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1902.

ORDINARY MEETING.*

THE REV. CANON GIRDLESTONE, M.A., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed, and the following election took place :—

ASSOCIATE :—Miss Eva J. Board.

The following paper was read by the author :—

ADAPTATION AND SELECTION IN NATURE: THEIR BEARING ON DESIGN. By WALTER KIDD, M.D., F.Z.S.

IT is a singular fate that befell the theory of evolution that its main terms have been not only ambiguous, but even incorrect, but it is probable that this has conduced greatly to its wide acceptance. We know well how the mind of man is captivated by a form of words or even an expression, and for good or ill, the leaders of mankind have known how to use this fact of human nature.

I refer to the four outstanding terms or conceptual formulæ inscribed on the banner of the evolutionist host, viz. :—

1. Origin of Species.
2. Struggle for Existence.
3. Natural Selection.
4. Survival of the Fittest.

3 and 4 being practically equivalent.

1. If Darwin had named his great work more modestly "Modification or Transformation of Species," how different

* Monday, March 17th

might have been its reception! That species of plants and animals were mutable was well enough known before the "fifties" through the marvellous divergencies produced by breeding from the original wild stocks of horses, cattle, sheep, dogs, and from those of fruit-bearing trees and cereals. But *origin* was the title, and it threw down the challenge at once to older views and was on that account the more calculated to capture the restless mind of modern man.

2. The theatre in which Darwin claimed that this origin had occurred was the supposed struggle for existence. Here the obvious competition for means of livelihood and comfort raging among individuals and races of men, which had given rise to the remarkable essay on population by a clergyman named Malthus, was read into that struggle for existence among the lower forms of life which it was purely gratuitous to postulate. It ought to have been enough for the more candid and reasonable exponents of Darwinism to see that to talk of struggle for life between lower plants and animals, especially in that region which so much struck Darwin's imagination, viz., the survival of certain individual seeds out of a single plant, or of certain ova out of the million in each herring, was an unwarrantable liberty in the use of language.

3. The now familiar term Natural Selection was an inappropriate reading of a word, instinct with human purpose and will, into a process assumed and stated to be no more purposeful than the wind that blows, to use the simile of Darwin himself. This aspect of the familiar term has been forcibly pointed out by the late Duke of Argyll, and by strict logic and use of terms he was well justified, but it is held that the term is only the best that occurred to Darwin, and no sinister design of deluding the unwary is wrapped up in it. Professor Poulton has attacked the Duke rather bitterly in a work on Charles Darwin, for what he declares to be captious criticism.

4. The fourth great term in the evolutionist vocabulary is Mr. Herbert Spencer's equivalent for Natural Selection, viz., Survival of the Fittest. This resembles the other three in looseness and ambiguity, and the latter quality is acknowledged by Huxley.

The new meaning of the Survival of the Fittest has now to be taken to be "fittest to survive," or "fittest for the environment." It really might be rendered "whatever is,

is best," and it has a flavour of optimism which Mr. Spencer claims is an essential ingredient in his philosophy of evolution.

It is evident, then, that a somewhat amended dictionary is required, if one is to explain at all accurately the subject-matter of much of the writings of evolutionists, and it is not the least of their claims to be heard that they have dared, and successfully, to twist the meanings of three or four well-known words to their purposes of conveying a certain line of thought, and the meanings are now generally understood. One has no right to complain of this, and the Duke of Argyll's protest was of too academic a character to weigh with the scientific world, and accordingly it fell somewhat flat. But it is not out of place to mention this character of some of the evolutionist vocabulary, because certain of the terms in question will be referred to later in this paper.

Adaptation.—The conception of adaptation has become so widely used in biological writings as to deserve critical study, for through such comprehensive terms many errors of the first importance may be allowed to creep into our mode of thought.

