodily senses, in instinct, as well as in the possession of some incomprehensible faculties, by animals around him? The elephant could crush him by a curl of his trunk, the horse or the hare could outrun him. Cannot the cat see, the dog smell, the mouse hear, the spider feel, sooner and better than man? And do not domestic animals, simple birds, know for a certainty the direction of their home, and to a certainty find it, over lands or seas, when the wisest, shrewdest man

would be lost without his compass or his direction-post?

If man attempts to run, he is soon out of breath; if to swim, he is very likely to be drowned; he would like well enough to fly, but down he comes on his head, and then perhaps he will not even walk again. He places funnels to his ears, hollow tubes to his eyes; he sends sharp powders up his nose; he pokes about with hands extended, endeavouring in vain to feel that which he cannot see, hear, smell, or anyhow perceive, though the animals around him are conscious of the matter sought, and of a thousand other things, without any effort at all. How is all this? Would the inhabitant of another world, finding these facts so, pronounce that man was fitted to be "the lord of the creation" here? What think you, my young friend?

A. I begin to think that I am not so sure of our pre-eminence: we seem to be outdone in everything!

No, not in *every* thing, I reply. I will answer my own question, and say, that a visitor from another world, although to his superior perceptions man might appear both mean and degraded, would acknowledge his rank here to be far above every other creature.

Let us see. In the first place, I would ask—Who is MASTER, man or beast? Elephants are sagacious, and have uncommon strength; lions and tigers are both fierce and strong; foxes are cunning; apes and monkeys try their hand at man's doings; but what does it signify? Did you ever hear that the beasts, with all their powers, united their endeavours so as to drive a number of human beings into one of their dens, there to feed, poke, and show them off?—or that they attempted to fatten them as meat, or train them as labouring slaves?

The fact, you know, is exactly the reverse of all this.

Q. Not always the reverse, surely; animals do sometimes catch men, and eat them up alive.

A. That does not alter the matter I am speaking of. The beast overpowers the man, as a falling tree, or a wave of the ocean, may do; but it cannot be said that these become the man's master, neither does the tiger become his master even when he bites him in two; he has never *ruled* the man, he has never compelled service from him; neither can the tiger wait behind a bush, and kill his man without approaching him.

See, now, what man has really done with animals. See, not only the flocks, and herds,

and horses, all the cattle of the land, as much under the dominion of man as his own children are,—nay, a great deal more,—but behold the most enormous, the most fierce, those armed with deadly weapons, all caged like birds, fed, and trained, and made to fear the keeper, whose body would not be a mouthful amongst them,—one whom the least of them could snap up as we would a kitten,—but before whom they cower in awe, not daring to disobey him!

Q. Oh, but they do snap up their keepers sometimes!

A. Yes, but that is when the keeper forgets his proper manner towards them, and trifles with the conditions on which alone he can manage them: he may beat them till they howl, if needful, but he must not trick them, nor tamper with their tempers. When we see creatures like those which are the terror of the tropics, couched under the wand of a keeper,—when we find that a whale, which is bigger than a thousand men, is hooked, and landed, and skinned, and carved by a boat-full of people,—this looks very much like mastery—quite like the superiority of man.

And did you never see a little child leading a horse?—a little fellow sitting on the back of

the huge creature, and guiding it away from the herbage it would like to crop,—away from the pond where it really wants to drink?—Yes. Of these powerful animals it is even now true, that "a little child can lead them!"

All this, you know, was expressly promised to man by God himself: "And the fear of you and the dread of you shall be upon every beast of the earth, and upon every fowl of the air, upon all that moveth upon the earth, and upon all the fishes of the sea; into your hand are they delivered." (Gen. ix. 2.)

Well, now, let us see what man has to do before he can make use of the gifts of Nature that are placed before him. The materials, we have seen, are of three general sorts, and man's wants, we may say, are also of three general kinds: we have animals, vegetables, and minerals; and we require food, clothing, and shelter.

Suppose, now, all these things in a state of nature, and you a poor, hungry, houseless, uncovered wretch, but very clever indeed, placed amongst them. There are wild bulls careering along the plain, wild goats scrambling up the rocks, and, so far from acknowledging your superiority at that moment, that, —see! they are looking down upon you! Well, catch, and eat them,—you have free leave.

And there are the wild vegetables too, which cannot run away; and fruits, and berries, and corn-seeds, here and there,—taste, and eat them. Oh, they are growing amongst thistles and prickles, very inconveniently! and, ah, they are very sour, austere, bitter, and husky!

You eat a few, but you are not half satisfied; and, besides, you are shivering with cold. Well, that sheep has a *great* coat on, which he really does not want, try and ease him of it. Dear me, how tiresome!—he sets off scrambling through the thickets, frightened at the sight of you! Ah, now it rains!—hail-stones come pelting down,—the wind rattles them in your face:—get under a tree, that is a little better, but it is rather an inclement home!

Well, cut the tree down, split it into boards, build yourself a house. But you have no tools! There is iron in the mine,—but where is the mine?—in another part of the country! You sit down dejected, helpless, and famished; you obtain a little uneasy sleep, till the wild animals disturb you; the pigs and foxes put their noses to your face, and have a smell at you; they grunt or bark in your ear, and then they trot away. It is very unpleasant; up you jump, and climb a tree,—a monkey is there before you,—he gibbers and pelts you down!

"This will never do!" you say. So you set your brains to work, and now find a new use for your hands. Somehow, you build yourself a hut; you procure a fire; the smoke that issues has a savoury odour in it; there is cooking going on, and you are a little better off.

The fact is, that until man has made use of his special powers and faculties, which are the best gifts of God to him, he must be a wretch. He cannot live as the beasts do, nor share their competence; for, though Nature waits upon them, and gives them all their meat in due season, she will not do so by man. She says to him,—"There are all sorts of things provided for your use, but they will not come to you; you must up, and be doing, and procure and prepare them: YOU MUST WORK."

Well, man has taken the hint, as I said before. See, now, the miners, the founders, the smiths, the artificers in all kinds of wood and metals. Man has obtained tools, and there he is, without ceasing, digging, and heaving, and blowing, and hammering, and driving, and all the rest of it. Men do not sleep under trees now—at least, not sensible men, under whole ones: the sawer has worked his way through and through the mighty oak; and the builder, with his beams and boards, has already caged

himself in, and has room for a score of people under one roof.

And the architect, not content with this, rears a mighty edifice to be seen from far, and for those afar off to come and see, and to perpetuate his name to future ages. Where did he find those very convenient square blocks of stone? Oh, peep down yonder at the foot of the craggy steep, where works the mason. With patient diligence he sits, pushing and pulling his long toothless saw through the shapeless masses. Did I say *he?* Hundreds are at the work; and the rock, which Nature had piled mid the darkness of chaos, is taken down by man that he may rebuild it at his pleasure. Man can do all this, for now he is no longer a famishing wretch, contending with the beasts of prey for his meal: his food is secured; the husbandman has learned to plough, to sow, to reap, to gather into barns.

And now the beasts, which once grinned at the roaming savage in contempt, come lowing and bleating to his gate, asking to partake of the benefits of this state of things; they expect here their daily food and nightly shelter. For this they lend him their mighty strength, yield him their own bodily substance: they

give up their rugged freedom, and in exchange they acknowledge MAN THEIR MASTER!

We have taken a glimpse of man, wild in the woods; we have seen him gain the dominion over the beasts of the field;—shall we now behold, man ruling man—the MONARCH on his throne?

Beneath the stately dome behold him then, arrayed in purple and gold, resplendent in the sparkling treasures of the mine. His ministers are princes, and bow the jewelled crest before him. At his banquet Nature pours forth her gifts without measure: the best blessings of the field, of the wood, of the sea; costly viands from every sunny clime, the richest juices of the fruit, are ranged before him. The monarch has but to lift a finger, and the choicest of the choice is at his lips.

Man, you see, has taken Nature at her bidding; and from the field, the forest, and the flood—from everything having life, that has flesh, fur, or feathers, for his use—has he taken at his will, wrought them to his fancy, till Nature knows not her own gifts again.

It would be little, however, for man, if only princes or peers partook of the vast benefits of civilized life. Thankful let us be, that, from the palace to the cottage, all share, to some

extent, the good which human industry, skill, and enterprise have achieved. Agriculture and commerce, and the arts of life, have now placed things within the reach of the peasant in his hut, which the monarchs of past ages might have desired in vain. The poor man procures from the opposite hemisphere of the world his tea, his sugar, his cotton clothing—yes, and the fragrant weed which consoles his leisure hour; and were it not for the demand created by the millions of small consumers, commerce must give up her enterprise as ungainful.

