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ORDINARY MEETING, MAY 19, 1884.

H. CADMAN JONES, ESQ., M.A., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following Elections were announced :—

MEMBER :—J. Ruscoe, Esq., F.G.S., &c., England.

ASSOCIATES :—The Ven. Archdeacon Carey, M.A. Camb., Chelmsford ; Rev. Professor J. M. Davis, United States ; J. Elmer, Esq., England ; W. F. Fremersdorf, F.G.S., Wales ; E. W. Harcourt, Esq., M.P., England ; A. Main, Esq., Canada ; J. Rogers, Esq., London ; Rev. W. J. Smith, B.A. Oxon., England ; Captain R. C. Temple, R.E., F.R.A.S., F.R.G.S., India.

HON. LOCAL SECRETARY—Rev. W. David, M.A. Oxon., Cardiff.

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

"Proceedings of the Royal Society"	*From the Same.*
"Proceedings of the Royal United Service Institution"	,,
"Proceedings of the American Philosophical Society"	,,
"Legal Ethics, or the Unity of Law." By Professor J. W. Platt, D.D., LL.D.	*From the Author.*
"Virgil," 3 vols. By Major Burt, F.R.S.	,,
"The Unreasonableness of Atheism." By J. Hassell, Esq.	,,

The following paper was then read by the Author :—

EVOLUTION BY NATURAL SELECTION, TESTED BY ITS OWN CANON, AND SHOWN TO BE UNTENABLE. By JOSEPH HASSELL, A.K.C., London.

> "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. 146, sixth edition.

I.—INTRODUCTION.

MAN is everywhere surrounded by Life, Organisation, Intelligence, and Will. Such being the case, it is but reasonable that he should desire to know the origin of these phenomena. Hence the inquiry, Has life existed from all Eternity, or had it its origin in time? Were the complicated organisms of the animal and vegetable kingdoms evolved from less complicated forms, or were they brought forth in their completeness from an egg or germ in which was *involved*

all that should afterwards be *evolved*, and this, too, by the direct fiat of an almighty Being? In other words, were all the wonderful examples of adaptation of means to ends, which are now found in both the animal and vegetable world, brought into existence by a Great First Cause—God,—or are they due to second causes—to Natural Selection?

2. In endeavouring to solve the mystery of Life, not a few students of nature, and a larger number of those who merely follow where others lead, have arrived at the conclusion that Life was produced in the remote past by purely physical causes, which causes had their origin in matter itself. In other words, certain elementary bodies entered into combination, and the product of that union was Life. With this primitive creature, or *Evolute*—the monad—commenced an unconscious struggle for improvement—a seeking after something which did not exist—the result of the struggle being complex organisms, intellectual faculties, moral sentiments, will, and conscience.

Many of those who hold these views, dogmatically assert that Evolution is to be regarded as proved to a demonstration; yet they know that not a single instance can be cited of the transmutation of one order of animals into another; they know that, as far as human experience goes, no sponge ever produced a jelly-fish; no insect ever gave birth to a mollusk, nor a mollusk a fish. Again, they know that no bird ever produced a mammal, nor one order of mammals ever produced another order. In the face of the evident persistency of species in the present, these people maintain that in the past there was constant transmutation.

3. Another class of persons are those who, while willing to admit that man's physical nature may have been derived from some unknown anthopoid, his ψυχή and πνεῦμα were bestowed upon him by a superior Being. Such persons endeavour to pursue the *via media*, and in doing so often use expressions which are somewhat contradictory. Thus, one eminent naturalist, when describing a particular family of flowers, says, "the labellum is developed into a long nectary *in order* to attract lepidoptera, and we shall presently give reasons for suspecting that the nectar is *purposely* so lodged that it can be sucked only slowly *in order* to give time for the curious chemical quality of this viscid matter setting hard and dry.*

Now, may it not be asked, By whose order were these contrivances arranged? Was it by the order of the flower, or of the insect? If by either plant or animal, then it must be

* Darwin *on Orchids.*

credited with Intelligence; and that, too, of the very highest kind. For surely *contrivance* points to a *contriver*, and the ordering of means to ends is the evidence of wisdom and power. But are wisdom and power attributes of cellular tissue or albuminoid secretions? Certainly not. If, then, the potentiality which effected the results did not reside in the orchid nor in the moth, must we not look for it outside matter —in the region of the unseen—in the great I AM?

4. There is a third class of thinkers; namely, those who, having examined the hypothesis of Evolution, have found it wanting, and so reject it. It is true that this class of persons are in the minority, and are often spoken of as a narrow-minded, old-fashioned, and unscientific set. Under these circumstances it becomes the duty of these so-called unscientific persons to state clearly and fearlessly why they are not prepared to give up their faith in a Divine Creator for the new dogma of Evolution by natural selection, as taught by the Haeckels, the Spencers, and the Huxleys of the present day.

II.—Reasons for Holding the Doctrine of Special Creation.

1. Because the hypothesis of Evolution is not supported by any reliable evidence, and hence it is unscientific. If Evolution be true, then back-boned animals had progenitors which were destitute of a vertebral column; fish were transformed into reptiles; and these in their turn became birds on the one hand, and mammals on the other; and the human species originated in the struggle of a race of apes to better their condition, although that condition was exactly suited to their mode of life.