Adaptation is a term in general use in scientific works on account of the ease with which any intelligent and personal element may be excluded from its application. No one can object to a literary tool being employed for business purposes, as long as no subtle root-error is thereby admitted into a system. In regard to this term "adaptation," there is some danger that this may happen, as I think will appear if we look at it closely. Adaptation has become in certain ways the equivalent of the older term "means," which always connoted the further idea of end. "Adjustment" is another modern term virtually synonymous with adaptation. The conception of adaptation is of immense range in biology, so much so that Weismann was well justified in his statement, "Everything is adapted in animated nature and has been from the beginnings of life." But in this great range of application comes in one element of danger.

The primary meaning of the word is "fitted to." This is a somewhat complex word, for it signifies that one thing is fitted to another thing or condition of things, and as used in general language before it was annexed by scientific writers, it contained the further idea of something being fitted to another by an active agent for a purpose. There are in it, then, properly four ideas:—1st. The thing adapted.

2nd. That to which it is adapted. 3rd. The purpose for which it is adapted. 4th. The agent who adapts it. The fourth of these ideas must be surrendered in the present day on account of the resolute way in which the word is used without any reference to a person or agent, and because scientists have adopted this term and must have their tools or conceptual formulæ with which to do their work. We must take adaptation as a term employed by the leaders of biology as one condemned to not more than three, and probably only two, of the four meanings which truly belong to it. We must also bear in mind that for their own convenience biologists have enlarged the abstract idea of adaptation further, and speak of "an adaptation" or "adaptations," as concrete nouns substantive, as formerly the word "means" was used.

It must be remembered that the term adaptation is further complicated because a thing may be (1) adapted as a whole to its surroundings, (2) a part may be adapted to the efficiency of the whole—the adaptation may be *extrinsic* or *intrinsic*.

The most usual, if not exclusive, application of the word in science is to the phenomena of organic existence; it is therefore the special tool of the biologist, and it is in his department of science that misapplications must be most carefully watched, more particularly because in the province of life such are the most important, as tending to belittle the teleological meaning of that part of the cosmos with which we are chiefly acquainted. One of the simplest instances of adaptation, and one which is confessedly a matter of pure chance, as we call it, and due only to the action of purposeless-mechanical causes, is the fall of an avalanche down a mountain side, the result of which is that various fragments of rock or ice roll on until they find their resting place and each is at rest in its suited position. These fragments may be said to be adapted each to its position for no purpose whatever. The fragments of various shapes and sizes settle down into such situations as suit their size, weight and character, from the mass of rock weighing several tons to each grain of sand, each disintegrated and set going by certain physical laws. This entirely mechanical case of adaptation connotes two of the four ideas only—the thing adapted and that to which it is adapted; purpose must be excluded. But it is just this form of mechanical adaptation, under certain chemical and physical laws which some extreme-

biologists would gladly apply, if they could, to the living, growing, developing organic life around us. But the facts of biology do not lend themselves to such simple handling, and by no less an authority than Weismann we are warned that in biology we come upon the unknown sooner than in any other branch of science, so that here, more than elsewhere, is a hasty making of ambitious "laws" to be especially guarded against.

But much more significant forms of adaptation meet us as soon as we turn from the inorganic to the organic, and the great range of the latter, and the immense diversity of their environments, are illustrated by a bacterium at one end, and man at the other, of the great chain of life. The former in its fluid medium can move, can absorb nutriment, and in response to certain simple stimuli can manifest what the extreme mechanically-minded biologist will call free-will and choice. The bacterium is adapted to its simple home, and the latter is adapted to the life of bacteria, among other properties it possesses. There are thus two of our meanings of adaptation fulfilled, and the third, viz., that of the purpose for which it is adapted, may be beautifully illustrated in the case of those simplest bacteria of putrefaction which from the beginning of life on the globe have exercised their beneficent function as scavengers of a decaying and developing world. It is needless to point out that if organisms require oxygen to respire, and nutriment to absorb, they require only in a little less important degree, when they die, to be disintegrated, for the benefit of the succeeding population of the globe, by means of these humble bacteria of putrefaction so recently discovered through the genius of Pasteur.