And it is owing to the wants of the many that the many find employment, and the means of purchase. The trades connected with, or dependent upon, the production of articles found in every house, are innumerable, whilst the house itself, and the materials of it, have probably employed thousands of hands in their manufacture: things which have required the wit and industry of man for ages to perfect and render accessible to all.

So, then, instead of a life in dens and caves; instead of a roaming, precarious existence, we have civilized life and comforts. But these are low and mean considerations by which to prove the superiority of man. Think of LANGUAGE, addressed not only to the ear, but the eye.

Think of THE MIND OF MAN, grasping at knowledge, hungering for other things to feed it than those which the body desires!

I have already shown that man has found out his place in the universe—his career amongst the stars. He has ascertained the size, figure, motions, and speed, of this rolling, gliding ball, on which he stands. And, more than this, he has traced the courses of other worlds which his unsleeping eye has discovered in the blue vault around him. He marks the circling paths in which they move; he has measured—I might almost say he has weighed—both them and the central sun! He has found means to bring even the dimly-distant starry host within the reach of his eye and of his restless reasoning understanding.

But is man, indeed, content with all that science can teach him? Would he be satisfied with the utmost that an archangel from the spheres could tell him of the worlds of all space? Does he not think anxiously—joyfully—of the period when he shall have a portion in some other world than this? These are the contemplations, these are the PROOFS OF SOUL, which raise man above the brutes!

CHAPTER X.

A GLANCE AT HISTORY.

We have taken some little notice of the earth and its productions; we have seen how animals, vegetables, and minerals, are constituted and arranged for the use of a superior race of beings; let us now inquire, what has man done with all his advantages—what sort of a story is his, now that we can look back upon it for six thousand years?

In the sense in which I now use the term, it is evident that animals have no history; for although the migrations of some tribes of them, and the disappearance or extinction of others, the voyages of a whale, and the gaping of an oyster-shell, may be called events, they bring about no changes in the general condition of the creatures. Whales swam, and oysters yawned, just the same at first as at present; and with regard to the most sagacious, the most cunning, or the most apt to learn of any animals we are acquainted with, it is evident that they do not get beyond their original condition. The foxes, and dogs, and apes, of Esop's

acquaintance could learn nothing from those of modern days if they were to rise from the dead.

But man! he has indeed a HISTORY; and notwithstanding the vast achievements of his mind and hands, that history is, to a great extent, a melancholy one. With the power to work wonders, he has almost always had the will to work mischief. With faculties and endowments which have enabled him to subdue natural enemies around him, he has become an awful enemy to himself,—the greatest destroyer of his own species. The history of nations, as we all know, is little else than an account of their contests, a narrative of the acts of the oppressor, and of the struggles and sufferings of the oppressed.

If, therefore, I were writing a general history, I must give an account of battle after battle. I must tell of hundreds of thousands slain on this side, and of hundreds of thousands slaughtered on the other. I must present you with a pen-and-ink picture of the devastations attending the successive tempests of war that have swept over fruitful lands, and made them deserts again and again.

These affairs, of course, it is very needful to set forth in larger works, but the reader will see at once that I have not room for them all

here. All I can do is, to notice a few of those events and doings that have made certain people conspicuous amongst the families of the earth. We must begin with that of Noah.

Here the Scriptures are our only guide; but it is observable, that all other histories lead us back to some such period, and leaving us there, give us good reason to infer some such fact as the Bible sets before us, regarding the origin of nations. The Greeks, the Assyrians, the Indians, the Chinese, have all had a traditional belief in the destruction of mankind by a deluge, and the escape of a single family by the waters —referring to a common patriarch bearing a strong resemblance to Father Noah. It is even thought that he was worshipped under the name of Saturn; and we may easily recognise two of the sons of Noah in the Jupiter-*Japetus* and Jupiter-*Ammon* of the ancients.

It does not appear that the dispersion of mankind took place until about a hundred years after the flood. It is probable that Noah and his descendants formed a single community under patriarchal influence during that time, and that it was the discomfiture at Babel which made the several families become separate nations. The descendants of Shem occupied the best provinces of Asia; those of Ham

founded the Assyrian or Babylonian empire, and also reigned in Egypt, and spread over Africa; whilst the posterity of Japheth peopled part of Asia and Europe, and were our own ancestors. From all these, innumerable tribes, and nations, and monarchies, were derived; many of which, no doubt, became intermixed according to the prophecy delivered by Noah himself: "God shall enlarge Japheth, and he shall dwell in the tents of Shem, and Canaan (the son of Ham) shall be his servant." This was specially fulfilled when the Greeks and Romans became masters of those portions of Asia and Africa which were peopled by the descendants of Noah's other two sons.

Now, of the nations that have sprung from the three great branches of the human race after the flood, those that have most distinguished themselves, and have formed the great subjects of ancient history, are the Assyrians, the Egyptians, the Medes and Persians, and the Greeks and Romans. Of these, I know not whether the Egyptians do not form as interesting a chapter in the history of man as any; not on account of conquests achieved, or dominion exercised, or the eminence of individuals, but because of the genius of the people, and the vast proofs of that genius which remain. We may

say that all other specimens of the works of ancient nations sink into insignificance when compared with those of Egypt. Let us notice a few things connected with this celebrated country, and the monuments of art by which its earliest history was distinguished.

I need not tell you where to look for Egypt on the map. It is situated, you know, on the north-eastern corner of the vast African continent. The most curious natural fact regarding Egypt is the regular overflowing of the Nile, its only river, which supplies the want of rain. We should think our farms destroyed, and Old England ruined, if the fields were every year laid under water and covered with mud, whilst at all other seasons a shower of rain should be scarcely known! This, however, is the case with Egypt, which is, or has been, the most fruitful land in all the world. In the time of the patriarch Jacob, you know, there was corn in Egypt when there was none elsewhere; and at the present day they get three harvests in the year, harrowing the corn into the mud wherever the waters of the river can be made to pass over the land. The ancient people had much ado to find their own fields again after the inundations. By this they gained great experience in land-surveying and measure-

ments, which made them skilful geometricians.

Egypt was esteemed in ancient times the seat of learning; and to this school the most illustrious men in Greece repaired for instruction. The early history of this country is involved in much obscurity, like that of every other nation but the Jews. The simplest form of government seems to have prevailed at first, being that of shepherd kings; but the historians of fable would have us believe that Egypt was governed by gods and heroes, and by inferior monarchs, more than thirty thousand years before its credible history begins.

The stupendous undertakings and gigantic works, actually accomplished by the Egyptians, prove that a high degree of science and genius was exercised by a very populous nation, but under probably the ferocious bidding of an iron despotism and a merciless superstition. It appears that the energies of these vast influences were exercised and exhausted, not in wars and conquests, as amongst other people whose records have reached us, but in constructing imperishable monuments of their power. They succeeded, indeed, in rearing edifices which are likely to endure as long as the world itself; but if their object was to per-

petuate the memory of individuals, they have signally failed,—we *know* no more about the potentates thus intended to be honoured, than we do of the onion-eaters who sweltered at the toil of building.

It is remarkable, indeed, that history gives us so very slender an account of ancient Egypt, which was the fountain of letters, philosophy, and science. The fact is, that Greece and Rome supplied almost the only early historians we have, except, as I said before, those of the Bible. Egypt has not told her own story, or if she has, it is in the language of hieroglyphics, which we have not learned to read. It is generally thought, however, that Menes or Misraim, the son of Ham, founded the kingdom; and that it continued in the line of his immediate successors about four hundred years. Of these, Amasis was the first who gained an ascendancy. It seems to have been the descendants of Amasis who were ruling in Egypt at the time when the patriarch Jacob sent there for corn. These kings were the Pharaohs of whom we read in Genesis. Sesostris was the most illustrious of the early Egyptian monarchs, and was different from the rest in being a military conqueror; he is said to have subdued the best provinces of Asia and part of

Europe. He styled himself king of kings and lord of lords, which shows that he had ambition and vanity enough for any conqueror the world ever knew.