But though not a single proof is to be found of this wonderful change from the lower to the higher, it is still asserted to have taken place; the unknown is made to do duty for the known, and upon the uncertainties of the unknown are built up the so-called certainties of the known. This is both unscientific and illogical. Unscientific, because it is regarding *improbabilities* as if they were *certainties*; and illogical, because it is drawing conclusions from false premises. It is premised that changes took place of which there is no proof, and then conclusions are drawn which could only be legitimately drawn from undisputed facts. From the known non-transmutation of species is deduced a past transmutation, and this, we hold, is illogical.

2. In the second place, Evolution by natural selection is rejected, because it attributes to mere matter the properties

of mind. There is now before us a beautiful flower—the purple Iris. Its three lower petaloid sepals are delicately striped with a lighter tint, which are there, according to the Evolutionist, to direct the bee or butterfly to where it will find the store of nectar for which it is in search. Above these painted sepals are three delicate stamens, with their long, pocket-like anthers laden with their precious pollen. These important organs are so arranged that when the insect enters the flower to reach the nectary, it must of necessity rub its back against the anthers, and so brush off on to itself some of the pollen, and then on its exit the precious material is carried to the stigma of the pistil, which is open to receive the necessary fertilizing agent.

Here, then, is a beautiful instance of a mechanical arrangement to effect the particular purpose of fertilization. Whence this plan? Did the plant invent it? If it did, then it must have been gifted with intelligence. If it acquired this particular organization, as we are told it did, it must have had power to mould its parts accordingly: it must have exercised a quality which is found only in connexion with mind. That this self-acquiring power is attributed to plants by the Evolutionist is proved by referring to their writings. One example must suffice. Mr. Grant Allen, in his article "Chestnuts Fall," in *Knowledge* for Oct. 26, 1883, says:—"The key to this strange resemblance between the chestnut and the horse-chestnut is to be found in the fact that they are both *nuts;* they have survived in the struggle for existence by adopting for their seed-vessels the exactly opposite tactics from those adopted by the true fruits." "Nuts have *concentrated all their efforts* upon repelling rather than upon attracting the attention of animals." "The filbert has not only encased itself without in a green husk covered by sharp and annoying little hairs, but has also acquired a very solid and difficult shell." Now, no instance is found, in the present, of inanimate matter arranging for itself means to ends. What authority, then, is there for saying such phenomena did occur in the past? Scientific dogmatism may demand that its dictum in this particular must be accepted, but those who believe in a Creator protest against the intolerance.

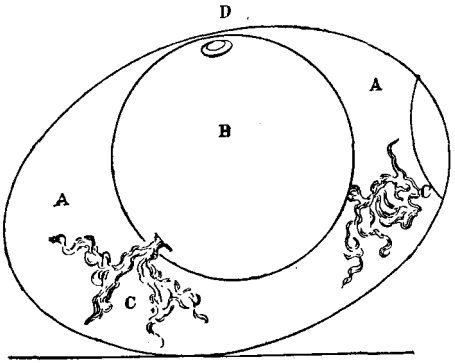
Again. Whence, we ask, the wonderful order and system which characterises the whole vegetable world? Why is it that dicotyledonous seeds produce exogenous stems, while the monocotyledonous produce endogenous? Why have the leaves of the former reticulated veins, while those of the latter have parallel? And why are the floral leaves of exogens found to be either four or five, or some power of those numbers, while those of the endogens are three, or some power of three?

These persistent characters were either assumed by the plants themselves, or they were arranged by Intelligence.

When such evidences of systematic arrangements are found in the region of human activities they are naturally associated with mind, and any attempt to attribute them to any other source is regarded as folly. Why, then, should the systematic arrangements found in the vegetable kingdom, and the adaptation of means to ends in the animal world, be placed to the credit of natural selection, and not to the deliberate act of a presiding mind?

3. In the third place, Evolution by natural selection is rejected, because it cannot account for the teleological adaptation of various organs which are possessed by animals.

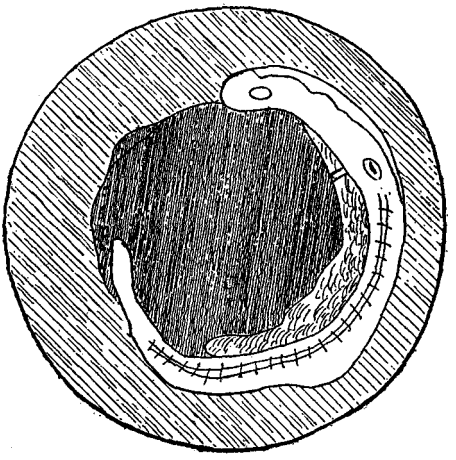
And here it will be well to apply the canon laid down by Mr. Darwin. "Natural selection," he says, "acts only by taking advantage of slight successive variations; she never can take a sudden leap; but must advance by short and sure though slow steps. . . . If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous successive slight modifications, my theory would absolutely break down." (*Origin of Species*, p. 146, sixth edition.) Well, be it so! The knowledge of the structure of a bird's egg will enable us to demolish the whole fabric of Evolution by natural selection.