Between this lowly instance of adaptation, in which profoundly important issues lie enwrapped, and man himself, there lie open to our scrutiny and admiration a world of adaptations, extrinsic and intrinsic, incalculable in number and beneficent in purpose.

Another side of the question of adaptation is opened up when, in addition to the means to ends which every organism, vegetable and animal, presents for its own benefit, we look at the great question of the environments provided for these various organisms. The *means* are wonderful, the *ends* are beneficent, but they require a *field* in which to work. The key of a Chubb's lock is an instrument interesting enough to a mechanician, who may admire the finish and complexity

of the wards, but it is of vastly greater interest when the lock to which it is adapted is also investigated by one who is competent to understand its working and make. The two must be looked at together, and, broadly speaking, a key is for a lock and a lock for a key. This instance introduces the environment side of organic existence, and the latter is very largely ignored, or taken for granted, and its bearing on teleology not mentioned when adaptations, adjustments of the organisms themselves, are considered and expounded by a one-sided "law."

Before the bacteria of putrefaction could commence their beneficent work as scavengers of the globe, they require for their own life a measure of moisture, warmth, oxygen and organic material, before it becomes of the least importance whether or not *they* are adapted. The environments referred to must exist before they can do so. And so it is through the vast ascending series of protophyta, protozoa, metazoa up to man. Suited environments must *precede* the life of any one of these forms of life, which become adapted to them. When we scan in thought the immense stretch of geological time, and the size and variety of the globe which has been the theatre of an ascending scale of life, and remember that to a great extent the environments of one epoch are not fully suited to the needs of the preceding and succeeding flora and fauna, some dim idea of the importance of the environment side of the question of adaptation is reached. *Selection* has become the modern equivalent of the Creator in the thought of certain through-going scientists, and its range claimed to be from nebula to man, from the elements of matter to the productions of the human intellect. In biology it has several aspects. At first there was only known the natural selection of Darwin, then there came physiological or sexual selection. Later there was conceived by Roux a form of selection acting within the organism itself, between the different cells of which it is built up, and finally Weismann, recognizing the "lowering clouds" with which he saw Darwinism threatened, invented what he called germinal selection. There are, then—

1. *Personal Selection*, by which individuals among a group are selected as being generally more fitted to survive.

2. *Sexual Selection*, according to which certain individuals among higher animals select one another for some attractive qualities or characters, and so these are propagated. Darwin and Romanes are the authors of this form.

3. *Histonal Selection*, or the selection among the various cells of an organism, conceives the singular notion that within the organism there is a struggle of the parts going on, and certain cells are selected to survive, and relegated to their appropriate region of the organism. This is very much like a civil war, or a fight within a fight, a series of single combats for pre-eminence. This aspect of a house divided against itself, as Sir William Dawson calls it, is a strange and fanciful one when from such internecine strife is to emerge an harmonious, correlated, and perfect whole, such as an organism presents when developed.

4. *Germinal Selection* of Weismann is purely hypothetical, and declares that within the germ, among a host of indifferent variations, there are always present the necessary favourable variations for upward progress, and that these are selected to survive, and form adaptive modifications.

Of these four forms of selection the fourth may be looked upon as pure hypothesis, and only entertained because of its supplying a mode of thought which may, or may not, fit into an articulated whole.

3. *Histonal* selection of Roux is also too vague and supported by too insecure evidence to be of any more importance, except as a suggestion, than that of Weismann.

2. *Sexual* selection is obviously applicable only to the higher forms of life in animals, so as a factor in organic evolution it is of minor importance.

1. *Personal* or natural selection of Darwin is the real conception which mainly concerns us here, though it may be pointed out in passing how great is the importance in the modern world of the *sexual* form of selection under the guiding hand of man, which is responsible for all the wealth of beauty and utility arising from purpose and intention by man, in *artificial selection* of plants and animals.

Selection resembles adaptation in that it has been robbed as far as possible of all purposeful meaning, so much so that it has been applied by Professor Karl Pearson and Sir Norman Lockyer and others to the physical selection of chemical elements composing the heavenly bodies and our own planet, and to so-called "meteoritic evolution," and is in this form considered a leading factor in inorganic evolution.

