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865TH ORDINARY GENERAL MEETING

HELD AT 12, QUEEN ANNE'S GATE, LONDON, S.W.1, AT 6 P.M. ON MONDAY, MARCH 25TH, 1946.

L. RICHMOND WHEELER, ESQ., PH.D., M.Sc., B.A., F.L.S., IN THE CHAIR.

The Minutes of the previous Meeting were read, confirmed and signed.

The CHAIRMAN then called upon O. R. Barclay, Esq., M.A., Ph.D., to read his paper entitled "The Meaning of the Word 'Evolution' and its Bearing on the Christian Faith."

The following elections have been made: Miss Joyce Van Straubenzee, Fellow; Rev. A. H. Hawley, B.A., B.D., LL.D., Fellow.

THE MEANINGS OF THE WORD EVOLUTION IN BIOLOGY AND THEIR BEARING ON THE CHRISTIAN FAITH.

By OLIVER R. BARCLAY, M.A., Ph.D.

TO anyone who attempts to study the relevant literature it soon becomes apparent that a great diversity of meanings has been given to the word *evolution* in both scientific and religious circles. The idea naturally suggests itself that some at least of the controversy that has raged round the subject may have been due to the use of the same word in different senses. In this paper, then, we shall attempt (*a*) to analyse the main biological ideas which have been conveyed by the word evolution; (*b*) to assess their present scientific status and, finally, (*c*) to discuss their bearing on the Christian Faith.

In the first place it is necessary to differentiate between the main scientific problems which arise in the study of evolution. In the past this has been done in various ways and a good deal of confusion has been caused by inadequate analysis. The following divisions appear, however, to be scientifically necessary and, from our present point of view, of considerable importance.

Three main biological problems are involved. First of all there is what we may term the problem of *descent with modification*. Are species absolutely rigid in type, or can there be

modifications in successive generations ? Originally this was merely a problem of genealogy, but today we might ask : Are animals and plants capable of adaptation to a changing environment or should we regard them as rigid types, each fitted for a particular ecological niche, and therefore doomed to extinction if the corresponding conditions should cease to exist ? Secondly, if descent with modification takes place at all, how far has this process gone ? This may be termed the problem of *the extent of descent with modification.* Is descent with modification limited to a process within the species by which new varieties are produced, or are all the species of each genus related phylogenetically—or all the members of each family, class or phylum ? Indeed, are all forms of life descended from a common ancestor ? Thirdly, if descent with modification has taken place, how has it been brought about ? What is *the mechanism of descent with modification* ? Is it an *élan vital,* an orthogenetic trend, natural selection acting on heritable variation, or direct Divine control ?

Our answer to this third problem has some bearing on our answers to the other two, because, if the evidence for descent with modification were slight and by itself inconclusive, we should be even less ready to adopt the idea if no possible mechanism for its accomplishment could be proposed. Equally if the known mechanism could only account for variations within a species we might be hesitant to accept a more extensive process. The distinction between these problems is well illustrated by the Conclusions of Darwin's *Origin of Species.* After discussing the question of the mutability of species he goes on to say : " It may be asked how far I extend the doctrine of the modification of species. . . . I cannot doubt that the theory of descent with modification embraces all the members of the same great class or kingdom. I believe that animals are descended from at most only four or five progenitors, and plants from an equal or lesser number. Analogy would lead me one step farther, namely, to the belief that all animals and plants are descended from some one prototype. But analogy may be a deceitful guide." This is followed by a discussion of the mechanism of descent with modification.

Unfortunately these distinctions have all too rarely been made : indeed the three separate problems have all at times been covered by the single term *evolution. In addition* the

word has been given a large variety of meanings innon-biological spheres of knowledge, notably in ethics and astronomy. These other senses of the word have, I believe, no real logical relation to the biological problems, and it has been in large measure the attempts to deduce sweeping philosophical theories from the biological evidence which have been the cause of controversy. In some cases this movement of thought, from the biological to the philosophical, has been clearly recognized, but the most troublesome writers on both sides of the disputes have been those who have confused the two (probably unintentionally) and have suggested that reasoning which applies to the one could be carried over to the other. This is not to deny that there may be important philosophical and religious implications in some of the scientific theories which have been proposed, but these implications have been too much assumed and insufficiently subjected to critical analysis. When a scientist, knowing little theology, announced that his science had disproved fundamental tenets of Christianity, no one can fairly censure the Christian who, understanding little biology, retorted that in that case something must be wrong with the science. Often the facts were right but the deductions drawn by the scientist from these facts were very questionable. At the same time it must be said that the arguments for teleology advanced by scientists in the early nineteenth century were open to similar criticisms. It is part of the function of this paper to examine the legitimate implications of the various scientific concepts involved.

