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THE PRESENT STATUS OF TELEOLOGY.¹

BY LT-COL. L. MERSON DAVIES, D.Sc., Ph.D., F.R.S.E., F.G.S.

“ *The fool hath said in his heart ‘ There is no God ’.*” (Ps. xiv, 1).

“ *Verily Thou art a God that hidest Thyself, O God of Israel, the Saviour.*” (Is. xlv, 15).

1. THE ETHICAL ISSUE.

IT is a remarkable fact that while Scripture calls the existence of God *as God* obvious to all but the mentally defective, it calls the existence of God *as Saviour* anything but obvious. In other words, nature makes the intelligence and power of God much more apparent than His graciousness. This should be remembered when, after nearly two milleniums of professing Christianity, and much recent stressing of the love of God with little mention of His wrath, many suppose that the design everywhere apparent in nature cannot be attributed to the God of the Bible unless it everywhere argues benevolence on His part. However forcibly a writer like Sir Charles Bell may appeal to a structure like the human hand as indicating conscious design², it is thought to discount his appeal when design is equally apparent in the elaborate mechanism of a viper's poison fangs. As the object of the latter is far from benign, the unmoral (or neutral) Darwinian theory is held to afford a more consistent explanation of adaptations in general, since it views them all as resulting from factors which produce what will benefit each species, however noxious the result may be to members of other species.

That is the situation which faces us today. The harsher facts of nature, such as fear, disease, suffering of all kinds, sorrow, decay and death, aborted structures, and all the myriad adjustments and specialisations for internecine strife, are held to

¹ TELEOLOGY: “ The argument from design, in proof of the existence of God ” (*Cassell's Dictionary*).

² “ The Hand,” *Bridgewater Treatise*, 1833.

oppose belief in a loving Creator, and combine to favour some philosophy like the Darwinian, which regards organic features as resulting from the action of Natural Selection on fortuitous Variations during a ruthless Struggle for Existence. According to this view, structural adaptations were not pre-designed to meet the circumstances of existence, but were produced by the circumstances themselves—much as a casting is not separately made to fit its mould, but has its shape determined by the mould. (Variability, on this analogy, would be represented by the molten state of the substance committed to the mould; while the force of gravity represents the Struggle for Existence adapting the consequent—or Surviving—Form to certain Conditions, represented by the shape of the mould. The analogy is crude, but may illustrate the idea).

The philosophic completeness of this view makes it attractive to many, while the supposed inadequacy of the Christian view is underlined by good men who write and speak as if the first two chapters of Genesis gave the full Bible account of the origin of nature as it exists today. This follows from the deplorable habit of regarding the “Days” of Genesis i as prolonged geological periods. That practice, the object of which is to identify the geological record with the events of the Hexaemeron, causes all the trouble; for it makes one regard fossil conditions (which were obviously similar, in harsher characters, to those of today) as being what God considered “very good.” That at once eliminates the third chapter of Genesis from all bearing on current conditions, and commits those who hold the “period” view of the Six Days to defending the existing state of nature as ideal. Naturally, the opponent of Scripture exults—like Haeckel—in “dysteleology,”¹ or countless evidences of discordance with the ideal.

If, then, one is to discuss teleology, or the evidence of design in nature, from the Christian standpoint, one must accept the whole Bible explanation of the existing state of nature. This one can only do by treating the third chapter of Genesis as seriously as the first two. (For that reason, I did not subscribe a paper

¹ “*Dysteleology, or the theory of purposelessness* (is) the name I have given to the science of rudimentary organs, of suppressed and degenerated, aimless and inactive, parts of the body; . . . which . . . is alone sufficient to refute the fundamental error of the teleological and dualistic conception of Nature” (E. Haeckel, *History of Creation*, Eng. ed., Vol. II, p. 353). The “fundamental error” is no doubt due to forgetting the Curse, and thinking that the Bible calls all nature perfect.

for the Gunning Prize Essay, 1937, since it allowed only of taking the "First Two" chapters as a "basis" of natural science. I indicated my objections in the discussion following Dr. Hart-Davies' paper; and to my remarks there I must, to save space, refer present readers. I was inevitably forced, in this connection, to discuss the "period" theory of the Six Days, which Dr. Hart-Davies necessarily accepted as justifying concentration on the first *two* chapters of Genesis; so I would ask readers to note all the objections to it which I mentioned there, and observe how little those who favour the "period" theory could say in reply. Compare my condensed and multiple arguments on pp. 79-83, Vol. LXX, 1938, with pp. 203-211, Vol. LXXII, 1940, which profess to defend the "period" view, but, at great expense of words, do little more than question the identity of the Seventh Day with the literal Sabbath; a most doubtful reply even on its own small score).