In organic existence selection depends on three preceding conditions. *Living matter, organisms composed of this; variations among individuals of these organisms;* in addition to the equally momentous condition of *appropriate environments.*

Therefore, before selection can do anything it requires a good start, and when it is established as a working factor assumes an immense range in the minds of biologists.

Four years ago a controversy was carried on concerning the origin of living matter which was evoked by the remarkable address of Prof. Japp at the British Association of Science at Bristol. The outcome of this was that the agnostic evolutionists were driven to show that their scheme of life comprehended in the azoic period an accidental combination of symmetrical molecules in non-living inorganic matter, by which an asymmetrical compound was developed and became the groundwork of all life on the globe. Professor Japp's mature conclusion will better commend itself to our mind when he said, "I see no escape from the conclusion that, at the moment when life first arose, a directive force came into play—a force of precisely the same character as that which enables the intelligent operator, by the exercise of his will, to select one crystallized enantiomorph and reject its asymmetric opposite." In his reply to many criticisms from acute opponents of his views Professor Japp says tersely, "All my critics seem to be moving in that unreal world where a fount of type, if jumbled together sufficiently often, ends by setting up the text of Hamlet."

We are compelled to go back for the rudiments of selection to the primeval days when the so-called protista, neither vegetable nor animal, but with apparently infinite potentialities, were the sole population of a warm, homogeneous, watery environment. By some means not known these must have been differentiated into two great classes, which were to be the stock from which plants on the one hand and animals on the other were to be formed. Mr. Clodd takes it for granted that in some way or other the vegetable cell became possessed of a harder, tougher cell-wall, and as he says, "thereby sealed its fate." It must be borne in mind that according to the theory the earliest inhabitants of the globe were homogeneous, and no variation had as yet arisen, and we have also to consider a homogeneous environment. So that not only did the latter change in most momentous ways, but the former had to be modified so profoundly and with such far-reaching results into vegetable and animal one-celled organisms that the change equals any miracle of later days, and certainly there is no evidence whatever for it.

In course of time the slow modifications of the environments through physical and chemical processes must be supposed to have transformed these primitive organisms, but the former being homogeneous the latter could only be modified *en masse*, so that hitherto no place for individual variation has arisen. There is thus postulated a state of things in which various centres of life arose according as vast areas of the surface began to differ from one another, and large collections of minute organisms must be assumed to have been existing, marked off from one another by slowly developing geographical changes, the habitats of the different groups very slowly coming into contact with one another at their borders. These may be considered to have come together in the lapse of ages, but for immense stretches of geological time no reproduction of the organisms by conjugation would take place. Selection had not yet come into operation. I would here point out how large a demand must be made in this hypothetical account of primitive life on the globe, on the view that environmental changes affect organisms so that the variations are transmitted to succeeding generations, a proposition totally denied by the consensus of opinion of present day biologists. Even so late as last year, 1901, Professor Ewart in the presidential address in the zoological section of the British Association, said at Glasgow, "I do not believe there is any trustworthy evidence that definite somatic variations are ever transmitted." Hitherto the chain of life has not proceeded far, and it has been enormously assisted by hypothesis up to this point. Variations in individuals are not yet fairly accounted for at all. The fundamental cause of variation (which is the crux of the whole question of evolution, so much so that Bateson said lately "Variation is Evolution") is diversity of sex as Wallace, in *Darwinism*, p. 439, points out.

Also see Professor Adam Sedgwick at Dover in 1899.

I am not prepared to deny the great effect of external conditions in modifying plastic rudimentary forms of life any more than in the case of man himself, but it is necessary to picture to oneself the deeply purposeful issues involved in such changes in the protista that one branch of their stock was destined to produce the whole vegetable kingdom, which was to come, and the other the animal kingdom, bearing especially in mind the intimate and absolutely essential inter-relation between the two kingdoms.