Sesostris having reigned long, and become blind, at length killed himself, and the empire fell to pieces. The next name of note we hear of was Psammetichus the Second, who united all under his rule, but he again was conquered by Cambyses, King of Persia, who added Egypt to that empire, under which it remained till the reign of Darius. It continued subject to the Persians until Alexander defeated them. At the death of Alexander, Ptolemy, one of his generals, succeeded in gaining the throne of Egypt; and it continued subject to kings of that name till the time of Cleopatra, when Egypt became a Roman province; and when, in turn, the Roman empire fell to ruin, Egypt became the prey of Mahometan rulers, and it remains under their yoke at this day.

And now for the wonders of ancient Egypt —we should rather say of the ancient world. If we were required to show the most marvellous achievements of human power and skill, we must point at once to the existing remains in Egypt of pyramids, temples, palaces, cities,

sepulchres, obelisks, labyrinths, grottoes, and mighty excavations.

First, for the pyramids, which have generally been considered the sepulchres of kings, of whose names, however, as I said before, we know nothing for certain. We may even be wrong in supposing them tombs at all. The largest of them covers eleven acres of ground—as much land as an industrious man in England would keep a family upon, and call a nice little farm. It is five hundred feet high, which is one hundred more than from the pavement to the top of St. Paul's. It is built of solid stone; each slab or block of such size, that our present machinery would hardly move it on level ground! These blocks of stone are piled one above another, in the form of steps, ending in a point at the summit.

People told Herodotus, the best historian we have, that one hundred thousand men were engaged twenty years in building this pyramid, and that ten years were employed in making a road for the conveyance of the materials. But this is no wonder at all; and had the workmen and the time been ten times more, we must still have reserved our astonishment, not for the number of hands, nor the cost of the undertaking, had it been paid for in gold

to free labourers, but for the fact, that such masses were anyhow detached from the quarry, rolled away to their destination, and raised to the height at which we find them now. The pyramid of Cheops is the largest of three that stand near each other, not far from Cairo; but there is a chain of them reaching along the valley of the Nile, the smallest of which would puzzle our modern architects and engineers to erect. Some of them are of brick, made, perhaps, by the hands of the Israelites when in bondage!

I will next speak of the obelisks, the erection of which exceeds in mechanical difficulty perhaps anything that has been done by human hands! We make watches, we make steam-engines,—we almost fly by their means over land and water,—but we could not cut out, carry away, and raise on end, a solid single block of granite one hundred and eighty feet high, and weighing more than five hundred tons! Who taught that wondrous people engineering?—and of whom could our present practitioners learn the art these ancients exercised? One of the smaller obelisks has fallen, which was removed to Rome; but all endeavours have been vain to raise it up.

The obelisks, of which Egypt is so full, are for the most part covered with hieroglyphics,

the sacred *picture*-writing of the Egyptians; and it is highly probable that they contain much of that very history of which we know so little. Many ingenious men have spent years in endeavouring to discover the secret meaning of this kind of writing, but, at present, a learned doctor before an obelisk is very much like puss at a spelling-book, neither one nor the other can understand the thing at all; but neither one nor the other will tell us so. On the contrary, some of the learned have made bold guesses, and have thought they could read words and sentences, spelt not with letters, but with characters shaped like a cat, an onion, a blackbeetle, and an ape!

I cannot find sufficient space for even the names of the vast ruins of temples and cities, and the enormous masses of sculpture, with which Egypt is overspread. The valley of the Nile is like the grave-yard of remote antiquity. It is full of the most affecting and sublime memorials of the dead—monuments of a people who have so long passed away, that they seem to have belonged not only to a dimly distant age, but to another order of beings. They make strange dumb signs to us, which we cannot understand,—they exhibit wonders which we cannot imitate.

Besides the vast edifices of ancient Egypt, it was celebrated for its colossal statues of gods and heroes executed in the hardest stone, finely finished, and of enormous dimensions. There are thousands of these scattered up and down the country, and especially round the temples. They are cut out of solid blocks, and represent divinities in human and animal forms, and various fabulous monsters — amongst which the sphynx, half woman and half lion, is the most frequent. The statues of the Egyptian deities, Osiris and Isis, and of the various animals which were objects of worship, are wonderful examples of the skill and the engrossing superstition of the people.

The earth-works, or excavations of Egypt, were on a scale proportioned to their usual gigantic ideas of things. The Lake Mœris, entirely artificial, and dug with the spade, was as large as an English county. Its intended use was to contain the waters of the Nile when they rose too high. Egypt being deficient in rivers, the enterprising and indefatigable people dug several in the form of canals, and endeavoured to form one reaching from the Red Sea to the Mediterranean, but being dissuaded from the work by an oracle, they gave it up.

But the most singular and determined effort made by any people to perpetuate themselves, was the constant custom of embalming the bodies of the dead. Herein, also, they excelled all other nations, and conducted the process so effectually, that at the end of three thousand years we behold them in as good condition as if newly done. The bodies called mummies have been frequently exhibited, and may be seen always in the British Museum. The art, as practised by the Egyptians, is now lost, and the embalming practised at present occasionally, does not attempt anything but a partial and temporary preservation of the remains.

So much for ancient Egypt: the fountain of arts, letters, and science—the sink of superstition the most degrading;—the people whose genius reared mountains of stone, and formed lakes and rivers where nature had denied them; worshipped birds, beasts, and vermin, and placed the embalmed bodies of loathsome creatures in the sepulchres of their ancestors and heroes! Such was human nature; and such in heart it still is until better light than that of the sun shine upon it.

Another branch of the family of Ham settled in Asia, and founded the great Babylonian or Assyrian monarchy, which was the first great

empire in the world. It is supposed to have been founded by Nimrod, who built Babylon, or established himself there, not long after the deluge, and about 2200 years before the birth of Christ. It was afterwards greatly enlarged by Ninus, who built Nineveh, about the year before Christ 2000. This city was also partly built and governed by his queen, Semiramis. There is great confusion and uncertainty in the accounts we have of the origin of these very ancient cities. Some say that Belus built Babylon, and some Semiramis. She was unquestionably a person of wide renown, and attempted the conquest of many countries, but was at length defeated, and died soon after. To Semiramis succeeded Ninyas, her son, who, devoted to luxury, shut himself up in his palace and left all to his ministers. His successors are said to have imitated this example for thirty generations, during the space of fifteen hundred years. Sardanapalus was the last king of Assyria, who is said to have surpassed all his predecessors in extravagant profligacy. Sardanapalus being at length attacked by his enemies, and defeated in battle, retired to his palace, and there having erected a great funeral pile, he burnt himself and all his treasures to a vast amount: thus the empire was transferred from

the Assyrians to the Medes. Cyrus, the king of the Medes and Persians, afterwards took the city of Babylon, having turned the course of the river for that purpose.

I must say something of the ancient city of Babylon, whose name is so very conspicuous in the Scripture and other histories. According to the accounts given of it, Babylon was the greatest city that ever existed; and yet it is remarkable that it has wholly disappeared, or the vestiges of it are so difficult to trace, that travellers are never sure that they have found the spot. Scripture indeed, foretold the ruin of it, but ruin has been succeeded by obliteration; so that we are ready to ask, not who has demolished it, but what has been done with the ruins? The vast materials of this enormous city seem to have been run away with, or to have sunk into the earth. Let us see what they were.

The walls of Babylon were, it is said, nearly one hundred feet thick, three hundred and fifty feet high, and sixty miles round: the city being exactly square, these walls were fifteen miles each way: they had one hundred gates of solid brass, with a street running from each, in a straight line to the opposite gate. There were in all fifty great streets, each fifteen miles long.

Babylon attained its chief celebrity and splendour under Nebuchadnezzar, whose self-congratulations on account of it are recorded in Scripture—"Is not this great Babylon which I have built?"

Its magnificence is frequently spoken of in the sacred writings. It is there called, "great Babylon"—"the glory of kingdoms"—"the beauty of the Chaldees' excellency"—"the golden city"—"the lady of kingdoms"—"abundant in treasures"—"the praise of the whole earth;" and its beauty, strength, and grandeur—its walls, temples, palaces—its hanging or elevated gardens—the canals and lakes, made for draining the river during its overflowings, are described with such pomp of language by heathen writers, that it might justly be considered the wonder of mankind. And the city seemed not only great but secure: its massy walls, and brazen gates, defied all aggression. But yet the ruin, and devastation, and desolation, of this vast city, predicted by the Jewish prophets, arrived at last. The mighty river that flowed through its midst was turned from its course; and along the forsaken channel of those waters, which had been regarded as its chief defence, the conqueror Cyrus entered, with his army, and in one night made all his own.