I must therefore continue to emphasise what I have been saying for over forty years (and what Pember said before me, and one of the leading botanists of the last century said before Pember), namely, that the third chapter of Genesis provides the essential means for reconciling the deplorable state of nature, as found today, with the account of an ideal state resulting from God's works described in the first two chapters of Genesis.

Here is the answer to Haeckel and his like. It is really remarkable that, in the severe economy of that crucial third chapter, the three structures mentioned as typifying the general Curse upon nature are *all peculiarly representative of ABORTION and INTERNECINE STRIFE*. Thus the serpent, Cursed "above" all other animals, is deprived of limbs and made to go upon its belly; while mortal enmity is instituted between it and man. Similarly, thorns are aborted branches and leaves,¹ etc., often extremely unpleasant to man and beast; while thistles, cited as thriving at the expense of man, owe their noxious properties to an aborted state of the calyx.²

¹ "That thorns are, in reality, undeveloped branches, is shown by the fact that they are connected with the centre of the stem, that they bear leaves in certain circumstances, and that under cultivation they often become true branches. Many plants are thorny in their wild state, which are not so under cultivation, owing to this transformation" (Prof. J. H. Balfour, F.R.S., *Phyto-Theology*, 1851, pp. 110-111). And Dr. Marie Stopes says that "in the Cactus the leaves are all reduced to needle-like spines" (*Botany*, pp. 17-18, 63).

² "The calyx is not developed as in other plants, but is abortive, blighted as it were and changed into hairs, which . . . indicate degeneration. Thus thistles add to the sweat and toil of man" (Prof. J. H. Balfour, *Op. cit.*, p. 147).

It seems clear that the Bible has its own way of accounting for the harsher facts in nature, whose existence it recognises as definitely as Darwin did. Perversion of function, abortion, conflict of interests, with internecine strife, pain, fear and death etc., are all allowed for in that brief but pregnant story of the Fall and Curse. We may, indeed, compare the Bible view of nature with that of Darwin by saying that the former offers *two opposed factors* to account for what we see, namely, perfect Creation superimposed by universal Curse; while the latter stakes all on blind compulsion—represented by survival values in a struggle for existence.

That puts, I submit, a very different complexion on matters from what is commonly supposed to exist. The Bible does not share the illusions about nature which have been—if they are not still—cherished by many Christians. Tennyson's lament about "Nature, red in tooth and claw" (when Darwin shocked contemporary sentimentalists by concentrating on all that they glossed over) is matched by Paul's grim generalisation that "the whole creation groaneth and travaileth in pain together until now" (Rom. viii, 22), and Isaiah's insistence that only when the wolf lies down with the lamb, the lion eats straw like the ox, and the cockatrice (Heb. *tsepha*, or viper) stings no more, will things be as God would have them (xi, 6-9; lxxv, 25). The lion's diet and serpent's harmlessness, here predicted, obviously recall conditions before the Curse (Gen. i, 30-31).

Now it is clear that the *two opposed factors* indicated in Genesis as accounting for structural characters, have marked advantages over the Darwinian means for explaining the same. Sir Charles Bell may well claim that the perfection as an instrument of the human hand proves the intelligence of a benign Creator; for the evolutionist finds it by no means easy to explain how that hand could have been derived from any terminal specialised for progression among the trees.¹ The thumbs of the greater apes are much reduced in size, and their fingers are degraded to the status of mere grasping hooks; while the muscles of their forearms are so specialised that these creatures cannot even place the palms of their hands on the ground, as we do when going "on all fours," but can only apply their knuckles to the ground and use their forelimbs as crutches.

¹ Darwin characteristically glossed this over, assuming that, to get a human hand, an ape had only to cease using his own for progression (*Descent of Man* 2nd ed., p. 77).

