CHARLES KINGSLEY

MADAM HOW AND LADY WHY; OR, FIRST LESSONS IN EARTH LORE FOR CHILDREN

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Kingsley C.

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Содержание

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PREFACE

My dear boys,—When I was your age, there were no such children's books as there are now. Those which we had were few and dull, and the pictures in them ugly and mean: while you have your choice of books without number, clear, amusing, and pretty, as well as really instructive, on subjects which were only talked of fifty years ago by a few learned men, and very little understood even by them. So if mere reading of books would make wise men, you ought to grow up much wiser than us old fellows. But mere reading of wise books will not make you wise men: you must use for yourselves the tools with which books are made wise; and that is—your eyes, and ears, and common sense.

Now, among those very stupid old-fashioned boys' books was one which taught me that; and therefore I am more grateful to it than if it had been as full of wonderful pictures as all the natural history books you ever saw. Its name was *Evenings at Home*; and in it was a story called "Eyes and no Eyes;" a regular old-fashioned, prim, sententious story; and it began thus:—

"Well, Robert, where have you been walking this afternoon?" said Mr. Andrews to one of his pupils at the close of a holiday.

Oh—Robert had been to Broom Heath, and round by Camp Mount, and home through the meadows. But it was very dull. He hardly saw a single person. He had much rather have gone by the turnpike-road.

Presently in comes Master William, the other pupil, dressed, I suppose, as wretched boys used to be dressed forty years ago, in a frill collar, and skeleton monkey-jacket, and tight trousers buttoned over it, and hardly coming down to his ancles; and low shoes, which always came off in sticky ground; and terribly dirty and wet he is: but he never (he says) had such a pleasant walk in his life; and he has brought home his handkerchief (for boys had no pockets in those days much bigger than key-holes) full of curiosities.

He has got a piece of mistletoe, wants to know what it is; and he has seen a woodpecker, and a wheat-ear, and gathered strange flowers on the heath; and hunted a peewit because he thought its wing was broken, till of course it led him into a bog, and very wet he got. But he did not mind it, because he fell in with an old man cutting turf, who told him all about turf-cutting, and gave him a dead adder. And then he went up a hill, and saw a grand prospect; and wanted to go again, and make out the geography of the country from Cary's old county maps, which were the only maps in those days. And then, because the hill was called Camp Mount, he looked for a Roman camp, and found one; and then he went down to the river, saw twenty things more; and so on, and so on, till he had brought home curiosities enough, and thoughts enough, to last him a week.

Whereon Mr. Andrews, who seems to have been a very sensible old gentleman, tells him all about his curiosities: and then it comes out—if you will believe it—that Master William has been over the very same ground as Master Robert, who saw nothing at all.

Whereon Mr. Andrews says, wisely enough, in his solemn old-fashioned way,—

"So it is. One man walks through the world with his eyes open, another with his eyes shut; and upon this difference depends all the superiority of knowledge which one man acquires over another. I have known sailors who had been in all the quarters of the world, and could tell you nothing but the signs of the tippling-houses, and the price and quality of the liquor. On the other hand, Franklin could not cross the Channel without making observations useful to mankind. While many a vacant

thoughtless youth is whirled through Europe without gaining a single idea worth crossing the street for, the observing eye and inquiring mind find matter of improvement and delight in every ramble. You, then, William, continue to use your eyes. And you, Robert, learn that eyes were given to you to use."

So said Mr. Andrews: and so I say, dear boys—and so says he who has the charge of you—to you. Therefore I beg all good boys among you to think over this story, and settle in their own minds whether they will be eyes or no eyes; whether they will, as they grow up, look and see for themselves what happens: or whether they will let other people look for them, or pretend to look; and dupe them, and lead them about—the blind leading the blind, till both fall into the ditch.

I say "good boys;" not merely clever boys, or prudent boys: because using your eyes, or not using them, is a question of doing Right or doing Wrong. God has given you eyes; it is your duty to God to use them. If your parents tried to teach you your lessons in the most agreeable way, by beautiful picture-books, would it not be ungracious, ungrateful, and altogether naughty and wrong, to shut your eyes to those pictures, and refuse to learn? And is it not altogether naughty and wrong to refuse to learn from your Father in Heaven, the Great God who made all things, when he offers to teach you all day long by the most beautiful and most wonderful of all picture-books, which is simply all things which you can see, hear, and touch, from the sun and stars above your head to the mosses and insects at your feet? It is your duty to learn His lessons: and it is your interest. God's Book, which is the Universe, and the reading of God's Book, which is Science, can do you nothing but good, and teach you nothing but truth and wisdom. God did not put this wondrous world about your young souls to tempt or to mislead them. If you ask Him for a fish, he will not give you a serpent. If you ask Him for bread, He will not give you a stone.

So use your eyes and your intellect, your senses and your brains, and learn what God is trying to teach you continually by them. I do not mean that you must stop there, and learn nothing more. Anything but that. There are things which neither your senses nor your brains can tell you; and they are not only more glorious, but actually more true and more real than any things which you can see or touch. But you must begin at the beginning in order to end at the end, and sow the seed if you wish to gather the fruit. God has ordained that you, and every child which comes into the world, should begin by learning something of the world about him by his senses and his brain; and the better you learn what they can teach you, the more fit you will be to learn what they cannot teach you. The more you try now to understand *things*, the more you will be able hereafter to understand men, and That which is above men. You began to find out that truly Divine mystery, that you had a mother on earth, simply by lying soft and warm upon her bosom; and so (as Our Lord told the Jews of old) it is by watching the common natural things around you, and considering the lilies of the field, how they grow, that you will begin at least to learn that far Diviner mystery, that you have a Father in Heaven. And so you will be delivered (if you will) out of the tyranny of darkness, and distrust, and fear, into God's free kingdom of light, and faith, and love; and will be safe from the venom of that tree which is more deadly than the fabled upas of the East. Who planted that tree I know not, it was planted so long ago: but surely it is none of God's planting, neither of the Son of God: yet it grows in all lands and in all climes, and sends its hidden suckers far and wide, even (unless we be watchful) into your hearts and mine. And its name is the Tree of Unreason, whose roots are conceit and ignorance, and its juices folly and death. It drops its venom into the finest brains; and makes them call sense, nonsense; and nonsense, sense; fact, fiction; and fiction, fact. It drops its venom into the tenderest hearts, alas! and makes them call wrong, right; and right, wrong; love, cruelty; and cruelty, love. Some say that the axe is laid to the root of it just now, and that it is already tottering to its fall: while others say that it is growing stronger than ever, and ready to spread its upas-shade over the whole earth. For my part, I know not, save that all shall be as God wills. The tree has been cut down already again and again; and yet has always thrown out fresh shoots and dropped fresh poison from its boughs. But this at

least I know: that any little child, who will use the faculties God has given him, may find an antidote to all its poison in the meanest herb beneath his feet.

There, you do not understand me, my boys; and the best prayer I can offer for you is, perhaps, that you should never need to understand me: but if that sore need should come, and that poison should begin to spread its mist over your brains and hearts, then you will be proof against it; just in proportion as you have used the eyes and the common sense which God has given you, and have considered the lilies of the field, how they grow.

C. KINGSLEY.

CHAPTER I—THE GLEN

You find it dull walking up here upon Hartford Bridge Flat this sad November day? Well, I do not deny that the moor looks somewhat dreary, though dull it need never be. Though the fog is clinging to the fir-trees, and creeping among the heather, till you cannot see as far as Minley Corner, hardly as far as Bramshill woods—and all the Berkshire hills are as invisible as if it was a dark midnight—yet there is plenty to be seen here at our very feet. Though there is nothing left for you to pick, and all the flowers are dead and brown, except here and there a poor half-withered scrap of bottle-heath, and nothing left for you to catch either, for the butterflies and insects are all dead too, except one poor old Daddy-long-legs, who sits upon that piece of turf, boring a hole with her tail to lay her eggs in, before the frost catches her and ends her like the rest: though all things, I say, seem dead, yet there is plenty of life around you, at your feet, I may almost say in the very stones on which you tread. And though the place itself be dreary enough, a sheet of flat heather and a little glen in it, with banks of dead fern, and a brown bog between them, and a few fir-trees struggling up —yet, if you only have eyes to see it, that little bit of glen is beautiful and wonderful,—so beautiful and so wonderful and so cunningly devised, that it took thousands of years to make it; and it is not, I believe, half finished yet.

How do I know all that? Because a fairy told it me; a fairy who lives up here upon the moor, and indeed in most places else, if people have but eyes to see her. What is her name? I cannot tell. The best name that I can give her (and I think it must be something like her real name, because she will always answer if you call her by it patiently and reverently) is Madam How. She will come in good time, if she is called, even by a little child. And she will let us see her at her work, and, what is more, teach us to copy her. But there is another fairy here likewise, whom we can hardly hope to see. Very thankful should we be if she lifted even the smallest corner of her veil, and showed us but for a moment if it were but her finger tip—so beautiful is she, and yet so awful too. But that sight, I believe, would not make us proud, as if we had had some great privilege. No, my dear child: it would make us feel smaller, and meaner, and more stupid and more ignorant than we had ever felt in our lives before; at the same time it would make us wiser than ever we were in our lives before—that one glimpse of the great glory of her whom we call Lady Why.