STRUCTURE OF A HEN'S EGG.
A A, *White or glair.* B, *Yolk.* C C, *Balancers or Treddles.* D, *Embryo.*

The parts of a hen's egg are the shell, the white or glair; the yolk with its treadles, or balancers, and the embryo. Whence these treadles? On the hypothesis of Evolution the ancestors of birds were reptiles or fishes, and, as there are no balancers in the eggs of either fish or reptiles, it is clear

that they do not owe their present form to any slight modification of any previously existing organ; there could not be a modification of that which did not exist, and so these important parts must have been produced in their entirety,—that is, created. If by the reptile, that creature must have been both omniscient and omnipotent. It must have known all the future condition of its progeny. And what were these? A warm-blooded creature to be incubated by another warm-blooded creature, at that time not in existence. It must have foreseen the necessity for the embryo to be kept on the upper side of the yolk in order to receive the proper degree of warmth. It must have had some knowledge of the specific gravities of the



THE EGG OF A SALMON (on the eighteenth day of its development).
The egg when laid is spherical, about the size of a small pea, and nearly transparent.

yolk and glair, and determined the exact spots in the yolk to which the new part should be affixed so as to secure the end in view. All these points must have been apprehended and provided for by the reptilian creature, and the structure must have come forth in its completeness, whenever it did appear, there being nothing upon which natural selection could act.

Here, then, is clearly an instance of creation. How can it be accounted for? Either it created itself, which is impossible; or the reptile designed the structure, and placed the germ of it in some particular egg,—which is equivalent to saying that the creature was all-wise and all-powerful. Or it was planned by an Intelligent Being who possessed the wisdom to design, and the power to execute; which is, to say the least, reasonable.

4. In the next place, let the canon, as laid down by Mr. Darwin, be applied to the production of Class Mammalia.

If the hypothesis of Evolution be true, then mammals were evolved from birds or reptiles. If so, then some primitive oviparous creature placed in its egg the germ of the following additions to, and alterations of structure:—

First, as to the Main Characteristic of the Sub-Kingdom,—the possession of the mammary glands. Now, as nothing like these exist in the three classes of the oviparous vertebrata,—Pices, Reptilia, Aves,—"natural selection" was, on Mr. Darwin's own showing, impotent to produce them, as there was nothing upon which "natural selection" could act. That an animal without milk, and without care for its offspring, should of its own accord acquire milk and be attached to its young, is "unthinkable." Whence, then, this special organ? Either it created itself, or the bird involved it in its egg, or it was designed by *Intelligence.* We hold the last to be the true solution.

Second, as to the Changes in Structure.—How came the two condyles of mammals to take the place of the single one in birds and reptiles? Why should the "Os quadratum" be obliterated? Why should the thorax and abdomen be separated by the diaphragm? To these questions "natural selection" can supply no answer.

Again—and this is, perhaps, the most remarkable point,—why should the aorta turn over the left bronchus, and not over the right, as it does in birds? Why should the red corpuscles become non-nucleated and change their form,—the oval to circular bi-concave discs? As far as is known, the office of the blood corpuscles in birds is the same as in mammals; there could, therefore, be no necessity for any change of form. Yet the doctrine of natural selection requires that all changes in the form and character of any organ must result in the advantage of the individual. Now, as there could not be any advantage by the change of form, if it was effected by natural selection, it was a purposeless change.

While on the subject of the blood character of mammals, it will be well to give a few facts concerning the circulatory fluid of the various classes of vertebrate animals, which tend to prove that one class was not transmuted into another.

1. The blood of reptiles has corpuscles remarkable for their relative size, and "the size," says Professor Owen, "increases in the ratio of the persistence of the branchial organs." Those of the siren can be discerned by the naked eye, and are considerably larger than those in the human blood.

2. The red corpuscles of the amphibia are the largest

known. Those of the frog's blood being taken as a standard of comparison, and observed under the microscope side by side, those of birds are about one-half the size of those of a frog; those of the salamander not quite one-third larger than those of the frog, and rather more elongated; those of the lizard about two-thirds the size; while those of the human blood measure only one-fourth the long diameter of the frog's, and only one-twelfth the long diameter of those of the siren. The red corpuscles of the musk-deer are exceedingly small, being only about one-twentieth the size of those of the frog.

3. We have the highest medical authority for saying that, if the blood introduced into the veins of a living animal differs merely in size of its corpuscles, a disturbance, more or less remarkable, takes place; the pulse is increased in frequency, the temperature falls rapidly, and death generally happens after the lapse of a few days. The effects produced by the injection of blood having circular globules into the veins of an animal, the corpuscles of whose blood are elliptical, or *vice versâ*, are still more remarkable: death then usually takes place amidst nervous symptoms of extreme violence, and comparable, in their rapidity, to those that follow the introduction of the most energetic poison.*

Here then, again, judged by its own canon, the whole fabric of Evolution by natural selection falls to the ground.