At the same time, it is obvious that the existence of the viper's fangs agrees well with the terms of the Curse; while their production is hard for the Darwinist to explain. It is amusing to see how Dr. E. Nicholson, when trying to show how such fangs might have evolved, had to concoct an ancestry out of creatures that could not possibly have been the viper's progenitors, since each stood at the end of a very different supposed lineage (*Indian Snakes*, 2nd ed., p. 43). He had also to place the simplest poison apparatus (that of sea snakes, or Hydrophidae) furthest from the supposed common stock (Tortricidae), and the most complicated apparatus (that of the Viperidae) nearest to that stock! The subject obviously bristles with difficulties for the transformist; and the candid Mr. St. George Mivart, although an evolutionist, declared regarding another group of serpents that "The ancestors of the rattlesnake are beyond our mental vision" (*Types of Animal Life*, p. 149). So here again the Christian may claim that the facts support belief in special Creation; for, granting the companion doctrine of the Curse, the intelligence of God can just as well appear in His penal machinery, as the intelligence of man appears in, say, the electric chair.¹

2. ORGANIC ADJUSTMENTS.

Let us now see what are the chief requirements for a materialistic explanation of organic structures—one which may account for their intricate purposiveness without reference to creative Intelligence. And here we may note that these requirements are, in effect, those of the Darwinian theory itself; for no other theory has yet been invented which makes anything like a thorough-going attempt to account for organic nature on purely

¹ As I stress the Curse since *Adam and Eve fell*, and hold that six literal days of Creation brought the whole existing world of life into being, it is clear that I believe in separate creations—as most geologists did a century ago. Belief that previous creations were destroyed involves belief that they had penal histories, no doubt similar to our own; so there is nothing incongruous in finding that fossil faunas and floras exhibit similar characters to our own, and I refuse to let merely parallel phenomena in geology prevent my noting the marked agreement of *Genesis i.-iii. with nature as we find it*. How to reconcile real or apparent continuity in geology with belief in separate creations and exterminations of world faunas and floras is far too big a subject to be discussed here. The matter is dealt with in chapters VIII and IX of my book *The Bible and Modern Science*.

mechanical and non-teleological lines¹. Every other evolutionary doctrine, without exception, makes some concession, open or veiled, to teleology, by admitting some factor which goes off those lines. As such factors we may cite the "élan vital" of philosophers like Bergson² and the "entelechy" of biologists like Driesch,³ who believe in the intelligent action of life forces; the "orthogenesis" of many like L. S. Berg,⁴ who think that the course of evolution is determined in advance, rather than progressively shaped by fortuitous conditions; and even the "saltations" of those like De Vries,⁵ who think that evolution progresses by great and unaccountable leaps.⁶ These admissions of the incalculable are all anathema to the more rigid materialist (invariably an extreme Darwinist) who realises that they leave loopholes for—if they do not directly necessitate—belief in some external creative power, or God of some sort, even if not the very particular God of the Bible. And that is why, to this day, desperate efforts are made to keep the sorely battered and riddled Darwinian theory to the fore, as the only real hope of the anti-teleologist. What, then, are its requirements, as such a hope?

Perfect Gradation.—The first requirement, as Darwin realised when he insisted so stubbornly that "Natura non facit saltum", is that there shall be no leaps, or discontinuities between structures, but that perfect gradation of the most infinitesimal kind must link even the most diverse and specialised forms, just as perfect continuity of substance links the most widely separated twig-tips of a tree to the common trunk. For it is only by postulating infinitesimal gradation that one could hope to explain, on purely mechanical lines, the intricate and minute adjustments found, e.g., in the human eye, where more than a million rods and cones appear in the central pit, alone,⁷ of the yellow spot of the retina; besides countless other adjustments of a most complicated kind, all perfectly co-ordinated to secure effective vision.

¹ "Darwin's explanation . . . does not appear to offer an adequate explanation of the observed facts . . . On the other hand, if Darwin's hypothesis be rejected there is, it must frankly be admitted, no satisfactory alternative to take its place" (Prof. W. B. Scott, *The Theory of Evolution*, 1917, p. 25).

² H. Bergson, *Creative Evolution*, 1913.

³ H. Driesch, *Gifford Lectures*, p. 106, etc.

