

ART. IX.—MAGNETISM, THE LIFE OF THE WORLD.—BY ANDREW DEWAR.

(Read April 14th, 1879.)

IN commencing I may say that I quarrel with no religious bodies or opinions. In saying that Magnetism is the *Life* of the World, I mean in its broadest sense and as a physical fact only.

By life, I mean the life force, or vital principle, which animates and regulates everything, from the crystals in the rocks to the spreading of the tree and the breathing of the animal. One law, (and is it not a grand and likely idea,) one law pervades the world, and regulates itself and everything connected with it as one body, even such a body as our own is. Thus, what we consider space, may be to the planets as firm and compact a material as our flesh is to our bones or blood veins.

Before we indicate the connection between life and magnetism, we must show first what magnetism is, according to our ideas of it, the properties it possesses, and the extent of its domain.

Magnetism was, and still is supposed to be a property belonging peculiarly to iron. Certain particles of iron were seen to attract and repel one another, and this force was called magnetism. We observe, however, that other materials attract and repel one another, although not in so marked a manner.

For instance, there are layers of slate, freestone, shale, coal, granite, etc., all separate and distinct, each material by itself. The question arises, how came each material to be so stratified? It could only be done in two ways. Either it was brought and placed there by physical means, through some superhuman agency; or, which is the more likely, the attraction of like materials, and the consequent repulsion of unlike materials, formed these beds, when, possibly, everything was in a state of solution.

All matter then, (and innumerable examples and facts will occur to every one to prove the assertion,) is governed by a law of the attraction of like materials.

But, as iron particles exhibit polarity, so we believe do the atoms of all other materials. Our reason is, that we find a con-

structive principle among all materials. This principle must be guided by some law. If then we can find a law which controls any of the earth's materials, and which in its action would explain the crystalization of others, we think we would be justified in accepting it, instead of searching out some entirely new law.

Such a law is that of Polarity, viz.: Every atom has two poles which, for the sake of illustration, may be called positive and negative. When at rest, as in a block of stone or metal, the positive pole of each atom has hold of the negative pole above it, and the negative pole a hold of the positive below it. It is this regularity which causes many materials to scale so easily.

In solution, similar poles of similar material repel and scatter one another, while opposite poles attract and accumulate.

The Law of Polarity, generally stated, is, that similar poles of similar material coming together in solution or in fire, repel, scatter, reduce, dissolve and destroy one another, while opposite poles in solution, attract, increase, reform and rebuild.

Every permanent production of the earth has been formed either in or by water, or by fire; and, generally speaking, every natural production has been formed by water, while every artificial one is by fire.

From these two laws, the attraction and repulsion of matter, and the law of polarity, we have deduced the law of Atomagnetism, which we have announced as the *law* governing the universe. In connection with this enunciation, it must be borne in mind that the law is not given to supplant another, but to fill a void in physical science which has never yet been filled. Going deeper than gravitation into the constitution and force of matter, it also absorbs it and widens itself to an indefinite extent beyond it.

The law of atomagnetism is as follows: The materials of the earth are all divided into two great classes, mineral and vegetable, or hydrogen and oxygen. Each class has innumerable distinct component parts, forming the different minerals or varieties of vegetation and animal life. By these two classes and their interaction or connection, according to the above given laws of Matter and Polarity, everything in the world is either formed and built up, or dissolved and destroyed.

Magnetism is thus the life of the law, and consequently, the life of matter.

We will give a few facts showing that matter has polarity. If water freezes gently on a pond, the ice is perfectly transparent; but if a wind blows while it is being congealed, the ice is whitish and opaque. In the former case the atoms were not disturbed, and thus they arranged themselves in perfect polar order. In the latter the poles were disturbed, and congealed in a disturbed state.

