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ORDINARY MEETING, Feb. 20, 1882.

J. E. Howard, Esq., F.R.S., V.P., in the Chair.

The minutes of the last meeting were read and confirmed, and the following elections were announced :—

Associates :—The Lord James Douglas, Glen Stuart ; Rev. T. N. Farthing, M.A. Cantab., Mossley ; C. J. W. Pfoundes, Esq., F.R.G.S., F.R.A.S., F.R.S.L., F.R.H.S., &c., London ; Miss A. F. Layard, Bath.

Hon. Local Correspondent :—Rev. C. H. H. Wright, D.D., LL.D., Ph.D. (Leipsic), Belfast.

Also the presentation of the following works for the library :—

"Proceedings of the Royal Society."	*From the same.*
"Proceedings of the Geological Society."	*Ditto.*
"Proceedings of the Antiquarian Society of Philadelphia."	*Ditto.*

A Smaller Work. By H. Phillipps, Esq.

The following paper was then read by the author :—

THE THEORY OF EVOLUTION AS TAUGHT BY HAECKEL, AND HELD BY HIS FOLLOWERS, EXAMINED, AND SHOWN TO BE NOT PROVEN.

By Joseph Hassell, Associate of King's College, London.

"SO God created man in His own image, in the image of God created He them; male and female created He them." A noble origin this! An origin which indicates both a divine ancestry and a glorious destiny. Such an origin

Note.—The writer wishes it to be distinctly understood that he does not class all Evolutionists with Dr. Haeckel. He recognises the fact that there are three classes of evolutionists. There are first, those who receive the hypothesis to account for the existence of all species of animals in the present day, but who do not admit that it accounts for the beginning of life ; secondly, there are those who, while they accept the hypothesis as being conclusive with regard to all the lower orders of animals are not content with it when it is applied to man's origin ; and thirdly, there are those, and I am afraid they are increasing in number, who follow directly and openly the teachings of men, who, like Dr. Haeckel, of Germany, are, in reality, atheists.

The object of the paper is to examine the hypothesis as stated by Dr. Haeckel, who may safely be regarded as the exponent of the most advanced non-theistic evolutionist theories of the present day.

and such a destiny has been the faith and hope of millions of the human family in all ages, and the teaching of not a few of the profoundest scholars of their day.

Now, however, we are called upon to give up this faith in man's noble descent, and accept—at the risk of being considered unscientific—the dictum of the German professor, Ernst Haeckel, and believe that man has been evolved out of the monera, to hold that "There is no doubt that man is descended from an extinct mammalian form, which, if we could see it, we should certainly class with the apes"; and "It is equally certain that this primitive ape in turn descended from an unknown semi-ape, and the latter from an extinct pouched animal."* And this, again, from another unlike creature, and so on by successive steps backward until the first shapeless, structureless mass of protoplasm is reached which was, we are told, the true ancestor of man.

Now, since the views of the German professor on the subject of evolution are held by many scientists of our own country in the present day, and are used by some to disprove the Bible account of man's origin, it will be well to examine the subject carefully, and test the hypothesis both by common sense and by the teaching of modern science.

In the first place, it will be necessary to examine the foundation on which the hypothesis rests. Man, says the professor, has descended from the monera. Well! But from whence the monera? Now note the answer:—"When animated bodies first appeared on our planet, previously without life, there must, in the first place, have been formed, by a process purely mechanical, from purely inorganic carbon combinations, that very complex nitrogenised carbon compound which we call plasson, or 'primitive slime,' and which is the oldest material substance in which vital activities are embodied. In the lowest depths of the sea such homogeneous amorphous protoplasm probably still lives in its simplest character, under the name of bathybius. Each individual living particle of this structureless mass is called a monern. The oldest monera originated in the sea by spontaneous generation, just as crystals form in the matrix."†

After declaring that the doctrine of spontaneous generation cannot be experimentally refuted, and admitting that it cannot be experimentally proved, the professor goes on to say,‡ "He, however, who does not assume a spontaneous generation of

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* *The Evolution of Man*, vol. ii., p. 26. † *Ibid.*, p. 31.
‡ *Ibid.*, p. 32.

monera to explain the first origin of life upon our earth, has no other resource but to believe in a supernatural miracle; and this, in fact, is the questionable standpoint still taken by many so-called 'exact naturalists,' who thus renounce their own reason."

In keeping with this is the opinion of Professor Strauss, who, in his work, *The Old Faith and the New,* gives it as his opinion that bathybius was a presumable triumphant keystone in his argument against belief in the supernatural, and this was just what he wanted. For he had once confessed that a miracle must have occurred at the introduction of life, unless some method of filling up the chasm between the dead and the living forms of matter could be found. Bathybius is, in the opinion of the Professor, that other method; it does, in fact, span the chasm between the living and the not living, so the belief in miracle was rendered impossible.

But does bathybius really span the chasm? Let us see. Dr. Lionel Beale in his work on protoplasm quotes Dr. Wallich, who says, "Bathybius, instead of being a widely extending sheet of living protoplasm, which grows at the expense of inorganic elements, is rather to be regarded as a complex mass of slime with many foreign bodies, and the *débris* of living organisms which have passed away. Numerous living forms are, however, found upon it."* Nor is this all. In the October number of the *American Journal of Science,* 1876, in an article on the voyage of H.M. Ship Challenger, it is affirmed that some bathybius had been dredged from the bottom of the sea and submitted to chemical analysis. It was found to be made up of sulphate of lime, and when dissolved it crystallised as gypsum. Here, then, the boasted bridge which was to span the chasm falls to pieces. And yet it is upon this uncertain, this unsound basis, that the conclusions of the German professor rest, at least, as far as concerns the introduction of life on our planet.

But it may be asked, Have not experiments been performed which prove that living bodies have been produced from the non-living? How about the experiments of Dr. Bastian? Let us examine the subject carefully.

In the year 1870 Dr. Bastian published his account of the experiments which he performed. It appears that he prepared certain infusions of hay, turnips, &c., and placed them in glass tubes. He then submitted them to the action of heat, and while the steam was issuing from the ends of the tubes he sealed them so as to exclude the air. After a time the infu-

* *Protoplasm,* by Dr. L. Beale, p. 110.

sions were examined under a powerful microscope, and in some were found various forms of animal life. How came they there? The Doctor concluded that by the action of heat all the germs of life which might have been in the water were destroyed, and therefore, as life was now present, it must have been produced *de novo*, or in other words, there must have been spontaneous generation. Shortly after Dr. Bastian published the account of these experiments, Professor Huxley, in his address to the British Association, questions the conclusions of the Doctor, and while claiming for himself "a philosophic faith" in the probability of spontaneous generation in the far-off past, still says that "Biogenesis—that is, life through the action of life—appears to me, with the limitation I have expressed, to be victorious along the whole line at the present day." Again. In the year 1879 Dr. Tyndall performed a number of experiments with a view of further testing the question. He procured sixty flasks, in which he placed infusions of beef, mutton, turnips, and cucumber. All these infusions were boiled for a certain length of time, and while boiling the necks of the flasks were sealed. The Doctor now carefully packed up and removed them to his house at Bel-Alp in Switzerland, at an elevation of 7,000 feet above the sea. When the box was opened fifty-four of the infusions were found to be clear, and six muddy. On close examination it was discovered that the flasks containing the muddy infusions were damaged, and, as a consequence, the air had entered. In these various forms of life were found to exist.

The fifty-four remaining flasks were now exposed for three weeks to the sun's rays by day, and to the warmth of a room by night; at the end of the time they were as clear as at the commencement. Four of the flasks were now damaged, and the fifty remaining were divided into two sets. Twenty-seven were carried up to a ledge of the Alps 10,000 feet above the sea. The ends of the flasks were now broken, and the whole were allowed to remain for a period of three weeks exposed to wind which was blowing across the snow-capped peaks of the Oberland. At the end of three weeks the infusions were found as clear as they were before the exposure, and when submitted to microscopic investigation there were no traces of animal life.

The other twenty-three flasks were taken to a hay-loft in the rear of the Doctor's house; the necks were broken off, and the infusions allowed to remain for three weeks in direct communication with the air. At the end of the time the infusions were found to be muddy, and when submitted to microscopic investigation were found to be rich in animal life.

When the Doctor returned to London he performed a number of experiments under similar conditions, and in every case with similar results.

When speaking of these experiments, and supposing they had been investigated by a careful observer, he says, "Such faithful scrutiny fully carried out would infallibly lead him to the conclusion that, as in all other cases, so in this, the evidence in favour of spontaneous generation crumbles in the grasp of the competent inquirer."—*Fragments of Science*, vol. ii., p. 319. 1879.

So much, then, for the hypothesis and the experiment. We go a step further, and assert that it is contrary to the analogy of nature to suppose that spontaneous generation did ever take place. Let us test the question by geology. It is generally admitted that the formation of the various strata of rocks which form the earth's crust was due to precisely the same physical forces that now exist. If spontaneous generation did once take place, it must have been at a time when the physical forces of nature were at work which resulted in the formation of our rocks and earths. Now, as the same forces are in operation at the present day as were in past ages, what they were able to accomplish then they are able to accomplish now. If mere physical forces were able to produce life twenty thousand or twenty millions of years ago, they are equally able to produce life at the present time. But there is, as we have shown, no well-authenticated instance of spontaneous generation at the present time, although the physical forces of nature remain the same as at the period when it is assumed they did produce life. We must, therefore, insist that if spontaneous generation does not occur at the present day we have a right to assume that it never did.

Now, as all the conclusions of Professor Haeckel are drawn from the assumption that at some time in the unknown past life was introduced on our globe by spontaneous generation, which has never been established as occurring, and which, on the parity of reason, we have a right to conclude never did occur, we hold that the doctrine of evolution is unscientific, being grounded on a mere hypothesis unsupported by proof. Science is truth—truth ascertained by observation. But the origin of life by spontaneous generation, and the origin of species—species we say, not varieties—are not ascertained facts, but are mere assumptions. The conclusions which are drawn from these assumptions are the fruit of mere scientific imagination, and we are bold enough to say that imagination has no authority in such a question as this. As life is every-

where seen to be the product of life—of the living, not of the not living—it is reasonable to believe that this wonderful and mysterious power was introduced by the Great First Cause, who "is the Lord and giver of life." To believe this is much more reasonable than to believe that life originated by mere mechanical action. Surely, then, the German professor is unscientific, inasmuch as he draws his conclusions from mere hypothesis, not facts; and persuades himself, and expects others to be persuaded, that these fallacious conclusions are facts. He attributes effects to insufficient causes. On the other hand, those who believe in the creation of certain typical forms—true species—of living creatures by a Great First Cause, attribute the marvellous effects by which they are surrounded to a cause commensurate with these effects: life from life; laws from a law-giver; adaptation of means to ends, as the deliberate planning of one who saw the end from the beginning, and not the result of blind unreasoning "Natural Selection," whatever that may mean.