⁴ L. S. Berg, *Nomogenesis*, 1926, p. 111, etc.

⁵ H. de Vries, *Die Mutationstheorie*, 1901.

⁶ I omit reference to Lamarck, since his less materialistic system was practically eclipsed by Darwinism. I here refer to Darwin's later rivals.

⁷ This astonishing fact was vouched for by Prof. W. K. Clifford, F.R.S., in his book *Seeing and Thinking*, pp. 46-7. The number is obviously very great.

Survival Value.—What is more, it is essential that there should not only be perfect gradation, but also that each infinitesimal step in this gradation should have survival value over its immediate predecessor in the series.¹ Only on condition of its possessing such advantage (in the Struggle for Existence) could the selection and fixing of each minute step be explained on a basis of blind and fortuitous compulsion.

Absence of Useless Features.—It also follows that there can be no really useless structures. Thus every organic feature, however small, is a liability to its possessor. By the very fact of being alive, it demands nourishment; so, unless it makes adequate return for the same, it is not only useless but noxious. And if any *blind* force (like Natural Selection) automatically fixes the most infinitesimal advantages (to produce complicated structures), it must equally attack an infinitesimal disadvantage. Even Darwin saw this, and repeatedly insisted that Natural Selection would rigorously attack anything that was in the least degree harmful (*Origin of Species*, 6th ed., pp. 63, 117–118, 163 etc.; *Descent of Man*, 2nd ed., pp. 71, 93 etc.).² It is important to remember this; for the agencies postulated by the materialist are anything but conservative. By the very fact of being evolutionary forces, they care nothing for the past. Their ceaseless effort is (*ex hypothesi*) to adapt the species to existing conditions; and so they must continually and ruthlessly attack all mere relics of previous adaptations. Whenever, therefore, a materialist tries to prove the fact of descent by claiming to find vestiges of the past incongruous to the present, he directly discredits his own supposed agents of evolution, and justifies the teleologist's claim that the more marvellous organic structures could only have been produced by Divine action. The more numerous and useless the supposed vestiges, and the greater the periods since their supposed usefulness, the more incompetent they prove the supposed agents of evolution to be. It may sound paradoxical, but it is a fact, that the only belief which really useless rudiments could support is belief in special Creation.

¹ As E. S. Goodrich says: "In the evolution of an organ by Natural Selection every stage must be useful, and it is often difficult to picture the intermediate conditions" (*Living Organisms*, 1924, p. 141).

² That he nevertheless claimed "useless" rudiments as proving evolution shows his inconsistency as a thinker. T. H. Huxley refused to follow him here.

Specific Selfishness at all Stages.—It is equally clear that these blind mechanical agents of evolution, concentrating on (or Naturally Selecting) whatever promotes the Survival of each species in the Struggle for Existence, know nothing of sympathy between species. Any altruism would handicap the benefactor, in a Struggle during which the slightest disadvantage would be fatal to Survival. If any purely altruistic structure were found to exist, therefore, its presence would directly discredit the efficacy of the supposed agents of a materialistic evolution. Like a really useless “rudiment,” and for the same reason, an altruistic structure would wreck the case for materialism. Darwin himself declared as much, saying that: “If it could be proved that any part of the structure of any one species had been formed for the exclusive good of another species, it would annihilate my theory” (*Origin of Species*, p. 162). These are strong words, and the admission should be remembered.

To sum up: In order to justify the materialist’s claim that all organic nature “is formless, unplanned, owing its character to accidental events” (Prof. D. M. S. Watson, *The Listener*, 1942, p. 621),¹ it is essential for him to prove:—

(1) That infinitesimal gradation links all organic structures to each other; and

(2) That each infinitesimal step along each diverging line possessed survival value over its predecessor.

(3) That no vestigial structure exists which is in the least degree harmful, or even superfluous, to its present owner; and, equally,

(4) That no structure in any one species is of use solely to members of another species.

Needless to say, neither Professor Watson nor anyone else has ever proved these things—or is ever likely to prove them. Many have not even the wits to see the necessity for proving them; for, as the Bible says, materialists are not mentally normal.