But I will say more of her presently. We must talk first with Madam How, and perhaps she may help us hereafter to see Lady Why. For she is the servant, and Lady Why is the mistress; though she has a Master over her again—whose name I leave for you to guess. You have heard it often already, and you will hear it again, for ever and ever.

But of one thing I must warn you, that you must not confound Madam How and Lady Why. Many people do it, and fall into great mistakes thereby,—mistakes that even a little child, if it would think, need not commit. But really great philosophers sometimes make this mistake about Why and How; and therefore it is no wonder if other people make it too, when they write children's books about the wonders of nature, and call them "Why and Because," or "The Reason Why." The books are very good books, and you should read and study them: but they do not tell you really "Why and Because," but only "How and So." They do not tell you the "Reason Why" things happen, but only "The Way in which they happen." However, I must not blame these good folks, for I have made the same mistake myself often, and may do it again: but all the more shame to me. For see—you know perfectly the difference between How and Why, when you are talking about yourself. If I ask you, "Why did we go out to-day?" You would not answer, "Because we opened the door." That is the answer to "How did we go out?" The answer to Why did we go out is, "Because we chose to take a walk." Now when we talk about other things beside ourselves, we must remember this same difference between How and Why. If I ask you, "Why does fire burn you?" you would answer, I suppose, being a little boy, "Because it is hot;" which is all you know about it. But if you were a great

chemist, instead of a little boy, you would be apt to answer me, I am afraid, “Fire burns because the vibratory motion of the molecules of the heated substance communicates itself to the molecules of my skin, and so destroys their tissue;” which is, I dare say, quite true: but it only tells us how fire burns, the way or means by which it burns; it does not tell us the reason why it burns.

But you will ask, “If that is not the reason why fire burns, what is?” My dear child, I do not know. That is Lady Why’s business, who is mistress of Mrs. How, and of you and of me; and, as I think, of all things that you ever saw, or can see, or even dream. And what her reason for making fire burn may be I cannot tell. But I believe on excellent grounds that her reason is a very good one.

If I dare to guess, I should say that one reason, at least, why fire burns, is that you may take care not to play with it, and so not only scorch your finger, but set your whole bed on fire, and perhaps the house into the bargain, as you might be tempted to do if putting your finger in the fire were as pleasant as putting sugar in your mouth.

My dear child, if I could once get clearly into your head this difference between Why and How, so that you should remember them steadily in after life, I should have done you more good than if I had given you a thousand pounds.

But now that we know that How and Why are two very different matters, and must not be confounded with each other, let us look for Madam How, and see her at work making this little glen; for, as I told you, it is not half made yet. One thing we shall see at once, and see it more and more clearly the older we grow; I mean her wonderful patience and diligence. Madam How is never idle for an instant. Nothing is too great or too small for her; and she keeps her work before her eye in the same moment, and makes every separate bit of it help every other bit. She will keep the sun and stars in order, while she looks after poor old Mrs. Daddy-long-legs there and her eggs. She will spend thousands of years in building up a mountain, and thousands of years in grinding it down again; and then carefully polish every grain of sand which falls from that mountain, and put it in its right place, where it will be wanted thousands of years hence; and she will take just as much trouble about that one grain of sand as she did about the whole mountain. She will settle the exact place where Mrs. Daddy-long-legs shall lay her eggs, at the very same time that she is settling what shall happen hundreds of years hence in a stair millions of miles away. And I really believe that Madam How knows her work so thoroughly, that the grain of sand which sticks now to your shoe, and the weight of Mrs. Daddy-long-legs’ eggs at the bottom of her hole, will have an effect upon suns and stars ages after you and I are dead and gone. Most patient indeed is Madam How. She does not mind the least seeing her own work destroyed; she knows that it must be destroyed. There is a spell upon her, and a fate, that everything she makes she must unmake again: and yet, good and wise woman as she is, she never frets, nor tires, nor fudges her work, as we say at school. She takes just as much pains to make an acorn as to make a peach. She takes just as much pains about the acorn which the pig eats, as about the acorn which will grow into a tall oak, and help to build a great ship. She took just as much pains, again, about the acorn which you crushed under your foot just now, and which you fancy will never come to anything. Madam How is wiser than that. She knows that it will come to something.

She will find some use for it, as she finds a use for everything. That acorn which you crushed will turn into mould, and that mould will go to feed the roots of some plant, perhaps next year, if it lies where it is; or perhaps it will be washed into the brook, and then into the river, and go down to the sea, and will feed the roots of some plant in some new continent ages and ages hence: and so Madam How will have her own again. You dropped your stick into the river yesterday, and it floated away.

You were sorry, because it had cost you a great deal of trouble to cut it, and peel it, and carve a head and your name on it. Madam How was not sorry, though she had taken a great deal more trouble with that stick than ever you had taken. She had been three years making that stick, out of many things, sunbeams among the rest. But when it fell into the river, Madam How knew that she should not lose her sunbeams nor anything else: the stick would float down the river, and on into the sea; and there, when it got heavy with the salt water, it would sink, and lodge, and be buried, and perhaps ages hence

turn into coal; and ages after that some one would dig it up and burn it, and then out would come, as bright warm flame, all the sunbeams that were stored away in that stick: and so Madam How would have her own again. And if that should not be the fate of your stick, still something else will happen to it just as useful in the long run; for Madam How never loses anything, but uses up all her scraps and odds and ends somehow, somewhere, somewhen, as is fit and proper for the Housekeeper of the whole Universe. Indeed, Madam How is so patient that some people fancy her stupid, and think that, because she does not fall into a passion every time you steal her sweets, or break her crockery, or disarrange her furniture, therefore she does not care. But I advise you as a little boy, and still more when you grow up to be a man, not to get that fancy into your head; for you will find that, however good-natured and patient Madam How is in most matters, her keeping silence and not seeming to see you is no sign that she has forgotten. On the contrary, she bears a grudge (if one may so say, with all respect to her) longer than any one else does; because she will always have her own again.

Indeed, I sometimes think that if it were not for Lady Why, her mistress, she might bear some of her grudges for ever and ever. I have seen men ere now damage some of Madam How's property when they were little boys, and be punished by her all their lives long, even though she had mended the broken pieces, or turned them to some other use. Therefore I say to you, beware of Madam How.

She will teach you more kindly, patiently, and tenderly than any mother, if you want to learn her trade. But if, instead of learning her trade, you damage her materials and play with her tools, beware lest she has her own again out of you.

Some people think, again, that Madam How is not only stupid, but ill-tempered and cruel; that she makes earthquakes and storms, and famine and pestilences, in a sort of blind passion, not caring where they go or whom they hurt; quite heedless of who is in the way, if she wants to do anything or go anywhere. Now, that Madam How can be very terrible there can be no doubt: but there is no doubt also that, if people choose to learn, she will teach them to get out of her way whenever she has business to do which is dangerous to them. But as for her being cruel and unjust, those may believe it who like. You, my dear boys and girls, need not believe it, if you will only trust to Lady Why; and be sure that Why is the mistress and How the servant, now and for ever. That Lady Why is utterly good and kind I know full well; and I believe that, in her case too, the old proverb holds, "Like mistress, like servant;" and that the more we know of Madam How, the more we shall be content with her, and ready to submit to whatever she does: but not with that stupid resignation which some folks preach who do not believe in lady Why—that is no resignation at all. That is merely saying—

> "What can't be cured
> Must be endured,"

like a donkey when he turns his tail to a hail-storm,—but the true resignation, the resignation which is fit for grown people and children alike, the resignation which is the beginning and the end of all wisdom and all religion, is to believe that Lady Why knows best, because she herself is perfectly good; and that as she is mistress over Madam How, so she has a Master over her, whose name—I say again—I leave you to guess.

So now that I have taught you not to be afraid of Madam How, we will go and watch her at her work; and if we do not understand anything we see, we will ask her questions. She will always show us one of her lesson books if we give her time. And if we have to wait some time for her answer, you need not fear catching cold, though it is November; for she keeps her lesson books scattered about in strange places, and we may have to walk up and down that hill more than once before we can make out how she makes the glen.

Well—how was the glen made? You shall guess it if you like, and I will guess too. You think, perhaps, that an earthquake opened it?

My dear child, we must look before we guess. Then, after we have looked a little, and got some grounds for guessing, then we may guess. And you have no ground for supposing there ever was an earthquake here strong enough to open that glen. There may have been one: but we must guess from what we do know, and not from what we do not.

Guess again. Perhaps it was there always, from the beginning of the world? My dear child, you have no proof of that either. Everything round you is changing in shape daily and hourly, as you will find out the longer you live; and therefore it is most reasonable to suppose that this glen has changed its shape, as everything else on earth has done. Besides, I told you not that Madam How had made the glen, but that she was making it, and as yet has only half finished. That is my first guess; and my next guess is that water is making the glen—water, and nothing else.