Apart from Design this must be supposed to be involved.

in some fortuitous undirected change in the watery home of those early ancestors of ours! Well, it must be for each of us to ask himself calmly if his faith in the evidence of a mechanical theory of life will bear a strain such as this.

But Selection in course of long ages came into operation—whether in producing new forms of life or simply in maintaining, as I believe, certain breeds or groups of organisms according as we are Creationists or Evolutionists—and then took rank as a factor in the ascent of creation to its present phase. It is clear that at either end of the chain of life the province of a merely mechanical selection is greatly curtailed.

The bearing on the question of design in Nature of these two biological conceptions, Adaptation and Selection, is obvious. The least significant uses of the words are the most favoured in current science, as not postulating the operation of any Mind or purpose in Nature, and I would submit that our consideration of the former is eloquent of meaning of a most far-reaching kind, and the latter has a much curtailed province in which to operate. Professor Henslow, a great opponent of Natural Selection in the origin of species, goes so far as to say that Natural Selection is unnecessary, and at any rate, only a supplementary factor in organic evolution, and out of his immense knowledge of the botanical side of biology refers nearly all evolution to self-adaptation of plants through their protoplasmic response to environments. He would of course apply this theory also to animal life, and the conception finds a good measure of favour with such eminent zoologists as Professors W. K. Brooks of America, and J. Arthur Thomson of Aberdeen. Professor Henslow being a theist sees in this mode, by which organisms have developed to their present perfection, the operation of Divine directing power.

In the present consideration we are not compelled to choose between Creation and Evolution as rival theories of the origin of living forms, but we surely must see the necessity of admitting that Design is immanent in these marvellous chains of life, whatever be the way in which the links have been forged by the Divine Artificer. The ultimate reasons for it all, the final causes, may not be clear to us yet and may never be so, but the grand primary purpose opens before us the greater the range and the more profound the scrutiny of biological study. Whether it be by creation of groups of organisms at successive stages, by

the direct effect of environments, by variation, struggle for existence, heredity and selection between more or less adapted individuals, by geographical isolation, by self-adaptation to environments through protoplasmic response—whether each or all of these be admitted into our groping views of a tangled problem, they are but biological questions with a philosophical bearing, and must be settled by the *evidence* that is forthcoming. The greatest injury to truth may be done by haste in formulating cosmic theories too ambitious for the available evidence, which aim at embracing all Nature by a “law” which man has to conceive for himself, and which his successors may entirely contradict.

Surely it is Purpose here, there, and everywhere, which furnishes the missing link in all the problems of science.

If it did happen, indeed, in the Azoic Age of this world that such a conjunction of chemical and physical conditions as Professor Karl Pearson supposes took place, and eventuated in the origin of life, if some remarkable environmental stimulus was followed by a branching out into vegetable and animal forms from the very undifferentiated masses of protoplasm which then constituted the population of the globe, if from that homogeneous mass of living forms there came by further environmental changes such a marvellous complex of life as a Foraminifer presents, and in due time the diverging and multiplying groups of organisms by Selection or other factors of organic evolution till metazoa appeared, and so the great drama of higher organic life was put on the stage of a changing world, till at last the human body and mind emerged from the great mammalian stock, and this mind of man after long ages of groping among the grosser rudiments of human life, began to read backward by the light of science its remarkable past—if all this took place without any “Special Creation,” “Creation by fiat,” “Creation by fabrication,” or any other form of creation which opponents may label with a needless adjective, found neither in Revelation nor reason—if all this did happen in the course of geological history, the mere inconceivable length of time and apparent simplicity (*on paper*) of the processes can never block out the light of Purpose which is seen after the event in every act of this fateful drama, even though many shadows of ignorance throw up more vividly the light we do see.