Let us go a step further and calmly inquire what the doctrine of evolution as taught by Professor Haeckel requires us to believe. Nothing less than this. First, that all inorganic bodies at present found on our globe and all parts of the solar and stellar systems, have been developed out of a simple homogeneous mass of matter; and, second, that all the forces of nature, both mechanical and chemical, and even psychical, are not the result of mind and will, but are the product of molecular motion, which motion—in the absence of mind—must have been assumed by the particles of matter themselves. But this is opposed to human reason. Because,—

1. It is admitted that matter is inert—that is, it cannot of itself originate motion. Now, if this be so, and we see it is, then every exhibition of motion at the first must have originated in something outside matter, *i.e.*, in mind.

2. But it is indisputable that matter does exhibit motion and other forces, and is governed by laws which are discoverable, and when discovered are found to be uniform. As these laws could not have originated in matter itself, they must have been impressed on it by mind.

3. Now, since the forces, the laws and the motions of matter were in operation long before any human mind existed, it is evident that there must have been a sentient Being existing at the time when matter first exhibited these various forces, and that this Being impressed these forces on matter. This Being, the great First Cause, we call God.

We are bold enough to say that the above propositions are

in accordance with the deliberate judgment of mankind at all times, and are strictly scientific.

To this deliberate judgment of the human race Dr. Haeckel opposes himself, and asserts that matter did originate for itself forces; that matter did make for itself those laws by which it is now governed; so that out of impotency came power, and out of disorder came order. Such a belief is, we hold, both unreasonable and unscientific. Is not such a creed a "blind belief"? How much more reasonable and more worthy of acceptance is the doctrine of the direct creation of forces and the arrangement of laws by an Almighty Being, the great First Cause of life, of order, and of beauty.

Now, concerning the evolution of the solar system out of the "Nebulous Fire-dust" without the action of a mighty will, it may safely be affirmed that there are many circumstances connected with it for which the hypothesis fails to account. Thus, to quote the words of Mr. R. A. Proctor, in his *Expanse of the Heavens*, published in 1873, "It does not account for the strange disposition of the masses of the solar system. Why should the inner family consist of minor bodies in the main unattended, while the outer consists of giant orbs with extensive families of satellites? Why should the innermost members of the outer family of planets be the largest, while just within these lies a family of asteroids, not only individually minute, but collectively less than Mars, or even Mercury? Why should the two middle planets of the inner family be the largest members of that family? Laplace's theory gives no account of these peculiarities; nor perhaps could it be insisted that these peculiarities should be explained; yet if any other theory should give an account of these features, explaining also the features which we have seen accounted for, then such theory would have a decided advantage." Now, we think the theory that the disposition of the heavenly bodies by an almighty Being a more reasonable one. Again: Evolution does not account for those wonderful laws which govern the motions of the members of the solar system, especially that of their relative distances, which it was the glory of Kepler to have discovered, and which he found to be as follows:— The square of one planet's period of revolution round the sun is to the square of the next planet's revolution, as the cube of the former planet's distance from the sun is to the cube of the next planet's distance from the sun. Here, then, is a wonderful fact, and one which we challenge the learned professor to account for by evolution, pure and simple.

In the next place we have to remark that the doctrine of

Haeckel respecting evolution requires us to believe that all the past and all the present forms of animal life have been evolved out of a structureless minute mass of mucous albuminous matter—minute protoplasms, or bioplasms as they are called, and that out of these formless masses, by differentiation and natural selection, man himself has been produced. Do we ask the professor to give the steps by which the wonderful changes have been effected, he is, we admit, ready with his answer?

The gradual development of man from bathybius is thus stated by Haeckel in his *History of Creation*, and implied in his *Evolution of Man*.

Step 1. Minute portions of structureless protoplasms—the monera of to-day—"Organisms without Organs." In the course of time, by differentiation an inner kernel was developed, and thus there was produced—

Step 2. Single-celled creatures, like the amœba of the present day. In the process of time these primordial creatures became sponges.

Step 3. These associated amœba gave birth to ciliated larva, which, by natural selection, produced a new race of beings, viz.:

Step 4. Simple-stomached animals—primitive worms which, after untold ages, gave rise to—

Step 5. Gliding worms, which, not being content we must suppose with their lowly estate, determined to improve their condition, and so gave birth to—

Step 6. Soft worms—the scolecida. These creatures, by some unaccountable means, formed for themselves a true body cavity, and managed somehow or other—the professor does not say how—to possess blood. In the course of ages these soft worms gave rise to—

Step 7. Sack-worms, which originated out of the former creatures by the formation of a dorsal nerve, and by the formation of a spinal rod, which lies between it. After many ages these creatures produced—

Step 8. Skulless animals like the present lancelet. These wise animals managed to produce a progeny in which the sexes were separate. In the course of time these creatures gave birth to quite a different race altogether, and thus were formed—

Step 9. Single-nostrilled animals, which were developed out of the former by the anterior end of the dorsal marrow forming itself into a brain, and the chord into a skull. In the course of ages these creatures evolved themselves into—

Step 10. Primæval fish. In these animals the nostril divided

itself; a double nervous system was evolved; jaws were formed; a swim-bladder made its appearance; and two pairs of legs were developed; and so was produced—

Step 11. The mud-fish, somewhat like the present salamander, and this was effected by the adaptation of life on land. The swim-bladder was now made into an air-breathing lung, and thus was produced—

Step 12. Gilled amphibiums, such as are met with in the present day. In the course of ages these creatures were evolved into—

Step 13. Tailed amphibians. These creatures accustomed themselves to breathe only by means of gills in the early stages of their life, and in the latter stages through lungs. In the course of ages these gave birth to—

Step 14. The primæval amniota. These were evolved out of *an unknown tailed amphibian*, by the loss of gills. Strange to say, the organs of tears were now developed. How wonderful! After many ages these creatures were evolved into animals with hairs and mammary glands, and so—

Step 15. Primary mammals, closely related to the ornithorhynchus of the present day, were produced. By degrees these monotremata produced—

Step 16. Pouched animals. In the course of time one of these marsupial creatures produced—

Step 17. Semi-apes, which, in the lapse of ages, produced the animals of the narrow-nosed monkey tribe, and out of these were evolved—

Step 18. The tailed apes of the New World, which, in the course of ages, produced—

Step 19. The man-like apes (anthropoides) which, in the process of time, lost their tails and a portion of the hairy covering on the back. Poor things! How much inconvenience they must have suffered on this account! When speaking of these creatures the professor says,—"*There do not exist direct human ancestors among the anthropoides of the present day, but they certainly existed among the unknown extinct human apes of the Miocene period.*" We beg the reader to mark this assumption,—"*they certainly existed*"—that is, they existed in the professor's imagination. In the face of this assumption, however, Professor Haeckel continues his steps in the development of man as if it were a thing of certainty, and states that in the process of time these man-like apes produced—

Step 20. Ape-like men. In the course of time out of these were evolved—

Step 21. Man, who was developed out of the former race by the gradual development of the brain and the larynx, so that language and mental power were the result. All these changes were produced by natural selection, resulting in "the survival of the fittest."

Such is the creed of the learned professor, and such must be, he says, the creed of every man who claims to be scientific. "We must," writes the professor, "either accustom ourselves to the idea that all the various species of animals and plants, man also included, originated independently of each other by the supernatural process of a divine creation—or we are compelled to accept the theory of descent in its entirety, and trace the human race, equally with the various animal and plant species, from an entirely simple primæval parent form. Between these two assumptions there is no third course; either a blind belief in creation, or a scientific theory of evolution."*

But to proceed. Let us now inquire into the grounds for believing that man has been evolved out of the monera. Here is the answer. Because, in all living creatures there is a similarity of organization, and a graduation which has a general relation to the historic succession of life.

We admit that there are many points in which the structure of one set of animals resembles another set in the same sub-kingdom. Thus, all the protozoa are built up on the same general type; all the cœlenterata on another; all the annuloida on another; all the annulosa on another; and so on, through the whole animal kingdom. But while the animals in each sub-kingdom are marked by a similarity of structure, those of another sub-kingdom are marked by differences equally as striking. Every student of zoology knows that, while in the sub-kingdom annulosa the main masses of the nervous matter lie on the ventral side of the body, in the sub-kingdom vertebrata they lie on the dorsal side. Other points of structure might be noticed equally as marked; indeed, we may say that each sub-kingdom is characterised by a well-defined structure of its own. And what is still more remarkable, the blood corpuscles of the different classes of the vertebrata have a character of their own, both as regards size and form. In fishes, reptiles, and birds, they are oval, while in mammals they are, with one exception, round. At the same time, they are smaller than those in the three other classes.

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* *The Evolution of Man*, vol. ii. p. 36.

Then, as to the historical succession of life, we shall show, by-and-by, that the testimony of the rocks fails to supply the necessary links. But, admitting that there is a similarity of structure in any or all of the sub-kingdoms of the animal world, does similarity prove identity or commonality of origin? Certainly, says Professor Haeckel. If not, how is it that man in some period of his embryonic condition resembles the lower animals? Hear what Professor Agassiz said on this point in the year 1873. "Embryonic conditions of the higher vertebrates to-day recall adult forms of lower vertebrates in the earlier geological times. From this fact the evolutionist *infers* that there has been some natural development in the long sequence of ages of the one out of the other. But the embryonic conditions of the higher vertebrates recall adult forms of lower vertebrates now living, their own contemporaries, just as much and in the same way as they recall the fossil forms. Shall we infer that because a chicken or a dog, in our own day, in a certain phase of its development resembles in certain aspects a full-grown skate, that therefore chickens and dogs now-a-days grow out of fishes? We know that it is not so, and yet the evidence is exactly the same as that which the evolutionists use so plausibly to support their theory. The truth is, that while a partial presentation of the facts seems to sustain this theory, when taken in their true connexion and fairly stated they destroy it by proving too much. They show that the relations between fossil animals supposed to prove descent, exist also between living animals where they have nothing to do with descent."