You open your young eyes. And I do not blame you. I looked at this very glen for fifteen years before I made that guess; and I have looked at it some ten years since, to make sure that my guess held good. For man after all is very blind, my dear boy, and very stupid, and cannot see what lies under his own feet all day long; and if Lady Why, and He whom Lady Why obeys, were not very patient and gentle with mankind, they would have perished off the face of the earth long ago, simply from their own stupidity. I, at least, was very stupid in this case, for I had my head full of earthquakes, and convulsions of nature, and all sorts of prodigies which never happened to this glen; and so, while I was trying to find what was not there, I of course found nothing. But when I put them all out of my head, and began to look for what was there, I found it at once; and lo and behold! I had seen it a thousand times before, and yet never learnt anything from it, like a stupid man as I was; though what I learnt you may learn as easily as I did.

And what did I find?

The pond at the bottom of the glen.

You know that pond, of course? You don't need to go there? Very well. Then if you do, do not you know also that the pond is always filling up with sand and mud; and that though we clean it out every three or four years, it always fills again? Now where does that sand and mud come from?

Down that stream, of course, which runs out of this bog. You see it coming down every time there is a flood, and the stream fouls.

Very well. Then, said Madam How to me, as soon as I recollected that, "Don't you see, you stupid man, that the stream has made the glen, and the earth which runs down the stream was all once part of the hill on which you stand." I confess I was very much ashamed of myself when she said that. For that is the history of the whole mystery. Madam How is digging away with her soft spade, water. She has a harder spade, or rather plough, the strongest and most terrible of all ploughs; but that, I am glad to say, she has laid by in England here.

Water? But water is too simple a thing to have dug out all this great glen.

My dear child, the most wonderful part of Madam How's work is, that she does such great things and so many different things, with one and the same tool, which looks to you so simple, though it really is not so. Water, for instance, is not a simple thing, but most complicated; and we might spend hours in talking about water, without having come to the end of its wonders. Still Madam How is a great economist, and never wastes her materials. She is like the sailor who boasted (only she never boasts) that, if he had but a long life and a strong knife, he would build St. Paul's Cathedral before he was done. And Madam How has a very long life, and plenty of time; and one of the strongest of all her tools is water. Now if you will stoop down and look into the heather, I will show you how she is digging out the glen with this very mist which is hanging about our feet. At least, so I guess.

For see how the mist clings to the points of the heather leaves, and makes drops. If the hot sun came out the drops would dry, and they would vanish into the air in light warm steam. But now that it is dark and cold they drip, or run down the heather-stems, to the ground. And whither do they go then? Whither will the water go,—hundreds of gallons of it perhaps,—which has dripped and run through the heather in this single day? It will sink into the ground, you know. And then

what will become of it? Madam How will use it as an underground spade, just as she uses the rain (at least, when it rains too hard, and therefore the rain runs off the moor instead of sinking into it) as a spade above ground.

Now come to the edge of the glen, and I will show you the mist that fell yesterday, perhaps, coming out of the ground again, and hard at work.

You know of what an odd, and indeed of what a pretty form all these glens are. How the flat moor ends suddenly in a steep rounded bank, almost like the crest of a wave—ready like a wave-crest to fall over, and as you know, falling over sometimes, bit by bit, where the soil is bare.

Oh, yes; you are very fond of those banks. It is "awfully jolly," as you say, scrambling up and down them, in the deep heath and fern; besides, there are plenty of rabbit-holes there, because they are all sand; while there are no rabbit-holes on the flat above, because it is all gravel.

Yes; you know all about it: but you know, too, that you must not go too far down these banks, much less roll down them, because there is almost certain to be a bog at the bottom, lying upon a gentle slope; and there you get wet through.

All round these hills, from here to Aldershot in one direction, and from here to Windsor in another, you see the same shaped glens; the wave-crest along their top, and at the foot of the crest a line of springs which run out over the slopes, or well up through them in deep sand-galls, as you call them—shaking quagmires which are sometimes deep enough to swallow up a horse, and which you love to dance upon in summer time. Now the water of all these springs is nothing but the rain, and mist, and dew, which has sunk down first through the peaty soil, and then through the gravel and sand, and there has stopped. And why? Because under the gravel (about which I will tell you a strange story one day) and under the sand, which is what the geologists call the Upper Bagshot sand, there is an entirely different set of beds, which geologists call the Bracklesham beds, from a place near the New Forest; and in those beds there is a vein of clay, and through that clay the water cannot get, as you have seen yourself when we dug it out in the field below to puddle the pond-head; and very good fun you thought it, and a very pretty mess you made of yourself. Well: because the water cannot get though this clay, and must go somewhere, it runs out continually along the top of the clay, and as it runs undermines the bank, and brings down sand and gravel continually for the next shower to wash into the stream below.

Now think for one moment how wonderful it is that the shape of these glens, of which you are so fond, was settled by the particular order in which Madam How laid down the gravel and sand and mud at the bottom of the sea, ages and ages ago. This is what I told you, that the least thing that Madam How does to-day may take effect hundreds and thousands of years hence.

But I must tell you I think there was a time when this glen was of a very different shape from what it is now; and I dare say, according to your notions, of a much prettier shape. It was once just like one of those Chines which we used to see at Bournemouth. You recollect them? How there was a narrow gap in the cliff of striped sands and gravels; and out of the mouth of that gap, only a few feet across, there poured down a great slope of mud and sand the shape of half a bun, some wet and some dry, up which we used to scramble and get into the Chine, and call the Chine what it was in the truest sense, Fairyland. You recollect how it was all eaten out into mountain ranges, pinnacles, steep cliffs of white, and yellow, and pink, standing up against the clear blue sky; till we agreed that, putting aside the difference of size, they were as beautiful and grand as any Alps we had ever seen in pictures. And how we saw (for there could be no mistake about it there) that the Chine was being hollowed out by the springs which broke out high up the cliff, and by the rain which wore the sand into furrowed pinnacles and peaks. You recollect the beautiful place, and how, when we looked back down it we saw between the miniature mountain walls the bright blue sea, and heard it murmur on the sands outside. So I verily believe we might have done, if we had stood somewhere at the bottom of this glen thousands of years ago. We should have seen the sea in front of us; or rather, an arm of the sea; for Finchampstead ridges opposite, instead of being covered with farms, and woodlands,

and purple heath above, would have been steep cliffs of sand and clay, just like those you see at Bournemouth now; and—what would have spoilt somewhat the beauty of the sight—along the shores there would have floated, at least in winter, great blocks and floes of ice, such as you might have seen in the tideway at King's Lynn the winter before last, growling and crashing, grubbing and ploughing the sand, and the gravel, and the mud, and sweeping them away into seas towards the North, which are now all fruitful land. That may seem to you like a dream: yet it is true; and some day, when we have another talk with Madam How, I will show even a child like you that it was true.

But what could change a beautiful Chine like that at Bournemouth into a wide sloping glen like this of Bracknell's Bottom, with a wood like Coombs', many acres large, in the middle of it? Well now, think. It is a capital plan for finding out Madam How's secrets, to see what she might do in one place, and explain by it what she has done in another. Suppose now, Madam How had orders to lift up the whole coast of Bournemouth only twenty or even ten feet higher out of the sea than it is now. She could do that easily enough, for she has been doing so on the coast of South America for ages; she has been doing so this very summer in what hasty people would call a hasty, and violent, and ruthless way; though I shall not say so, for I believe that Lady Why knows best. She is doing so now steadily on the west coast of Norway, which is rising quietly—all that vast range of mountain wall and iron-bound cliff—at the rate of some four feet in a hundred years, without making the least noise or confusion, or even causing an extra ripple on the sea; so light and gentle, when she will, can Madam How's strong finger be.

Now, if the mouth of that Chine at Bournemouth was lifted twenty feet out of the sea, one thing would happen,—that the high tide would not come up any longer, and wash away the cake of dirt at the entrance, as we saw it do so often. But if the mud stopped there, the mud behind it would come down more slowly, and lodge inside more and more, till the Chine was half filled-up, and only the upper part of the cliffs continue to be eaten away, above the level where the springs ran out. So gradually the Chine, instead of being deep and narrow, would become broad and shallow; and instead of hollowing itself rapidly after every shower of rain, as you saw the Chine at Bournemouth doing, would hollow itself out slowly, as this glen is doing now. And one thing more would happen,—when the sea ceased to gnaw at the foot of the cliffs outside, and to carry away every stone and grain of sand which fell from them, the cliffs would very soon cease to be cliffs; the rain and the frost would still crumble them down, but the dirt that fell would lie at their feet, and gradually make a slope of dry land, far out where the shallow sea had been; and their tops, instead of being steep as now, would become smooth and rounded; and so at last, instead of two sharp walls of cliff at the Chine's mouth, you might have—just what you have here at the mouth of this glen,—our Mount and the Warren Hill,—long slopes with sheets of drifted gravel and sand at their feet, stretching down into what was once an icy sea, and is now the Vale of Blackwater. And this I really believe Madam How has done simply by lifting Hartford Bridge Flat a few more feet out of the sea, and leaving the rest to her trusty tool, the water in the sky.

That is my guess: and I think it is a good guess, because I have asked Madam How a hundred different questions about it in the last ten years, and she always answered them in the same way, saying, "Water, water, you stupid man." But I do not want you merely to depend on what I say. If you want to understand Madam How, you must ask her questions yourself, and make up your mind yourself like a man, instead of taking things at hearsay or second-hand, like the vulgar. Mind, by "the vulgar" I do not mean poor people: I mean ignorant and uneducated people, who do not use their brains rightly, though they may be fine ladies, kings, or popes. The Bible says, "Prove all things: hold fast that which is good." So do you prove my guess, and if it proves good, hold it fast.

