

The Origin of the World

By E. McMillan.

THE DECEPTIVENESS OF MOTION.

One night, years ago, I sat on the verandah of an old homestead out in the bush, and the pastoralist and I watched the silent stars moving across the dark blue vault of the heavens, while afar off we heard the sad cry of the curlew. Everything was wonderfully still, and, having just come from the rush and hustle of a great city, I was in the mood to appreciate the wonderful calm of a starlight night in the bush. It was silent! Everything was very, very still; but, in spite of the stillness, I knew, even while we sat there, that this world was flying through space fifty times as fast as the fastest cannon-ball, and turning round on its axis as well at the rate of a thousand miles an hour, and falling through space at the rate of thirteen miles a second into the bargain. And yet with all that rush and roar, with all that mighty flying, there was not a sound to disturb the holy calm of the night.

When there is a fire in the city and the fire brigades come rushing and tearing through the streets, they make such a din that every other noise seems to be almost a silence. When they start a stream of water up to the top of the burning building there is as much noise and clatter as if great things were being done. If you stand at the foot of one of the giant gum-trees in a gully near your house, or down by the river, and look up to the very topmost branch of it, you will see that the leaves up there are quite green. If you stop to ask how the sap got up there into all the leaves on all the trees, you will find that it was pumped up by nature through the bark of the tree. If you lay your ear to the bark and listen, you will not hear a sound, yet the sap is running up there all the time. Nature is a witch! If you nick the bark all round, so that the sap cannot run, the tree will die, because it is "ringbarked." Nature does most of her great works very silently.

I want you to try an experiment. Get a glass of water, and stand it on a solid table, and watch how absolutely still and motionless it is. You cannot think of anything in the world more perfectly still. Let it stand for a good while, so that all motion must have gone out of it, and then, when you know that it is quite still, drop a single drop of ink into it, and watch what happens. If the water is quite motionless when you drop the ink into it, as softly as possible, the blue-black fluid will rush to the bottom, and form a ring, while the lighter part of the ink will spread itself all out, and very gradually disappear.

But how did that happen if there was no motion in the water? You try it. Do not take my word for anything. Try everything you can for yourself, and prove everything possible. Is it possible for the water in a tumbler to be really quite still? You may believe this till you find that it is otherwise; there is nothing still in the universe. We think of motion as being always accompanied by more or less whirr and bustle, in some form or other; but the mightiest motions in the world are silent—to our ears—as death.

The water in the tumbler is composed, as I told you, of two gases—oxygen and hydrogen. They—the gases—are composed of tiny molecules, and when one molecule of oxygen meets two molecules of hydrogen, at an electric dance, they unite and form water. But their molecules go flying about at an enormous rate, even when they are united; and they are never at rest. There is no such thing in nature as rest; all things are changing always. The very mountains are being worn down and the mighty ocean beds are being filled up, and nothing ever remains the same for two seconds.

If you could magnify a drop of water till it was as big as this world, you would find it made up of balls between the size of a cannon-ball and an orange. But think how small they must be to look no bigger than a cricket ball when a drop is magnified

to the size of the world! While that glass of water is standing on the table, looking the very picture of calmness, silence, and stillness, it is deceiving you, for it is in the wildest agitation all the time, only you cannot see it. When you begin to study science you will find that you can no longer believe your eyes or your ears, or any of your senses; and that is how it comes to pass that so few people have scientific minds. I think you have to be born with a peculiar sort of mind before you can grasp how the world began, and you must understand the deceptiveness of motion before you can understand how the world came to be.

While we are talking about the behaviour of a drop of ink, I might as well ask you a question. Did you ever notice that if you let a drop of ink fall on a sheet of blotting-paper it spreads to a wonderful extent, and you can never get it out again? But if you drop the ink on to a piece of polished marble, and wipe it off promptly, it will leave no mark at all. If you drop the ink on to a bit of glass, you will be able to wipe it off so as to leave the glass quite clean. Do you know why that difference exists? It is on account of the different spaces in which the molecules move. Everything in the world is in motion, and the molecules are all whirling and dancing in water and in rock, in glass and in wood, in marble and in iron. But they dance to different measures, and that is how the ink gets its chance. If the molecules are far apart, and have plenty of space, the ink can get in between them, and stay there, and make what we call a "stain"; but if the molecules are very close together the ink has a very poor chance, and we can wipe it off before it gets in.