It is necessary first, however, to review very briefly the history of the word *evolution*, for this history will help us to understand, at least in part, the difficulties which have arisen. The word *evolution* first appeared in biological writings in the earlier half of the eighteenth century. It was used, however, in a sense totally different from that given to it to-day. It described a particular theory (now known to be incorrect) of the development of the individual from the ovum. Bonnet, one of its most eminent advocates, used the words "evolution" and "development" as synonymous, and meant by both: "the expansion of that which was invisible into visibility." Later, when Bonnet's theories had been shown to be wrong, the word nevertheless retained an embryological significance and became a general term for development in the sense in which that word is used to-day. Evolution was apparently first used to cover

the idea of the mutability of species (*i.e.*, descent with modification) by Lyell in 1832, and Herbert Spencer (in 1852) popularized it in the sense of the general production of higher forms from lower, a sense which it is important to note contains the philosophical idea of progress as well as a scientific element. But although the idea of descent with modification was familiar from the writings of Erasmus Darwin, Goethe, Treviranus, Lamark and others, it was not until the publication of Darwin's *Origin of Species* (1859) that it found any general acceptance. It is notable that Darwin scarcely used the word " evolution " in this book. He spoke always of " the theory of descent with modification " and the passage already quoted sets out some of his conclusions. He believed firmly in descent with modification. Further, he believed that this process had been extensive, though he adopted an admirable caution with respect to the idea that all forms of life are descended from a common ancestor. These were not altogether new features, but the main reason for the tremendous impact of the book on the scientific world was apparently that for the first time he proposed a plausible mechanism by which descent with modification might have been brought about. Moreover it was a mechanism which, for a variety of reasons, appealed greatly so the scientific public of the day. Almost immediately the word *evolution* was applied indiscriminately to Darwin's theories. It was used to imply descent with modification ; it was used equally to convey the idea that all forms of life are descended from a common ancestor, and it was employed as a synonym for Darwinism, that is, for his theories about the mechanism of descent with modification. But this was not all. Herbert Spencer had already given to the word a philosophical meaning, and evolution rapidly became associated with the idea of the inevitability of progress and a mechanistic view of the universe.

A passage from T. H. Huxley written in 1878 illustrates the contemporary confusion. He writes : " Evolution, or development, is, in fact, at present employed in biology as a general name for the history of the steps by which any living being has acquired the morphological and the physiological characters which distinguish it. (It) . . . falls naturally into two categories—the evolution of the individual, and the evolution of the sum of living beings." Under the first head he discusses embryological development, and under the second he apparently

includes not only the whole range of biological problems mentioned above but also the philosophical ideas associated with them in the writings of Spencer and Haeckel. The confusion between the biological and philosophical ideas is quite understandable. If descent with modification has been very extensive, changes appear to have taken place which almost every one would describe as " progressive," and confusion has easily arisen between the fact of change and the quality of such change. Nevertheless this distinction must be enforced, especially since no real agreement has been reached as to what constitutes biological progress.

From the very first then the philosophical and scientific concepts have been confused. The same confusion appears again very obviously in such books as *Creation by Evolution* (edited, F. Mason, London, 1928). Here D. M. S. Watson uses the word in a sense implying a moderately extensive descent with modification, while C. Lloyd Morgan in the same volume defines it as the " upward passage from lower to higher," though he recognizes that this goes much further than other current scientific usages. Many nineteenth-century writers did not trouble to define the sense in which they used the term, and there remains to-day a considerable ambiguity in the writings of a number of authors. J. S. Huxley, for instance, writes: " Evolution in biology is a loose and comprehensive term applied to cover any and every change occurring in the constitution of systematic units of animals and plants, from the formation of a new sub-species or variety, to the trends, continued through hundreds of millions of years, to be observed in large groups. The main processes covered by the term are as follows: (1) Long-continued trends . . . a few towards that all-round biological improvement which may be styled evolutionary progress. . . . (2) Minor systematic changes." (*Evolution: the Modern Synthesis*, 1942.)