And how can I do that?

First, by direct experiment, as it is called. In plain English—go home and make a little Hartford Bridge Flat in the stable-yard; and then ask Mrs. How if she will not make a glen in it like this glen here. We will go home and try that. We will make a great flat cake of clay, and put upon it a cap of

sand; and then we will rain upon it out of a watering-pot; and see if Mrs. How does not begin soon to make a glen in the side of the heap, just like those on Hartford Bridge Flat. I believe she will; and certainly, if she does, it will be a fresh proof that my guess is right. And then we will see whether water will not make glens of a different shape than these, if it run over soils of a different kind. We will make a Hartford Bridge Flat turned upside down—a cake of sand with a cap of clay on the top; and we will rain on that out of our watering-pot, and see what sort of glens we make then. I can guess what they will be like, because I have seen them—steep overhanging cliffs, with very narrow gullies down them: but you shall try for yourself, and make up your mind whether you think me right or wrong. Meanwhile, remember that those gullies too will have been made by water.

And there is another way of "verifying my theory," as it is called; in plain English, seeing if my guess holds good; that is, to look at other valleys—not merely the valleys round here, but valleys in clay, in chalk, in limestone, in the hard slate rock such as you saw in Devonshire—and see whether my guess does not hold good about them too; whether all of them, deep or shallow, broad or narrow, rock or earth, may not have been all hollowed out by running water. I am sure if you would do this you would find something to amuse you, and something to instruct you, whenever you wish. I know that I do. To me the longest railroad journey, instead of being stupid, is like continually turning over the leaves of a wonderful book, or looking at wonderful pictures of old worlds which were made and unmade thousands of years ago. For I keep looking, not only at the railway cuttings, where the bones of the old worlds are laid bare, but at the surface of the ground; at the plains and downs, banks and knolls, hills and mountains; and continually asking Mrs. How what gave them each its shape: and I will soon teach you to do the same. When you do, I tell you fairly her answer will be in almost every case, "Running water." Either water running when soft, as it usually is; or water running when it is hard—in plain words, moving ice.

About that moving ice, which is Mrs. How's stronger spade, I will tell you some other time; and show you, too, the marks of it in every gravel pit about here. But now, I see, you want to ask a question; and what is it?

Do I mean to say that water has made great valleys, such as you have seen paintings and photographs of,—valleys thousands of feet deep, among mountains thousands of feet high?

Yes, I do. But, as I said before, I do not like you to take my word upon trust. When you are older you shall go to the mountains, and you shall judge for yourself. Still, I must say that I never saw a valley, however deep, or a cliff, however high, which had not been scooped out by water; and that even the mountain-tops which stand up miles aloft in jagged peaks and pinnacles against the sky were cut out at first, and are being cut and sharpened still, by little else save water, soft and hard; that is, by rain, frost, and ice.

Water, and nothing else, has sawn out such a chasm as that through which the ships run up to Bristol, between Leigh Wood and St. Vincent's Rocks. Water, and nothing else, has shaped those peaks of the Matterhorn, or the Weisshorn, or the Pic du Midi of the Pyrenees, of which you have seen sketches and photographs. Just so water might saw out Hartford Bridge Flat, if it had time enough, into a labyrinth of valleys, and hills, and peaks standing alone; as it has done already by Ambarrow, and Edgbarrow, and the Folly Hill on the other side of the vale.

I see you are astonished at the notion that water can make Alps. But it was just because I knew you would be astonished at Madam How's doing so great a thing with so simple a tool, that I began by showing you how she was doing the same thing in a small way here upon these flats. For the safest way to learn Madam How's methods is to watch her at work in little corners at commonplace business, which will not astonish or frighten us, nor put huge hasty guesses and dreams into our heads.

Sir Isaac Newton, some will tell you, found out the great law of gravitation, which holds true of all the suns and stars in heaven, by watching an apple fall: and even if he did not find it out so, he found it out, we know, by careful thinking over the plain and commonplace fact, that things have weight.

So do you be humble and patient, and watch Madam How at work on little things. For that is the way to see her at work upon all space and time.

What? you have a question more to ask?

Oh! I talked about Madam How lifting up Hartford Bridge Flat. How could she do that? My dear child, that is a long story, and I must tell it you some other time. Meanwhile, did you ever see the lid of a kettle rise up and shake when the water inside boiled? Of course; and of course, too, remember that Madam How must have done it. Then think over between this and our next talk, what that can possibly have to do with her lifting up Hartford Bridge Flat. But you have been longing, perhaps, all this time to hear more about Lady Why, and why she set Madam How to make Bracknell's Bottom.

My dear child, the only answer I dare give to that is: Whatever other purposes she may have made it for, she made it at least for this—that you and I should come to it this day, and look at, and talk over it, and become thereby wiser and more earnest, and we will hope more humble and better people. Whatever else Lady Why may wish or not wish, this she wishes always, to make all men wise and all men good. For what is written of her whom, as in a parable, I have called Lady Why?

"The Lord possessed me in the beginning of His way, before His works of old.

"I was set up from everlasting, from the beginning, or ever the earth was.

"When there were no depths, I was brought forth; when there were no fountains abounding with water.

"Before the mountains were settled, before the hills was I brought forth:

"While as yet He had not made the earth, nor the fields, nor the highest part of the dust of the world.

"When He prepared the heavens, I was there: when He set a compass upon the face of the depth:

"When He established the clouds above: when He strengthened the fountains of the deep:

"When He gave to the sea His decree, that the waters should not pass His commandment: when He appointed the foundations of the earth:

"Then I was by Him, as one brought up with Him: and I was daily His delight, rejoicing always before Him:

"Rejoicing in the habitable part of His earth; and my delights were with the sons of men.

"Now therefore hearken unto me, O ye children: for blessed are they that keep my ways."

That we can say, for it has been said for us already. But beyond that we can say, and need say, very little. We were not there, as we read in the Book of Job, when God laid the foundations of the earth. "We see," says St. Paul, "as in a glass darkly, and only know in part." "For who," he asks again, "has known the mind of the Lord, or who hath been His counsellor? . . . For of Him, and through Him, and to Him, are all things: to whom be glory for ever and ever. Amen." Therefore we must not rashly say, this or that is Why a thing has happened; nor invent what are called "final causes," which are not Lady Why herself, but only our little notions of what Lady Why has done, or rather what we should have done if we had been in her place. It is not, indeed, by thinking that we shall find out anything about Lady Why. She speaks not to our eyes or to our brains, like Madam How, but to that inner part of us which we call our hearts and spirits, and which will endure when eyes and brain are turned again to dust. If your heart be pure and sober, gentle and truthful, then Lady Why speaks to you without words, and tells you things which Madam How and all her pupils, the men of science, can never tell. When you lie, it may be, on a painful sick-bed, but with your mother's hand in yours; when you sit by her, looking up into her loving eyes; when you gaze out towards the setting sun, and fancy golden capes and islands in the clouds, and seas and lakes in the blue sky, and the infinite rest and peace of the far west sends rest and peace into your young heart, till you sit silent and happy, you know not why; when sweet music fills your heart with noble and tender instincts which need no thoughts or words; ay, even when you watch the raging thunderstorm, and feel it to be, in spite of its great awfulness, so beautiful that you cannot turn your eyes away: at

such times as these Lady Why is speaking to your soul of souls, and saying, “My child, this world is a new place, and strange, and often terrible: but be not afraid. All will come right at last. Rest will conquer Restlessness; Faith will conquer Fear; Order will conquer Disorder; Health will conquer Sickness; Joy will conquer Sorrow; Pleasure will conquer Pain; Life will conquer Death; Right will conquer Wrong. All will be well at last. Keep your soul and body pure, humble, busy, pious—in one word, be good: and ere you die, or after you die, you may have some glimpse of Me, the Everlasting Why: and hear with the ears, not of your body but of your spirit, men and all rational beings, plants and animals, ay, the very stones beneath your feet, the clouds above your head, the planets and the suns away in farthest space, singing eternally.

“‘Thou art worthy, O Lord, to receive glory and honour and power, for Thou hast created all things, and for Thy pleasure they are and were created.’”

CHAPTER II—EARTHQUAKES

So? You have been looking at that beautiful drawing of the ruin of Arica in the *Illustrated London News*: and it has puzzled you and made you sad. You want to know why God killed all those people—mothers among them, too, and little children?

Alas, my dear child! who am I that I should answer you that?

Have you done wrong in asking me? No, my dear child; no. You have asked me because you are a human being and a child of God, and not merely a cleverer sort of animal, an ape who can read and write and cast accounts. Therefore it is that you cannot be content, and ought not to be content, with asking how things happen, but must go on to ask why. You cannot be content with knowing the causes of things; and if you knew all the natural science that ever was or ever will be known to men, that would not satisfy you; for it would only tell you the *causes* of things, while your souls want to know the *reasons* of things besides; and though I may not be able to tell you the reasons of things, or show you aught but a tiny glimpse here and there of that which I called the other day the glory of Lady Why, yet I believe that somehow, somewhen, somewhere, you will learn something of the reason of things. For that thirst to know *why* was put into the hearts of little children by God Himself; and I believe that God would never have given them that thirst if He had not meant to satisfy it.