If you ask a scientific man the reason of the softness of some things and the hardness of others, he will tell you that it is owing to the "inter-molecular spaces" of the materials being different. And that is right, but it does not sound easy. If there is a large inter-molecular space, you can compress the material into a much smaller bulk; but if the molecules are very close together, you cannot compress them. In water the molecules are really very close together, so that if you tried to get a quart of water into a pint bottle you would find it impossible. If you raise the temperature of water to over 212 degrees and change it into steam, you drive the molecules away from each other to about 1,800 times their own diameter, so that one cubic inch of water produces about 1,800 cubic inches of steam, at ordinary pressure. We use that force of expansion in our steam-engines, and it helps us to do the world's work.

Have you ever noticed how quietly most things in nature work? There is no rush or roar or bustle; the whole world works so silently that when you sit on the verandah at night you think all is still. And all the while nothing is still. Everything is moving, from the smallest speck of matter to the mightiest of the distant stars. And it makes no fuss. The motions of the heavenly bodies (our earth is a "heavenly body") are so quiet that you cannot hear them, and all the turmoil in a glass of water is beyond the reach of any of your senses to discover. You were brought up to believe in "dead matter," were you not? You were told that there was life in some things, and no "life" in others. But everything is alive. Everything is thrilling and throbbing and whirling, and turning and changing and doing.

This world itself is a miracle. Nothing is comprehensible; we are living in a magical world, but we are so blind and stupid that we think all things dull and commonplace and uninteresting. A glass of water is as great a mystery as the "flower in the crannied wall," and if you only understand the laws which govern the water you would understand the laws which govern the entire universe. Then the origin of the world would seem very simple to you. Because we are ignorant of the "simple" things, so

are we ignorant of the deep things; but I sometimes think that there are no really "deep things" at all, for it is only that our minds are dull and slow, and we are insensitive to the real things of the world.

IN THE BEGINNING.

Do you realize that space has no bounds? Do you understand that if you were to travel upwards for ever and for ever, you would never reach the end? That if you travel downwards for ever and ever and ever, you would never reach an end? That if you went to the right or to the left on the wings of light, travelling at the rate of 186,000 miles a second, you would never reach an end? There is no end; likewise there is no beginning.

I tell you this in words, but I do not understand it. No human mind can understand it. All I know is that the human mind is a poor little instrument, so very limited in its scope and capacity that it can understand almost nothing of the universe. It is too vast, too awful; and yet why should we not face it and discuss it? When I meet people who have nothing to talk about except dresses or sheep, or bonnets or wool, I wonder if I am dreaming. It seems so odd to think that they never see the miracle of life, the romance of existence. I would never grumble at them not knowing, but I grumble because they do not care. They never appear to imagine there is any mystery at all; but they just go on as the sheep and the cattle do, from year's end to year's end. And for them there is but little hope.

All I want to be careful about is that you understand the infinite expanse of the universe. And I want you to understand that you do not understand. Time is the result of the revolution of the earth; and if there was no sun there would be no time. When one side of the earth is towards the sun, we say "It is day." When the other side is towards the sun, we say "It is night." So, if the earth ceased to revolve, or the sun failed us, there would be no more time. So there is no such thing as time outside of our sun and the earth. There is no "up," no "down," apart from our earth, for in space there is only—space! What a wonderful idea that is, and how false are all our ancient conceptions. But you will find that this idea agrees with all your new discoveries. Only this morning—February 25, 1912—I saw the following paragraph in the morning paper, which, as you see, comes right into line with what I have been saying:

BIRTH OF NEW WORLDS.

How new stars are born was explained at the Royal Institution recently by Professor A. W. Bickerton, in the first of two lectures on "The New Astronomy" states a London journal). Professor Bickerton, who has been sent by the New Zealand Government to expound his theory of the birth of the worlds to scientific men in this country, said that new stars were born by solar collision. "The impact of two colliding suns," he said, "results in the formation of a third body; a brilliant star flashes out and becomes permanent. A complete collision of two gaseous suns would result in the formation of a new sun. Such collisions are not incidental, and do not occur at random. Gravitation is included among a number of agencies tending to develop collisions; before suns come into collision they fall towards each other, and get up speed for hundreds of years. The tremendous speed thus developed is stopped suddenly in the colliding parts, and converted into heat. Thus, in about an hour, a new star is born, explosive force expands it, and it swells out its diameter at a speed of millions of miles an hour." Professor Bickerton, speaking of Nova Persei, the new star of the new century, said it was so brilliant that nothing equal to it had been seen for 300 years. It was 10,000 times as brilliant as the sun.

You see the great New Zealand professor explaining the same thing to the learned people of London as I am trying to explain to you. I wonder if either of us will be able to explain anything