With such a variety of different ideas covered by one word it is not always easy to discover exactly what the evidences which various authors present are intended to prove, and the idea of progress slides over almost imperceptibly into a philosophical system. Recently, however, there has been a tendency to restrict the meaning of evolution rather drastically and to define it as " descent with modification." If any usage can be said to be generally accepted in scientific circles to-day

it is this limited one of descent with modification. Thus J. B. S. Haldane (*The Causes of Evolution*, 1932) writes: "By evolution we mean the descent from living beings in the past of other widely different living beings. How wide the difference must be before the process deserves the name of evolution is a doubtful question." K. Mather (*Biological Reviews*, 1943, **18**, 3.2) similarly says: "Evolution is the occurrence of persistent changes in the hereditary constitution of a population of organisms." The whole subject would be greatly clarified if the word were restricted to this meaning or else abandoned altogether in scientific writings in favour of Darwin's more descriptive but more cumbersome phrases.

We have now reviewed the main ideas which, in the realm of biological thought, have passed under the title of evolution. It remains to assess their scientific status and to discuss their bearing on the Christian Faith. It is not my purpose in any of these matters to discuss personal opinion. I wish only to point out the issues raised and to set out the main positions which are adopted today. The function of this paper is analytical and informative rather than polemical.

Descent with modification may be said to have been recognized as a scientific fact. The most extravagant theories which have been proposed almost all accept a limited change, at least within a species. The races of man provide a good example. It is universally recognized that all are of common origin and yet several quite distinct types are clearly defined, showing differences, which might be given specific rank in other families. On a small scale descent with modification has been demonstrated to have taken place. The appearance of the grass *Spartiana townsendii* (apparently a hybrid of *S. stricta* and *S. alterniflora*, C. L. Huskins, *Genetica*, 1931, **12**, 531) is only one amongst a number of cases where distinct and stable new types have arisen from other different and equally stable types of organism. There seems to be little doubt that descent with modification has taken place at least on a very small scale.

When we turn to consider its possible bearing on the Christian faith, however, we find that the fact that new varieties may arise within a species has of itself no theological or philosophical significance. This has been too often forgotten, partly because of a failure to draw the distinctions made above, with the consequent failure to realize that the fact of change in itself

in no way proves or disproves the philosophical ideas which have also passed under the name of evolution.

The question of the extent of descent with modification, however, raises far more complex questions. Most biological authorities are agreed that it has been considerable and that at least all the members of each phylum are related. The majority would go farther and assume that all forms of life are descended from a common ancestor. But the degree of certainty involved here is quite different from that involved in the question of the fact of descent with modification. Here there is no direct evidence available and we are limited to indirect evidences similar to those discussed by Darwin in *The Origin of Species*. In the nature of the case no experimental evidence is available because it concerns events in the past which cannot be repeated. The most that can be said is that there is a considerable array of facts which can most readily be understood on the hypothesis that there is a descent relationship between the members of each phylum. Arguing, as Darwin says, by analogy we may conclude that all forms of life are descended from a common ancestor, though the evidence here is very slight and "analogy may be a deceitful guide." It can only be said that this appears to be (or not to be) the most convincing explanation advanced so far. But its possible bearing on the Christian faith is considerable. It is necessary to decide how much (or little) is stated by the Genesis account of the Creation, and in particular what is to be believed about the origin of man's body. If the Genesis account is understood as stating that all the species were created separately within the space of four periods of twenty-four hours then clearly the Biblical view is in conflict with any but the most limited descent with modification (*i.e.*, within a species), though the difficulty of defining a species remains acute. If, on the other hand, the "days" of Genesis 1 are interpreted as indicating arbitrary periods of time, this conflict is removed. The Biblical account may then be taken as a statement of the sovereign action of God in the Creation, which gives no clue as to the method of creation, whether sudden or gradual, in each case *de novo*, or by descent with modification. It is a question of interpretation which is at stake and not of necessity a matter of loyalty to Scripture. Even the view that all forms of life are descended from a common ancestor is not incompatible

with the fullest respect for Scripture *if* it is held that the Bible states nothing about the method of creation, but only that it was His sovereign action. This view may be wrong, but it is not easy to demonstrate that it is disloyal, especially if it is maintained that there were six periods of special creatorial activity. It has of course often been pointed out that the order of creation given in Genesis corresponds closely with the supposed evolutionary order. The question of the creation of man's body has been dealt with similarly by some Christians. They maintain that although man is created in the image of God this cannot refer to his physical body, which is surprisingly like that of an ape, but only to his spiritual nature, which has its crowning expression in the possibility of fellowship with God. Physically, they would maintain, man may, or may not, have been created by a process of descent with modification. The matter is of no importance to the theologian, for the physical and spiritual natures are different and the latter has been profoundly affected by the Fall. The suggestion that a physical evolution necessitates or even implies a similar spiritual history simply is not true.