There—you do not understand me. I trust that you will understand me some day. Meanwhile, I think—I only say I *think*—you know I told you how humble we must be whenever we speak of Lady Why—that we may guess at something like a good reason for the terrible earthquakes in South America. I do not wish to be hard upon poor people in great affliction: but I cannot help thinking that they have been doing for hundreds of years past something very like what the Bible calls “tempting God”—staking their property and their lives upon the chances of no earthquakes coming, while they ought to have known that an earthquake might come any day. They have fulfilled (and little thought I that it would be fulfilled so soon) the parable that I told you once, of the nation of the Do-as-you-likes, who lived careless and happy at the foot of the burning mountain, and would not be warned by the smoke that came out of the top, or by the slag and cinders which lay all about them; till the mountain blew up, and destroyed them miserably.

Then I think that they ought to have expected an earthquake.

Well—it is not for us to judge any one, especially if they live in a part of the world in which we have not been ourselves. But I think that we know, and that they ought to have known, enough about earthquakes to have been more prudent than they have been for many a year. At least we will hope that, though they would not learn their lesson till this year, they will learn it now, and will listen to the message which I think Madam How has brought them, spoken in a voice of thunder, and written in letters of flame.

And what is that?

My dear child, if the landlord of our house was in the habit of pulling the roof down upon our heads, and putting gunpowder under the foundations to blow us up, do you not think we should know what he meant, even though he never spoke a word? He would be very wrong in behaving so, of course: but one thing would be certain,—that he did not intend us to live in his house any longer if he could help it; and was giving us, in a very rough fashion, notice to quit. And so it seems to me that these poor Spanish Americans have received from the Landlord of all landlords, who can do no wrong, such a notice to quit as perhaps no people ever had before; which says to them in unmistakable words, “You must leave this country: or perish.” And I believe that that message, like all Lady Why’s messages, is at heart a merciful and loving one; that if these Spaniards would leave the western coast of Peru, and cross the Andes into the green forests of the eastern side of their own land, they might not only live free from earthquakes, but (if they would only be good and industrious) become a great, rich, and happy nation, instead of the idle, and useless, and I am afraid not over good, people which

they have been. For in that eastern part of their own land God's gifts are waiting for them, in a paradise such as I can neither describe nor you conceive;—precious woods, fruits, drugs, and what not—boundless wealth, in one word—waiting for them to send it all down the waters of the mighty river Amazon, enriching us here in the Old World, and enriching themselves there in the New. If they would only go and use these gifts of God, instead of neglecting them as they have been doing for now three hundred years, they would be a blessing to the earth, instead of being—that which they have been.

God grant, my dear child, that these poor people may take the warning that has been sent to them; "The voice of God revealed in facts," as the great Lord Bacon would have called it, and see not only that God has bidden them leave the place where they are now, but has prepared for them, in their own land, a home a thousand times better than that in which they now live.

But you ask, How ought they to have known that an earthquake would come?

Well, to make you understand that, we must talk a little about earthquakes, and what makes them; and in order to find out that, let us try the very simplest cause of which we can think. That is the wise and scientific plan.

Now, whatever makes these earthquakes must be enormously strong; that is certain. And what is the strongest thing you know of in the world? Think . . .

Gunpowder?

Well, gunpowder is strong sometimes: but not always. You may carry it in a flask, or in your hand, and then it is weak enough. It only becomes strong by being turned into gas and steam. But steam is always strong. And if you look at a railway engine, still more if you had ever seen—which God forbid you should—a boiler explosion, you would agree with me, that the strongest thing we know of in the world is steam.

Now I think that we can explain almost, if not quite, all that we know about earthquakes, if we believe that on the whole they are caused by steam and other gases expanding, that is, spreading out, with wonderful quickness and strength. Of course there must be something to make them expand, and that is *heat*. But we will not talk of that yet.

Now do you remember that riddle which I put to you the other day?—"What had the rattling of the lid of the kettle to do with Hartford Bridge Flat being lifted out of the ancient sea?"

The answer to the riddle, I believe, is—Steam has done both. The lid of the kettle rattles, because the expanding steam escapes in little jets, and so causes a *lid-quake*. Now suppose that there was steam under the earth trying to escape, and the earth in one place was loose and yet hard, as the lid of the kettle is loose and yet hard, with cracks in it, it may be, like the crack between the edge of the lid and the edge of the kettle itself: might not the steam try to escape through the cracks, and rattle the surface of the earth, and so cause an *earthquake*?

So the steam would escape generally easily, and would only make a passing rattle, like the earthquake of which the famous jester Charles Selwyn said that it was quite a young one, so tame that you might have stroked it; like that which I myself once felt in the Pyrenees, which gave me very solemn thoughts after a while, though at first I did nothing but laugh at it; and I will tell you why.

I was travelling in the Pyrenees; and I came one evening to the loveliest spot—a glen, or rather a vast crack in the mountains, so narrow that there was no room for anything at the bottom of it, save a torrent roaring between walls of polished rock. High above the torrent the road was cut out among the cliffs, and above the road rose more cliffs, with great black cavern mouths, hundreds of feet above our heads, out of each of which poured in foaming waterfalls streams large enough to turn a mill, and above them mountains piled on mountains, all covered with woods of box, which smelt rich and hot and musky in the warm spring air. Among the box-trees and fallen boulders grew hepaticas, blue and white and red, such as you see in the garden; and little stars of gentian, more azure than the azure sky. But out of the box-woods above rose giant silver firs, clothing the cliffs and glens with tall black spires, till they stood out at last in a jagged saw-edge against the purple evening sky, along

the mountain ranges, thousands of feet aloft; and beyond them again, at the head of the valley, rose vast cones of virgin snow, miles away in reality, but looking so brilliant and so near that one fancied at the first moment that one could have touched them with one's hand. Snow-white they stood, the glorious things, seven thousand feet into the air; and I watched their beautiful white sides turn rose-colour in the evening sun, and when he set, fade into dull cold gray, till the bright moon came out to light them up once more. When I was tired of wondering and admiring, I went into bed; and there I had a dream—such a dream as Alice had when she went into Wonderland—such a dream as I dare say you may have had ere now. Some noise or stir puts into your fancy as you sleep a whole long dream to account for it; and yet that dream, which seems to you to be hours long, has not taken up a second of time; for the very same noise which begins the dream, wakes you at the end of it: and so it was with me. I dreamed that some English people had come into the hotel where I was, and were sleeping in the room underneath me; and that they had quarrelled and fought, and broke their bed down with a tremendous crash, and that I must get up, and stop the fight; and at that moment I woke and heard coming up the valley from the north such a roar as I never heard before or since; as if a hundred railway trains were rolling underground; and just as it passed under my bed there was a tremendous thump, and I jumped out of bed quicker than I ever did in my life, and heard the roaring sound die away as it rolled up the valley towards the peaks of snow. Still I had in my head this notion of the Englishmen fighting in the room below. But then I recollected that no Englishmen had come in the night before, and that I had been in the room below, and that there was no bed in it.

Then I opened my window—a woman screamed, a dog barked, some cocks and hens cackled in a very disturbed humour, and then I could hear nothing but the roaring of the torrent a hundred feet below. And then it flashed across me what all the noise was about; and I burst out laughing and said "It is only an earthquake," and went to bed.

Next morning I inquired whether any one had heard a noise. No, nobody had heard anything. And the driver who had brought me up the valley only winked, but did not choose to speak. At last at breakfast I asked the pretty little maid who waited what was the meaning of the noise I heard in the night, and she answered, to my intense amusement, "Ah! bah! ce n'etait qu'un tremblement de terre; il y en a ici toutes les six semaines." Now the secret was out. The little maid, I found, came from the lowland far away, and did not mind telling the truth: but the good people of the place were afraid to let out that they had earthquakes every six weeks, for fear of frightening visitors away: and because they were really very good people, and very kind to me, I shall not tell you what the name of the place is.

Of course after that I could do no less than ask Madam How, very civilly, how she made earthquakes in that particular place, hundreds of miles away from any burning mountain? And this was the answer I *thought* she gave, though I am not so conceited as to say I am sure.

As I had come up the valley I had seen that the cliffs were all beautiful gray limestone marble; but just at this place they were replaced by granite, such as you may see in London Bridge or at Aberdeen. I do not mean that the limestone changed to granite, but that the granite had risen up out of the bottom of the valley, and had carried the limestone (I suppose) up on its back hundreds of feet into the air. Those caves with the waterfalls pouring from their mouths were all on one level, at the top of the granite, and the bottom of the limestone. That was to be expected; for, as I will explain to you some day, water can make caves easily in limestone: but never, I think, in granite. But I knew that besides these cold springs which came out of the caves, there were hot springs also, full of curious chemical salts, just below the very house where I was in. And when I went to look at them, I found that they came out of the rock just where the limestone and the granite joined. "Ah," I said, "now I think I have Madam How's answer. The lid of one of her great steam boilers is rather shaky and cracked just here, because the granite has broken and torn the limestone as it lifted it up; and here is the hot water out of the boiler actually oozing out of the crack; and the earthquake I heard last night was simply the steam rumbling and thumping inside, and trying to get out."