4. Another subject worthy of consideration is the adaptation of the general structure of fish to the element in which they live. The resistance which water offers to the passage of a body passing through it is very great. When compared with air it is as 30 to 1, and yet a fish can pass through it with the greatest ease, and this for several reasons. First on account of the form and disposition of the vertebral column. The backbone of a fish consists of a number of small vertebræ, having at both ends a cup filled with a gelatinous substance, that which is within each pair of cups, thus forming a ball. Thus there is a flexible axis with all the appendages somewhat flattened.

Second. The entire body tapers at both ends, so as to present to the water no actual line of resistance.

Third. Most fish possess a particular organ called the swim bladder. This organ, which is long and cylindrical, and placed along the under side of the central axis, is filled with a gas which is many times lighter than water, and thus the creature is rendered specifically lighter than it otherwise would be.

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* Milne Edwards.

Whence the particular form of the vertebræ? If Evolution be true, then the ancestors of fish were *invertebrates*. Why then a vertebral column at all? And, if one, why this particular form, which beyond doubt is the one most adapted to the wants of the animal?

5. Such a vertebral column as this, while it provides for great flexibility in one place, does not provide for movement in any other, and so would not be adapted to the wants of such a reptile as a serpent. A glance at the structure of the vertebral column of the Ophidians reveals a manifest adaptation of means to ends. Each vertebra is furnished with a ball at the one end and a cup at the other end: the ball of one vertebra fits into the cup of the other, thus forming a column which is flexible in more than one plane. This great flexibility, however, is gained at the expense of stability, and so a compensation is provided. Each vertebra is furnished with a number of lateral appendages, which, fitting into each other somewhat after the fashion of a tenon and mortise-joint in carpentry, effectually control the lateral movement of the column, thus securing both strength and flexibility. On the hypothesis of Evolution by natural selection, these alterations and additions to the spinal column were acquired by minute modifications of existing processes. But the examination of the vertebral column of the two classes will show the observer that such a view is most untenable. It is difficult to conceive of any slight modification of a biconcave vertebra which would end in one end becoming convex, when the former was the most adapted to the mode of life of the creature; or of the gradual loosing of the spinal processes of a fish so as to produce the movable ribs of a serpent.

But why should any fish ever have made an effort to change its condition when its organisation and constitution were finely adjusted to the elements in which it was placed. With a boundless ocean through which to roam at will, and with an abundant supply of food, it was in harmony with its environment; and so no advantage could accrue to the individual by a change. Not only so, but the very effort to effect a change would have been the first of a series of desperate struggles. The effort to breathe air not dissolved in water would result in inflamed branchia. And if, as we are told it did, the swim-bladder thus received its first impetus toward acquiring the structure of a lung, the individual who made the attempt would return to its native element with both gills and swim bladder less adapted than before to perform their proper functions. The creature would thus be less in harmony with its environment,

and so placed at some disadvantage. It is impossible that any such effort on the part of a fish could result in the good of the race.

Here then, again, we see that tested by its own canon "natural selection" is found wanting.

6. A few examples may next be given of the evidence of design in the lower forms of animal life.

First.—The Contrivances for Oxygenating the circulatory Fluids, and for obtaining Food in the Lower Forms of Animals.

(*a.*) *The common Sponge.*—This lowly creature, like all animals, must be nourished by food. It is, however, except as a germ, fixed during the whole of its life, and so is unable to go in search of its prey. What, then, must be done? The food must be brought to it. How is this accomplished? Thus. Its internal structure consists of a number of canals and cavities. The cavities are furnished with numerous delicate cilia, and these ciliated cavities are in connexion with an in-current and an ex-current system of canals. The former are connected with numerous pores, which are periodically opened and closed in the dermal membrane; the latter are in direct connexion with the oscula. When, therefore, the pores are opened and the cilia which line the cavities are moved rapidly, the water in them is set in motion, and passes out by the oscula; more water, of course, passing in to take the place of that which flows out, and thus a constant current is produced. The water, as it passes through the structure, brings with it both the oxygen and the food which are necessary for the support of the creature.

Now if the Spongida were evolved out of the Amœba which has neither ciliated cavities nor canals, these appendages must have been produced in their entirety whenever they did appear, there being nothing upon which natural selection could work. And then it must not be forgotten that the Amœba was entirely in harmony with its environment, and therefore there was no call—if one may so speak—for any alteration in structure.

(*b.*) *The Means of Defence in the Cuttle-fishes.*

These creatures have many enemies. The sharks and other inhabitants of the ocean regard them as a favourite morsel. Few, however, are thus destroyed. Why? Because the weaker creature is provided with a special organ of defence. It has a muscular bag, in which is secreted an inky fluid, which can be ejected at will. There is a communication between this ink-bag and the siphon through which the water passes, after having bathed the branchia. When, therefore, an enemy appears the contents of the ink-bag is passed into the siphon

and mingles with the water in its passage outward, rendering that in the immediate vicinity of the cuttle cloudy, and so entirely hides the creature from the gaze of its enemy. The force with which the coloured liquid is ejected causes the animal to pass rapidly backward, and so effectually to elude its foe.