The scientific problems connected with the mechanism of descent with modification are by far the most complex, but they do not concern us much here. The first issue is whether or not a mechanism has been found adequate to account for descent with modification. About this there is little disagreement. Several mechanisms might have played a part and natural selection acting on gene mutation, which may be termed the Neo-Darwinian theory, could account for limited changes, at least theoretically. Such a process appears to have been responsible for some at least of the differences between the races of *Drosophila*. On the wider question of whether this mechanism could have been responsible for the origin of all forms of life from a common ancestor there is difference of opinion. On the one hand it is argued that this is only a matter of degree and on the other that the type of variation produced by gene mutation (and inversions, etc.) could only account for a very limited range of change (*c.f.* Goldschmitt, *The Material Basis of Evolution*, 1942). Nevertheless no other scientific theory has been nearly so widely accepted and most of the recent work on genetics goes to show that its scope is wider than was at first thought by some workers. The real scientific difficulties

concern the nature and frequency of mutations and at present our knowledge of this subject is too sketchy to allow any dogmatic conclusions, but there are a number of technical objections to the belief that such a mechanism can be responsible for an increase in complexity (*e.g.*, Müller, *Biological Reviews*, 1939, **14**, 261). Nevertheless the view that this Neo-Darwinian mechanism is an adequate explanation cannot be said to be unreasonable. If it is proposed that mutations have been subject to Divine control there can be little objection, and so little is known about the causes of mutations that such an idea is perfectly possible.

Whatever view is taken, however, there is raised the problem of the relation between God's sovereign action and the laws of nature, a problem which demands more attention than it is at present receiving. In the nature of the case it can never be proved that any one mechanism has been responsible for the whole course of descent with modification nor can Divine interference ever be ruled out as a possibility, though it might be shown that other mechanisms are probably adequate by themselves. Certainly the extremely confident pronouncements of some scientists in their popular writings bear little relation to the tentative conclusions and opinions proper to a situation involving so many scientific uncertainties. The mechanism of descent with modification therefore raises no new problems in addition to those raised by an extensive descent with modification alone, except in so far as the general problem of the relation of scientific laws to the Divine action is raised, a problem which is common to almost every branch of science and which is not in any way peculiar to the subject of evolution.

The real conflicts appear when we consider the interpretations which have been placed on these scientific findings. The distinction has already been drawn between the fact of change and the quality of change. Now, if it is true that all the vertebrates, for instance, are descended from common ancestors, we have in this group a development which is generally recognised as "progressive." Just what is meant by progress, however, it is extraordinarily hard to define. There is certainly an increasing complexity of structure and organisation, but the reverse process leading to degeneration is also seen in many groups and descent with modification of itself might be in

either direction. Natural selection, given the appropriate mutations, may lead to adaptive changes; but adaptation can be either progressive or degenerative. The idea of progress is therefore not bound up with the fact of descent with modification nor with the Neo-Darwinian mechanism of descent with modification, but progress has apparently occurred in the course of the process if it has extended to the whole of the vertebrates. J. B. S. Haldane writes: "We must remember that when we speak of progress in evolution we are already leaving the relatively firm ground of scientific objectivity for the shifting morass of human values" (*The Causes of Evolution*, 1932, p. 154). The first question raised by the interpretation of the facts then is this: Has progress occurred in the course of descent with modification? To this it may be answered that there may have been an increase of physical complexity, but that there has been progress in any ethical or moral sense we have no evidence. If there has been an increase of physical progress in any sense, however, some serious difficulties are raised in the way of a mechanistic explanation. These were discussed by R. E. D. Clark (*Trans. Vict. Inst.*, 1943, **75**, 49) and will not be re-examined here except to state that if there has been a real decrease of "entropy" (in the wider sense of the word) it seems necessary to postulate Divine control over whatever mechanism has been responsible.