And then, my dear child, I fell into a more serious mood. I said to myself, “If that stream had been a little, only a little stronger, or if the rock above it had been only a little weaker, it would have been no laughing matter then; the village might have been shaken to the ground; the rocks hurled into the torrent; jets of steam and of hot water, mixed, it may be, with deadly gases, have roared out of the riven ground; that might have happened here, in short, which has happened and happens still in a hundred places in the world, whenever the rocks are too weak to stand the pressure of the steam below, and the solid earth bursts as an engine boiler bursts when the steam within it is too strong.”

And when those thoughts came into my mind, I was in no humour to jest any more about “young earthquakes,” or “Madam How’s boilers;” but rather to say with the wise man of old, “It is of the Lord’s mercies that we are not consumed.”

Most strange, most terrible also, are the tricks which this underground steam plays. It will make the ground, which seems to us so hard and firm, roll and rock in waves, till people are sea-sick, as on board a ship; and that rocking motion (which is the most common) will often, when it is but slight, set the bells ringing in the steeples, or make the furniture, and things on shelves, jump about quaintly enough. It will make trees bend to and fro, as if a wind was blowing through them; open doors suddenly, and shut them again with a slam; make the timbers of the floors and roofs creak, as they do in a ship at sea; or give men such frights as one of the dock-keepers at Liverpool got in the earthquake in 1863, when his watchbox rocked so, that he thought some one was going to pitch him over into the dock. But these are only little hints and warnings of what it can do. When it is strong enough, it will rock down houses and churches into heaps of ruins, or, if it leaves them standing, crack them from top to bottom, so that they must be pulled down and rebuilt.

You saw those pictures of the ruins of Arica, about which our talk began; and from them you can guess well enough for yourself what a town looks like which has been ruined by an earthquake.

Of the misery and the horror which follow such a ruin I will not talk to you, nor darken your young spirit with sad thoughts which grown people must face, and ought to face. But the strangeness of some of the tricks which the earthquake shocks play is hardly to be explained, even by scientific men.

Sometimes, it would seem, the force runs round, making the solid ground eddy, as water eddies in a brook. For it will make straight rows of trees crooked; it will twist whole walls round—or rather the ground on which the walls stand—without throwing them down; it will shift the stones of a pillar one on the other sideways, as if a giant had been trying to spin it like a teetotum, and so screwed it half in pieces. There is a story told by a wise man, who saw the place himself, of the whole furniture of one house being hurled away by an earthquake, and buried under the ruins of another house; and of things carried hundreds of yards off, so that the neighbours went to law to settle who was the true owner of them. Sometimes, again, the shock seems to come neither horizontally in waves, nor circularly in eddies, but vertically, that is, straight up from below; and then things—and people, alas! sometimes—are thrown up off the earth high into the air, just as things spring up off the table if you strike it smartly enough underneath. By that same law (for there is a law for every sort of motion) it is that the earthquake shock sometimes hurls great rocks off a cliff into the valley below. The shock runs through the mountain till it comes to the cliff at the end of it; and then the face of the cliff, if it be at all loose, flies off into the air. You may see the very same thing happen, if you will put marbles or billiard-balls in a row touching each other, and strike the one nearest you smartly in the line of the row. All the balls stand still, except the last one, and that flies off. The shock, like the earthquake shock, has run through them all; but only the end one, which had nothing beyond it but soft air, has been moved; and when you grow old, and learn mathematics, you will know the law of motion according to which that happens, and learn to apply what the billiard-balls have taught you, to explain the wonders of an earthquake. For in this case, as in so many more, you must watch Madam How at work on little and common things, to find out how she works in great and rare ones. That is why Solomon says that “a fool’s eyes are in the ends of the earth,” because he is always looking out for strange things which he has not seen, and which he could not understand if he saw; instead

of looking at the petty commonplace matters which are about his feet all day long, and getting from them sound knowledge, and the art of getting more sound knowledge still.

Another terrible destruction which the earthquake brings, when it is close to the seaside, is the wash of a great sea wave, such as swept in last year upon the island of St. Thomas, in the West Indies; such as swept in upon the coast of Peru this year. The sea moans, and sinks back, leaving the shore dry; and then comes in from the offing a mighty wall of water, as high as, or higher than, many a tall house; sweeps far inland, washing away quays and houses, and carrying great ships in with it; and then sweeps back again, leaving the ships high and dry, as ships were left in Peru this year.

Now, how is that wave made? Let us think. Perhaps in many ways. But two of them I will tell you as simply as I can, because they seem the most likely, and probably the most common.

Suppose, as the earthquake shock ran on, making the earth under the sea heave and fall in long earth-waves, the sea-bottom sank down. Then the water on it would sink down too, and leave the shore dry; till the sea-bottom rose again, and hurled the water up again against the land. This is one way of explaining it, and it may be true. For certain it is, that earthquakes do move the bottom of the sea; and certain, too, that they move the water of the sea also, and with tremendous force. For ships at sea during an earthquake feel such a blow from it (though it does them no harm) that the sailors often rush upon deck fancying that they have struck upon a rock; and the force which could give a ship, floating in water, such a blow as that, would be strong enough to hurl thousands of tons of water up the beach, and on to the land.

But there is another way of accounting for this great sea wave, which I fancy comes true sometimes.

Suppose you put an empty india-rubber ball into water, and then blow into it through a pipe. Of course, you know, as the ball filled, the upper side of it would rise out of the water. Now, suppose there were a party of little ants moving about upon that ball, and fancying it a great island, or perhaps the whole world—what would they think of the ball's filling and growing bigger?

If they could see the sides of the basin or tub in which the ball was, and were sure that they did not move, then they would soon judge by them that they themselves were moving, and that the ball was rising out of the water. But if the ants were so short-sighted that they could not see the sides of the basin, they would be apt to make a mistake, because they would then be like men on an island out of sight of any other land. Then it would be impossible further to tell whether they were moving up, or whether the water was moving down; whether their ball was rising out of the water, or the water was sinking away from the ball. They would probably say, "The water is sinking and leaving the ball dry."

Do you understand that? Then think what would happen if you pricked a hole in the ball. The air inside would come hissing out, and the ball would sink again into the water. But the ants would probably fancy the very opposite. Their little heads would be full of the notion that the ball was solid and could not move, just as our heads are full of the notion that the earth is solid and cannot move; and they would say, "Ah! here is the water rising again." Just so, I believe, when the sea seems to ebb away during the earthquake, the land is really being raised out of the sea, hundreds of miles of coast, perhaps, or a whole island, at once, by the force of the steam and gas imprisoned under the ground.

That steam stretches and strains the solid rocks below, till they can bear no more, and snap, and crack, with frightful roar and clang; then out of holes and chasms in the ground rush steam, gases—often foul and poisonous ones—hot water, mud, flame, strange stones—all signs that the great boiler down below has burst at last.

Then the strain is eased. The earth sinks together again, as the ball did when it was pricked; and sinks lower, perhaps, than it was before: and back rushes the sea, which the earth had thrust away while it rose, and sweeps in, destroying all before it.

Of course, there is a great deal more to be said about all this: but I have no time to tell you now. You will read it, I hope, for yourselves when you grow up, in the writings of far wiser men than I. Or

perhaps you may feel for yourselves in foreign lands the actual shock of a great earthquake, or see its work fresh done around you. And if ever that happens, and you be preserved during the danger, you will learn for yourself, I trust, more about earthquakes than I can teach you, if you will only bear in mind the simple general rules for understanding the "how" of them which I have given you here.

But you do not seem satisfied yet? What is it that you want to know?

Oh! There was an earthquake here in England the other night, while you were asleep; and that seems to you too near to be pleasant. Will there ever be earthquakes in England which will throw houses down, and bury people in the ruins?

My dear child, I think you may set your heart at rest upon that point. As far as the history of England goes back, and that is more than a thousand years, there is no account of any earthquake which has done any serious damage, or killed, I believe, a single human being. The little earthquakes which are sometimes felt in England run generally up one line of country, from Devonshire through Wales, and up the Severn valley into Cheshire and Lancashire, and the south-west of Scotland; and they are felt more smartly there, I believe, because the rocks are harder there than here, and more tossed about by earthquakes which happened ages and ages ago, long before man lived on the earth. I will show you the work of these earthquakes some day, in the tilting and twisting of the layers of rock, and in the cracks (faults, as they are called) which run through them in different directions. I showed you some once, if you recollect, in the chalk cliff at Ramsgate—two set of cracks, sloping opposite ways, which I told you were made by two separate sets of earthquakes, long, long ago, perhaps while the chalk was still at the bottom of a deep sea. But even in the rocky parts of England the earthquake-force seems to have all but died out. Perhaps the crust of the earth has become too thick and solid there to be much shaken by the gases and steam below. In this eastern part of England, meanwhile, there is but little chance that an earthquake will ever do much harm, because the ground here, for thousands of feet down, is not hard and rocky, but soft—sands, clays, chalk, and sands again; clays, soft limestones, and clays again—which all act as buffers to deaden the earthquake shocks, and deaden too the earthquake noise.

And how?