At each stage of the story a being endowed with a full measure of the knowledge of the twentieth century, who

might be supposed to survey the unfolding plot, whether he looked back or forward, could not fail to note the close correspondence of life with environment and preparation of environment for coming life at each and every stage. When these two corresponding and correlated sides of the matter are looked at fairly, the argument for Design in Nature goes beyond that of means to ends in particular cases, and the cogency of the proof is doubled at one stroke. The validity of the "Argument from Design" now rises to the height of moral certainty, perhaps never more than probable in the strict scientific sense, in the sense in which, as Jevons points out, the theory of gravitation is only *probable*. It is hardly too much to say that biologists, disguise it as they may, under the name of "natural laws," "energy," "response," "adjustment," "adaptation," "selection," "heredity," "struggle," "survival of fittest," do tacitly adopt this connecting link of Purpose in Nature as a working hypothesis, and when disavowing any form of teleology can never rid themselves of its common terms.

Though the progress of science is ever "Excelsior," and cloud after cloud of ignorance is penetrated by her growing light, a heavy mystery must always enwrap certain of her problems no less than those of religion. But it has been beautifully and ably shown by Ballard in his *Miracles of Unbelief*, that for those who abandon the guiding light of Revelation and faith in their study of Nature's secrets, the difficulties are vastly greater than for those who see Divine Purpose and Plan in Nature.

DISCUSSION.

MR. MARTIN ROUSE.—We heard just now in this paper that even the *bacterium* shows its adaptation to an environment, that it is required to go to work where it does go to work, and we know that a wonderful invention of man has followed on this discovery of Pasteur's by which corrupt refuse has been made to devour itself in what is called the Bacterial System of Sewage. By this admirable system the bacteria multiply to such an extent that they devour the rubbish and then eat themselves, so that finally there is nothing left! I may say for that alone, I have observed to my intense admiration, the wonderful provisions for cleansing

a desert. Some of us have noticed that in Algeria the rainfall is about the same as in London and around—about 27 inches. On the other hand the sun is intensely hot, the amount of daily sunshine being far greater. During the summer the streams dry up so that you may see in the middle of the waste a stream bed with nothing in it as we know. Everyone travelling in the East is familiar with these things. It was my lot last year to see them for the first time. As the camels travel across the desert, if there is no rain, innumerable little beetles fashion the droppings of the camels into balls in the dust and lay their eggs inside, and in half an hour there is nothing but dust. Of course these instances may be multiplied to a great extent when we care to study the subject, as Dr. Walter Kidd has done in his paper on "Design in Nature," for he has shown, over and over again, how wonderful are the personal adaptations of creatures to the universe.

Rev. F. A. WALKER, D.D.—The lecturer has made a very interesting remark on the inaccurate and inadequate formulæ or recognized terms in common use by scientists, and I very much wish that Dr. Kidd could give us some others. I think he has shown that he is well able to give us some other terms for those which certainly do not, to my mind, convey the meaning for which they are intended. I do not myself understand what is meant by "natural mimicry." I have already spoken here against that term. I take it that mimicry means the act of a conscious agent voluntarily copying another for a little time, and then dropping it again just at will. It means that we copy mannerisms, or words, or gestures, or tricks, or habits of our fellow-creatures. I do not call it natural mimicry because the moth is stamped, directly it comes from the chrysalis, with no volition on its own part, with the size or colour of the butterfly, because it still has a moth-shaped body. It is stamped by the Creator in that way, and it continues so to its death; perhaps the colour is a little faded in autumn. So with the dragon fly, known as *Sympetum flaveolum*, it is a little different in colour, but those are only minor matters of detail—there is no will of its own in the matter. What I should call mimicry, on the part of an organic object would be, for instance, if you take a chameleon as I have done, and put it in a box with little light. It then gets a dusky dark green, and if you tickle its cheeks it gets sulky and changes colour again. If you put it on a myrtle where it can

bask in the sunlight, it changes again. That is what I call mimicry; but you cannot call it mimicry just because changes take place naturally in an organism possessed of life.