In making sugar-candy, if the material is gently poured out, the candy will be comparatively transparent; but if it is *pulled* before it hardens, it soon becomes opaque, and becomes whiter with every pulling. It is sometimes said that the air mixing the water or sugar produces the opacity; but why should air, a transparent substance, mixing with water, also a transparent body, produce opacity, unless there were some constitutional law such as we have stated to cause it. In crushing many transparent or semi-transparent bodies they become whiter. We believe that in these facts is to be found the solution of the phenomena of light and flame, and the mystery of the comet's tail. The greater the friction of disorganized poles among suitable material, the more brilliant the light.

In frost ferns on window panes we see another instance of the polarity of matter, and this time in distinct magnetic action. Just as filings placed on the end of a magnet arrange themselves in distinct lines or feelers, so do the particles of ice array themselves, and each frond starting from the same centre, repels every other frond. If two similar magnetic poles are brought together, with iron filings on each, the repulsion is so great that the filings drop off. We have observed a similar effect with the frost ferns, for the points of the two fronds on nearing one another were seen to be shattered by some invisible force into utter confusion.

These frost ferns may be said to be links between rock and plant life, and the little frost bush which grows on ice under peculiar circumstances of thaw and frost is another. The bushes, which are from a half inch to two inches high, are per-

fect samples of vegetation, with feathered branches shooting out on every side. The construction is by the same polar law. A rising piece of ice forms a pole, on which the drifting particles of snow or ice congeal and arrange themselves by the magnetic force from the pole.

The lead tree hung in solution is formed in a similar way, and it is our belief that coral is only a similar mineral growth, formed entirely independent of the coral insect, which we consider only a parasite of it. In fact, we think we would be quite as justified in saying that the aphid makes the rose bush, as that the coral insect makes the coral.

All matter then has life. It may be inert, as in a block of stone, but change its condition by crushing it and put it in a suitable solution and position, and it will give life to a lofty tree by the exercise of its inherent atomagnetic law. Thus far we have been dealing with what may be called mineral life.

PLANT LIFE.

In tracing the connection between plant life and magnetism, it must be borne in mind that there is no theory of plant life before the world. It is considered an enigma undiscoverable by man. In suggesting magnetism as the life of the plants, we at least are not irreverent in doing so, as magnetism is a law of nature; and, as we have said before, if magnetism guides and controls some materials, why should we look for another law, if its action can explain all the phenomena of plant life. Magnetism is the only force we know of which directly controls any class of matter, and as plant life as well as any other must necessarily be controlled by some law, it is surely our bounden duty to test the laws of magnetism first before we seek for any other; and in our opinion, there is no need to do so.

In examining all plants, we find them to have a trunk or stalk, roots, and branches. Holding a plant in our hands, and observing that the roots are dispersed from one end and the leaves from the other, we naturally say the force must be from the centre either way; that is, from the trunk or stalk. Is this according to magnetic law? Yes. Taking a magnetised bar of iron, and scattering filings over it, we find they adhere princi-

pally to the poles, and, as far as the material will allow them, they are there formed into roots and branches. Moreover, as each branch and root fibre follows an individual course and repels its neighbours, so do the roots and branches of the filings. Again, if two leaves on the same tree are forced to meet and touch one another, in a few days they begin to fade and wither, thus seeming to repel and kill one another; so, in a magnet, if we force the filings on similar poles to meet, they also drop off, and, as it were, fade.

A seed, again, is as much a magnet with two poles as the magnetised iron bar; and as the bar does not seem to be a magnet until the filings are scattered over it, so, neither does the seed until it is placed in a position to show its poles, viz., in the earth, where, with heat and moisture, its magnetic character is apparent, for a root and a leaf is at once thrown out, thus showing its indestructible polarity.

Besides being governed by its own inherent magnetism, a tree is also influenced by the magnetism of the earth. If a tree was left to its own magnetism it might grow in a slanting direction, and, especially on a hill side, a forest might become entangled in inextricable confusion. We find, however, a wonderful regularity in the growth of trees, and even on the steepest hills they never vary from the exact vertical. This is caused by the magnetic force of the earth, which is continually in action, and must necessarily be vertical.