Secondly, it may be asked: If progress has occurred, by what means has it been brought about? The confident assumptions of some writers support a philosophy fundamentally opposed to the Christian view. They assert (*a*) that a rigid Neo-Darwinian mechanism, over which God had no control, has been responsible for the whole of descent with modification and (*b*) that there has been real progress brought about by this means. But the first of these assumptions can never be fully substantiated. Even if a Neo-Darwinian mechanism could be shown to have been responsible for the process there is no scientific reason for dismissing the idea of God's sovereign action in it and some of the difficulties of the idea of progress have already been raised. This is the crux of the modern controversy and it is a philosophical and not a scientific dispute. The scientific facts cannot at present support or oppose these theories. Because there is considerable evidence that a Neo-Darwinian mechanism has played a part in descent with modification people have jumped

to the conclusion that this is the entire explanation and that it disposes altogether of the Christian idea of God's creation. Such a position could only be maintained by an already developed materialistic prejudice. Although the scientific findings may be capable of being fitted into such a system they are at least equally capable of a fully theistic interpretation. But from these articles of philosophic faith an attack has been launched on the Christian position. Progress, it is said, is a fact. It has been brought about by these purely material forces, and apparent design is really only adaptation brought about by natural selection acting on chance variation. Bolder spirits have even urged that "progress" is therefore inevitable, that man is continually improving and that the Fall, if it ever occurred at all, must have been a fall upwards. God is politely bowed out of the Universe. But these are not scientific inductions and they are not based on assured premises.

The main concern of this paper has been to distinguish things that differ and to show how far the criticisms of Christianity which have been made in the name of evolution are truly science and how far pure philosophy. No attempt has been made to offer a proper answer to the basic problems raised, but it is demonstrated that the main conflict has arisen over philosophical issues which have no necessary connection with the findings of science and ought never to have been associated with the word "evolution." The sooner this word is limited to an exact scientific meaning or else abolished altogether from scientific literature the better it will be both for science and Christianity and for the general clarity of thought.

Discussion.

The Chairman, Dr. L. Richmond Wheeler, said: The paper they had just heard covers many interesting matters in biology and philosophy, and he could allude only to some of these. I hope that any botanists present will contribute to thediscussion, as Dr. Barclay has dealt with the problems of organic evolution mainly from the zoologist's point of view.

As regards the concept of progress in evolution, one criterion for this lay in increased power by organisms of dealing with their physical environment (*cf.* J. Needham in *Science and Ethics*, 1942,

ch. 3). Leading botanists, such as Scott, Tansley, Bower, Seward, and Thoday (references given in *Hibbert Journal*, April, 1944, p. 205), stressed the existence of large, unbridged gaps between the main groups of plants; these were indicated for animal orders by M. A. C. Hinton for rodents (1c) and A. D. Imms for insects (*Encl. Brit.*, 12, 421). These great gaps indicated the occurrence of creative activity or, at least, of large mutations. Dr. Willis had argued strongly for their occurrence in flowering plants (*Course of Evolution*, C.U.P., 1940); he, like myself, agrees with Drummond, Kropotkin, Allee, and others in challenging the struggle doctrines of Darwinism; co-operation, not inter-organismal struggle, was the main principle of the maintenance and evolution of species. The views of A. R. Wallace had been neglected by materialistic biologists; he claimed some new cause for at least three big events—the origins of life, of animal consciousness, and of mind in Man (*Darwinism*, p. 474). All these authoritative views made for harmony between biology and Christian belief.

I hope that the reference to Dr. Clark's paper will lead to re-reading of a very valuable contribution to the productions of the VICTORIA INSTITUTE. Even on the extreme, and, as I consider, erroneous view that evolution had occurred continuously from the nebula stage, T. H. Huxley had admitted that there was no answer to the idea that a Supreme Mind might have ordained it all from the beginning. We can certainly agree with Dr. Barclay that biological facts and legitimate scientific hypotheses based upon them do not controvert the Christian Faith. I have much pleasure in proposing a hearty vote of thanks for a very thoughtful and able paper.

WRITTEN COMMUNICATIONS.

Mr. DOUGLAS DEWAR wrote: Dr. Barclay has given us a most interesting paper, but, in my view, it is open to a few criticisms.

I am surprised that Dr. Barclay has not mentioned that a number of writers, both biologists and non-biologists, have distinguished between the two kinds of biological evolution. In this connection D. Gabriele Rabel wrote (*XIX Century and After*, June, 1945, p. 262): "Most important of all was his (Lamarck's) distinction

between two kinds of evolution, one creating new architectural plans, the other adapting the new types to conditions.