When speaking of this subject, the Rev. Alexander Stewart, M.D., of Aberdeen, well says: "To argue, however, that because there is physical similarity there must also be identity of being, is to proceed on the basis of a manifest fallacy. We might as well conclude that because the bodies of two men are the same in kind their moral character must also be identical. Have we not what is known in chemistry as isomorphous bodies—bodies which are alike in form and similar in chemical constitution, yet different in their properties? The salts formed by these substances, with the same acid and similar proportions of the water of crystallization, are identical in their form, and, when of the same colour, cannot be distinguished with the eye; magnesia and zinc sulphate may be thus confounded . . . In these isomorphous substances the identity of shape is so complete that they all possess the same crystalline form (octahedron, eight sides). No scientist, however, will presume to say that they are identical in kind or in qualities; or that the one has been evolved from the

other. Why then should we be expected to believe that because physical resemblances exist more or less between man and the higher apes, he and they should therefore be one save only in the degree of development."

Again: The mass of protoplasm, we are told, which ultimately produces a fish, is of the same nature as that which ultimately produces a reptile, a bird, or a mammal. Admitted, at least as far as the chemical analysis of dead protoplasm goes, but not admitted as regards the potentiality of each. For though the life-germ of each class is the same at first, it does not continue the same throughout its development. When the egg quickens there is a different segmentation for each of the great sub-kingdoms. All the eggs of the vertebrates may begin their development in one way and run on in the same way for a while; but the invertebrata begins in another, and in virtue of their own special potentiality they divide, and sub-divide, and weave in one case a protozoon, in another an insect, in another a mollusk, in another a fish, in another a bird, and in another a mammal, as the case may be: and this they always do, and, as far as evidence goes, always have done. Professor Haeckel, who bases his conclusion of man's descent from the amœba, on the similarity of the egg-cell of all animals, by a diagrammic representation of the egg cleavage of seven distinct classes really shows that the differentiation is different in each. Thus, while the parent cell of man, frog, and the amphioxus, presents no appreciable difference, the first cleavage state is not at all the same. In man the cleavage is dual, while in the frog and amphioxus it is quadruple; and, indeed, the whole of the five separate developments of the cells are dissimilar.* In fact, the diagram might with advantage be as well used by the opponents of the theory to substantiate their views as by the evolutionists to prove theirs. To adopt the language of Dr. Cook, of Boston, we may say: "Just as the weaver, when he throws his first shuttle, has the plan of the whole fabric in his mind, because he has arranged beforehand the pattern, and has provided for it in the disposition of his warp, so there is a well-arranged plan settled before to which each bioplast works; and, in virtue of this prearranged plan, all creatures produce progeny after its kind. To each seed is given its own body."

Once more. Is it not a fact, asks the evolutionist, that

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* *The Evolution of Man*, vol. i., p. 240.

in the progeny of some kinds of animals there are often well-defined varieties? Granted. But are *varieties* the same as species? Certainly not. There are, we admit, very many varieties of dogs, and of cats, of pigeons, and of fowls. But the dog tribe is distinguished from the cat tribe by well-defined marks, as is also the family of the pigeons from the family of the fowls. And what is more, each in the fulfilment of the great purpose of its life always seeks the companionship of one of its own kind, and in the process of time another of its kind is produced by, and of, its own kind, which thing, as far as evidence can be furnished, has always been the case. The mummy cats and ibisses of Egypt are identical with the cats and ibisses of to-day. If, then, the sum of the changes of four thousand years is nil, what right has Dr. Haeckel to assume that the sum of the changes of forty thousand years is the development of an ape out of a monera?

Many eminent scientists of the present day, while not agreeing, it may be, with Professor Haeckel as to the exact lines on which the gradual development of the higher vertebrates from the lower vertebrates has run; nor yet as to the production of life at the first, yet regard the doctrine of evolution as proven; and hence these leaders of scientific thought, both in their addresses and in their writings, take the thing for granted. The result of this is, that not to agree with them in this particular is to lay yourself open to the charge of being unscientific. But to this we demur. To be scientific is not merely to acquiesce in opinions, but to possess knowledge—truth ascertained and systematized.

Respecting the general question of the origin of species by natural selection, let us suppose the point in dispute reversed. Suppose, then, that we were everywhere surrounded with proofs of the transmutation of species, and the opponents of evolution to assume that though species did not at the present time breed true, yet in the far distant past they did, but that somehow or other all was altered now,—what would the evolutionists say? Would they not argue thus? We see around us the evidence of change; the known present is one of transmutation of species. Proceeding, then, from the known present to the unknown past, we conclude that what is true in the present was true in the past, and therefore you are wrong in assuming that true species were produced at the first by the direct agency of the Great First Cause.

In this they would, we think, be right.

Now look at the case as it stands. We are everywhere surrounded with the evidence of the non-transmutation of

species. This is the known present, and, proceeding from this known present to the unknown past, we conclude that what is true in the present in this particular was true in the past; and hence we say to the evolutionist, you are not justified in assuming that at some period in the unknown past all was different from the present. Now the animals of a particular species breed true; then they did not: now species are persistent; then they were not. Surely such an argument as this is illogical.

Such being the case, we hold that it is both reasonable and scientific to believe that at some time in the far distant past, a certain number of distinct species or types,—if one may so speak,—were created by the Great First Cause, and that when they were called into existence each was endowed with the power of producing progeny after its kind, and that to "each seed was given its own body." Such a faith commends itself to human reason, because it attributes a great effect to its commensurate cause.

Evolution, as taught by Professor Haeckel, on the other hand, does not commend itself to reason, because it attributes great effects to insufficient causes.

Evolution and natural selection require us to believe two most extraordinary things.

First.—That there was "selection" by the lowest form of animal life to a higher, when there was nothing higher than itself from which to select. For if life commenced with the monera, which were structureless—life without organs—and nothing higher, whence the struggle for existence, which, according to the advocates of the theory, led to the improvement of the race?

Second.—That the lowly-formed mass of jelly was impelled in some way to alter its form and improve its condition when there was really no necessity to do so. For the monera were as adapted to their mode of life as the amœba, the hydra, or any of their immediate descendants.

As we asked at a previous stage of our investigations, Whence came life at the first? so we ask now, Whence came the power, the desire, the will—call it what you please—that led some of the monera to assume a more complex structure? and why all did not do so, when all were subjected to the same influences, and placed in the same circumstances? For if "natural selection does nothing without variability, and this depends in some manner on the action of surrounding circumstances on the organisms," then there could have been no room for its action when there were no organisms to be improved by the surrounding circumstances.

Let us now examine Haeckel's doctrine in order to see whether it will account for the incipient stages of certain special structures.

It is a fundamental article in the creed of every evolutionist that, in the origin of species, all changes have been individually slight, minute, and insensible. Hence, Mr. Darwin says, "Slight individual differences, however, suffice for the work, and are probably the sole differences which are effective in the production of new species." . . . "Natural selection, if it be a true principle, will banish the belief of any great and sudden modification of their structures." . . . "Natural selection acts only by taking advantage of slight successive variations; she can never take a sudden leap; but must advance by short and sure, though slow steps." . . . "If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous successive slight modifications, my theory would absolutely break down."—*Origin of Species*, p. 239.

Let these articles of the evolutionist's creed be tested by some special peculiarities of animal structure. Take, for instance, the case of the baleen in the mouth of the Northern, or "Right Whale"—which subsists entirely on animal food—small medusa and other minute creatures. When the whale feeds it takes into its mouth a large quantity of water, in which the food is swimming. It cannot swallow all the water, so this is got rid of through the strainers formed by the plates of baleen, which are arranged side by side along the whole length of the upper jaws. The fringy nature of the inner edge of the plates secure the prey.

Now, according to Professor Haeckel, the progenitors of the "Right" Whale were not whales at all, but some other species of mammals. What other aquatic mammals are there through which the changes may have been effected? The only other purely aquatic mammals are the dugongs and the manatees. But these are purely vegetable feeders, and cannot, therefore, be held as being the immediate progenitors of the whale. And even if they were, until the baleen was sufficiently developed to serve as a perfect strainer, it would have been detrimental to the animal, and ought, on the hypothesis of "Natural Selection," to have been degraded, and ultimately to have been obliterated, or, at least, to have become rudimentary. Let us suppose the case of a dugong, or some such creature, in the process of development into a "Right Whale." At one period in its history it would have had half-formed baleen in the upper jaw, and half-degraded teeth in the lower jaw. How would such a creature subsist? It would be

unfitted for procuring its vegetable diet, and unable to retain within its mouth the medusæ which might enter that organ. Surely the fate of such a creature would be gradual starvation. How is it then, we ask, that we have any whales at all at the present day? How! In this way answers a living naturalist:*—"In North America the black bear was seen by Hearne swimming for hours with widely open mouth, thus catching, almost like a whale, insects in the water." We do not question this fact: but we do question the conclusion drawn from the fact. The philosopher goes on to say, "Even in so extreme a case as this, if the supply of insects were constant, and if better-adapted competitors did not exist in the country, I see no difficulty in a race of bears being rendered by natural selection more and more aquatic in their structure and habits, with larger and larger mouths, till a creature was produced as monstrous as a whale." This is one of the *monstrous things* which, on the hypothesis of evolution, we are asked to believe! But we prefer, however, to let reason control our imagination, and accept its verdict that such a faith as this is inconsistent with common sense. There is another fact in connexion with the structure of the whale which should receive special attention. The whale, as an aquatic air-breathing mammal, cannot exist without a constant oxygenating of its blood. And yet the creature can remain submerged for an hour, and not suffer any inconvenience. And this it can do by reason of a special provision which has been made to supply the system with a constant flow of arterial blood during the period of its submergence. And this is how it is effected. While the heart of a whale is not larger in proportion to the size of the creature than is the heart of any other mammal, the quantity of blood contained in the body is much greater; and there are special arteries and veins provided to hold the extra quantity of the circulating fluid.

When the whale comes to the surface of the water to breathe, the aërated blood does not all pass to the heart, and from hence to the system, as in other mammals, but some of it passes to a reservoir provided for it—which reservoir consists of a number of arteries situated at the back of the chest. When the creature plunges beneath the water to obtain its food, or to evade its enemies, the store of pure blood is propelled through the system, and, after being used, is passed into another reservoir of veins, where it is stored up

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* *Origin of Species*, C. Darwin, first edition.

until the animal again comes to the surface of the water. So long, therefore, as there is any oxygenated blood in the reservoir, so long can the creature remain submerged.

We ask the evolutionist to say how "Natural Selection" alone provided for the increase of blood in the first instance, and then, when that increase took place, how the special arteries and veins, which should hold it, were made and located? And we should like to know what the ancestors of the present whales did, when, as yet, the arrangements were in their incipient state.