Summing all the evidence together, the similarity between the action of a magnet and plant life is such that we see not how it can possibly be overlooked or set aside. Enough it is for us that finding plant life a mystery, we see no mystery in it when read by the light of magnetism, and our only desire is that botanists may test it for their own satisfaction.

ANIMAL LIFE.

To prove the connection between animal life and magnetism may seem more difficult than in the previous divisions of the subject, but it is not so in reality. It is well known that men and animals are possessed of magnetism. The teaching of the present day tends to separate material, from animal magnetism,

but the force is the same. It may exhibit itself in a hundred different ways, according to its condition, position, and materials under its influence. Sufficient attention is not often paid to the different conditions under which a force may either work easily or labour, according as they are favourable or the reverse.

A man can draw a spark of electricity from another man's nose, and some men after a brisk walk light the gas with their finger. We might, as a preliminary, argue that if a body is possessed of magnetism, that body must be a magnet, and if a magnet, then the certainty is that the principles of magnetism guide and control that body. But a man is not like either a mineral or vegetable magnet. He is a more compact body and in a—comparatively speaking—state of solution.

The great and essential difference, however, between a plant and an animal is, that the former is stationary and has its food supplied to it, while the latter is migratory and seeks its food. The former is, comparatively speaking, hard and solid, while the latter is pliable and soft. The former is connected with one huge feeding ground and galvanic battery, from which it draws supplies both of food and magnetic force, while the animal is cut off from this supply, and must consequently be endowed with an apparatus which will answer the same purpose, and which it can carry about with it. This apparatus is the stomach, the galvanic battery of the animal, where life is originated and sustained.

The Electric Telegraph supplies us with a grand illustration of the nature and working of this animal battery. In the battery of this apparatus we see two metals, zinc and copper, dissolving in diluted sulphuric acid, and the action produces a force possessed of enormous capabilities, which are only beginning to be known.

In the stomach of man, or other animal, a similar dissolving process is continually going on with the food put into it, and the force thereby developed causes and keeps up the circulation of the blood and the whole life action of the body, enabling it to move wherever it desires, and to perform all kinds of exercise and locomotion.

Not does the resemblance end here, for there is a wonderful

similarity between the telegraph switch and the animal brain. From the battery only two wires, one from either pole, lead the force to the *switch*; yet from this switch any number of wires may radiate, each one endowed with equal magnetic force, or the whole may be concentrated in one. From our stomach two cords also lead up the spine to the base of the brain, (which may be compared to the telegraph switch,) and from the brain the whole nervous system of the human body proceeds.

The inference to be deduced from this wonderful coincidence is, that the body is merely a machine, whose brain is controlled by the magnetism of the body; the *mind* being the *telegraph operator*.

An animal is thus as much a magnet as a plant, and its life is magnetism.

In concluding our argument that magnetism is the life of the world, if we have proved that minerals, plants and animals all live and grow by magnetism, then it only remains to show that the earth is a magnet; but this is a well established and acknowledged fact, and thus it is only making more certain what is sure, by proving plants and animals magnets; for the invariable law of magnetism is, that every atom of a magnet, no matter how connected, is also a complete magnet as well as a part of the whole.

ART. X.—NOVA SCOTIAN GEOLOGY.—NOTES TO RETROSPECT OF 1878.—BY REV. D. HONEYMAN, D. C. L., *Hon. Memb. Geol. Assoc., London, &c., Fellow of the University of Halifax, Curator of the Provincial Museum, Professor of Geology Dalhousie College and University.*

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AFTER I read my essay "On the Fossiliferous Rocks of Arisaig," before the Halifax Literary and Scientific Society, in April, 1859, a notice appeared in the *Presbyterian Witness* newspaper, in which the editor stated "that I had settled questions that had puzzled Lyell and Dawson," regarding the age of the Arisaig rocks.