Put your ear to one end of a soft bolster, and let some one hit the other end. You will hear hardly any noise, and will not feel the blow at all. Put your ear to one end of a hard piece of wood, and let some one hit the other. You will hear a smart tap; and perhaps feel a smart tap, too. When you are older, and learn the laws of sound, and of motion among the particles of bodies, you will know why. Meanwhile you may comfort yourself with the thought that Madam How has (doubtless by command of Lady Why) prepared a safe soft bed for this good people of Britain—not that they may lie and sleep on it, but work and till, plant and build and manufacture, and thrive in peace and comfort, we will trust and pray, for many a hundred years to come. All that the steam inside the earth is likely to do to us, is to raise parts of this island (as Hartford Bridge Flats were raised, ages ago, out of the old icy sea) so slowly, probably, that no man can tell whether they are rising or not.

Or again, the steam-power may be even now dying out under our island, and letting parts of it sink slowly into the sea, as some wise friends of mine think that the fens in Norfolk and Cambridgeshire are sinking now. I have shown you where that kind of work has gone on in Norfolk; how the brow of Sandringham Hill was once a sea-cliff, and Dersingham Bog at its foot a shallow sea; and therefore that the land has risen there. How, again, at Hunstanton Station there is a beach of sea-shells twenty feet above high-water mark, showing that the land has risen there likewise. And how, farther north again, at Brancaster, there are forests of oak, and fir, and alder, with their roots still in the soil, far below high-water mark, and only uncovered at low tide; which is a plain sign that there the land has sunk. You surely recollect the sunken forest at Brancaster, and the beautiful shells we picked up in its gullies, and the millions of live Pholases boring into the clay and peat which once was firm dry land, fed over by giant oxen, and giant stags likewise, and perhaps by the mammoth himself, the great woolly elephant whose teeth the fishermen dredge up in the sea outside? You recollect that? Then

remember that as that Norfolk shore has changed, so slowly but surely is the whole world changing around us. Hartford Bridge Flat here, for instance, how has it changed! Ages ago it was the gravelly bottom of a sea. Then the steam-power underground raised it up slowly, through long ages, till it became dry land. And ages hence, perhaps, it will have become a sea-bottom once more. Washed slowly by the rain, or sunk by the dying out of the steam-power underground, it will go down again to the place from whence it came. Seas will roll where we stand now, and new lands will rise where seas now roll. For all things on this earth, from the tiniest flower to the tallest mountain, change and change all day long. Every atom of matter moves perpetually; and nothing "continues in one stay."

The solid-seeming earth on which you stand is but a heaving bubble, bursting ever and anon in this place and in that. Only above all, and through all, and with all, is One who does not move nor change, but is the same yesterday, to-day, and for ever. And on Him, my child, and not on this bubble of an earth, do you and I, and all mankind, depend.

But I have not yet told you why the Peruvians ought to have expected an earthquake. True. I will tell you another time.

CHAPTER III—VOLCANOS

You want to know why the Spaniards in Peru and Ecuador should have expected an earthquake.

Because they had had so many already. The shaking of the ground in their country had gone on perpetually, till they had almost ceased to care about it, always hoping that no very heavy shock would come; and being, now and then, terribly mistaken.

For instance, in the province of Quito, in the year 1797, from thirty to forty thousand people were killed at once by an earthquake. One would have thought that warning enough: but the warning was not taken: and now, this very year, thousands more have been killed in the very same country, in the very same way.

They might have expected as much. For their towns are built, most of them, close to volcanos —some of the highest and most terrible in the world. And wherever there are volcanos there will be earthquakes. You may have earthquakes without volcanos, now and then; but volcanos without earthquakes, seldom or never.

How does that come to pass? Does a volcano make earthquakes? No; we may rather say that earthquakes are trying to make volcanos. For volcanos are the holes which the steam underground has burst open that it may escape into the air above. They are the chimneys of the great blast-furnaces underground, in which Madam How pounds and melts up the old rocks, to make them into new ones, and spread them out over the land above.

And are there many volcanos in the world? You have heard of Vesuvius, of course, in Italy; and Etna, in Sicily; and Hecla, in Iceland. And you have heard, too, of Kilauea, in the Sandwich Islands, and of Pele's Hair—the yellow threads of lava, like fine spun glass, which are blown from off its pools of fire, and which the Sandwich Islanders believed to be the hair of a goddess who lived in the crater;—and you have read, too, I hope, in Miss Yonge's *Book of Golden Deeds*, the noble story of the Christian chieftainess who, in order to persuade her subjects to become Christians also, went down into the crater and defied the goddess of the volcano, and came back unhurt and triumphant.

But if you look at the map, you will see that there are many, many more. Get Keith Johnston's Physical Atlas from the schoolroom—of course it is there (for a schoolroom without a physical atlas is like a needle without an eye)—and look at the map which is called "Phenomena of Volcanic Action."

You will see in it many red dots, which mark the volcanos which are still burning: and black dots, which mark those which have been burning at some time or other, not very long ago, scattered about the world. Sometimes they are single, like the red dot at Otaheite, or at Easter Island in the Pacific. Sometimes the are in groups, or clusters, like the cluster at the Sandwich Islands, or in the Friendly Islands, or in New Zealand. And if we look in the Atlantic, we shall see four clusters: one in poor half-destroyed Iceland, in the far north, one in the Azores, one in the Canaries, and one in the Cape de Verds. And there is one dot in those Canaries which we must not overlook, for it is no other than the famous Peak of Teneriffe, a volcano which is hardly burnt out yet, and may burn up again any day, standing up out of the sea more than 12,000 feet high still, and once it must have been double that height. Some think that it is perhaps the true Mount Atlas, which the old Greeks named when first they ventured out of the Straits of Gibraltar down the coast of Africa, and saw the great peak far to the westward, with the clouds cutting off its top; and said that it was a mighty giant, the brother of the Evening Star, who held up the sky upon his shoulders, in the midst of the Fortunate Islands, the gardens of the daughter of the Evening Star, full of strange golden fruits; and that Perseus had turned him into stone, when he passed him with the Gorgon's Head.

But you will see, too, that most of these red and black dots run in crooked lines; and that many of the clusters run in lines likewise.

Look at one line: by far the largest on the earth. You will learn a good deal of geography from it.

The red dots begin at a place called the Terribles, on the east side of the Bay of Bengal. They run on, here and there, along the islands of Sumatra and Java, and through the Spice Islands; and at New Guinea the line of red dots forks. One branch runs south-east, through islands whose names you never heard, to the Friendly Islands, and to New Zealand. The other runs north, through the Philippines, through Japan, through Kamschatka; and then there is a little break of sea, between Asia and America: but beyond it, the red dots begin again in the Aleutian Islands, and then turn down the whole west coast of America, down from Mount Elias (in what was, till lately, Russian America) towards British Columbia. Then, after a long gap, there are one or two in Lower California (and we must not forget the terrible earthquake which has just shaken San Francisco, between those two last places); and when we come down to Mexico we find the red dots again plentiful, and only too plentiful; for they mark the great volcanic line of Mexico, of which you will read, I hope, some day, in Humboldt's works. But the line does not stop there. After the little gap of the Isthmus of Panama, it begins again in Quito, the very country which has just been shaken, and in which stand the huge volcanos Chimborazo, Pasto, Antisana, Cotopaxi, Pichincha, Tunguragua,—smooth cones from 15,000 to 20,000 feet high, shining white with snow, till the heat inside melts it off, and leaves the cinders of which the peaks are made all black and ugly among the clouds, ready to burst in smoke and fire. South of them again, there is a long gap, and then another line of red dots—Arequiba, Chipicani, Gualatieri, Atacama,—as high as, or higher than those in Quito; and this, remember, is the other country which has just been shaken. On the sea-shore below those volcanos stood the hapless city of Arica, whose ruins we saw in the picture. Then comes another gap; and then a line of more volcanos in Chili, at the foot of which happened that fearful earthquake of 1835 (besides many more) of which you will read some day in that noble book *The Voyage of the Beagle*; and so the line of dots runs down to the southernmost point of America.

What a line we have traced! Long enough to go round the world if it were straight. A line of holes out of which steam, and heat, and cinders, and melted stones are rushing up, perpetually, in one place and another. Now the holes in this line which are near each other have certainly something to do with each other. For instance, when the earth shook the other day round the volcanos of Quito, it shook also round the volcanos of Peru, though they were 600 miles away. And there are many stories of earthquakes being felt, or awful underground thunder heard, while volcanos were breaking out hundreds of miles away. I will give you a very curious instance of that.

If you look at the West Indies on the map, you will see a line of red dots runs through the Windward Islands: there are two volcanos in them, one in Guadaloupe, and one in St. Vincent (I will tell you a curious story, presently, about that last), and little volcanos (if they have ever been real volcanos at all), which now only send out mud, in Trinidad. There the red dots stop: but then begins along the north coast of South America a line of mountain country called Cumana, and Caraccas, which has often been horribly shaken by earthquakes. Now once, when the volcano in St. Vincent began to pour out a vast stream of melted lava, a noise like thunder was heard underground, over thousands of square miles beyond those mountains, in the plains of Calabozo, and on the banks of the Apure, more than 600 miles away from the volcano,—a plain sign that there was something underground which joined them together, perhaps a long crack in the earth. Look for yourselves at the places, and you will see that (as Humboldt says) it is as strange as if an eruption of Mount Vesuvius was heard in the north of France.