After this, Babylon, whose empire was transferred to that of the Medes and Persians, rapidly declined, till, as we have said, the vestiges of its existence have disappeared, and travellers know not where to find it. Nineveh was another Assyrian city, very nearly if not quite equal to Babylon. It was built on the banks of the Tigris, but has long shared the fate of Babylon. It was the peculiar destiny of these cities, not only to suffer the loss of power and nationality, but to lose all their inhabitants, and retain no evidences of their former existence. The contrast between Assyria and Egypt in this respect is the greatest that can he conceived. I should mention that Chaldea is another name for the country of which Babylon was the capital.

Of the Medes and Persians we have already made mention. Their history is very much mixed up with that of the Assyrian empire. Cyrus became the monarch of that empire, and of the Median and Persian also, by conquest, about 550 years before the Christian era. This Cyrus, one of the chief names in ancient history, was of an ignoble origin, and was exposed that he might perish, but was saved by a shepherdess. He became the mighty monarch who took Babylon, and extended his dominion over

the best part of Asia, and was pursuing his course of ambition, when it was stayed by a dreadful defeat. Tomyris, a Scythian queen, had the honour of vanquishing this renowned warrior, whose head she caused to be cut off, and thrown into a tub of human blood, saying, "Be satiated with the blood for which thou hast thirsted." The Median empire was overthrown by Alexander, King of Macedon, about two hundred years after the death of Cyrus. This Macedonian empire fell in turn under that of the Romans. All ancient history concludes with this event.

And what of the Jews? Of all the nations of antiquity, there are none so interesting to the Christian inquirer as the once favoured inhabitants of Palestine or Judea. It is, however, wholly unnecessary to give a history so well known by every reader of the Scriptures as that of the Israelites. The Old Testament contains it, and to that plain and faithful record I shall refer the youthful student now.

You know, that, notwithstanding all the privileges, all the warnings, all the actual punishments of disobedience with which the Jews were visited; their continued transgression, and their blind unbelief, brought down upon them, at length, the full promised penalties of

of their sins. Conquest and captivity, and a vagabond life amongst the nations, succeeded the choice blessings of a peaceful home, where every temporal advantage was, under mild conditions, secured to them. The final overthrow of the Jews, when Jerusalem was taken by the Romans—THAT SIEGE, and the extirpation that followed, afford the most terrific example of Divine vengeance and retribution, that is supplied by the history of the world; and the Jews still continue a living proof of the reality of the Divine dispensations towards them of which we read—proofs that are scattered in every land, that every land may read them.

The Ishmaelites, also descendants of Abraham, have not been so distinguished, either by privileges or punishment. They have led a wild predatory life, never fully established as a nation, and never fully conquered. The Arabs —this is their modern name—have spread over a good part of Asia and the north of Africa, where they are at present unsubdued in spirit, contending against the strong arm of French aggression.

I must now notice a small province of Asia, which has been celebrated not on account of military transactions, or political power, but because it conducted the commerce of the

world from the earliest times. This was Phœnicia, a land whose sea-coast lay along the shores of the eastern end of the Mediterranean, and included much of the country afterwards called Palestine. Its chief cities were Tyre and Sidon. Some attribute the invention of letters to the Phœnicians; but it rather appears that the Egyptians were beforehand with them in that matter. For commerce and navigation, however, the Phœnicians were the most noted, as being the first of merchants, and the great colonists of antiquity. The Phœnicians became the prey of the great conquerors we have spoken of. They were subdued by the Persians, then by Alexander, and at length by the Romans. You see there were four great empires, which in turn carried nearly all before them—the Assyrian, the Median, the Macedonian, and the Roman. India was partly conquered by Alexander, and became tributary to the Romans, but was by no means fully subdued by any of the military empires.

China, if known at all, was merely considered as an interminable part of India, beyond the Ganges. It lay, in fact, beyond the reach of the grasping arm of conquest, and has only been subject to the incursions of the wild hordes of Tartars from the north. It has been sup-

posed that Noah himself found his way here, and laid the foundation of the most ancient empire in all the world. The affairs of China, however, form no part of our common histories; and their own accounts of themselves are too stupidly extravagant to be believed. It seems that the empire has been little disturbed during four thousand years, although Tartar chiefs have at times obtained the dominion. The people and their institutions, their religion and peculiar government, have remained the same.

CHAPTER XI.

THE GREEKS AND ROMANS.

As these polished nations have supplied nearly all the historians of antiquity, it is no wonder if their own affairs—the achievements of their own great men—form the chief subjects of their writings; and it is to be expected that they should magnify the doings and illustrate the glory of their men of renown, sometimes beyond the fact, but generally with security from censure—having no one to contradict them,

when telling of the marvellous exploits of their various heroes. Still, when we have made all needful allowances, their works, constituting what is called classical history, are invaluable possessions. To them we are indebted for almost all that we know of the movements and destiny of the chief branches of the family of man during many thousand years. Without the works of such authors as Herodotus, Thucydides, Xenophon, Livy, Tacitus, and some twenty more, there would be almost an entire blank in our review of past ages, extending to the recent period when our modern European chroniclers arose.

These classical historians being of such repute, it might be supposed that they would be careful not to commence their histories with fables. It is, however, the fact that, what with their poetry, their mythology, and their dreamy fits of writing, they make their first chapters little better than nursery tales, from which, however, we may gather here and there a few realities. The Greeks had a very favourite notion that they were either descended from the gods, or had sprung from the earth where they lived, and they heard with contempt the conjectures which traced their origin from Asia or Egypt.

In the first ages the Greeks were governed by monarchs, and there were as many kings as there were cities; but the regal power gradually declined, and the republican form of government prevailed, except in the state of Macedonia. The courage of the little bands of Greek soldiers was invincible, as was abundantly proved at the celebrated battles of Marathon, Thermopylæ, Salamis, Platæa, and Mycale. Millions of undisciplined barbarians were repulsed by the arms of a mere handful of troops, and driven back in tumultuous confusion and disgrace. Their greatest achievement, as defenders of their country, was at Thermopylæ, before Christ 480, when three hundred Spartans kept Xerxes and five millions of his army in check for three days: eventually, the haughty Persian retreated from Greece, losing everything for which he had contended—glory included.

After so many victories over foreign enemies, the Greeks became elated with their renown as warriors; and having no others on whom to exercise their valour, they turned their arms against each other, and some of them even leagued with foreign states to destroy the most flourishing of the rival cities. The most noted of these civil conflicts were the Messenian and

Peloponnesian wars, during which the most dreadful calamities were inflicted by Greeks upon Greeks.

The greatest military name in the history of Greece, or the ancient world, was Alexander, King of Macedon, called "the Great." We have mentioned the Macedonian as one of the four great empires, the beginning of which was almost as inconsiderable as any that we read of. Philip increased it greatly, but Alexander extended his conquests till he had subdued nearly the whole of the then known world: so that when he had vanquished the last nations that opposed themselves, he sat down and wept because there was nobody left on whom to gain a victory. Alexander died at Babylon in the thirty-second year of his age, having reigned twelve years. The Macedonian empire, at his death, was divided amongst his generals, as we have seen; and these, we know, all fell at length under the power of Rome.

Greece was the seat and fountain of learning, philosophy, and the arts, long after Egypt had ceased to be so. Its historians, philosophers, poets, warriors, statesmen, orators, sculptors, and artists of all kinds, have made it a spot more brilliantly conspicuous with the ays of

genius than perhaps any in the world; and the language,—the finest, fullest, and richest, that ever was spoken by man,—continues to form the best means of expression that learned men possess.

The antiquities of Greece, in the form of public works, which yet remain, are very different from those of Egypt. We may say, in general, that they are more elegant, but not so majestic or sublime. The Greeks had neither the soul to conceive, nor the means to execute, such buildings as the pyramids, such sculpture as that of the obelisks, such excavations as the lakes and rivers we have noticed. Nevertheless, their architecture has formed the model for all succeeding ages—their statuary, the inimitable pattern of every sculptor; and it is to be remembered, that the Greeks had no despotic powers whereby to effect their undertakings—they could not set hundreds of thousands of men to tear rocks from their deep foundations, and pile them in mountain heaps around them. They had not corn enough at command for these gigantic projects; and the wonder is, that the Greeks, few in number, were able, with such slender resources, to cover their territory with structures which should attract the eyes of posterity to their doings, even

to the present day. Their polished edifices are the gems of Europe still, though in ruins.