We hold that it is much more reasonable to believe that an intelligent being planned the whole structure at the beginning, and arranged the means to achieve the ends in view—the comfort and the protection of the creature. "We speak as unto wise men; judge ye what we say."

In the next place, let us consider the case of the eye as an organ of sight. According to the doctrine of Evolution, there was a time in the history of the world when all animals were eyeless, and that the first eyes were produced by "natural selection." Now, what does this imply? Nothing less than this. At some time in the far distant past, these sightless creatures became conscious—if one may use such a word—of the existence of light, and were moved by a desire to possess an organ which would enable them to profit by the light. This desire then led to the formation of a nervous centre sensitive to light, and by use this primitive eye-spot, became gradually more and more developed, until, at last, the perfect eye, as now possessed by birds and mammals, was the result. And all this, too, without the aid of any intelligence or power other than that which was inherent in the unreasoning lump of jelly and its successors.

Mr. Darwin himself, with his accustomed fairness, admits the difficulty of reconciling the hypothesis with reason. "To suppose," he says, "that the eye with all its inimitable contrivances for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by natural selection seems, I freely confess, absurd in the highest degree."—*Origin of Species*, p. 146. But how does Mr. Darwin get over the difficulty? By demanding "that our reason should conquer our imagination."

Well, let it be so! Reason says, that a complicated instrument which is constructed on true scientific principles, and which perfectly accomplishes the purposes for which it was evidently made, must have been designed by an intelligent being, and one who must have had the end in view at the

time when he drew his plans. Now, the eye is a complicated instrument especially adapted to the purpose of seeing, and every part fulfils its purpose. Reason, therefore, says it must have been constructed by an intelligent being. This is the verdict of reason. The imagination of the evolutionist, on the other hand, sees a multitude of sightless creatures; then, after an immense lapse of ages, a certain number of these eyeless creatures appear with rudimentary eyes. Then in after ages a number of these improve their rudimentary organs—but some, however, do not. Again, the struggle goes on, and after ages upon ages have passed, the more favoured creatures become the fortunate possessors of better eyes; and so on, until at last the wonderful eye of man is the result. A pretty picture this, but it is a picture of pure but unscientific, imagination.

Now, as it is the office of reason to control the imagination, we will allow the master-faculty to fulfil its mission. Reason says every change must have its adequate cause; and so the change from the non-seeing to the seeing, and the possession of a perfect organ of vision must have been effected, not by "natural selection"—which must have been unreasoning,—but by intelligence—by the mind and act of God.

There is another point which should receive attention in this investigation. It is this. There are thousands of creatures now existing—and which, on the showing of the evolutionist, have existed for unnumbered ages, which have but rudimentary eyes—as, for instance, the Medusa. Now, it must not be forgotten that the ancestors of these creatures have been using their rudimentary eyes during all these thousands upon thousands of years which, we are told, must have elapsed since they appeared, and yet not one of them has succeeded in evolving a more complex structure than any of its predecessors. How is this?

Again, the trilobite, one of the oldest of the "Medals of Creation," had compound eyes like those of the insecta of the present day. And there have been creatures in all ages of the world which have possessed compound eyes, who have used them well in the great struggle for life all through the geological and recent ages, and yet they are still the same in structure—no evolution of even an iris or an eyelid.

Again, there are fossil spiders found in some of the older rocks. These spiders have a number of simple eyes. There are spiders still, all of which have eyes of the same kind as their ancient ancestors. And yet all through the long vista of ages, since the time when those fossil spiders lived and crawled amidst the forests of the Miocene period, few creatures have

had to fight a fiercer battle than these Arachnida. For all this, however, not one of them has succeeded in evolving a compound eye, with its ten or twenty thousand lenses, as is possessed by the fly which is entrapped in its wonderfully woven web.

Surely, then, if the struggle for existence during many thousands of years has failed to effect any change in the organs of sight in all these creatures, what right has the evolutionist to *assume* that in others there have been all those wonderful changes which his doctrine requires us to believe there have been? We hold that he has no right either to make the assumption, nor has he any right to demand that we shall allow his imagination to dictate to us what our reason disapproves of.

In the next place, let us take the tongue of a woodpecker, a bird which feeds on insects that lie concealed beneath the bark of trees, or on larvæ buried deeply in the substance of the wood. How are these larvæ to be obtained? The hiding-place must be reached. The instinct of the creature determines the spot, and the strong chisel-shaped bill pierces the wood. But the hard, stiff bill cannot be thrust down the deep run of the maggot. Shall another hole be made—and another—until the exact spot be hit upon? No. There is a special contrivance in the mechanism of the tongue which enables the bird to thrust it to the very bottom of the run, and so obtain its food. Look at this contrivance and deny, if you can, the evidence of mind in its construction.

The tongue is really a double one, consisting of two distinct parts—a fixed fleshy base, and a projectile portion which passes through the centre of the fixed portion. The projectile part is prolonged into a double bow, which passes on either side of the larynx and over the bone of the head, and terminates near the nostril in the upper mandible. On the inner side of this elastic bow are muscles which, when contracted, force the projectile tongue forward. Another muscle has one of its ends fastened to the projectile tongue, near the part close to the fixed base; and the other end of the muscle is wrapped round the trachea. By the contraction of this muscle the projectile tongue is drawn in; and so by the alternate action of these two muscles, the long, thin tongue can be projected and retracted with great rapidity. Nor does the contrivance end here. The tip of the projectile tongue is horny and barbed. And further, when the tongue is projected, it rubs against a gland which, being excited, pours out a sticky saliva, which passes to the barbed extremity of the projectile tongue. Here there is a beautiful piece of

machinery, admirably fitted to perform a certain set of operations and produce certain results. Reason says that such means to such ends must have been the work of an intelligent Maker. They are stamped with the evidence of mind.

Dr. Haeckel, however, says, No! Nothing of the sort. It never was designed. But this is how it came. In the far distant past some ancient bird thought within itself, could I but find some unknown soft and dainty morsel, I should then be able to satisfy my hunger; and so it set off in search. It lighted on a tree, and heard a mysterious sound under the bark. Can this be what I want? It may be. But how shall I know? Could I but make a hole I should be able to reach the prize. I will try. No! I cannot do it; my bill is soft. But can I not harden it? Yes; I will continue trying to make holes, and in time it will get harder, and perchance grow longer. And so it tried, and failed, and tried again; and after thousands of generations of would-be woodpeckers had passed away, a bird was seen with a long hard bill. Now the struggle to obtain the larva commenced in earnest. A hole was made, and the run of the maggot discovered. Could I only put my bill or my tongue down the cranny, says the acute old bird, I should obtain the wished-for morsel. But my bill is rigid, and my tongue is short. I see! I must lengthen my tongue. But how can this be accomplished? I must continue to try. A thousand generations of birds are hatched, and die, and the prize is not obtained. At last an exceedingly wise old bird conceives the idea that if she could but place the germ of a longer tongue than her own in the next egg which she lays, her progeny would possess longer tongues; and then if these lengthened tongues were constantly used they would, in the course of future ages, be long enough to reach the hidden grub. So conceiving the idea, this wise bird did really place the germ of a long tongue in her eggs; and in course of time, after many failures and many alterations, the woodpecker of to-day is the result.

I am told that this is what I must believe—and nothing else, and if I do not believe this, I must forfeit all claim to be considered scientific, or even rational. But my reason demurs. It says such a theory is unreasonable, because it requires me to believe that the mere desire in some former soft-billed, short-tongued bird, to possess a hard bill and a long tongue, did ultimately produce the wonderful organ which the woodpecker of to-day possesses, not as the result of a presiding mind, but by "natural selection."

It is necessary now to take another step in our investiga-

tion. Much stress is laid by Professor Haeckel and other advanced evolutionists on the fact that certain animals possess what are called rudimentary organs, the presence of which, they say, prove the descent of the creature possessing them from other animals who had them as perfect organs.

When we ask, as we have a right, by what means the fully-developed organ became degraded, and so ultimately rudimentary, we are told, in the words of Mr. Darwin, "That disuse has been the main agent in rendering organs rudimentary. It would at first lead by slow steps to the more and more complete reduction of a part, until at last it became rudimentary."

Let us test this assertion by common sense. The boa-constrictor has rudimentary legs in the form of spurs, which are used by the creature when it is hanging on a bough of a tree watching for its prey.

Again. The rudimentary structure is, we are told, the result of the disuse of the fully-developed limb. But what could have induced the possessor of the perfectly-formed legs to have commenced the disuse of the organs? Surely it would have been more conducive to the comfort and welfare of the creature to have continued the use of the necessary organs. But the hypothesis of evolution requires that the limbs should have been disused in order that the spurs may be accounted for, and so the imagination of the evolutionist pictures a time when this supposed action took place, and then he asserts that it was certainly done.

Let us take another example. The Greenland whale has two bones in its hinder part, and we are told that these are rudimentary legs. In this case we are required to believe that the progenitors of the modern whale were four-legged creatures. If so, what could have induced the creatures to have discontinued the use of these necessary organs? and where are the links which are needed to unite the animals with no hind limbs with those which had two fully-developed?

We might reasonably suppose that when these imaginary creatures began the disuse of their hind legs, the *toes* would have first been degraded. For either in walking or swimming the toes are chiefly concerned, and so a race would ultimately have been formed with toeless limbs. Not a single relic of such a race has been found. This is most unfortunate for the evolutionist.

Once more. The horses of the present day have been, we are told, evolved out of an ancient race of three-toed animals, which, of course, used all three when standing or walking. But, somehow or other, all these three-toed animals took it

into their heads to lift up the two side toes so that they should not be used. Why this was so we are not told. This is to be lamented; because it would have been a source of satisfaction to know what circumstances induced all these creatures to have simultaneously commenced, and to have continued through untold ages, the very extraordinary procedure! And yet so it must have been, if the assertion of the evolutionist be true.

Let us take one more example; and this is, perhaps, the most extraordinary. We are told that the presence of the rudimentary mamma on the breast of the males of the class Mammalia is a proof positive that they have been evolved from animals which had them fully developed.

Well, of course they have; for every male has descended from his mother!

But this is not what the evolutionists require us to believe. They say the presence of these rudimentary organs is a proof that the males once had these organs fully developed, but by disuse they have become degraded. In other words, there was a time when the males suckled the young. Then, of course, as the mammary glands and the mamma could only have become rudimentary by disuse, there came a time when the males declined to fulfil the duties which they owed to the infants, and so it devolved upon the females.