Whence this arrangement of means to ends for the welfare of the individual? If by natural selection, from what other structure was it derived? The Gasteropoda have nothing of the kind, nor have the Lamellabranchiata; the only creatures which have any similar structure are certain of the Pteropoda. If the Cephalopoda derived the organ from the Pteropoda, whence did the latter derive it?

According to the canon laid down by Mr. Darwin by which to judge his hypothesis, here is another case that is fatal to the doctrine of Evolution by natural selection. Here is a complex organ which exists in a certain class of molluscs, and which does not exist in any creatures below that class. It is clear, then, that it does not owe its present perfect form to any slight modifications—improvements—of any existing organ less perfect, less useful. We contend, then, that we have a perfect right to say that the structure owes its existence to the will of an Intelligence. It must not be forgotten either, that the organ here spoken of has existed from the very earliest ages, for the fossil representatives of the present cuttle—the Belemnites of the Transition period—possessed the structure in its greatest perfection. It is an interesting fact that Dr. Buckland prepared the pigment sepia from the contents of the fossil Belemnites. Here, then, are two important facts: first, the structure is unique; and, second, it was possessed as perfect by the cuttles of the geological age as by the cuttles of the present day.

Enough has been said to show that, judged by its own canon, the hypothesis of Evolution by "Natural Selection" is untenable, and cannot account for those wonderful adaptations of structure to the habits of animals which are found in each of the sub-kingdoms, each example of which is a witness for the doctrine of special creation by an all-wise and all-powerful God.

6. Let us now step outside the world of organization, and glance at some of the laws which regulate the Forces of Nature.

First, the Force of Heat.—One of the properties of this force is the expansion of all bodies. There is, however, one exception to this rule—an exception which results in good to the world in general, and so bears the stamp of wisdom and benevolence.

Water, like other bodies, expands by heat and contracts by cold. But at one particular point there is an exception to this rule. At the temperature of 40 deg. Fahr., water is at its greatest density, and as each degree of heat is lost it *expands*, and so rises. It is thus that the temperature of 32 deg.—the point at which water becomes solid—is always the top layer—and ice is formed at the surface. If it were otherwise, many of the rivers and lakes of the world would ages ago have become solid masses of ice, and a large portion of the world a region of desolation and death. But, thanks to this exception to a general law, it is not so.

Whence this exception? Did the particles of the fluid impress it upon themselves? If so, they must be credited with doing that which bears the mark of Intelligence.

Take another example—the arrangement for maintaining the proper proportion of the constituents of the atmosphere. The atmosphere is composed of gases mechanically mixed. Nitrogen 77 parts, oxygen 23,* and a varying amount of watery vapour. The world of organization is made up of vegetables and animals. The plants are makers: and if they had a voice their constant cry would be, "Give us carbon." Animals are consumers, and if they had a voice their cry would be, "Give us oxygen." Now, how are the wants of each class supplied? Thus:—

The main substance of plants is carbon. In order that the tissues may be built up carbon must be supplied; and as plants obtain their nourishment by absorption, the carbon must be supplied in a gaseous form.

The chief product of respiration of animals is carbon di-oxide. Carbon, taken as solid food is the chief supply, and this, after the processes of digestion and absorption, as blood comes into contact with air in the lungs, unites with the oxygen, and forms carbon di-oxide, which is exhaled.

Plants imbibe the air charged with carbon di-oxide, decompose it, and turn it into carbon and oxygen, keep the carbon, and return the oxygen to the air, to be again used by animals. There is thus a constant interchange, and the balance is maintained. Whence this arrangement? Did the plants and animals arrange it for themselves? If so, they must be credited with wisdom, power, and benevolence.

According to the hypothesis of Evolution, the only animals that existed at first were certain low forms of the Protozoa,

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* Percentage of Oxygen, by weight, 23. Nitrogen, by weight, 77.
Ditto, by volume, 21. Do., by volume, 79.
Watts's *Chemistry*, vol. i., p. 431.

creatures destitute of nerve-centres, having no sentient life; it is clear, then, that these creatures could not have thought out the plan. But, perhaps, say some, the primitive molecules ordered the arrangement when they were issuing from the nebulous state? To this, however, the intuitive judgment of man demurs. What then? If the arrangement is not placed to the credit of the primitive organisms, nor to the molecules of the unorganised, it must have been provided for by mind—the great mind—the Great First Cause—God.

But enough of this. May we not apply the words of the great Apostle of the Gentiles, and say, "We speak as to wise men, judge ye what I say"?

III.—THE NEW FAITH.

If the doctrine of special creation be given up, and the Darwin-Spencerian creed of Evolution by natural selection accepted in its place, then we must subscribe to the following articles of scientific faith:—

1. A lifeless, plantless ocean evolved out of itself aquatic plants; and then a marine vegetation, passing from its proper domain, became terrestrial; sea-weeds thus transformed themselves into mosses, and mosses into ferns; and so like produced unlike.

2. A cryptogamic vegetation, planned for itself floral organs, and altered its structure to suit such change.

3. Acrogenic stems became endogenic, and some of these changed themselves into exogenic, and thus throughout the long vista of geological ages plants produced others *not* after their own kind, which thing, though contrary to experience, nevertheless did occur.