THE ROMAN EMPIRE.—The history of this marvellous dominion touches upon that of nearly every other ancient nation. We have seen, that kingdom after kingdom, empire after empire, became mixed or melted away—subjugated under the influence of this one invincible power; and there are few nations now existing which do not supply evidences of the government which once prevailed over them. It must be a very rapid sketch which we can give of a history which was formerly that of the world. Let us endeavour to catch a sight of a few points of that history which are the most important.

I scarcely know whether we can say that the origin of this people is one of those points. Unquestionably, it would be so, if we could be sure of no mistake in the matter; but here, as in the case of Greece, we have fables, and not facts, to begin with; and we must dismiss a whole army of gods and heroes, and blow away the clouds on which they are enthroned, before we can tell anything for truth, about the matter.

Unhappily for the glory which the poets

would shed around the origin of Rome, the first distinct glimpse that we obtain, shows it to have been a den of thieves. Their leader, or first chieftain, whose name might be Romulus, and certainly was not Nimrod, appears to have possessed himself of a building of some strength on the banks of the Tiber, where he erected a standard—perhaps hoisted a rag upon a pole—as a signal to any who might have reasons for seeking the protection which his castle could afford them. This expedient drew together great numbers of robbers, and other desperate adventurers, who under a bold and enterprising captain soon made themselves masters of a tract of country; and Romulus—for so we may as well call him—soon set about building for himself and followers a city: this was rather more than 750 years before Christ, and therefore about 2,600 years ago. Here, then, the robbers, the murderers, the criminals of all sorts, who had nimbler legs than justice, continued to establish themselves in something like security:—such was the commencement of the most celebrated city in all the world—such was Rome!

Romulus, however, succeeded in retaining even these, his unlikely subjects, within the bounds of government, and introduced a regard

to laws, and to religion, such as it was, which was better than none at all. It is true they committed a rather audacious act of plunder when they stole the Sabine ladies; but, excepting that, they do not seem to have been a particularly unruly crew.

During almost two hundred and fifty years, the Romans were governed by kings; but the tyranny, oppression, and violence of Tarquin, the last of these monarchs, and of his family, became so intolerable, that a revolution happened in the state, and the people took the government into their own hands. The regal dominion of Rome continued under seven princes, and this period is called the infancy of the empire. After the expulsion of the Tarquins, the Romans became very watchful of their liberties, but, at the same time, very contentious amongst themselves, and as despotic in their way as the kings had been. They elected consuls, to whom the affairs of state were entrusted, under great restrictions, or rather under constant fears of the people, who were, in fact, their masters. One of the first consuls was banished the city merely because he bore the name of Tarquin; and another thought it prudent to pull down his house, because it was considered too grand for a private citizen.

Under the consuls, however, the Romans pursued their conquests and extended their dominion on every side; yet they had their reverses, and the barbarians, as they called them, sometimes got the advantage, and took Rome more than once. This wonderful city, however, recovered itself after every disaster, and wonderfully increased in population, opulence, and power. Under Camillus,—Rome, having been besieged and taken by Brennus, the leader of the Gauls, —the enemy was vanquished and driven away, and the city, which had been burnt, was rebuilt; so that Camillus was called a second Romulus.

The most celebrated wars that the Romans ever conducted were those against Carthage, a kingdom established in Africa by a colony of Phœnicians. These were called Punic wars, and were occasioned by the ambition and jealousy of Rome against a rival power. Hannibal, the Carthaginian general, had Rome in his power on one occasion; but he neglected his opportunity, and Carthage was at last destroyed by Rome. The Romans were destined to be the final conquerors in all their wars for many ages, until at last, as we have seen, nearly every other nation fell under their dominion. Britain, though a distant island, and thought to

be almost the end of the world, was reached by the long arm of their military despotism, and subdued.

During these successes abroad, Rome was often torn and very much endangered by contentions at home. The lower orders of the people struggled for liberty and equality of rights with the noble citizens, and at length obtained them; but the men who thus were enabled to rise from the lowest condition to the possession of power, too often exercised it with brutality, and became the worst of tyrants in their turn.

The two great generals, Cæsar and Pompey, each professed to espouse the cause of the Republic, but each, in fact, fought that he might gain the sovereignty for himself. Cæsar, however, prevailed, and with him commenced the long line of Roman emperors, whose history it is impossible to pursue in this little book. Amongst them are to be found some few illustrious names, but more of a character whose infamy was such, that language scarcely supplies us with words by which it can be expressed. Historians lament the necessity which compels them to relate the deeds and describe the characters of such monsters as Caligula, Nero, Domitian, Commodus, Heliogabalus, and

many others. Constantine the Great embraced Christianity, which had been dreadfully persecuted under former emperors. It then became established, and has nominally prevailed in all civilized governments ever since. Constantine having removed the seat of government from Rome to Byzantium, thence called Constantinople, the empire became divided into two great branches, called the Eastern and Western. And now, also, the Christian church was parted, under two ecclesiastical monarchs. One, called the Patriarch of Constantinople, took the Eastern, or Greek church, as it is called: the other, the Bishop of Rome, retained the Western, or Latin church, and obtained the name of Pope. The present European governments all date their rise from "the decline and fall of the Roman Empire," about fifteen hundred years ago. The Russian monarchs have retained the name of Czar, or Cæsar; and these, as well as the great German sovereigns, have also claimed the style of Emperor—both words being derived from Rome, of whose history we cannot say more at present.

As the Greeks were indebted to the Egyptians, as scholars are to their schoolmasters, for their first education in arts, sciences, and probably in the use of letters, so were the Romans

to the Greeks, and so are we at present beholden to all these ancient nations for the rudiments, or first principles, of those operations of the human mind which have civilized the world. Roman antiquities are peculiarly interesting, and useful to study, because they explain to us the origin of so much that we see about us in modern Europe: and a knowledge of the Roman or Latin tongue is needful, not only for the right understanding of our own speech, but of nearly every other language that is now spoken, except in Eastern or barbarous lands.

The ruins of Ancient Rome at present standing have a grandeur and an interest about them that is especially their own. They are totally different, in kind and character, from those of Egypt, and are not to be compared, in point of grace and elegance, with those of Greece; but the temples, theatres, amphitheatres, aqueducts, baths, subterraneous passages, walls, and towers, with innumerable other monuments of this mighty city, executed in its ages of prosperity and power, still remind the spectator that this *was* the metropolis of the world. But the antiquities of the Roman people are by no means confined to the city itself. Wherever the Romans placed the foot

of conquest, they employed the masterly and diligent hand of civilization; and where barbarian cities fell beneath their power, new ones speedily arose of a superior order. And so it was, that the reeded and walled huts of the Britons gave place to buildings of brick or stone; whilst the raw hides which clothed the wild natives, were exchanged in time for the products of the loom. At the same time, straight military roads were made through the pathless forests of this wooded isle, and Britain partook of the advanced civilization of her conquerors.

We have thus noticed the chief points of interest in the ancient history of 'THE OLD WORLD,' as it is called. A question might now reasonably be asked—What is the ancient history of the NEW WORLD, or that vast portion of the earth's surface, which was discovered a few centuries ago? I mean, North and South America, and the innumerable islands, teeming with inhabitants, with which the Pacific ocean is studded.

I must at once admit, that this is a question which cannot satisfactorily be answered. Of the ancient history of those vast continents and innumerable islands we know nothing; we have, in fact, nothing to guide our conjectures

as to the origin of those nations, whose antiquity we know must be equal to those of our own hemisphere. Whence America was peopled we know not, nor at what period colonies first reached the shores, which were not only unknown to Europe, before the time of Columbus, but the probable existence of which was denied, with derision, by nearly all except himself.

It is certain, however, that when discovered at the latter end of the fifteenth century, the western continents were inhabited by populous nations, some of them, such as Mexico and Peru, having resided there evidently from a very remote period. These had also attained to a certain degree of civilization, and the courts of their monarchs displayed a splendour equal to many of those of the old world. They had not, indeed, invented an alphabet, yet they had methods of commemorating events, which enabled them to recall the past to a certain extent; but as to their own origin, they were ignorant of it.

Of the native tribes there are now, comparatively, but few and indistinct remains in the new world. European settlers have displaced them, and the ancient monarchies of Mexico and Peru have been long supplanted, and are extinct.

The inhabitants of the United States, a colony from England, occupy the ground which was once the inheritance of Indian nations, who have retreated from time to time, till they have left undisputed possession to the intruders on their rights.