Now, it must not be forgotten that the hypothesis of Evolution requires that there must have been a transition-state. What would, then, become of the young, poor things! In the case of the improved apes, perhaps they had recourse to a kind of ancient "feeding-bottle." Some fossils of these may, for aught we know, turn up by-and-by. But in the case of the lower orders of mammals, such a contrivance could not have been used, and so the wonder is that any of the poor, deserted infants survived. Pardon the sarcasm! But let us pursue this view of the rudimentary mamma to its legitimate end, and see to what conclusion we shall be brought.

If the rudimentary mamma on the breast of the males were rendered rudimentary by disuse, then there must have been a time when the progenitors of these males suckled the young. But if they ever did suckle young, they must have been *their own young*. For the milk is not perfectly formed by the mammary glands until shortly before the birth of the infant, and the "flow" is not complete until the third day after the birth. So, then, according to the hypothesis, the present males have descended from a race which fulfilled the functions of the females. And as the present females have, of course, descended from a race who were females, there was a time in

the far distant past when all the mammalia were females. An evident absurdity!

Then, again, there must have been a time when the progenitors of the present males gradually ceased to perform the functions of females, and were gradually transformed into males. Another evident absurdity! We are bold to say that such a doctrine as this is an insult to the common sense of mankind. And yet this is what Dr. Haeckel must believe if he is true to his own doctrine; and this is what he demands that others shall believe on the pain of being pronounced unscientific. If not to believe such a theory as this is to be unscientific, then we glory in being unscientific. But it is not so. That man is unscientific who allows his imagination to control his reason, and who bases his faith on pure assumptions rather than on facts, and such a man we hold the German professor to be.

But it may be asked, If the present species are not the result of evolution by natural selection, from whence did they spring?

Before answering this question, it will be necessary to ask another, viz., What is a true species? Let the answer be that of Dr. Cook, of Boston:—"True species are such animals as are found within the outermost limits of the sphere of ascertainable variability." Taking this as our guide, let us suppose a number of circles, and in each circle place all the animals of one order, or, if you please, one genus—say the carnivora, or, if you please, the cat tribe, as the case may be; in another circle put the ruminants. We say that there is no evidence of any such species having been transmuted into another. We may even go further, and say that every genus seems to surround itself with a hedge, which renders the transmutation impossible. And so in a natural state each tribe breeds true.

Now, as there is no evidence that species are transmuted, we say that it is both reasonable and scientific to conclude that in the distant past the progenitors of each *true species*—not varieties, but true species—were formed by an Intelligent Being, who worked according to a well-defined plan.

Thus, in the sub-kingdoms of the invertebrated animals there is found a general resemblance; all the radiate animals being formed on one plan and all the annulosa on another.

Again, in the great classes of the vertebrated animals, there is also a general resemblance, the fishes being constructed on one plan, the reptiles on another, the birds on another, and the mammalia on another. And, in accordance with the general plan, we find the presence of certain organs,

modified, it may be, to suit the particular habits of the creature. And thus the whole animal kingdom admits of an easy and intelligent classification, which even the youthful student of zoology can understand. Surely such a faith as this is more intelligent and reasonable than that of the transmutation of one species into another by evolution and natural selection, which must of necessity be blind and unreasoning.

There is another point of very great importance in this controversy. It is this. Evolution by natural selection is not borne out by the testimony of geology, or, in other words, by what the rocks declare as to the succession of life on the earth.

We are told by the advanced evolutionist that the changes produced by evolution cannot be tested by the history of animal life in historic times; but if we wish to get any evidence of the truth of the doctrine we must seek it in the treasure-house of geology. Agreed. Let us, therefore, question the rocks, and mark well their answers. In the oldest rocks, at the very bottom of the Laurentian series in Canada, there has been found what is considered to be the most ancient of all fossils. It has been called by Professor Dawson the *Eozoon*, or "dawn of life." The Eozoon is supposed to be the fossil form of a *protozoon*—a species of foraminifera, which, instead of existing as minute microscopic creatures as we find their representatives to-day, were gigantic aggregations of protoplasm, which combined to secrete vast reefs of calcareous shells. Thus much for the first evidence of animal life—a Protozoon.

The Laurentian rocks reveal no further indications of animal life; not one trace of the evolution of an eozoon into any other form. And what is true in the case of the Laurentian series is true also in that next above, viz., the Huronian.

Let us now take another step upwards and question the Cambrian system. Among these rocks, at Bray Head, near Dublin, some remarkable fossils have been found, to which the name of Oldhamia has been given. What is the position of these creatures in the scale of nature? It is now generally admitted that the Oldhamia rank with the Corallines of the present day. The second fossil is doubtless the remains of a more highly-organized animal than the eozoon, and so far seems to favour the hypothesis of evolution.

Let us, however, take another step upwards. Ascending higher in the Cambrian series we find the *third* oldest fossil. And what is it? Not a protozoon, not an hydrozoon, not an

actinazoon, not an annuloida, nor an annulosa, but a mollusc. It is one of the most ancient shells, and is known by the name of the "Obolella." It belongs to a group well known to the zoologist as the Brachiopoda, and which holds a position in the scale of organization only a little lower than the oysters and mussels of the present day.

Now every student of zoology knows that there is a wide chasm between the protozoa, or hydrozoa, and the mollusca. If, therefore, the "Obolella" were developed out of an Oldhamia, there must have been many intermediate links. For, according to the hypothesis, natural selection "can never take a sudden leap, but must advance by short and sure, though slow, steps." Is it not very strange and unfortunate that none of these "*sure steps*" are to be found?

Continuing our journey upwards in the series of rocks, and, therefore, onwards in the course of time, what do we find? Not a more highly-developed mollusc, but multitudes of "trilobites," creatures allied to the decapod crustaceans of the present day. True, there are found associated with these creatures fossil sponges and encrinites; but the former belong to the protozoa, and ought, on the hypothesis of evolution, to have been found in the upper portion of the Laurentian, or in the Hurion, while the latter rank with the echinodermata, and ought to have been found much lower down in the series of rocks.

Entering the great Silurian system, most important negative evidence is obtained. In these rocks are found, for the first time, immense numbers of fossil corals, creatures belonging to the actinazoa, and, side by side with these lowly creatures, the evidence of a rapid growth of molluscan life. Here are found the shells which were embedded in the soft tissues of a kind of cuttle-fish, and what mighty cuttle-fish they must have been when their internal shells are found to measure seven or eight feet in length!

Let us linger for a minute to contemplate the exact nature of these cuttle-fish. First, then, we remark, that they occupy the highest position in the scale of molluscan life; second, they approach very nearly in some part of their organization to the vertebrate section of the Animal Kingdom. In these molluscs there is a brain enclosed in a cartilaginous brain-case, and, what is still more important in this discussion, the cuttle-fish has special ganglia for the sole purpose of origin to the nerves of sight. How strange that these highly-formed molluscs should come next to the crustacea. Where is the evidence of the evolution of the one out of the other?

Passing now to the upper portion of the Silurian series, we

find the remains of sharks, and of sharks of the highest types. Every student of zoology knows that the brain organization of the shark brings that creature extremely near to the reptiles. Observe, then, that we have here the remains of a highly-organized fish before there are any traces of the lowly. Surely, there, then, we have evolution turned upside down. Where are the links which are needed to connect the fish with the crustacea?

In company with the sharks are found some members of the ganoid fishes, which have their representatives in the present day in the bony pikes of North America. Leaving the Silurian system and entering the Devonian, we find the fossil known as the *Eurypteus*—a monster lobster—which attained the size of 6 to 7 feet in length. Surely the lobsters of the present day are but a degraded, puny race compared with their ancestors. Entering the Carboniferous system, fossil spiders are met with for the first time. Now, surely "natural selection" must have made a mistake here. Spiders evolved out of mollusca or crustacea! This is, indeed, evolution the other way on—a degradation rather than a development. In these rocks a few trilobites are still found, and side by side with the Limuli another set of crustaceans, whose representatives in the present day are the king-crabs of the tropical seas. But though found side by side there is no evidence that the "Limuli" were evolved out of the trilobites.

Taking another step upwards we reach the Permian rocks. Here are found some fossil shells peculiar to this stratum, and also the remains of some reptilian form of animal life allied to the lizards and crocodiles of more recent times. Above these—in the Triassic rocks—are found the footprints of some very remarkable four-footed creatures, whose hind feet were larger than their fore, as is the case in the Batrachians of to-day. Whence, we ask, these four limbs? From what creatures were they developed? Where are the links which unite them with the ganoid fishes? Again: In these same rocks are found the impressions of a three-toed biped, supposed by some geologists to be the footprints of a walking bird; and no mean creature either! For in comparison of which the living ostrich is but a dwarf. Again, we ask, where are the links which unite these gigantic creatures with those animals which have gone before? and why are their representatives such pigmies?

Leaving these Triassic rocks and entering the Oolitic, some remarkable fossils are found. The belemnites and the ammonites tell of the presence of the mollusca; the ganoids and the sharks testify of the presence of the piscerine tribes.

But in addition to these are found the remains of reptiles, both terrestial and aquatic, such as the world never saw before nor since—the ichthyosaurus, the plesiosaurus, the megalosaurus, and the pterodactiles—all testify to the wonderful perfection of reptilian life in those ancient times; but their transition forms are not found.

In these rocks also are found the remains of a most remarkable bird: not the mere footprints, but the fossil forms themselves. The curious creature, which has received the name of the archæopterix, differs from all living forms of birds in the disposition of its tail-feathers. The birds of the present day have all the tail-feathers set upon the last joint of the tail, and upon none other. In the case of the archæopterix, however, it is different; there being one pair of feathers to each joint—ten in number. Now, as there is no evidence that the pterodactyles possessed feathers, and as "natural selection must work by a number of minute changes," where are the links which are necessary, on the hypothesis of evolution, to unite the one with the other? There must have been many links in the evolution upwards, and there must have been many in the process of the degradation of the long-tailed birds into the short-tailed ones of recent times. But none of these links are found. This is most unfortunate; but it is true.

In the same series of rocks are found the teeth and other remains of animals belonging to the class Mammalia, mostly such as are now represented by the Marsupia and Insectivora. Whence they came—that is, out of what previous creatures they were evolved,—is nowhere shown. Another misfortune for evolutionists, yet another truth.

Rising to the Chalk formation, some very remarkable fossils are found—birds whose beaks were furnished with rows of teeth resembling in their structure those of reptiles. Ah! says the evolutionist, here, at least, you have a proof in favour of evolution. Here is clearly a connecting link between the reptiles and the birds.