Then the "survival of the fittest" is referred to in the paper: "The new meaning of the 'survival of the fittest' has now been taken to be the 'fittest to survive' or 'fittest for the environment.'" Some things exist on isolated islands that are the only fit ones for the environment. The thick-bodied moths of Iceland are adapted to their environment, and why? Because they go underground in winter, and the dreadful storms of rain and snow over their heads do not touch them, and they have also their food-plants. In Iceland there is no suitable shelter under which the butterfly can conceal itself. There are no hollows in large tree-trunks into which our common English butterfly can creep in bad weather and hibernate or hang up their chrysalis in a tree. There is everything to support the thick-bodied moth but nothing to support butterflies, and they are not found in Iceland in any quantity that could survive. In my opinion *survival* means those which longest survive the rest. So I should do away with *survival*, too, for it is not only that those things exist on the island, but others never existed there.

Professor LANGHORNE ORCHARD.—I am sure we all agree that we are indebted to Dr. Walter Kidd for this valuable and graceful contribution to the great argument for Design.

It is much easier for myself personally, at least, to note the many beauties of this paper than to attempt anything like a criticism. Dr. Kidd has rightly drawn attention to the fact that ambiguity and even incorrectness in the main terms of the theory of evolution have tended greatly to its wide acceptance, and I am sorry to say this has not been entirely unintentional on the part of evolutionists. Herbert Spencer himself, in his *First Principles*, says that the system of philosophy, as he terms it, which he proposes, would be more correctly described by the term *involution* than *evolution*, and he says he prefers the term *evolution* in order to make it square with a popular theory, alluding, obviously, to Darwinism; but, to my mind, it is scientific immorality—an offence against truth, to use a term with a meaning—an especially different meaning, to that in which it is accepted.

Dr. Kidd refers to the fundamental cause of variation being

diversity of sex. No doubt it is the fundamental cause, but I suppose he would not contend that it is the *only* cause. Variation may be produced by an individual himself and, surely, by environment also; though, doubtless, change of sex may be, as he points out here, the fundamental cause.

We might say it was almost comic, if it were not, in some respects, really somewhat tragic, to read Professor Karl Pearson's statement referred to by the author, which appears to be really put forward as a scientific conjecture. I greatly prefer such an expression as "special creation" to creation by this imagination of Professor Karl Pearson's. Indeed it is creation by imagination, because if this protoplasmatic mass existed from all eternity, then long, long ago it ought, according to his theory, to have evolved into different forms. So he is driven to assume creation somehow or other, and why should it be thought that the Creator could not create anything more important by His creative art? It is not only opposed to experience, but, with all respect to Professor Karl Pearson, to common sense. Even his absurd theory could not have been carried out actually—much less could the actual events have taken place, without there being, what Dr. Kidd so truly insists on, when he says "Purpose here, there and everywhere, which furnishes the missing link in many of the problems of Science," I should say in *all* of them. [Applause.]

The CHAIRMAN.—Before I call on Dr. Walter Kidd to reply or to make any further suggestions, I should like to point out that what seems to me to be the gist of the paper is this—that evolution, at any rate atheistic evolution, is not credible. All the words that have been discussed to-day are words which presuppose a designing mind: all this struggling—this selecting—this surviving of what is fit, this adaptation and the rest are mental processes. Take, for example, adaptation. We only see adaptation in nature because we have in ourselves a process of adapting one thing to another, and then we read into Nature what we find in ourselves. It is all mental, and the word "adaptation" implies reason and purpose.

Take another word that Dr. Kidd uses, though the discussion has not turned on it, viz., "Beneficence." Beneficence is very different to adaptation, although the two words go together so well. When you find Adaptation combined with Beneficence,

then you have got two strings to your bow, both converging to produce the great conclusion. Then "Purpose" is also used in a very tentative way by the persons to whom reference has been made. It may be immediate or something far distant, and the further distant it is the more mind is implied. If a thing is done for the immediate moment it may seem to be done casually; but if you do a thing to-day the result of which is not discovered for a hundred years, the action is read in its full meaning and then you see, at once, purpose. Now supposing that some far-reaching purpose, instead of being simple in its nature, is complicated; so much the more difficult it is to prove purpose or the opposite to purpose, mind or absence of mind; and if you test mind or mindlessness in creation, not by a simple case but by one great conglomeration of cases, and when you see a mass of what might be isolated instances of purpose running on into systems accumulating not only through space but through time, you have impressed on your mind that there is something not human, but superhuman, and you read the superhuman through the human. Thus, you read the Mind at the back of the universe through the mind that you have in your own selves.