CHAPTER XII.

THE RELIGION OF MANKIND.

Religion? Yes, Religion. Do you know the meaning of the word? "Yes," you reply, "I am sure I do—religion means"—"faith and obedience towards God—all that we ought to believe and do."

Well, it is certain, that he who believes what God has revealed, and is obedient to that which God has commanded, must be a religious man. But let us see what is the exact meaning of a word that is so frequently upon our tongues. It is derived from the Latin word, *ligo*, which means to bind, to tie up, to tie fast, and we have the word *ligature* from the same source. So, then, a religious man is one tied and bound to obedience, by the faith that he professes.

All nations, and almost all individuals of every nation, have had a natural belief in a god, and a sort of an impression that they were not quite at liberty to do exactly as they pleased, but that they were under some obligation, on account of their belief, to do certain things and abstain from others.

Now this natural persuasion would have done great good in society, and have prevented much of that crime and misery that have abounded in the world, if men had retained THE TRUE GOD in their knowledge, which they might have done, if they had but preserved the tradition of him which Noah must have delivered to his descendants in his lifetime. Instead of this, however, men set their imaginations to work, and the devil was at hand, and ready enough to help their inventions. Sometimes he suggested to them that the sun, moon, and stars, were fitting objects of worship. Eastern nations promptly agreed with this, and paid the most profound adoration to the sun, and moon, and the host of heaven. But these luminaries were not sufficient to carry off the excess of their devotion—besides, they were not always to be seen; so they bethought them of sublunary objects—fowls of the air, and four-footed beasts, and creeping things!

Of these, above fifty species were idolized by the Egyptians; and the men who reared those imperishable monuments of skill and genius which we have noticed, held sacred the bodies of the dog, the ape, the cat, the crocodile, the horned asp, and the beetle, and embalmed their carcases after death!

The mythology of the Greeks and Romans was superior to this in many respects, and in others worse. A number of imaginary and heroic beings, represented by exquisite statuary, filled the minds or temples of the worshippers; whilst the rites practised in certain cases were of the most debasing kind. There seems also to have been this difference between the African and European idolatries: with the Egyptians there is no doubt that there was a perfect persuasion, a real belief, in the divinity of their religion. They actually feared or adored the objects mentioned, and paid their homage accordingly; whereas, there is no reason to think that the Greeks and Romans had any such impressions. On the contrary, it is nearly certain that the least educated amongst them had attained to a knowledge of the true God, though they worshipped him not as God. Again, the religion of the Asiatic Indian nations, or that of the Hindoos, which subsists

to this day, and is very different to that of any other people, is no doubt a sincere faith; and it presents a strange mixture of sublimity, malignity, and folly.

The religion of mankind has generally been described as consisting of the Jewish, the Christian, the Mahometan, and the Pagan. This is a rough division of a vast subject, but it will serve well the purpose of such a glance as we can take.

We have noticed the Pagan or Heathen systems; and it is only needful to say of the Jewish and Christian religions, to which the Scriptures bear witness, that they each proceeded, not as did the others, from the imaginations of the worshippers, but from the object worshipped. God Himself was the Author of both these systems, and their divinity is abundantly proved by the nature and the history of these religions. The Jewish system was evidently a temporary and a limited dispensation, preparatory to another; but the Jews, up to this time, will not believe this: they insist upon it, that though driven from their land, deprived of their ancient worship, embarrassed by their prophecies, and suffering under the vengeance therein predicted that the true Messiah is yet to come—that tem-

poral Redeemer, whom alone they hope or care for.

The Mahometans profess to believe in the religion of Moses, and declare that they are descended from Ishmael, the son of Abraham. They also admit that Christ was a true Prophet, but contend that Mahomet was one of a superior order, who has superseded him.

Now this Mahomet, who was born at Mecca in the year 571, and whom we take leave to call the Arabian Impostor, was not at all the sort of person, nor is his religion the kind of doctrine, that good and sensible people might have expected to proceed from God. Mahomet did not "go about doing good,"—it cannot be said of him that, "He pleased not himself." He promises his followers, instead of a heaven for the soul, a paradise for the body; and on the faith of this, calculating on such a reward, his followers have furiously fought, and rushed upon death, being very well content to exchange limited enjoyments below, for undying ones above, of the kind which they have always loved best.

The two grand doctrines of the Mahometan religion are, that there is but one God, and that Mahomet is his prophet. The first we knew before. The second is far from clear. If

Mahomet was a prophet, it is very odd that he has foretold us nothing. The Alkoran, which is his Bible, does not hint at the future destruction of a city—the dispersion of a people—far less does it tell of the triumph of a despised religion by the simple, the unlikely means of preaching.

When Mahomet was called upon for miracles, he prudently declined the office of working them; saying, that he did not need the evidence of these wonders to establish his religion: it was much easier to take the sword and become a conqueror.

By sharp and pointed arguments, directed not against the mind, but the body, and more fitted to slay a bullock than to convince a man, Mahometanism has prevailed, and spread over a large portion of Asia, Africa, and even Europe. Temporal dominion has been acquired. Apart from this, we may say that the faith of the Arabian prophet has done nothing. No one thinks of professing Mahometanism, except where that religion is the ruling power.

Now this was not the case with the religion of Christ. It had its way to make in the face of persecution. It was not advanced, but opposed by those who had dominion. According to an ancient prediction, "The rulers took counsel

together *against* the Lord, and *against* his anointed, saying, Let us break their bands asunder, and cast away their cords from us."

It is now nearly 2,000 years since Christ, the founder of our religion, appeared. In the eyes of the world at the time, it seemed certain that when Christ suffered on the Cross there was an end, not only of Him, but of *faith* in Him. His own disciples probably regarded all as lost, when they said, in deep dejection, "We *thought* that this was he who should have redeemed Israel."

And even after the Resurrection, the religion of Christ was only professed by a very few persons, generally of a low and despised condition. Who would then have thought that this marvellous faith could have survived as it has done —that it could have remained uncrushed under the trampling tyranny of a Roman emperor— that a power which could vanquish the nations could not tread out the recent spark of Christianity in Rome itself?

Let us contemplate the surprising fact at this day. After almost twenty centuries have passed, Christianity is not only the acknowledged profession of the whole civilized world, but it is the deep persuasion, the real religion of the most illustrious minds which that civilization has produced. Nations who are half barbarous,

who have no science, no literature, reject it—Jews, and Mahometans, and Hindoos, and the Chinese reject it—and infidels around us reject it, who, willingly forgetting the God that made them, will not obey any religion.

But the wise and the good, the sage and the child, receive the Christian faith. Nations, civilized by its means, acknowledge it. These believe that the God whom else they had not known, but had ignorantly worshipped, hath in these last days spoken to them by His Son, by whom also He made THE WORLDS.

GEOLOGY.

Forty or fifty years ago, our writers on the nature and conditions of this globe of ours thought they had done all that could be expected of them—they were pretty sure that they had said all that could or would be told of terrestrial matters when they had noticed the earth geographically, astronomically, and chemically. When land and sea, fire, air, earth, and water, and then the animal and vegetable worlds had been examined and disposed of, what more could be imagined regarding it?

Now, however, it seems an easy matter to wonder, that our philosophers of the past age

could have left off where they did—that they could have been satisfied to leave unexplored so much of the vast interior of things as was open to them—that they examined the shell without thinking of the substance—and that they wished to hold converse with Father Time no farther back than to the recent period when man was placed upon the globe !

We know better now; and though we have, as it were, only commenced turning over the leaves of the book of the earth after having pored so long over the title-page, we have made some most startling discoveries, such as have given religious men a new and vastly expanded view of the Divine proceedings, and have confounded the infidels exceedingly.

Unbelievers, you see, never much liked the thought, that man and the present state of things had a beginning, and that not many thousands of years ago; still less were they pleased to be told that a catastrophe was in prospect that would demolish and burn up all again, perhaps before very long—"How do you know that?" they would say; "has such a thing taken place before, and are there any probable signs of any such coming event?" Geology replies, "YES:"—that is the grand truth that has sprung out of the earth—

such things *have* been—such things *will* be ; and the transitions are still going on by which the mighty changes have been and will be accomplished.

