LETTERS TO THE EDITOR.

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Life on Mars.

If the canals of Mars are structures made by intelligent beings, it is difficult to believe that these beings have not at their disposal appliances both for construction and survey. It is difficult to believe that some of these appliances are not made of metal. If made of metal, it is difficult to believe that the Martians do not use fire. There is strong evidence that friction was the source of the discovery of fire on the earth. But is it likely that fire would be discovered by friction on a planet the barometrical pressure of which is less than 4 inches of mercury, and the still atmosphere of which is believed to be free from thunderstorms and lightning flashes?

The obvious, and I think adequate, criticism of such an argument is that it is anthropomorphic. It interprets the conditions of life on Mars too much in terms of human experience. In the present state of our knowledge, may not the same criticism be made of the assertion that life on Mars is accompanied by an intelligence similar to our own? On the earth, life without any high degree of intelligence has been the rule. Life with a high degree of intelligence has been the exception, an exception confined to an insignificant fraction of the time during which mundane life has existed. Is it safe, without very cogent evidence, to assert that a similarly exceptional state of things exists on Mars? Can no other possibilities be suggested?

To be told that life exists on Mars tells us but little of its nature. It does not even tell us that living beings exist. Perhaps on Mars there is only one living being, a gigantic vegetable the branches or pseudopodia of which embrace the planet like the arms of an octopus, suck water from the melting polar snows, carry it to other parts of the planet, and are visible to us as the Martian canals. Lowell adduces the straightness of the canals as a proof that they are artificial products of intelligent beings. But they are certainly no straighter than the somewhat similarly interlaced pseudopodia seen in certain Heliozoa, Foraminifera, and Radiolaria.

That this idea is not excluded by anything necessarily inherent in the nature of living matter may be shown by considering the conditions that must have accompanied the origin of life, whether on the earth or on Mars. Parenthetically, it may be remarked that the existence of life on Mars is not without bearing on the problem of the origin of life on the earth, and Lowell's discovery may be regarded as adding reason to the hope that has been expressed that some day life may be artificially produced in our laboratories.

It is impossible to believe that life originated directly by a fortuitous concurrence of atoms of the elements of which living matter consists. Organic compounds must first have come into existence as links between the living and the not living. Some clues as to the nature of these links possibly may be afforded by current researches on the fixation of atmospheric nitrogen. We may surmise that some stages in the evolution of living matter were amino-acids, polypeptides, and proteids. The fact that nowadays no such substances exist in natural water does not disprove this supposition, for had such compounds existed they must long ago have been destroyed by bacteria and similar organisms. We may surmise that gradually these primeval proteids became aggregated into larger and larger molecular complexes until they existed as a loose jelly of indefinite extent, that these complexes were subjected to a slow oxidation, that, if we may accept Pfleger's doctrine of the nature of respiration, these molecular complexes, under the influence of oxidation, acquired a certain molecular instability, but showed at first no other vital character than the power of combining with or assimilating other molecules of primeval proteid.

However imperfect such a conception may be, there can be no doubt that the process of the origination of life was in the main a process of building up (one is tempted to use the word polymerisation) of small simple aggregates into larger and more complex aggregates. I can see no reason for believing that there was anything in the nature of this primitive living matter that would prevent this process of aggregation from continuing indefinitely. Or, in other words, we have no right to assert that there could have been anything in the nature of the primitive living matter itself to prevent it forming a scum of unlimited extent on the water in which it existed.

The fact that such indefinite growth either did not occur, or, if it did occur, was only a transient stage in evolution, may safely be ascribed to the effect of some external forces or conditions of the environment. An illustration may make this clear. Ice-crystals have the property of aggregating together to form snow-flakes. Owing to conditions and forces external to themselves, the process of aggregation does not continue indefinitely, but the snow-flakes cease to grow when they have reached a certain size. Under another set of conditions, ice-crystals may not form snow-flakes at all, but may cover a large extent of country in the form of hoar-frost. Similarly, the primitive living matter on the earth, owing to the action of some external forces or conditions, developed in the form of separate individuals that we may compare to snow-flakes. The possibility cannot be excluded that on Mars living matter developed in the form of a scum covering the seas of that planet, which scum would correspond to the hoar-frost of our illustration. What external force is there that would be likely to act on primitive living matter on the earth, but not on Mars? Could it be the action of tides and waves?

All I wish to assert is that it is possible and conceivable for a single vegetable organism to come into existence on a planet, and for it not to break up into separate individuals. In such a vegetable, parts unfitted for the environment might perish and be assimilated by other parts that were better adapted to the conditions that existed. Thus it might possess a power of adaptation to a changing environment, such as must have occurred, for example, in the drying up of the seas that once existed on Mars. No one who believes in "the continuity of the germ-plasm" will see any objection in the quasi-immortality of such an organism.

Another possibility may be suggested. Supposing, in the course of many millions of years, the earth was to follow the example of Mars and gradually to lose its water. Should this happen, a stage would be reached in which a few isolated lakes existed in the dried-up beds of the oceans. Let us imagine what then might be seen by an intelligent being on the planet Venus who had "an eye for planetary detail." Might he not see a system of faintly shown lines stretching from lake to lake and to the polar caps? Might they not show evidence of seasonal change? And might he not then conclude that they were canals made by beings of greater intelligence than his own, though in reality they were only fronds of a gigantic seaweed that had developed from the gigantic seaweeds that at present exist in the Sargasso Sea? Is it not likely that in the course of ages the fronds of such vegetables would contract until they formed straight lines from oasis to oasis, and so further the idea that their production was due to intelligence?

These ideas are obviously merely of the nature of suggestions, and I wish expressly to disclaim holding any definite opinion or belief as to the nature of the life on Mars. Prof. Lowell has measured the rate of flow of water in some of the Martian canals. Is this rate the "economical rate" for the flow of water along an open canal, or does it agree better with the economical rate, if the phrase is applicable, for the flow of water along pipes of a vegetable organism, where presumably the loss from percolation and evaporation would be trivial?

My position is that one may admit that Prof. Lowell's brilliant researches prove the existence of life on Mars, and still ask from him further evidence before we are convinced that that life is intelligent.

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