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GOD AND MATTER

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A recent statement by Prof. George Wald of Harvard University pictures the existence of life as the normal order of nature, instead of something merely accidental. In connection with the celebration of the hundredth anniversary of the National Academy of Sciences, he said:

For life to exist at all, according to the most modern scientific concepts, it is requisite to have a planet somewhat like this earth—of about the same size, at about the same temperature, and receiving about the same amount and quality of radiation from its sun as does ours. (*New York Times*, Oct. 29, 1963)

Dr. Wald pointed out that a minimum of one million such planets exist in our galaxy of the Milky Way alone, and since there are about a hundred million such galaxies visible with the most powerful telescope, a conservative estimate would say that there are perhaps a hundred million million such planets in the already observed universe.

In all such planets, life can occur. On many of them—given enough time, life has occurred, and has then undergone an evolution much as it has done on earth. For evolution is also part of the order of nature.

This seems to be the most important outcome of our story: Life has a status in the physical universe. It is part of the order of nature. It has a high place in this order, since it probably represents the most complex state of organization that matter has achieved in our universe. We on this planet have an especially proud place as men; for in us as men matter has begun to contemplate itself, and to ask such questions as we have asked today concerning the origin and beginnings of things.

The view currently held is that over a vast reach of time organic (carbon-containing) molecules accumulated in the oceans, until the

oceans became a great "cosmic soup," in which these molecules were kept in a sterile state and in a lack of oxygen. Their concentration became ever higher and their variety and size ever greater. At this point, according to the Russian biochemist A. I. Oparin, began the process of natural selection.

The picture here given, although retaining certain points of the "accident" or "chance" doctrine of creation—especially in the concept of natural selection—nevertheless offers certain new aspects. So-called evolution is now no longer thought to have followed upon an exceptional or chance condition in nature, but upon a condition which lies in the order of nature.

By the term "natural selection," Oparin meant the strengthening of certain molecules by accidental advantages as to situation or composition. This is an unmistakable reality of nature, but the background of causes is left untouched.

At this point, the human being who is inclined toward religion begins to ask: "Chance or Providence?" For if evolution "belongs to the order of nature," then the existence of advantages or favorable circumstances for progress also belong to that order. The existence of disadvantages is then only the shadow cast by the existence of advantages.

The concept of "advantage" therefore deserves a very close scrutiny. In nature, it involves primarily the situation or environment. For this is determining for the formation, by conjunctions, of greater molecules or "aggregates" and also the strengthening of cells by nourishment. According to the old evolution doctrine, it was mainly the situation or environment to which the development of higher forms of life had to be credited. The new forms existed only by virtue of a survival process. The missing link in this argument was that although situation may cause the strengthening of a given species, it does not bring about any mutations in a given species determined by given genes.

Prof. E. L. Tatum, a Nobel Prize winner of the Rockefeller Institute, described on this same occasion (October, 1963) the most recent discoveries regarding the nature of the genes, which are the determining elements for the whole of biology. He stated:

The interaction between the organism and the environment can modify the expression of a character, but only within these gene-determined limits; and only as a consequence of *mutation* can new limits of variability be set to serve as the raw ingredients of selection and evolution.

One of the major discoveries of recent times is that the basic material of the gene is the complex chemical named dioxynucleic acid, or DNA, and that it operates through the medium of a related nucleic acid named RNA.

Prof. George E. Palade of the Rockefeller Institute, noted in the discussion: "It turns out that the remarkable properties of living matter are due to the way in which common chemical elements are put together in time and space." This does not say any more, however, than that every organic form has its own chemical composition consisting of known chemical elements; it does not say *how* this composition came into existence. The basic problem of the mutations of species remains unsolved.

In the nucleic acid DNA a mechanism has been discovered which is responsible for the structure of the cells.¹ This mechanism dictates the composition of the proteins that are to be produced. Although the DNA of one type of cell appears to be the same as that of another, yet it always functions differently in each kind of cell, this by means of a kind of elimination of signals which are not applicable—like a photographic negative of which only a certain part is printed. Exactly how this elimination takes place is not known.

The observation of the activities of DNA and its tool, RNA (they differ only by one oxygen atom) has shown that the ruler of life has a seat directly in each cell. The blue-print or code is the same in the one-cell stage as later on, when there are countless millions of cells. The blue-print is completely present for the weaving of a body on the plane of matter.

Much has been discovered recently about "interferon" and the nucleic acid RNA.² One of the striking things is that each cell creates for itself a protein which resists the acids of other cells and also foreign viruses. Again we are confronted with the fact of the individuality of each living organism, and may note that the whole truth lies hidden in the statement of Prof. Palade that the remarkable properties of living matter are due to *the way* in which common chemical elements are put together in time and space. For DNA and interferon are no common chemicals.

So the gene keeps the mystery to itself—that mystery which one might call the soul of the organism and in which its very individuality lies. The above-mentioned acids behave in many

¹ See *LIFE*, October 4, 1963; *Proceedings N.A.S.*, March and Dec., 1962.