Geology tells us plainly that which it may fidget the best of us to hear, that nothing in or upon the globe is at rest—the bed of the sea is rising, continents are sinking—the fires by which all things were once fused and mingled have never been extinguished, but are ready to fuse and mingle all again. There is no such thing as stability or security in the bowels of the mountain or in the heart of the earth. The materials provided for the use of man are fast diminishing—nature herself is burning them. All these facts point to an end, and not a very remote one. Men did not choose to take a beginning or an end of the world from the Scriptures. Well, then, stones have spoken, the earth has opened her mouth ; and concerning her own mysterious origin and awful destiny she has uttered her dark sayings—she tells us, with evidence impossible to be mistaken, IT IS ALL TRUE!

Now I have not space here for even an abridged account of the particular discoveries that have made geology so conspicuous as a science within a few years. A large volume

would only suffice for some portions of a subject that is at once so broad and deep. But I can perhaps explain the general nature of its revelations, and point to some of the most remarkable of them.

We must bear in mind, however, that man has not been permitted, either by his own subterraneous operations, or by an inspection of any natural depths or fissures in the earth, to examine more than a comparatively very thin crust of it.

The deepest mine is not a mile below the surface, and if we take the utmost extent that can be measured from the lowest opening known to the highest mountain's peak, we shall not have more than the thousandth part of the distance from the surface to the centre. The skin of an apple is much thicker in proportion than this geological crust of which we are speaking.

But little as this mile or two of earth is in comparison with the 4,000 miles to the centre, it is still enough to show us the mighty, the incessant changes which the globe has undergone. We find here layer upon layer of the earth's rocks, stones interlaid with animal and vegetable substances, alternately the produce of the land or the sea, of the fresh water or the salt ocean—

coral beds formed at the depths of that ocean, forced up till they have become islands or mountain-tops: here, the remains of immense animals now extinct—there, the surface overspread with the bones of present species; such, again, covered with sea-shells—these in their turn with chalk, which is itself a mass of shells, exquisitely minute; whilst in other regions the vegetable world has been laid prostrate—vast forests have been buried, the woody substance of trees turned into stone or coal, above which we find layers of sand or gravel, still interchanged; on the external surface of which the mingled soil of our fields is spread.

Now, it is evident that each of these strata or layers must have been the result of the rising or falling, the upheaving or the sinking down, of the unquiet shell or crust on which we live, or over which the sea, in ages inconceivably remote, rolled its tides. There is not a spot on the face of the globe that has been examined which has not apparently been sea, or lake, or river, or dry land many times; and though this may have been countless ages ago, the same alternating process is still going on. The eastern coast of England has been sinking continually as long as it has been known to man,

and thousands of acres of land have in consequence been swallowed up by the sea. The vast island of New Holland is also sinking, so that the interior is even now a swamp. The western coast of America seems rising, as does also the bed of the Pacific Ocean, so that a continent may yet appear in place of that wide expanse of waters.

Q. Is the land ever *seen* to move, whilst supposed to be rising and falling?

A. Certainly not, except in sudden instances, like that of Graham's Island, in the Mediterranean. You must bear in mind that great plots of fertile country are only a few feet above the level of the sea, and if these sink at the rate only of one foot in a century, they will in a few centuries be under water.

Q. What is the cause of all these movements—why cannot the surface of the earth lie still?

A. Simply because change being the appointed order of things, the Maker of the world has placed moving forces of the most enormous powers within the vast machine. These forces are probably fire and water—the chief agents by which man urges his locomotive engines. The fire, which we know exists beneath the land and the sea, no doubt meets with water in its course, and may upheave the land by the force

of steam. Earthquakes are visible enough, and terrible enough, as you know.

These changes, these slow, yet overwhelming operations of nature on the surface of our globe, of course have formed the great incidents in its history; but if their effects had not been registered, their results stored up, as they have been in the hills and in the depths, man could never have even guessed at the vicissitudes which the mountains and the valleys have undergone. Those vicissitudes, and an examination of the relics of periods indenfiitely remote, form the study and care of the geologist. He finds, by an inspection of the streaky sides of the cliff or the riven rock—by the materials exposed to view on the summit of the mountain or the depths of the mine, that distinct and extinct races of animals,—that forests of stately trees, and lowly herbs, of species now unknown, occupying extended tracts of country, have, during very long periods, and at exceedingly remote intervals, succeeded each other on the earth;—but that, as for man and his doings, there are no traces of him until about the time when his known history commences. He is, in fact, a new-comer, though he was scarcely aware of it; and his pride does not much like to be told that other creatures had possession here long before

him. These might have been unblessed beings, enduring their sentence during the period of chaos, and whilst as yet the visible sun had not risen.

So stands rebuked the pride of man,
Who thinks Earth moved alone for him,
But demons played
In her awful shade
Ere the first dawn had poured a beam!
Whilst Chaos reigned,
They roamed unchained,
Or ceaseless wheeled their rapid flight,
If haply they
Might find the day
At either pole; but all was Night!

Q. I suppose Geology knows nothing of such inhabitants?

A. No; but it sets the imagination to work very often. The earliest creatures whose fossil bones remain to us were of the saurian or lizard kind. Some of these appear to have been nearly one hundred feet long. There were, too, flying lizards, not much unlike the dragons of which as fabulous beasts we have heard so often. The thought of these flying creatures, which a crack-brained rhymester has supposed to be half a mile long instead of half a yard, suggested to him the idea of an engagement in the air—a battle on high. I

give you his lines on condition that you do not *print them.*

"Certainly not. I do not know how."

Attend, then. He considers, you see, that there were human giants in those days, who bestrode the flying monsters for their amusement: he calls the affair

A SKY-HUNT.

Come—turn up your eye
To the sky;
Behold what the giants are doing:
If your fingers you crook,
And between them you look,
You will see what Olympus is viewing:—
See! thousands career it fierce tempests among,
Each astride on a Pegasus half a mile long!

The air how they darken;
And hearken!
In echoing bellows, they're crying:
Ye gods, there's a bang!
How it rang
On the jowl of the beast hither flying!
There's a gape of his jaws,
I should fancy, because
The broken-skulled monster is dying!
Thickly patters the blood,
And makes horrible mud,
Dead giants around me are lying:
Oh, he comes, twisting down, dreadful wretch, as he is!—
Enough of the sky-hunt, good Sir, if you please.

The flying lizard, or pterodactyle, was not, as I have said, more than a few feet long, if we can judge by the remains discovered. Such creatures, however, would have dreadfully annoyed human beings, and we are thankful, therefore, that their time was come and gone before ours: they were of the reptile kind.

But there have been enormous bones discovered of quadrupeds which must have far surpassed the elephant in size. The Megatherium was almost as big as a house, and, perhaps, quite as heavy. His food was evidently of the vegetable kind, and he had strength sufficient to uproot forests, and to masticate the timber. Such creatures seem to have required a world to themselves, and it is probable that they so had it; but I must soon conclude my notices of these things.

Another marvellous fact, revealed to us by geology, is this, that animals of known species, but now only met with in tropical climates, once existed in the northern countries and on the shores of Britain, where bones of the elephant and hyena have frequently been found. I have not met with any satisfactory explanation of this. Either Britain must have been then warm enough for them, or they must have been cast or floated here by some vast convulsion.

But the great fact of geology, and that which should, perhaps, most fix our thoughts, is this —that the entire crust or shell of the globe, at the depth of only a mile or two, has, at some remote period, undergone the influence of intense heat—in fact, it has been in a melted state. Since that time we know that creatures of every kind must have been created. There is an end, therefore, to the absurd notion once entertained by some, that the world of animated beings always existed on our globe as they do now. It is found, on digging deep enough, or on examining portions of rock that have been forced by nature from greater depths, that a clear substance, a once molten rock, free from any animal or vegetable remains, rises to view—this is the well-known granite of our masons.

If, therefore, fire has before prevailed, and reduced all things to a simple state of fusion; if that fire, so far from having been extinguished, seems only partially subdued; if it spouts forth in dreadful torrents—heaves continents in its progress, and seems even now to traverse the globe at no great distance from the surface—it cannot be unreasonable to conclude that it is still reserved for some similar purpose of external conflagration. I say, we might well

suppose so; but the Bible has long settled the matter. The sacred writers, without any scientific aids, without any natural knowledge of such a thing as a burning mountain, boldly predicted this result before Vesuvius had exhibited its flames to the eye of man. Urged, instructed by Inspiration alone, they wrote, "The elements shall melt with fervent heat; the earth also, and the works therein, shall be burnt up." Let us never forget that the fire is already kindled.

CONCLUSION.

THUS we have nearly completed our "Glance at the Globe"—a glance indeed it has been when we consider that our ball of earth, which appears so small in comparison with many of the heavenly spheres, presents a surface for observation of 196,663,000 square miles.