" Recently the distinction between Big and Small Evolution has become fashionable. Most scientists imagine that if one could follow up Micro-evolution for a sufficiently long time, one would arrive at Macro-evolution. Others have recognized the completely different character of these two processes, and some suggest reserving the term ' Evolution ' for the creation of new types. The superficial changes which give rise to species or genera, may be called ' Diversification ' (Vialleton) or ' Differentiation ' (Dewar) or ' Adaptive Radiation ' (Osborn)."

Among those who are not biologists Arnold Lunn has suggested the terms " Major Evolution " and " Minor Evolution," and H. C. Morton " Evolution and Parvolution."

The reason why this obvious distinction is not stated in every textbook is not far to seek. Many modern biologists have adopted Evolution as a creed, and such defend their belief with religious fervour. As the only evidence adduced in favour of evolution applies to the lesser type, if the distinction were adopted in books written for the public or for students, it would soon become generally known that the evidence for major evolution is to all intents and purposes NIL!

Minor evolution postulated changes in animals and plants which are not obviously impossible; whereas major evolution involves changes which are fantastic. For this reason I am surprised that Dr. Barclay, while stating that " there is a considerable array of facts which can be most readily understood on the hypothesis that there is a descent relationship between the members of each phylum," without pointing out that this hypothesis involves transformations in animals which cannot have been effected *gradually*, such as the conversion of a reptile into a mammal and a land mammal into a whale. The former involves, *inter alia*, the quadrate and two jaw bones becoming forced into the skull and the hinge of the lower jaw on the skull being changed. The latter change involves a series of animals in which the pelvis was too small to enable them to walk on land and too big to enable them to swim after the manner of the whale.

As to the Biblical account of the creation. The idea that every species was separately created was enunciated by Linnaeus and not by the writer of Genesis. Genesis tells us that many kinds of animals were separately created, but it does not say how many kinds, or whether or not these were equivalent to the zoological species, or genus, or family, or whether they were equivalent to any of the categories of the classification now adopted by biologists.

Lt.-Col. L. M. DAVIES wrote : I appreciate Dr. Barclay's references to the many meanings given to the word " evolution," and long ago defined the doctrine of organic evolution as the one which postulates unbroken genetic continuity between all present forms of life and those which first appeared on this earth ; for Continuity is the basic dogma of modern evolutionary faith (*Journ. Trans. Vict. Inst.*, Vol. LVIII, 1926, p. 214 ff. ; Vol. LXI, 1929, p. 191 ff.).

I cannot, here, discuss all the issues raised by Dr. Barclay ; but the idea that the " days " of Genesis represent geological epochs instead of 24-hour periods, raises far more serious difficulties than it seeks to remove. And I cannot possible agree that " the Bible states nothing about the method of creation " (cited as a possible contention), because that method, as regards both Eve and Adam himself, is stated in terms which show that talk of their evolution is quite " incompatible with . . . regard for Scripture " (*cf. Journ. Trans. Vict. Inst.*, Vol. LXXI, 1939, pp. 174–5). I also deny that " The suggestion that a physical evolution . . . implies a similar spiritual history is simply untrue " ; for only the other day I was asked by a student at what point I could postulate a spiritual influx in a genetic series insensibly graded from monkeys to modern men. I told him that that series only existed in his—and his teachers'—imagination ; but it is obvious that if such a series were objective fact, man would be a risen creature, not a fallen one. The first man would be the lowest conceivable one—and so be far below the level of any existing race. The first sin would then be the most excusable, as by the most bestial representative of the race. So it would be doubly absurd to attribute the first death, and the Curse upon all nature, to that sin ; and since the

race has (*ex hypothesis*) advanced far beyond that sub-barbarian level, it is clear that any talk of Salvation would be incongruous with regard to those who had done so well.