² See *Scientific American*, Oct. 1963.

respects like the *spiritus animalis* of Swedenborg: a natural spirit, omnipresent in the blood and fibers, which is the representative of the soul in the body.

Concerning the soul of man (which is undoubtedly the supervisor of all cell formation), Swedenborg repeatedly states that it is completely present in the seed; that it possesses the knowledge to form for itself a body; that it is present in everything of the body; that, being essentially spiritual and unbounded by time and space, it is capable of unlimited extension. Hence it is that DNA is capable of endlessly dividing itself into two parts, each of which is just as complete as the original molecule. But the most important of all his statements regarding the soul properly so called was that it is an organism on the spiritual plane, and in itself indestructible. Thus it does not die but merely withdraws itself at the death of the body from the material plane onto the plane of a higher dimension.

It would require a separate study to consider the scientific data indicating the existence of this higher dimension. Here let it suffice to observe that such data certainly exist, and that they reflect conclusions drawn from scientific observations.

It is clear that this soul is capable of almost unlimited extension, for it constructs, after conception, a physical structure which it then sustains and renews continuously for a century. In addition, it acquires consciousness by developing the spiritual side of man, which is built up on the memory as a foundation. The relationship of the memory with RNA is of great importance in this connection.

Nothing in this whole story about the interior composition of the gene (the existence of which, incidentally, has been known since 1870) deprives it of its deep secret. On the contrary, the secret becomes the more profound and the question of evolution the more puzzling. The code, or formula, which determine the genetic structure can be disturbed by thermochemical or cosmic influences. Some see in this fact the explanation of evolution. Be it so—but the important question is this: which influence causes the genetic structure to change in such a way *that the organism assumes a higher or superior form?* Could it not—if it were only a matter of chance—lead just as easily to devolution? What may be said about the mutations upon which everything of the doctrine of evolution depends?

In physics, a distinction is made between a chemical reaction and a nuclear reaction. A similar difference exists between the concept of “the influencing of character through environment” (this is true

of a chemical reaction which leaves the atomic structure intact), and "mutations" (such as nuclear reactions involve). This distinction is of greater significance than may appear at first sight. A true genetic mutation can probably only take place by means of as yet unknown cosmic rays; and this places before man the question: What is in the cosmic radiation that can bring about new compositions in the DNA molecule, and thence a new genetic structure? There seems to be a force in it that is always able to bring forth something new. The Source that emits the rays is full of original ideas; the variety of species is unlimited, and within each species there is likewise an endless variety. But the crowning species is that which (to borrow the words of Prof. Wald) "begins to contemplate itself, and to ask such questions as we have asked today concerning the origin and beginnings of things."

In using the word "ray" here we mean in actuality that field of force which determines the genetic structure of the living organism, the investigation of which, since begun in 1935 by Burr and Northrop of Yale University, has led to the electrodynamic theory of life. In the nature of each creature, therefore, we see the reflection of the nature of the soul-giving ray. Each organism is suited to the conscious reception of the ray that created it. A logical inference which might be drawn from this theory is that in living radiation, which is the causal predecessor of all matter, organic as well as inorganic, electrodynamic fields are present, and that these prefigure on the pre-time-and-space level (which might be called the plane of the Idea to which the ancients ascribed substantiality) the form and quality of the organism nature produces by a process that appears to man as evolution, or the unfolding of a higher form from a lower one.

What ray, then, must have been responsible for man's existence? There is a big jump between an animal and a creature which seeks for the Cause, wishes for conscious conjunction or communication with the Creator; raises itself up upon its hind legs, casts its eyes to heaven, and asks, where do I come from, and who made all this? Where, in other words, do the rays originate which put into man the urge to seek after the Causality of things, to wish to free himself (in the words of Einstein) "from the prison of the individual destiny, and to seek the totality of existence as a unity full of significance"?³ What rays brought about this jump in the mutation of creatures?

³ *Cosmic Religion*.

This radiation could not have come from a secondary source such as the sun of the solar system, which, in its turn, has a prior cause common to all suns. If it had, man would only seek nature like the animals; but he is driven by a hunger for the knowledge and reception of that which lies behind nature in its totality. The rays which created him as a human and which continually inspire him could only have originated directly in the prime or universal source itself, which embraces "the *totality* of existence." And that source, in order to have looked to and produced man as the highest creation, must itself be essential, perfect and limitless Humanity.

In seeking after the Causality of things, one must not, therefore, be blinded by the brilliance of the natural sun, whose radiation possesses a certain observable velocity or wave-length; for obviously, there is a simultaneous sphere which penetrates and holds together the whole of creation—in which neither distance, nor measure, nor duration of time is conceivable. In this connection, it will be of interest to cite a few words from Swedenborg regarding the sun of the spiritual world, where time and space no longer play any role; but first some of the most recent developments in the sector of nuclear research ought to be mentioned.

The latest discoveries indicate the existence of still smaller nuclear particles than the pi- and mu-mesons, and these have been called the weak or W-particles. The CERN⁴ researchers shot protons against a wall of steel 82 yards thick with a velocity almost that of light. Behind this wall, neutrinos in their collisions with the atomic nuclei of freon gas were photographed. The bubble tracks appearing on the photograph were caused by the by-products of these neutrino collisions.