So it seems as if these lines of volcanos stood along cracks in the rind of the earth, through which the melted stuff inside was for ever trying to force its way; and that, as the crack got stopped up in one place by the melted stuff cooling and hardening again into stone, it was burst in another place, and a fresh volcano made, or an old one re-opened.

Now we can understand why earthquakes should be most common round volcanos; and we can understand, too, why they would be worst before a volcano breaks out, because then the steam is trying to escape; and we can understand, too, why people who live near volcanos are glad to see them

blazing and spouting, because then they have hope that the steam has found its way out, and will not make earthquakes any more for a while. But still that is merely foolish speculation on chance. Volcanos can never be trusted. No one knows when one will break out, or what it will do; and those who live close to them—as the city of Naples is close to Mount Vesuvius—must not be astonished if they are blown up or swallowed up, as that great and beautiful city of Naples may be without a warning, any day.

For what happened to that same Mount Vesuvius nearly 1800 years ago, in the old Roman times? For ages and ages it had been lying quiet, like any other hill. Beautiful cities were built at its foot, filled with people who were as handsome, and as comfortable, and (I am afraid) as wicked, as people ever were on earth. Fair gardens, vineyards, olive-yards, covered the mountain slopes. It was held to be one of the Paradises of the world. As for the mountain's being a burning mountain, who ever thought of that? To be sure, on the top of it was a great round crater, or cup, a mile or more across, and a few hundred yards deep. But that was all overgrown with bushes and wild vines, full of boars and deer. What sign of fire was there in that? To be sure, also, there was an ugly place below by the sea-shore, called the Phlegræn fields, where smoke and brimstone came out of the ground, and a lake called Avernus over which poisonous gases hung, and which (old stories told) was one of the mouths of the Nether Pit. But what of that? It had never harmed any one, and how could it harm them?

So they all lived on, merrily and happily enough, till, in the year A.D. 79 (that was eight years, you know, after the Emperor Titus destroyed Jerusalem), there was stationed in the Bay of Naples a Roman admiral, called Pliny, who was also a very studious and learned man, and author of a famous old book on natural history. He was staying on shore with his sister; and as he sat in his study she called him out to see a strange cloud which had been hanging for some time over the top of Mount Vesuvius. It was in shape just like a pine-tree; not, of course, like one of our branching Scotch firs here, but like an Italian stone pine, with a long straight stem and a flat parasol-shaped top. Sometimes it was blackish, sometimes spotted; and the good Admiral Pliny, who was always curious about natural science, ordered his cutter and went away across the bay to see what it could be. Earthquake shocks had been very common for the last few days; but I do not suppose that Pliny had any notion that the earthquakes and the cloud had aught to do with each other. However, he soon found out that they had, and to his cost. When he got near the opposite shore some of the sailors met him and entreated him to turn back. Cinders and pumice-stones were falling down from the sky, and flames breaking out of the mountain above. But Pliny would go on: he said that if people were in danger, it was his duty to help them; and that he must see this strange cloud, and note down the different shapes into which it changed. But the hot ashes fell faster and faster; the sea ebbed out suddenly, and left them nearly dry, and Pliny turned away to a place called Stabiæ, to the house of his friend Pomponianus, who was just going to escape in a boat. Brave Pliny told him not to be afraid, ordered his bath like a true Roman gentleman, and then went into dinner with a cheerful face. Flames came down from the mountain, nearer and nearer as the night drew on; but Pliny persuaded his friend that they were only fires in some villages from which the peasants had fled, and then went to bed and slept soundly.

However, in the middle of the night they found the courtyard being fast filled with cinders, and, if they had not woke up the Admiral in time, he would never have been able to get out of the house.

The earthquake shocks grew stronger and fiercer, till the house was ready to fall; and Pliny and his friend, and the sailors and the slaves, all fled into the open fields, amid a shower of stones and cinders, tying pillows over their heads to prevent their being beaten down. The day had come by this time, but not the dawn—for it was still pitch dark as night. They went down to their boats upon the shore; but the sea raged so horribly that there was no getting on board of them. Then Pliny grew tired, and made his men spread a sail for him, and lay down on it; but there came down upon them a rush of flames, and a horrible smell of sulphur, and all ran for their lives. Some of the slaves tried to help the Admiral upon his legs; but he sank down again overpowered with the brimstone fumes,

and so was left behind. When they came back again, there he lay dead, but with his clothes in order and his face as quiet as if he had been only sleeping. And that was the end of a brave and learned man—a martyr to duty and to the love of science.

But what was going on in the meantime? Under clouds of ashes, cinders, mud, lava, three of those happy cities were buried at once—Herculaneum, Pompeii, Stabiæ. They were buried just as the people had fled from them, leaving the furniture and the earthenware, often even jewels and gold, behind, and here and there among them a human being who had not had time to escape from the dreadful deluge of dust. The ruins of Herculaneum and Pompeii have been dug into since; and the paintings, especially in Pompeii, are found upon the walls still fresh, preserved from the air by the ashes which have covered them in. When you are older you perhaps will go to Naples, and see in its famous museum the curiosities which have been dug out of the ruined cities; and you will walk, I suppose, along the streets of Pompeii and see the wheel-tracks in the pavement, along which carts and chariots rumbled 2000 years ago. Meanwhile, if you go nearer home, to the Crystal Palace and to the Pompeian Court, as it is called, you will see an exact model of one of these old buried houses, copied even to the very paintings on the wells, and judge for yourself, as far as a little boy can judge, what sort of life these thoughtless, luckless people lived 2000 years ago.

And what had become of Vesuvius, the treacherous mountain? Half or more than half of the side of the old crater had been blown away, and what was left, which is now called the Monte Somma, stands in a half circle round the new cone and new crater which is burning at this very day. True, after that eruption which killed Pliny, Vesuvius fell asleep again, and did not awake for 134 years, and then again for 269 years but it has been growing more and more restless as the ages have passed on, and now hardly a year passes without its sending out smoke and stones from its crater, and streams of lava from its sides.

And now, I suppose, you will want to know what a volcano is like, and what a cone, and a crater, and lava are?

What a volcano is like, it is easy enough to show you; for they are the most simply and beautifully shaped of all mountains, and they are alike all over the world, whether they be large or small. Almost every volcano in the world, I believe, is, or has been once, of the shape which you see in the drawing opposite; even those volcanos in the Sandwich Islands, of which you have often heard, which are now great lakes of boiling fire upon flat downs, without any cone to them at all. They, I believe, are volcanos which have fallen in ages ago: just as in Java a whole burning mountain fell in on the night of the 11th of August, in the year 1772. Then, after a short and terrible earthquake, a bright cloud suddenly covered the whole mountain. The people who dwelt around it tried to escape; but before the poor souls could get away the earth sunk beneath their feet, and the whole mountain fell in and was swallowed up with a noise as if great cannon were being fired. Forty villages and nearly 3000 people were destroyed, and where the mountain had been was only a plain of red-hot stones. In the same way, in the year 1698, the top of a mountain in Quito fell in in a single night, leaving only two immense peaks of rock behind, and pouring out great floods of mud mixed with dead fish; for there are underground lakes among those volcanos which swarm with little fish which never see the light.

But most volcanos as I say, are, or have been, the shape of the one which you see here. This is Cotopaxi, in Quito, more than 19,000 feet in height. All those sloping sides are made of cinders and ashes, braced together, I suppose, by bars of solid lava-stone inside, which prevent the whole from crumbling down. The upper part, you see, is white with snow, as far down as a line which is 15,000 feet above the sea; for the mountain is in the tropics, close to the equator, and the snow will not lie in that hot climate any lower down. But now and then the snow melts off and rushes down the mountain side in floods of water and of mud, and the cindery cone of Cotopaxi stands out black and dreadful against the clear blue sky, and then the people of that country know what is coming. The mountain is growing so hot inside that it melts off its snowy covering; and soon it will burst forth with smoke

and steam, and red-hot stones and earthquakes, which will shake the ground, and roars that will be heard, it may be, hundreds of miles away.

And now for the words cone, crater, lava. If I can make you understand those words, you will see why volcanos must be in general of the shape of Cotopaxi.

Cone, crater, lava: those words make up the alphabet of volcano learning. The cone is the outside of a huge chimney; the crater is the mouth of it. The lava is the ore which is being melted in the furnace below, that it may flow out over the surface of the old land, and make new land instead.

And where is the furnace itself? Who can tell that? Under the roots of the mountains, under the depths of the sea; down "the path which no fowl knoweth, and which the vulture's eye hath not seen: the lion's whelp hath not trodden it, nor the fierce lion passed by it. There He putteth forth His hand upon the rock; He overturneth the mountain by the roots; He cutteth out rivers among the rocks; and His eye seeth every precious thing"—while we, like little ants, run up and down outside the earth, scratching, like ants, a few feet down, and calling that a deep ravine; or peeping a few feet down into the crater of a volcano, unable to guess what precious things may lie below—below even the fire which blazes and roars up through the thin crust of the earth. For of the inside of this earth we know nothing whatsoever: we only know that it is, on an average, several times as heavy as solid rock; but how that can be, we know not.

Конец ознакомительного фрагмента.