But, we ask, ought not this link to have been found much earlier? It seems out of place here. It comes in much later in time than the age of the archæopterix. Was not that primitive bird destitute of dental appendages? and besides this there is no evidence that the archæopterix descended from flying reptiles of the pterodactylean age. We hold, therefore, that these toothed birds, instead of proving evolution to be true, become, when viewed in connexion with the period of time at which found, rather a perplexity to the advocates of that theory.

We must now take another step upwards, and pass from the Oolitic system to that of the Tertiary. Speaking of this transition, Professor Williamson says:—"I may observe here that in all probability, if we except some foraminiferous creatures of low organization, no one species of animal that lived previous to the close of the Chalk age survived that period. Except one doubtful shell, all these species found in the Mezozoic strata became extinct. None of them are to be found in the Tertiary strata."

In one sense, therefore, life seems at this time to have begun *de novo*, and the records of these rocks lead us up step by step to the present day. Hence the use of the three terms by the great geologist, Lyell, to distinguish the three main divisions of those rocks: the Eocene—the dawn of recent life; the Miocene—the less recent; and the Pliocene—the more recent.

Now, what is the answer given by these rocks to the question, Is evolution proved? Let us listen.

In the Eocene series are found the remains of fishes—perches and others, all allied to modern forms. Now, also, are found terrestrial and aquatic mammals; the former represented by animals somewhat like the modern tapirs and antelopes, the latter by the zeuglodons—a monster of over seventy feet in length. If these latter creatures had been evolved out of more ancient ichthyosaurus there must have been hundreds of transmutations. Where are these links? We look for them in vain.

Entering the Miocene series of rocks we find a marvellous outburst of animal life—monster mammoths and mastodons, but from what previous forms of mammalian life they were evolved we are not told. On this point the rocks are silent.

Passing from the Miocene to the Pliocene deposits, abundant evidence is obtained of the profusion of animal life. Now are found the remains of true whales, also of many other mammals which are found on the earth at the present time—and not only mammals, but birds, reptiles, and fishes. But from what creatures they were evolved is not revealed, nor yet any of the successive links in the chain of development from the lower to the higher. But we are told by the evolutionist that we must modify our statement that no links are found in the process of development, for Professor Huxley has clearly shown that the horse of the present day was evolved out of the hipparion of the Pliocene age, and this again was evolved out of the anchitherium of the earlier tertiary times.

But this, it must be remembered, is, after all, but an assumption, not a proof.

Referring to this subject, Professor Owen, in his *Anatomy*

of Vertebrates, vol. iii., p. 792, says:—"These extinct animals differ from each other in a greater degree than do the horse, the zebra, and ass, which by Professor Huxley are acknowledged as true species."

Again, it has been well said:—

"There is a want of reliable evidence in the case of Professor Huxley's theory of the descent of the horse, because:—

"1. There are remains of the horse in the Upper Miocene period, which resembles, in nearly every respect, the horse which to-day runs wild in Asia and Africa.

"2. There are remains of the hipparion found in the same deposit as the horse, viz., in the Upper Miocene.

"3. Now this proves that the hipparion could not have been the ancestor of the horse. For, according to the hypothesis of evolution, there must have been many intermediate stages.

"4. The remains of the anchitherium are only found in the Lower Miocene: so that there is a wider gap between it and the hipparion than between the latter and the horse."

It is worth while to mark well the reasoning of the evolutionist here. According to the theory, the anchitherium ought to be the ancestor of the hipparion, and the hipparion the ancestor of the horse, which, in both cases, it is difficult to see how they could have been. But inasmuch as on the hypothesis they ought to have been, therefore the imagination is allowed to control the reason, and so what ought to have been must have been, notwithstanding any obstacles whatsoever. Enough has been said to show that the testimony of the rocks gives little, if any, countenance to the doctrine of evolution, and if these witnesses do not agree, to what others can we apply? Surely none.

Having shown that in regard to the organization of the lower animals evolution has been found wanting, we will proceed to test it in regard to man's physical nature.

This is a very important part of the subject, and one on which some eminent evolutionists are not agreed.

Professor Tyndall, in his celebrated Belfast address, when speaking on the subject, says:—"Natural selection acts by the preservation and accumulation of small inherited modifications, each profitable to the preserved being." And Mr. Wallace, an evolutionist, says:—"It is a fundamental doctrine of evolution, that all changes of form and structure, all increase in the size of an organ, or in its complexity, all greater specialisation or physiological divisions of labour can

only be brought about, inasmuch as it is for the good of the being so modified."

If this be the case, then the modifications which must have taken place in the physical character of the apes while in their transition state, could not have been for their good.

Two or three points will make this clear. And first, as to the loss of hair on the skin. Mr. Wallace's remarks on this subject are very valuable. In his *Limits of Natural Selection as Applied to Man*, he says:—"It seems to me, then, to be absolutely certain that 'Natural Selection' could not have produced man's hairless body by the accumulation of variations from a hairy ancestor. The evidence all goes to show that such variations could not have been useful, but must, on the contrary, have been to some extent hurtful. If, even, owing to an unknown correlation with other hurtful qualities, it had been abolished in the ancestral tropical man, we cannot conceive that, as man spread into colder climates, it should not have returned under the powerful influences of reversion to such a long persistent ancestral type. But the very foundation of such a supposition as this is untenable; for we cannot suppose that a character which, like hairiness, exists throughout the whole of the mammalia, can have become, in one form only, so constantly correlated with an injurious character as to lead to its permanent suppression—a suppression so complete and effectual that it never, or scarcely ever, reappears in mongrels of the most widely different races of man." This is, we think, a most important admission to be made by an evolutionist. In the second place, the shortening of the forearms and the conversion of the hind-thumbs into toes, and the hind-hands into feet, must have been a dire calamity to a race whose food could best be obtained by climbing. When speaking on this subject, Mr. Wallace makes a most important admission. He says:—"Again, the hand of man contains latent capacities and powers which are unused by savages, and must have been less used by palæolithic man and his still ruder predecessors. It has all the appearance of an organ prepared for the use of civilised man, and one which was required to render civilisation possible. Apes make little use of their separate fingers and opposable thumbs. They grasp objects rudely and clumsily, and look as if a much less specialized extremity would have served their purpose as well."

In the third place, evolution will not account for the brain capacity of man's skull. The *average* internal capacity of the cranium in the different races of men has been found to

be as follows:—The Teutonic family, 94 cubic inches; the Esquimaux, 91; the Negroes, 85; the Australian, 82; and the Bushmen, 77 cubic inches. Individuals, however, have been found to possess skulls of much larger measurement. But it may be asked, What proof is there that the ancient races of men had equally well-developed brains? We answer all the evidence that is needed. Some time ago a skull was found in the lake dwellings of Switzerland, supposed to have belonged to a man who inhabited that country in what is called the Stone age, and this skull corresponds in size and character with the Swiss of the present day.

Another celebrated relic known as the Engis skull, which, according to the testimony of Sir John Lubbock, was contemporary with the mammoth, is yet, according to the opinion of Professor Huxley, "a fair average skull, which might have belonged to a philosopher, or might have contained the thoughtless brain of a savage."

So much, then, for man. Now, as to the skulls of apes. The adult male ourang-outang is quite as large as a small-sized man; the gorilla is larger; yet the former has but 28 inches of brain capacity; the latter only 30 to 34½ inches.

Again, the lowest races of men have five-sixths of that of the highest races; while the highest races of apes have scarcely one-third the capacity of man.

The brain of savages varies in size. A negro has been found with 105, and an Australian with 104 cubic inches. It is certain, then, that these individuals had a development of brain which could be of no use to them as savages. How did they obtain it? If they inherited it from their progenitors, then those individuals must have been very far removed from the highest apes of the present day: for it has been shown that the gorillas have but 34 inches of brain capacity. Nor can the great capacity be the result of great mental exertion, for as savages they would never have been engaged in such work. In view of this wonderful brain capacity of the savage races we are, we think, justified in saying that there is more proof that the present savage races of men have been degraded from more civilized races than that they were once apes. It is, we hold, rather a case of degradation than of development.

Another point of great importance in this investigation is the character of the organs of the voice, and the faculty of speech in man.

When speaking of this Professor Mivart, in his *Lessons from Nature*, well says:—

"First. The brutes are all without true language—that is,

sounds which are rational and articulate. It is by means of this language that our feelings, memories, thoughts, and volitions are made manifest to the senses of other men, and by which we ourselves learn other men's feelings, memories, thoughts, and volitions. We are bold enough to assert that this rational language is peculiar to man. That brutes have a language is not denied, but no brute is found possessing rational language.

"This distinctive feature of man is a point that Mr. Darwin, in his *Descent of Man*, endeavours to account for in two ways, which, to say the least of them, are contradictory; thus, in vol. i., p. 54, he attributes the faculty in man to his having acquired a higher intellectual nature; while in vol. ii., p. 391, he says his higher intellectual nature was the result of his having acquired the faculty of speech.

"In this possession of rational speech there is a wide chasm between man and brutes—a chasm which has not been bridged. What has been attempted is only groundless speculation, such as that made by Mr. Darwin in vol. i., p. 56, where he says 'That primeval man, or rather some early progenitor of man, probably used his voice largely, as does one of the Gibbon apes at the present day, in producing true musical cadences—that is, in singing; we may conclude from a widely-spread analogy that this power would have been especially exerted during the courtship of the sexes, serving to express various emotions, as love, jealousy, triumph, and serving as a challenge to their rivals. The imitation by articulated sounds of musical cries might have given rise to words expressive of various complete emotions.' *Might* have! But what proof, we ask, is there that it did? Mr. Darwin says in another place, 'It does not appear altogether incredible that some unusually wise ape-like animal should have thought of imitating the growl of a beast of prey, so as to indicate to his fellow monkeys the nature of the expected danger, and this would have been the first step in the formation of a language.'"

To this conjecture we demur, and, we ask, what data is there to warrant such a supposition? None is given. It is another case of the imagination controlling the reason. If an exceedingly wise ape in the past did what Mr. Darwin supposes was done, why does not some equally wise ape in the present do the same, and a race of apes be formed who have the faculty of speech? Why not, we ask? and we wait for an answer.