Almost all the words, I think, that we have brought before us to-day were originally associated with ourselves as human beings. Then the evolutionist, not having any other words and not having the skill to invent any, as suggested just now, is compelled to utilize words and, as far as possible, to emasculate them and take out their sense, and to believe that such things as "beneficence" and "adaptation" are floating about somewhere in the universe, and if later on they happen to catch on somewhere, certain results follow. If that is so, the less reason we have the better. God has given us reason in order that we may investigate the laws of His universe, and the more we honour human reason the more we shall realize the magnitude of the Divine mind; not to recognize the Divine mind seems to me to be an abuse of one of the greatest gifts that we have in nature. There is another word that I should like Dr. Kidd to introduce a substitute for—it is hardly a mental word—I mean the word "tendency." It is a most convenient word for evolutionists. They say there is a "tendency" to do this or that. That is true, but they do not tell you the origin of the tendency at all. Suppose we say, "I believe that at a certain time there was a strong tendency in creatures

to vary, and then a strong tendency that those creatures having varied should vary no more"—so that from a few types you get first multiplicity of species—then fixity. Supposing there were this tendency in creation, then those tendencies are simply processes in creation; and you can never get rid of this—that all the words, even such an impersonal word as "tendency," have behind them the author of the tendency—the author of the law—the author of order, and the author of adaptation of means to ends; and so we are driven back, by force of our reason, to recognize Him who gave it to us.

Dr. WALTER KIDD.—I have very few adverse remarks to reply to. I am very much obliged for your kind reception of my paper. I quite agree with Dr. Walker as to the danger that comes in through a word like "mimicry." It is only another instance, added to those I mention here, of the way in which these expressions are handled and wrongly handled, and different words ought to be invented, though I do not care to undertake the task. I think "fittest to survive" does not apply to the mass but to individuals of any group, and that it is an unobjectionable term which we must allow to the evolutionists.

I quite think that Professor Orchard is justified in saying that there is a kind of scientific immorality in the way in which some of these terms are handled; and yet it is very difficult for evolutionists or ourselves to get rid of these terms, such as "purposeful" and other mental terms. It is only another way of saying that we are surrounded by divine mystery and purpose and divine immanence in all the affairs of the world. The illustration I gave of the fall of an avalanche is only a simple way of putting what I have called "purposeless mechanical causes," or what Spencer has called a power that sets going certain laws, though he has not the grace to admit it in words. I should agree with Professor Orchard that minute creatures like bacteria, as their environment changes, are potentially adapted to the coming change and are adapted from the first.

I think diversity of sex is being made too much of. I was there quoting Dr. A. R. Wallace, who states it so strongly, that he hardly allows any other cause of variation at all, and many hold that environment does not affect the individual so that variations are transmitted to posterity. Many of these are most eminent people, and they have not admitted any instances in which their favourite theory

has been contradicted, but I think they are bound to be admitted as time goes on. As I suggest in my paper, Professor Ewart has declared that no trustworthy evidence is forthcoming.

Professor ORCHARD.—The individual varies though the species does not vary.

Dr. KIDD.—The question is whether he transmits that to his posterity. I believe it is bound to be proved that that is so.

I infinitely prefer Professor Orchard's "special creation" to Professor Karl Pearson's "creation by fiat." I do not see that we need go beyond the term "creation" in general.

As to "spontaneous generation," I am afraid that Agnostic evolutionists have included it under the head of "unity of nature," assuming that spontaneous generation has taken place. It is in keeping with the rest of their science, observation and laws, that they assume it must have taken place; but all evidence is against it, as is well known.

The Meeting then adjourned.