4. At some unknown period in the past the whole course of the vegetable world reversed itself, and from that time to this every plant has produced another after its own kind. Why persistency of species is now found to be the order of nature, while in the past transmutation pertained, cannot be determined; yet since the doctrine of Evolution requires that both be believed, it is to be accepted without questioning.

5. The first animals were evolved either out of non-living matter, or else from vegetable protoplasm. The primitive animals thus produced were destitute of any specialised contrivances for the performances of the functions of animal life, —respiration, circulation, assimilation; each was extemporised by the lump of jelly as occasion required.

6. As all animals were at first aquatic, but are now both aquatic and terrestrial, the latter were evolved out of the former; although there is no reason why such a thing should

take place. But as the existence of land animals cannot be accounted for in any other way, it is to be believed, even though it is unsupported by any evidence.

7. As the invertebrated animals have their main masses of nervous matter ventrally disposed, and the vertebrated dorsally, by some unaccountable freak of nature the animal world was, once at least, "turned upside down." It is difficult to say why this should have taken place, or how it was accomplished; but inasmuch as the doctrine of Evolution requires that it did take place, that is enough,—therefore it is to be believed that it did occur.

8. Every special organ in animals sprang into existence, as required, by the operation of the mystery of mysteries "natural selection," and so it came to pass that the oil-glands in the water birds were invented by a clever old goose who once suffered with rheumatic fever consequent upon repeated drenchings. After many failures, she hit upon this plan to prevent the mischief in future.

9. Birds were evolved out of reptiles, scales becoming feathers, fins becoming wings and feet; swim-bladders becoming lungs; a heartless creature extemporised a heart; two-chambered hearts became four chambered; and cold blood became hot. How, when, where, and why, need not be known: suffice that it must have been so, because evolution requires it.

10. Class Mammalia being evolved out of reptiles or birds—it matters not which—it came to pass, by some unaccountable act of the mystery of "natural selection," the form of the blood corpuscles were changed from oval to spherical, and the blood capillaries enlarged their capacity to suit the change. How this was accomplished it matters not. The unreasonableness of the whole affair makes it the more credible.

11. In the past, species were not fixed, and so it happened that one race of animals gave birth to another quite unlike itself; and so by the mystery of Evolution, a marsupialian was evolved into a ruminant, a ruminant into a rodent, a rodent into one of the quadrumana, and one of the quadrumana into one of the bimana. The unreasonableness of this is not to be questioned.

12. Human speech and moral consciousness have been evolved as necessity occurred, and although the highest forms of the quadrumana have never shown any tendency, during the human period, to advance towards a state of civilisation, the very fact that they do not should be accepted as a proof that at one time they did. True, such a line of argument is illogical; but, then, if such changes did not take place Evolu-

tion cannot be true. It stands, therefore, that as Evolution must be true such changes did take place, notwithstanding their unreasonableness.

Finally, it is to be believed that out of nonentities came potentialities; by the action of the non-living came life; by the motions of the inorganic were produced the organic; and by the commingling of the atoms of gross matter were produced thought, will, and conscience. Though all this is opposed to human reason and common sense, it matters not; it must be believed.

These articles of the Evolutionists' Creed may be popular —as doubtless they are,—but we are bold enough to say that they are erroneous, and therefore, instead of subscribing to them lest we should incur the wrath of some of the leaders of modern thought, we prefer to re-assert the Old Faith, which holds:—

1. That God did at the first create a certain number of distinctive creatures, which, though capable of variation within well-defined limits, have always produced other creatures essentially after their own kind.

2. That each distinct group of animals was formed on a well-arranged plan or type, so to speak: and thus, though there is a similarity of a general character in the various sub-kingdoms, there is a dissimilarity between the members of one group and the members of another group of the same sub-kingdom, which proclaims them as distinct: built up, it is true, according to a well-devised plan, but not derived from each other.

The CHAIRMAN (Mr. H. Cadman Jones).—Mr. Hassell's paper has been listened to with so much attentive interest, that I need hardly ask the meeting to return its thanks to the author, but take it for granted that those thanks are unanimously accorded. If any present have remarks to make upon it, we shall be glad to hear them.

Mr. W. P. JAMES.—I rise to say how entirely I agree with what Mr. Hassell has said in reference to Mr. Grant Allen. As a botanist, I must say that I think that agreeable writer is really carrying the theory of evolution to a simple *reductio ad absurdum*. He appears to me to convert the whole thing into a romance. In his hands plants can do all but speak. Unfortunately for the interests of true science, there are others who pursue the same method. I might refer to the lady whom Mr. Hassell has mentioned,—although it is with regret that one criticises the works of one belonging to the fair sex; but I am sure her books are open to the same objection, from the zoological point of view. She takes it for granted that the doctrine of evolution is true, and, although a very painstaking writer,

she not only assumes this, but derives all sorts of consequences from it. These two writers (and I may add Mr. Clodd) are, unfortunately, only types of a large class.