Much might be said as to the impotency of evolution, as taught by Professor Haeckel, to account for man's mental

and moral nature, but as that branch of the subject would require time to investigate, it must for the present be left unnoticed. It only remains, then, to make a summary of the reasons why we consider that the doctrine of evolution as taught by Professor Haeckel is not worthy of support, and—

1. The main argument adduced for its proof is unsound. If life was not introduced on our planet by God, "the Lord and Giver of Life," it must have originated by mechanical forces. But spontaneous generation, *i.e.*, life as the result of mechanical or chemical forces, has never been known to occur; therefore, as life did occur, it must have been introduced by God. We hold, then, that it is more reasonable and more scientific to accept the doctrine of the special creation of life by the Great First cause than to accept the hypothesis of evolution as taught by Professor Haeckel.

2. The doctrine of evolution is opposed to human reason. Reason demands an adequate cause for every effect. We are surrounded on all sides with life, organisms, forces, which could not have been the result of mere molecular motion or combination. It is, therefore, more in harmony with reason and science to believe that all these changes have been the result of the power of an Almighty Being, than to attribute them to blind unreasoning evolution by natural selection, resulting in the "survival of the fittest."

3. We see that in nature there is no such thing as selection to produce generic change: all animals produce progeny after their kind, and never go beyond their kind in fulfilling the law of their being. And so we hold that it is more reasonable to believe that they always did this than to believe that at some time in the distant past their nature in this respect was different from what it is at the present time.

4. Geology gives little, if any, support to the development theory. Species are found in their perfect state. The lowly-formed are found side by side with the more complicated organisms; and the links between the simple and the complex structures are not to be found. In addition to this, the testimony of the rocks is in favour of sudden outbursts of life at different periods of the world's history. Now, such conditions as these are quite in harmony with the doctrine of special creation of typical species of animals by the power and wisdom of an intelligent First Cause, the Lord God Almighty, who is the author and giver of life.

5. The physiological condition of man cannot be satisfactorily accounted for, either by evolution or natural selection, but can be by the belief in his descent from a pair who were made perfect at first by the fiat of an Almighty Being.

Such a faith as this is, we know, considered folly by Professor Haeckel, who says:—"It is much more to my individual taste to be the more highly-developed descendant of a primæval ape ancestor, who, in the struggle for existence, had developed progressively from lower mammals, as they from still lower vertebrates, than the degraded descendants of an Adam, god-like but debased by the Fall."* Well, let it be so, as far as the professor is concerned. We are content to rest our faith on divine revelation rather than on the assumptions of science falsely so called. We would, however, ask the professor, and those who accept his teaching, what benefit can accrue to the human family by believing that man has been evolved out of a race of brutes—may we not say a race of beasts? Can the belief in the bestial descent of man even tend to raise him in the intellectual and moral scale? We trow not. Will such a view of man's origin and destiny ever make a man one whit the kinder or purer? We think not. Will the belief that man has sprung from a lower race of animals, and that he must of necessity share the fate of the lower, ever tend to elevate an individual or a nation? We trow not. But how different will be the effect of the doctrine of a special creation! Does a man believe that he has a noble pedigree? Then he will endeavour not to dishonour it. Does a man believe that he has a noble destiny? Then he will endeavour to live as becomes a being who has. Does a man believe that his race had such a noble beginning, and may have such a glorious end? Then he will seek to teach the same faith to all those with whom he comes in contact. And thus the individual, and the race may be led to raise themselves to their proper level,—a true and noble development—the level of a higher—the highest—even God, "in whom we live, and move, and have our being."

The CHAIRMAN (Mr. J. E. Howard, F.R.S.): I am sure that all present will agree with me when I say that we are exceedingly obliged to Mr. Hassell for having, in his able paper, summarised many of the most powerful arguments against the doctrine of evolution. I agree with the whole of what he has read, with the exception of the little note that appears on the first page, and I look upon that in the light of a "sop thrown to Cerberus," though I doubt very much whether Cerberus is likely to take it.

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* *The Evolution of Man*, vol. ii. 540.

In dealing with Haeckel's doctrine he has taken simply the consistent doctrine of evolution, all the others being, to my mind, utterly inconsistent and self-contradictory. Evolution is a dream, founded on nothing—certainly not on facts; for in whatever direction one looks in order to compare it with facts, it breaks down. The reason why it is so popular is that it is the fashion. We need not be ashamed to be laughed at for not going with the fashion, which certainly seems to be as powerful with men as with women. I, for one, am most heartily glad to be out of the fashion. I should be ashamed of my own reason if I believed in the doctrine of evolution at all; because, as I have just said, it is utterly inconsistent with facts: and, if I know anything about science, it is this, that science consists of knowledge which is gradually built up from the observation of facts until you come to a superstructure of proof, not worked out, as in the case of evolution, from a *dream* in which all the facts are imagined to coincide with preconceived hypotheses. I can fully sustain Mr. Hassell in what he has said with regard to the admirable experiments made by Professor Tyndall and the proof he has been enabled to furnish that spontaneous generation cannot be shown to exist. I was present and heard the discussion which took place before the Royal Society when these very able and admirable experiments were put before us by Professor Tyndall. In consequence of what then occurred I wrote to Professor Tyndall, and said that with regard to this point I was thoroughly satisfied that his experiments had not only been admirably conducted, but had led to very conclusive results with regard to the question of spontaneous generation. I would only say further that I think the geological argument is as perfect as any part of Mr. Hassell's paper.

Mr. C. Pfoundes (Memb. R. Asiatic Soc.): I think the opening sentence, and the concluding paragraph of Mr. Hassell's paper, have very ably and admirably put before us thoughts well worthy of being placed on permanent record, and translated into many tongues for the benefit of young and old of all nations and creeds. Speaking as one of the general public rather than as a scientist—although I have taken some trouble in America, as well as in England and elsewhere, to ascertain what they have to say for the information of one who is altogether unbiassed by preconceived notions and theories—I think that the evolutionists are to be divided into two distinct classes. One of these is composed of the real men of science, who look for something they are in want of, and with whom the wish is frequently father to the thought, let their motives be ever so admirable; the other consists of those lesser lights who would fain shine alongside the scientists with the same brilliancy—men who are mere seekers after reputation and fame, and who are well pleased if they can only gain notoriety. We must deal with these people exactly on their merits, having regard to their own statement of their own case. I, as an Orientalist, have been brought face to face with records of some of the ablest men of the olden time—the "wise men of the East"—and, from what I have there read, have been led to the belief that the evolutionists of the present day are inferior to

hose old writers, and more contradictory to their own theories. We are now told that, step by step, evolution has gone on producing developments that have led up to the noblest animal, and yet they say that this noble creature is still imperfect in details which anatomists understand, and which I will not endeavour to explain; yet they claim for their own generation a wonderfully sudden development of intellectual power. I quite agree with the passage in which the lecturer says, speaking of God's creation of man: "A noble creature this! an origin which indicates both a divine ancestry and a glorious destiny." I will not quote the concluding paragraph; but I have here, in my hand, a book nearly a century and a half old—a book unbiassed by any of our Western theories—in which it will be seen that the people of the East claim for themselves a noble origin, for they refer to their ancient records, and, throwing overboard Buddhism and superstition, they claim to go back to the faith of their fathers, who tell them "you are of a divine ancestry, worthy of a noble and an intellectual race." I think, therefore, that when we find quasi-scientific writers tackling us upon our creed as Christians, we have a right to ask, is it not fair that we should take them to these non-Christian sources, and there meet them with their own weapons? If our scientists will only go to the East, and inquire into these things, they will learn something that may help to prevent their putting forward facts in a manner which simply misleads our young people, who are nowadays going so far astray, that I regret to say, after having passed part of my life in Eastern and non-Christian countries, I feel almost ashamed of my own countrymen, and the insincerity of their belief.

Mr. T. K. CALLARD, F.G.S.:—I think that Mr. Hassell, in his very able paper, has succeeded in showing that evolution, as taught by Dr. Haeckel, is not only at present unproved, but is not very likely to be proved in the future. It strikes me that the method Dr. Haeckel adopts of adding assumption to assumption, where there is no evidence to guide him, is most unscientific. On the second page of the paper we are told that Dr. Haeckel says:—"There is no doubt that man is descended from an extinct mammalian form, which, if we could see, we should certainly class with the apes." "There is no doubt," says Dr. Haeckel; but why does he say there is no doubt? Dr. Virchow, a man well known as a naturalist, says in connexion with this question of evolution,—"We must really acknowledge that there is a complete absence of any fossil type of a lower stage, in the development of man"; and Professor Boyd Dawkins says of the miocene and pliocene apes:—"There is no tendency in them to assume human characters." And yet, in the face of all this, Dr. Haeckel says:—"There is no doubt!" Then Dr. Haeckel goes on to say:—"It is equally certain that the primitive ape is in turn descended from an unknown semi-ape, and the latter from an extinct pouched animal." There I agree with him—it is "equally certain" for there is no certainty in either statement. I will now refer you to page 257, "step 19," where Dr. Haeckel is quoted as having stated that:—"There do not exist direct human ancestors among the anthropoids of the present day, but they

certainly existed among the unknown extinct human apes of the miocene period." Now, how could these "unknown" apes be the direct ancestors of man if they became extinct in the miocene period? All attempts to prove that man lived in the miocene period have completely broken down, and the work supposed to have been done by man—those chipped flints that were alluded to some time ago as presumed evidence of human handiwork —is now, by almost common consent, attributed either to dryopithicus —an anthropoid ape—or to natural causes. There is no proof of man having lived in the miocene period. Then, if these apes became extinct in the miocene, how, I ask, could they have been the direct human ancestors of man, who did not appear until the pleistocene period? Mr. Hassell has very forcibly shown the unphilosophical position of supposing spontaneous generation to be the beginning of life, when experiments have now proved that spontaneous generation does not take place. Every hermetically-sealed tin of meat that is brought into this country from Australia is a protest against the doctrine of spontaneous generation, and the followers of Hutton, Playfair, and Lyell should be the last to believe in a physical law operating in the far past, which has no existence in the present. It is most unphilosophical, and altogether contrary to uniformitarian views which, at other times, they put forth. Again, it is strange that Dr. Haeckel should hold on to "bathybius," after Professor Huxley, who invented him, has had to give him up. On page 276 there are one or two points I wish to notice. Mr. Hassell has supported the position I took in my last paper, namely, that there was a break in the continuity of life during the cretaceous period which is fatal to Dr. Darwin's theory of evolution. Mr. Hassell quotes Professor Williamson, who says :—"I may observe here, that in all probability, if we except some foraminiferous creatures of low organization, no one species of animal that lived previous to the close of the chalk age survived that period. Except one doubtful shell all these species, found in the mezozoic strata, became extinct. None of them are to be found in the tertiary strata." If Professor Williamson is right the hypotheses of Darwin and Haeckel are wrong, for, according to both hypotheses, there must be no break, in the one till we reach the ascidian mollusc, nor in the other until we come to bathybius, who Professor Huxley had to renounce at Sheffield, as a naughty boy who could not be found when he was wanted. The author says, in the sixth paragraph : many pliocene mammals are found on the earth at the present time. He has kindly given me privately his authority for saying so. It is that of Sir Charles Lyell in his *Antiquity of Man*, and the evidence rests on certain forms of life found in the Cromer Forest beds ; it is important to call attention to this, as it has a bearing on the last paper read here; but Sir Charles Lyell, after stating this, found certain modern shells without any admixture of extinct species, which led him to say :—"I am in doubt, therefore, whether to class the forest beds and overlying strata as pliocene or to consider them as passage beds between the newer pliocene and past pliocene periods." That,

of course, would make all the difference. I may add that I have given this quotation from the second edition of Sir Charles Lyell's book, published in 1863. Seventeen years afterwards, in 1880, Professor Boyd Dawkins, in his *Early Men in Britain*, without hesitation, placed the forest beds in the pleistocene period; and his zoological argument for the non-existence of man in the pliocene is, that only one pliocene form now lives, at any rate in Europe. This, I think, will strengthen the position of Mr. Hassell. (Applause.)