The elementary particles thus discovered, whose existence had already been speculated about, are an aspect of the nuclear binding force and related to the hypothetical gravity particle, the graviton, and the electromagnetic particle, the photon. They have a duration of a hundred millionth of a billionth of a second, and no mass. *With such qualities, matter approaches to the behavior of the spiritual:* it is even calculated that of all the neutrinos produced by nuclear processes in the sun that pass through the center of earth, only about one in ten billion is likely to react with another particle. "Obviously a particle that reacted with nothing whatever could

⁴ *Centre Européen pour la Recherche Nucléaire, Geneva.*

never be detected. It would be a fiction. The neutrino is just barely a fact.”⁵

The existence of such things is no surprise for those who are acquainted with Swedenborg's *Principia*—the content of which caused Prof. van 't Hoff, the great Dutch physicist, to call its author the founder of stereochemistry. For Swedenborg speaks of the composition and the motion of elementary particles—and so exhaustively that one has to be amazed at the clarity of his *a priori* conclusions. And these were but the products of a period preparatory to that work which was to be of eternal importance for humanity: the explanation of the composition and nature of the matter of the other world.

Here are two extracts from his writings on the subject of creation:

Every created thing is finite, and the Infinite is in the finite things as receptacles, and It is in men as in its image. The reason every created thing is finite, is that all things are from Jehovah God by means of the sun of the spiritual world, which encompasses Him from most nearby; and that sun is from substance that has come forth from Him, the essence of which is Love. By its heat and light, the universe from its first to its lasts was created. One thing was formed from another, and so degrees came to exist—three in the spiritual world and three corresponding ones in the natural world, and a like number in the things at rest of which the earth consists. Through these degrees it was arranged that all posterior things should be receptacles of prior ones, and these again of still more prior ones, and so, in order, the receptacles of the primitives of which the sun of the angelic heaven consists. In this manner, finite things are receptacles of infinite—which agrees with the wisdom of the ancients, who said that all in each thing is divisible to infinity. The opinion generally prevails that finite things—because the finite cannot contain the infinite—cannot be the receptacles of the infinite; but God first limited His infinity by means of substances emitted from Himself, from which His nearest environment, the sun of the spiritual world, came to exist; and afterwards, by means of that sun, He perfected all the remaining surroundings down to the last one, which consists of things at rest. (TCR 33)

The work just quoted was published in 1771. In another book Swedenborg wrote in the year 1759:

There are two suns, the sun of the spiritual world and the sun of the natural world. The sun of the spiritual world is the Lord's Divine Love, and the sun of the natural world is pure fire. From the sun that is the Divine Love every work of creation has commenced, and by means of the sun that is fire it has been carried to completion. Everything that proceeds from the sun

⁵ L. M. Lederman, *Scientific American*, March 1963.

that is Divine Love is called spiritual, and everything that proceeds from the sun that is fire is called natural. The spiritual, from its origin, has life in itself, but the natural originally has nothing of life in itself. And because from these two fountains of the universe all things in both worlds have come into existence and continue to exist, it follows that there is in every created thing in this world a spiritual and a natural, a spiritual as its soul and a natural as its body; or a spiritual as its internal and a natural as its external or a spiritual as its cause and a natural as its effect. . . . That there is such a conjunction in the particular, yea, in the singular things of nature, has not yet been known. It has been unknown because of the existing ignorance respecting the spiritual world, the sun there, and heat and light there, and because of the insanity of sensual men in ascribing all things to nature and rarely anything to God except nature as a generality; when yet not the least thing is possible nor can be possible in nature, in which there is not something spiritual. (AE 1196)

Since, according to the fifth-dimension theory of the universe as propounded by the great British scientist and philosopher, J. G. Bennett, we human beings living in matter are "eternity-blind," the question is apt to arise at this point, Where, then, is this spiritual sun with its rays? Obviously, that radiation must be omnipresent in nature, and possess a velocity which is such that it can traverse the universe in not any time; in other words, it must not experience a single obstacle from time and space.

No investigation of matter can, in itself, make known to man the source of what is observable. For behind that, again and again, lies an earlier cause. Only an *idea* can penetrate the barrier: the idea which itself is formed from the source-substance.

The coming into the mind of this idea is called the revelation of the spirit, which stands always prepared to meet Science at its furthest frontier, embrace it, and introduce it to something new. Experience will undoubtedly bring us back again to the conviction of *a priori* principles. For in the end we are always rescued by the Unknown itself, which accompanies us upon every ever-more-penetrating investigation.

In the works of Swedenborg which were written after his scientific period, the indescribable mystery steps forward, now in the form, not of particles, but of the fully organic configuration of Divine Humanity: Lord and Master of matter, particle, spiral motion, cell, plant, animal, and of man himself. The entire creation turns out to be an organic whole, which cannot be taken apart because it is, was, and shall come forth from the infinitely complex Divine Organism that is the Creator Himself.