The Right Hon. A. S. AYRTON.—I am sure we are much indebted to Mr. Hassell for the practical illustrations he has given us of what may be described as the romantic nature of the doctrines advanced by those who profess and teach the theory of evolution. There is, at all times, something very fascinating in romance, however strange and startling it may be. Many, at the present day, seem to be more fond of reading romances than the record of occurrences belonging to the regions of fact and truth. This was, in all probability, the idea entertained by the great philosopher of old, who said that all young people should be educated exclusively in what was true, and that only when they had acquired a perfect and solid basis of truth should they allow their minds to wander into the arena of fiction. This was because it was only then that they would be able to distinguish fiction and romance, poetry and imagination, from what was real and true, as made known by the accumulated facts of worldly experience. This is a form of education which, I am afraid, is being reversed at the present day, when boys are very early entrusted with books of romance as part of their reading; and I think it is found that they always prefer the romantic to what is real, and true, and solid. (Hear, hear.) I am of opinion that this is the one cause of the popularity obtained by the ideas which have been put forward on the subject of evolution. It is so delightful to read and speak about plants and animals doing this and that and the other. It brings to the mind a new kind of Æsop's Fables, in which the plants and animals are always talking and thinking, and arranging all sorts of stories and ideas and actions; but the evolutionist writers, instead of giving their peculiar views the form of fables, dress up the subjects they discourse about in the guise of little deities, in the sense of their being able to create, by the operation of their own wills, the means of satisfying all the wants of their different species, and even of inventing new species, if they find their own do not suffice for their requirements. Let us suppose the case of an individual belonging to a particular species, who is dissatisfied with the conditions of his own existence; for it must be some individual member of a species who is first to enjoy the privilege of recruiting himself by the process of selection, as I do not see how one individual can operate on another. We, at any rate, do not possess this faculty as human beings. We cannot say, "We should like this little boy to have six fingers instead of five," then proceed to confer upon him the additional digit. Indeed, we are unable to attain such a result for ourselves, however much we may desire to bring about such a change. We certainly cannot attain it by thinking we should like to have it. Therefore, we have no power of evolution in ourselves, and much less can we exercise it in that of our neighbours. Let us here consider what we are called upon to believe,—because we are asked to give credence to analogous wonders as actual facts. We are actually called on to believe that an individual, having effected an alteration in the conditions of its own existence, is enabled to impart to its

eggs—and the word "eggs" may be applied to the embryo of all creatures, for they are all eggs, though, it may be, in different forms and conditions,—the property of growing in a different way from that in which the parent animal grew itself. How is the animal to transmit this peculiar power and force? If we only think of this for a moment, we must see that we are invited to believe that which is utterly incredible. The limits of deviation are prescribed for the whole human race, and the entire family of mankind necessarily exists within those limits.

Mr. W. GRIFFITHS.—In the days of Harvey, the discoverer of the circulation of the blood, this very theory of evolution was started by French philosophers, who held that creation was in reality a system of evolution from minute particles. But Harvey took the illustration of the hen's egg, and showed that all the parts of the developed animal must have existed in the egg from which it came, and that the production of the chicken was not a species of evolution, dependent on the conditions of warmth and other external influences outside the shell. Harvey was at that time considered as having put an end to this doctrine, which, after all, was merely an hypothesis, for the foundation of which no facts could be produced. All that was done by those who advanced the evolution theory was to say: "If so and so, then so and so"; but they never proved that "so and so" did, in the first instance, exist. Throughout the whole of their arguments there was nothing to show that organic life of the animal or vegetable world was developed from inorganic matter, nor that the moral life of the human being was developed from the organic life of the animal.

Mr. D. HOWARD, V.P.I.C.—I am sure we have all enjoyed Mr. Hassell's paper, which has so vigorously and clearly put before us the weak points of the evolution hypothesis. I think it quite true, as has been already stated, that the worst enemies of the evolution theory are those who belong to the romantic school. The fact that it is impossible to think out the real Darwinian hypothesis without calling in some such aid as is afforded by Miss Buckley's fairies, and giving an anthropomorphic turn to the discussion by imputing reason to plants and the lower animals, shows the peculiar difficulty in the way of accepting the theory. That variations—the results of blind chance—should gradually improve a species is the original hypothesis, and it is one that is singularly unproved by anything in the shape of reasonable evidence. The throwing in of a few millions of years does not, to my mind, help the matter; it is rather like saying: "Two parallel lines do not include a space, but if you go on continuing the same lines for millions of miles, who can say they will not produce such a result?" This, however, would seem to be the tendency of modern thought; and the primary difficulty I have thus stated in regard to the Darwinian theory is one which even its own advocates and defenders seem unable to get over. They are obliged, therefore, to call in the aid of the anthropomorphic method adopted by the writers to whom allusion has been made. But the more difficult points they have to get over are those to which Mr. Hassell has called attention. How, for example, can a two-celled heart become a four-celled heart? We can understand the action of either, but

it is impossible to conceive the mode by which this development is originated. A two or a three-celled heart can be conceived, but how can a two-celled heart become three-celled? It is true that we may find rudimentary organs which may be taken as the transition point; but those rudimentary organs do not necessarily prove evolution, because a rudimentary organ must be useless in the intermediate stage. This seems to be the weak point of the hypothesis. How far the modifications of a species may go is a fair matter for inquiry. That these are less than is commonly imagined is undoubtedly proved by evidence. Until the laws of heredity are properly understood, and the mysterious laws of reversion are made clear, it is a bold assumption that there is any gradual change in all directions, which is the foundation of the evolution theory; and I would again ask, in regard to what is one of the great difficulties of the whole system, "How, by a small gradual change, can two become four?" Until we have answered this question, we shall not have got over the difficulty. The theory of Haeckel is that chance variations are at the bottom of the whole matter. I hold that the writings of these popular evolutionists are impossible to think out unless they call in some other factor such as I have referred to. When they have to call in the aid of fairies, and so forth, there is pretty good evidence that, for sober thought, we want something a great deal stronger than they have advanced. The result is that we must have a creative mind and a creative idea. (Applause.)