Mr. WILLIAM GRIFFITH:—Wishing to do no injustice to Haeckel, I obtained a copy of his work, and may unhesitatingly say that the basis of his theory is atheism. If that basis fails his theory falls with it, as the superstructure cannot stand when the foundation is removed. There is no doubt that there are difficulties with regard to the theistic theory, but, at any rate, it is sufficient to explain, or account for, the problems of human and other life existing around us. It helps to elucidate the difficulties of the past, to clear up those of the present, and at the same time, affords hope for the future. The atheistic theory, however, does not explain these difficulties, but ignores the hopes we may cherish, and the arguments for the existence of the infinite power and goodness of a Supreme Being, to be derived from the evidences of adaptation and design which have been so ably treated by Paley. At the present day it may be the fashion to depreciate the argument from design. But its great expounder, Paley, was a man of high mathematical talent; and the argument he brought forward was not new, and does not rest upon his work alone, inasmuch as the most celebrated of all physicians, Galen, who was a heathen, dwelt with great force upon it, and sixteen centuries before Paley flourished, "felt that in writing his anatomical treatises he was composing a hymn to the Deity, that a declaration so plain of the wisdom, the power, and the goodness of God was an act of piety and praise."* Of all physicians in ancient or modern times, the works of none have more extensively influenced the branches of medical science than those of Galen. To leave this general view of the subject, and to deal more specifically with the view of evolution adopted by Dr. Haeckel; it will be seen that his theory starts with the proposition that life arises from spontaneous generation. Now the experiments of Dr. Tyndall, and other experiments that have been made in the same direction, have proved, as a matter of fact, that spontaneous generation cannot be produced. But what is it that this so-called spontaneous generation demands in its origin? It demands that atoms of matter should possess certain qualities which have a creative power. Now, I would ask, which is the more reasonable assumption—that one Creator made all the varieties of matter and modes of life which we see around us, or, that we have thousands upon thousands of atoms which have endowed themselves with these perpetually creative properties? But even if, for the sake of

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* Watson's *Principles and Practice of Physic.*

argument, we admit the theory of spontaneous generation, we have no absolute ground upon which we can set our foot. Before anything can be generated we must have had these atoms of matter; but whence do these atoms come? How can you explain the coalescence of these atoms in the case of the immense orbs that circulate around the sun? How do you explain the laws of gravitation which hold them together—laws which it required a Newton and a Kepler to discover. How the initial force which still keeps them in their orbits, and prevents them gravitating pell-mell to the centre? These atoms of matter could not have impressed the laws of gravitation upon themselves; they could not direct the course of the planets round the sun. All this must have come from an external source; therefore, the origin of matter and all the great problems of astronomy are unaccounted for by the theory of evolution, and exist independently of the theory of spontaneous generation. The only explanation Dr. Haeckel offers is that matter began to differentiate. To differentiate is to produce a difference, according to the ordinary use of language; but, as Dr. Whewell has well asked in his *History of Inductive Science*, "What principles produced these differences?" There must have been some active principle at work, otherwise these differences could not exist. And if matter were able to differentiate at so early a period, why does it not continue to differentiate now? Why do we not see molluscs developing themselves into men? Why are we not able to observe the process by which one species of animal changes itself into some other species? This is a very reasonable question, and one that should have an answer. If matter can differentiate itself at one particular epoch in the world's existence, why does it not do so at the present time? and why, also, do we not see those intermediate changes which are so readily assumed, but of which we have no evidence whatever? It is to be remembered that there are only a few philosophers—so called—who take the view advocated by Dr. Haeckel. The greatest physiologists of the present day are against it. Not only was Dr. Whewell opposed to it, but "he considered it unnecessary to point out how extremely arbitrary every part of this scheme is, and how complex the machinery would be even if it did account for the facts; that it is sufficient to observe, as others have done, that the capacity of change and of being, influenced by external circumstances such as we really find in nature, and such as in science we must represent it, is a tendency not to improve but to deteriorate";* and we also find men of such high repute as Dr. Carpenter, Registrar of the University of London, and one of the leading physiologists of the present day, laying down, as an axiom, that all the ultimate facts of creation which we cannot explain, and which we must admit, involve the idea of creation by some external power. "All sciences have their ultimate facts for which no other cause can be assigned than the will of the Creator; and that of the existence of the

* *History of Inductive Sciences*, iii., p. 628.

properties of the different kinds of matter, and the determination of the conditions of their action, we can give no other account than that the Creator willed them to be so."*

The CHAIRMAN (Rev. R. Thornton, D.D., in place of Mr. J. E. Howard, F.R.S.).—As I am now occupying the Chair in place of Mr. Howard, I may be expected to supplement what he has said with a few remarks. I confess I am one of those somewhat amphibious animals of whom Mr. Howard seems to have so great a detestation—those who are a little inclined towards the doctrine of evolution, not as it is taught by Dr. Haeckel, but as under certain restrictions. It is a matter of indifference to me, so long as I believe in one Supreme Intelligence, whether it pleased Him to carry out the work of creation by way of evolution or development, or otherwise. Given a Divine cause for development, and I am satisfied with the theory; but there is an old axiom which I learnt in my early studies of mediæval philosophy, *ex nihilo nihil fit;* nothing can come out of nothing. I confess I have been surprised, on referring to the works of evolutionists, to find how entirely they set that old principle at naught. They as good as tell us that the best way to get something is to have nothing, and it would doubtless be a most satisfactory thing in the matter of finance if it were so. (Laughter.) But how do they put the proposition? They say, we want to account for the existence of life. Where do we seek for it? Not in something living, but in something which has had no life. We want a high organization: whence do we get it? From protoplasm or bathybius. We want intellect: where do we go for it? To the germs of intellect in the unintellectual ape, or to a still less intellectual source. I am wholly at a loss to understand how they can speak of something brought out of nothing. And there is another difficulty, which I think the able autbor of this paper might make some remarks upon: the evolutionists have not attempted to account for the whole of the phenomena of life which exhibit themselves. They do not account for the processes of degradation which we constantly see around us. The phenomenon of degradation is not an uncommon one; and yet, although the evolutionists tell us of the persistence of species, which they say were formed, and have reached their present condition, by the survival of the fittest, they have not in any way endeavoured to account for the degradation that has taken place. They can hardly call the degradation of species the survival of the fittest. Whether they will reply that degradation fits a degraded state I do not know; but the point is one that is certainly very difficult to understand. I do not think there have been any objections made to this paper; on the contrary, it appears to me that all the remarks which have been made, have been in its favour.

Mr. HASSELL.—If the meeting will bear with me a little longer, I have to show it one or two diagrams of those creatures which, we are assured, are the true ancestors of man, and which we are called upon by

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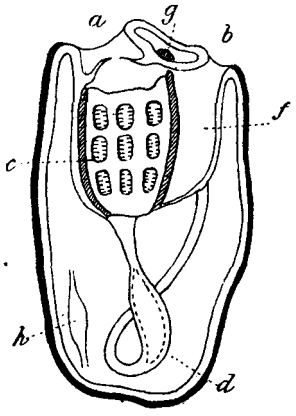
* *Manual of Physiology, including Physiological Anatomy*, p. 13.

Dr. Haeckel to accept as such. The first is the *Tunicata*, one of the Ascidian molluscs. The part marked *g* is supposed to be the rudimentary brain, and that marked *c* the rudimentary lung.



TUNICATA.

a Oval aperture. *b* Atrial aperture. *c* Pharyngeal, or branched sac, with its rows of ciliated apertures. *d* Alimentary canal, with its hamal flexure. *f* Atrium *g* Nervous ganglion.

This creature is, you will perceive, most unlike a man, and not very much like a fish, yet we are told that we are to believe, or else be considered unscientific, that from it was produced the first primitive vertebrate animal, the lancelet, and that from this, in prooess of time, sprang all the classes,

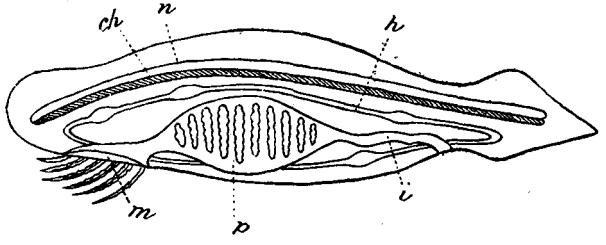


DIAGRAM OF THE LANCELET (*Amphioxus*).

m Mouth surrounded by cartilaginous cirri. *p* Greatly-dilated pharynx, perforated by ciliated clefts. *i* Intestines. *h* Hamal system, with pulsating dilations. *ch* Notochord. *h* Spinal cord.

orders, and species of the sub-kingdom Vertebrata. This creature, you will observe, is one of negation : without eyes, without heart, and without back bone ; and yet Dr. Haeckel calls upon us to revere it as being our progenitor. The learned Doctor may do so, but I cannot. At this late hour it would be impossible for me to go into the question of the degradation of organs to which our Chairman has referred to, suffice it to

say that we are called upon to believe that some animals ceased to use certain useful organs, and thus those parts became degraded ; and the degraded parts were reproduced, and thus became persistent. Very much more might be said on this important subject, but it is not possible to cover the whole ground in the time allowed for one lecture. I thank you very much for your patience, which I am afraid I have tried, but hope that what I have put before you will make you think on this important subject.

The meeting was then adjourned.