Nor do matters stop there; for the empty tomb, on the first Easter day, itself implies that physical death was not man's ancestral lot before the Fall. The doctrine of literal Creation alone justifies the physical Resurrection of the Christ. To the logical evolutionist such a Resurrection—as distinct from glorified personal survival—is a sheer anomaly. Meaningless, to him, is Paul's insistence that if Christ be not thus Risen we are still in our sins (1 Cor. xv, 17). Only if physical death were not natural to man, but due to the Fall and Curse, could the PHYSICAL death of the sinless Christ be our "Ransom" (1 Tim. ii, 6), and the PHYSICAL Resurrection prove the *completed payment*. That empty tomb is the clearance certificate of the logical Christian, the credal enigma of the "Christian" evolutionist.*

Mr. JOHN EVENDEN wrote: The paper will arouse interest among both those who study philosophy and those who study science, in that it provides a basis for a discussion of what definition, if any, is to be given to the word Evolution. Consideration of this problem is obviously of immense value and long overdue, and so lucid a paper as Dr. Barclay's cannot fail to be of value.

The better to discuss definitions, consider first the following points which would not, from their philosophical nature, be included in the paper:—

Where a development is continuous it becomes easy (though not of necessity correct) to postulate the absence of external guidance, or of creative will, and this must, if only subconsciously, have given considerable impetus to men's belief in the extravagant extrapolations upon the biological theory so rightly criticized by the author. Later, when Lamarckianism and similar theories that support an effectively continuous descent with modification, began

* Note that "as in Adam all die, even so in Christ shall all be made alive" (1 Cor. xv, 22). All, good and bad alike, must rise again, the first death being finally cancelled in Christ. The Second Death (Rev. xx, 14–15; xxi, 8) then awaits the lost, for their own sins as distinct from Adam's sin (*cf.* John viii, 24).

to fail, the exponents of the "philosophical evolution theories" held out vigourously against such suggestions as creative mutations and "evolution" began to become a general word for "development without creation or external guidance," this applying to all spheres of thought. In the public eye purely scientific definitions of evolution then became of secondary importance.

Considering now the problems of definition, it will be seen from the author's paper that the word Evolution might with profit be used as the word for "biological descent with modification," whilst by contrast I have at a previous time suggested the use of the word for the co-ordination of certain philosophical conceptions, an example of which was quoted (discussion on Evolution and Entropy, by E. H. Betts, B.Sc., *Trans.*, VI, 1944). But this problem is not simply one of scientific or philosophic priority, it is also a question of "strong meat," for the word "Evolution" has become associated with a particular interpretation, and if used in either of the above senses it will be misinterpreted by the undiscerning, besides going against the indecisive, but popularly accepted meaning of the word (see Mr. Betts' reply). It would thus seem best to withdraw both the above definitions in favour of more cumbersome but less confusing phrases. But a name is required for the theories of "evolution philosophers," as these theories exist, however misguided they may be, and in fixing the definition of the required word an attempt must be made to express the underlying root of these theories. Then why not re-define the word Evolution in some such way as the following: "An Evolution theory is one that believes in the existence of non-repitative progressive developments, that can be thought of as conditioned solely by cause and effect within the system considered. Such a development is termed Evolution." By limiting the word in this way the theories of nearly all the non-Christian workers who call themselves Evolutionists are included, confusion with purely scientific theories is avoided and, incidentally, a certain light is thrown on what many of the exponents of evolution are really basing their theories.

Dr. Barclay's opinion on these points arising from his paper would be very valuable.

Author's Reply.

I am grateful for the criticisms and suggestions which have been made. In reply to Mr. Dewar I would say that the distinction between "Big" and "Small" evolution is an extremely difficult one to draw and each author would probably draw it in a different place. I did not use it because, from a biological point of view, it is impossible to define it satisfactorily and I was concerned with definition. The concept, however, I agree is a useful one (see also R. Goldschmitt "The Material Basis of Evolution," Yale U.P., 1940) but I thought it more exact to draw attention to the same problems under the heading of "The extent of descent with modification." From a philosophical point of view this matter also arises on the question of "progress." I am sure Mr. Dewar will agree with me that from a strictly scientific point of view there is still room for difference of opinion as to the extent of evolution.

Lt.-Col. Davies defines evolution in the sense of a very extensive descent with modification and adds the concept of continuity as the basic dogma of "evolutionary faith." I presume, therefore, that he regards evolution as primarily a matter of philosophy. Mr. Evenden also suggests another philosophical definition. Personally I would be sorry to have to adopt this position because (speaking as a biologist) it suggests a necessary relation between the fact of descent with modification and anti-Christian philosophies. Because of its biological origin the word evolution will probably always be used in biology for the fact of descent with modification. I hope that in biology it may be restricted to this sense. At the same time I believe it would be eliminated from philosophy as a current term conveying any intelligible meaning, and in fact this process of elimination is, I believe, already taking place.