A MEMBER here wished to point out that, when the lecturer had introduced a figure of speech—saying, "The constant cry of the plants was, 'Give us carbon!' and of animals, which are consumers, 'Give us oxygen!'" he implied that, on the part of the plants and animals, there must have been a concentration of effort in a particular direction. Therefore he should not have quarrelled with Mr. Grant Allen doing the same in regard to the horse-chestnut.

Mr. HASSELL.—I quote Mr. Grant Allen's own words. He says: "Nuts have concentrated all their efforts upon repelling rather than upon attracting the attention of animals." I only use a figure of speech in speaking of a fact in botany; but in Mr. Grant Allen's case, he does not claim to use a mere figure of speech. He says the "nuts have concentrated their efforts," and thereby he attributes to the nuts a conscious faculty. What I imply is, that the want of the plant is carbon, and that of the animal oxygen, and I do not think I am open to the charge of doing any wrong to Mr. Grant Allen in what I say of him. I may also state that, in opposition to the articles of faith which I do not subscribe to, I have given two articles to which I do subscribe; these I maintain are reasonable, and should be constantly brought before the young, whenever there is an opportunity. It is the duty of every teacher to impress upon his hearers the fact that it is more reasonable to believe that plants and animals were made by an intelligent Being, than that they formed themselves. And it is the duty of every believer in *Creation* to fearlessly assert that belief. I quite agree with what Mr. Howard has said, and thank him for his remark about the heart: I believe that the heart and the blood

are the great crucial points on which we may take our stand. I thank the meeting very much for the kind attention it has given to my paper.

The meeting was then adjourned.

PROFESSOR VIRCHOW ON EVOLUTION.

The following speech was made by Professor Virchow, during the Edinburgh University Tercentenary, 1884 :—

"I should have wished to speak to you in your own language, but as I only received the invitation to this meeting on arriving in London, it was impossible for me to prepare a good address ; therefore I beg to be excused if I make my speech in German. [Professor Virchow then proceeded with his speech in German, of which the following is a translation.] In considering what to say that might be of interest to a group of students, I remembered that I would be speaking not only to Scotland, but to the whole English-speaking world. I knew that great subjects were discussed in your university, in the wide range of which the teachings of this school were largely in accordance with my own. Among the matters which have a common interest for us, I am in such cordial sympathy with you that there is only one topic on which there may seem to have been some disturbance in the happy relations which subsist between us. You will allow me to speak to you on the position which I am supposed to have taken up towards the teachings of Darwin. The opinions which I expressed have, in some English publications, been much misunderstood. I never was hostile to Darwin, never have said that Darwinism was a scientific impossibility. But at that time, when I pronounced my opinion on Darwinism at the Association of German Naturalists at Munich, I was convinced, and still am, that the development which it had taken in Germany was extreme and arbitrary. Allow me to state to you the reasons on which I founded my opinions. Firstly, Darwinism was interpreted in Germany as including the question of the first origin in life, not merely its manner of propagation. Whoever investigates the subject of development, comes upon the question of the creation of life. This was not a new question. It is the old *generatio equivoca*, or *Epigenesis*. Does life arise from a peculiar arrangement of inorganic atoms under certain conditions ? We can imagine oxygen, hydrogen, carbon, and nitrogen coming together to form albumen, and that out of the albumen there was produced a living cell. All this is possible ; but the highest possibility is only a speculation, and cannot be admitted as the basis of a doctrine. In science it is not hypotheses that decide, but facts ; we arrive at truth only by investigation and experiment. I need not say that this demand of science for proof, instead of speculation, was long ago made in England. Ever since the time of Bacon it has had a home amongst you. We may concede that *generatio equivoca* is a logical possibility. But it is important for you students always to bear in mind the great distinctions between the construction of logical possibilities and their application in practical life. If you try to shape your conduct simply according to logical possibilities, you will often find yourself coming into violent conflict with the stern facts of existence. Let me give you an illustration. In recent times, the fact of the presence of minute organisms giving rise to important processes has been recognised, not only in medicine, but in connexion with agriculture, and various industries. It was of the utmost importance to determine whether these organisms were originated *de novo* in the decomposing bodies, or were produced by similar pre-existing organisms, and introduced from without. A century ago it was possible to admit the spontaneous generation of microbia. But here sits M. Pasteur, the man who has demonstrated by means of direct experiment that, in spite of all logical possibility, all known