But how could we be situated to obtain more than a glance—the largest and the clearest view of all this, so, I mean, as to gain the best sight of the most interesting objects, small and great? Shall we stand, or stoop, poring over a garden

or a meadow; or shall we run—shall we fly from place to place to see the most we can in a day?

We should know little more than the horses or the crows do, by such a proceeding, and we should have as little to say about the matter. And if we could become ourselves so far fixed, as that the earth, like a school-globe, should revolve without us, such would be the rapidity at which the surface would pass beneath our eyes—about 450 miles an hour at our latitude—that we could not possibly distinguish land from water, houses from hay-stacks; and if not put out of harm's way, by being hung up some five or six miles high in the air, we should be in danger of an awful thump, from the summit of some careering mountain, that would send us to the moon perhaps, to take such a glance at the globe as our frontispiece represents.

I forgot, when I was discoursing on the subject of planetary dimensions, to suggest the way in which my readers may judge for themselves as to the fact of the sublime—the terribly enormous appearance, which the solar globes would exhibit at greatly diminished distances. I should have thought of this the better to explain the lines on "An approach to the Sun." Now attend.

Take a large orange, say one three inches in

diameter; now go out of doors, where you can see the horizon, and hold the orange between finger and thumb, at just three inches from your eye—let some one else tell you when it is right in that respect; now move the orange till the lower outline of it touches apparently the horizon line, and then cast your eye up to that part of the sky where the top of the orange seems to be. Look at it also as well as you can from side to side: it is rather too near for distinct vision.

Now, supposing that the orange were a perfect globe of the size mentioned, and that its distance from your eye were also exactly three inches, it would occupy, or rather hide, just as much of the sky as the sun would, if he were also at the distance of *his own diameter* from your eye; he would then be within 880,000 miles of you instead of 95,000,000, as at present.

This is true, of course, of any globe, of whatever size; and by this rule I find that if the sun were brought to the distance of about 200,000 miles of us, or rather less than one-fourth of his diameter, he would, as the mathematicians say, subtend an angle of about ninety degrees, which, you know, is a quarter of a circle; so that, supposing his lower edge just touched the horizon, his upper visible curve would reach the zenith, or the point immediately over head.

This, probably, is the view that comets have of that vast radiant orb!

Thus we see, the moon also may be judged of as to apparent magnitude; but she must be brought within about 200 miles of the earth, to occupy ninety degrees of the heavens. If once so near, she must be kept at that distance by a special miracle, or she would presently be down upon us! And what would the sun do if his enormous body were brought as close as I have supposed? He would remain nearly unmoved; the earth's attraction would have no effect upon him that could be measured; but the sun's power of attracting the earth would be so inconceivably great, that she would rush towards him at a speed about 100 times faster than that of a cannon-ball!

I should add, that if you would like a glance at *our* globe on this scale of apparent magnitude, you must rise about 2,000 miles from its surface, and this, I believe, is the most of it that would be seen at any distance.

Such, in fact, are the real distances and dimensions of the solar and planetary spheres, that it is exceedingly difficult to find room for the ideas of them in the mind; and when we do obtain something like a glimpse of the reality, we may perhaps be ready to ask, not only what

is man that his body should be conveyed by such vast machinery, but why is the machinery so vast?

But if we consider again, we shall find that neither the earth nor the sun, for instance, are at all too large for the uses assigned to them; and if they are not too big, I dare say Jupiter is but little out of the way. The earth certainly is not disproportioned to the accommodation and sustenance of the beings that may exist upon it; and if nations go on increasing, it will be much too small for them in a few thousand years. This, probably, is the case with all the other planets.

And if these planets are to revolve as they do, they are not too far from the sun, nor from each other, for as it is, they a little disturb one another. The moon, as we have seen, pulls the ocean about every day, and even Jupiter tugs at us now and then. As to the sun, if he were less than he is, he could not keep his family in order round him, nor control their motions: if he were smaller, we should fly off into space; if larger, we should all plunge into his fiery furnace some day or another.

It seems, then, that the size of the sun himself has some relation to that of the creatures whose existence depends upon him. Yes—for a

man, or a horse, requires so much corn, or so much grass to keep him—and that corn, or that grass, requires so much space, and so much rain and sunshine to produce it; so that, if there were less of all these,—men and horses, and all other creatures, would find that they were on a wrong planet, under a wrong sun, and that a mistake had been made which must eventually prove fatal to them all. You would not have had your Christmas dinner if the sun had not been what it is, so he and your plum-pudding are related to each other!

And some persons, in turning a globe about, or in casting their eyes over maps of its surface, may wonder at the extent of sea they find: they regard the ocean almost as so much waste! But if they reflect and think again, they will find that this vast proportion of water is needful to supply the wants of the land. Rain comes from the clouds, and clouds come from the sea by evaporation. These rains water the earth, in general, just sufficiently and not more. Suppose, then, that the Pacific and Atlantic oceans were to become continents: America and Europe must then become arid deserts. Britain would soon miss, not only the fertilizing rains, but also the warmth proceeding from the ocean. The new continents and the

old ones would be, or become uninhabitable regions. England would be like Iceland, at the best.

Then, again, as to the air, it is compounded of various ingredients, each of which, if alone, or if wanting, would render it fatal to every thing that breathes; and as to its quantity, there is just enough of it to make us comfortable. Had the weight and quantity been very different from what they are, the present race of creatures would not have existed. In ascending high mountains, where the pressure of the atmosphere is greatly reduced, the respiration of the traveller becomes difficult and painful, attended with bleeding at the nose and ears; and if the air had been much heavier, we should all, whether travellers or not, have been in the same manner inconvenienced, and soon destroyed, whilst the slightest gusts would have blown us down, and strong winds would have driven the water into a heap, and, perhaps, have upset the mountains in their terrific course!

And what would have been the case, if the temperature of the globe had not been specially regulated to the degree which the bodies of animals could either endure or require? It is found that the heat of the earth increases constantly as we descend from the surface; and if

this increase continues, there must be, a very few miles beneath the path we tread, a heat of great intensity. It seems probable that Mother Earth had once a very red face indeed—was, in fact, a red-hot ball through and through; and then, don't you see, she must have been visible by her own light, as the fixed stars, and, it may be, some of the distant planets are now; or those last, like the earth, may have just cooled down to the temperature convenient for animal existence. In that case, their distance from the sun is of little consequence.

But suppose now, that the sun himself should cool down, and like a poker taken from the fire, become less and less radiant, till at length it has lost all its light and heat! This may be be so at some far distant period, and it seems to have been the case with some of the stars, which have disappeared from the heavens. The earth, however, has evidently fire enough within it to burst out again and destroy all that is inflammable on its surface, and we cannot tell when this may occur. You see, therefore, how entirely dependent we are on a variety of circumstances connected with the condition of our globe. But He who made the worlds manages all these things, and we also are His workmanship—it is a comfort to think of that;

and it is more than a comfort to know that he will take special care of each of us, if we trust in Him.

There is much, you see, that we *can* understand, and see the reason of, and rejoice in, connected with our earth, and which may be taken in, as it were, at a glance. Yet this is little, indeed, compared with the things of which we could take no notice, or of which, if we had studied them ever so intently, we could have understood nothing at all. Thus, the nature and composition of light; the source and causes of electricity and magnetism, and the various species of attraction; the principle of life, or vitality, as it is called, and almost all the final laws which govern matter,—have been hidden since the time when the human mind first began to inquire about them. These are among the secret things which belong unto God. They are not only unrevealed, as were the sciences in general, but they have not been discovered by those who have constantly endeavoured to search them out.

And if matter (that is, body, substance, any thing noticed by the senses)—if that which we can see, or hear, or feel, is so incomprehensible to the mind, what shall we say of the mind itself—what of THE SOUL OF MAN? It

is in vain that we strive to obtain even a glance at that living being, associated with the body, which thinks, and remembers, and resolves—which commands our limbs, and seizes on the powers of nature, that they may do its bidding. Shall the soul of man, which fain would comprehend the Universe in its grasp, which would recall the first facts that Time could tell, and stretches forth even now with strenuous desire towards eternity,—shall this spiritual being inhabit no other home than this vile body—enjoy no longer existence than its threescore years and ten?—The soul of the savage expects other things than this, but the soul of the Christian *knows* that this corruptible must put on incorruption, that this mortal must put on immortality!

THE END.

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