¹ It is disgraceful that such nonsense, which Prof. Watson did not dare to defend when challenged by Mr. Douglas Dewar and myself, should have been broadcast to the public. Even Prof. A. Einstein, although a professed pantheist, insists on “the sublimity and marvellous order” revealed in nature and talks of his “rapturous amazement at the harmony of natural law, which reveals an intelligence of such superiority that, compared with it, all the systematic thinking and acting of human beings is an utterly insignificant reflection” (*The World as I see It*, Eng. ed., 1935, pp. 25, 28).

But the necessity exists, whether appreciated or not; and in absence of proof, the materialist, like the Christian, walks by faith, not by sight.

The Christian, of course, knows that he walks by faith. He leaves it to the materialist to walk by faith without knowing it. He realises that he was not there to see how things came into being. He trusts the statements of a Book which existed before he was born, and which he has reason to regard as Divinely Inspired. For the vindication of his trust, he is prepared to wait. In the meantime, it is clear that the two Biblical factors (for explaining the state of things in nature) namely, perfect CREATION superimposed by universal CURSE, make no such demands as are inevitably made by the supposed agents of the materialist. There is no need whatever, so far as the Bible factors are concerned, for infinitesimal gradation between types, much less for survival value at each minute step over the last along every line; while the existence of harmful elements is amply allowed for by the Curse, at the same time that species may well, on the doctrine of original perfect Creation, sometimes exhibit purely altruistic structures.

How, then, do the known facts regarding organic structures suit these two very different beliefs regarding their origin? Which belief do they seem to favour most?

As regards the first materialistic requirement—perfectly graduated series—it is notorious that no such thing exists in nature *except in embryology*; and it only exists there because, in the first place, the end is determined from the beginning,¹ and, in the second place, the embryo is not a working machine.² Limbs are sketched out, in the rough, long before they have any capacity for functioning as limbs; eyes of vertebrate type are adumbrated, with their accessories, long before they are capable of combined functioning for sight, etc. Nor is any

¹ As De Beer says: "if development occurs at all it conforms to the type of the species . . . the possible qualities are pre-determined" (Art. "Embryology and Evolution," in *Evolution* by Prof. E. S. Goodrich, 1938, p. 63).

² "The embryo is not like a finished piece of mechanism . . . it is unfinished, it is like a piece of mechanism in process of construction, and its activities consist in a ceaseless progress towards . . . completion" (J. W. Ballantyne: Art. "Human Embryology" in *Green's Encyclopaedia and Dictionary of Medicine and Surgery*, 1907, Vol. III, p. 71).

regard paid, during development, to supposed ancestral phases.¹ The one obvious consideration ruling matters, during production, is the convenience of the developing creature, as such.

This is significant to anyone familiar with mechanical problems, for the same can be said of man-made machines. Intermediate phases in perfect gradation appear during the production of such; but no perfect series connects the finished machines, because every design for an intermediate purpose represents a solution of problems of its own, requiring specialisations of its own, which throw it out of exact series between other designs. Finished organic structures bespeak special design just as definitely as finished man-made structures bespeak it; and no argument against such design can be found in productive processes, either in the one case or in the other.

Nature, in fact, testifies to creation, not evolution; and it is the same story everywhere. The fossil record is most emphatic in this respect, and opens with a colossal anomaly—on the evolutionary point of view. For the oldest (Lower Cambrian) fossils are by no means the simplest, but include a mass of highly organised and widely differentiated forms representing all the main invertebrate Phyla, or groups, existing today. These include Annelids identical (according to P. Lemoine) with ones living in our seas today, Jellyfish (*Medusites*), Sponges (*Lyssacina*), Corals (*Archaeocyathus*), Echinoderms (Cystoidea, Holothuroidea), many Brachiopods (*Lingulella*, *Kutorgina*, *Acrotreta*, *Obolella*),² Molluscs of all kinds including Lamellibranchs (*Fordilla*), Gastropods (*Stenotheca*), and most advanced types like Pteropods (*Hyolithes*, *Coleoloides*) and even Cephalopods (*Volborthella*); while there are numerous Arthropods, including Eucrustraceans (*Protocaris*) and many families of Trilobites (represented by *Agnostus*, *Eodiscus*, *Conocoryphe*, *Olenellus* etc.). As E. Koken admits, all these widely different types are “sharply defined” from the first; “and of those periods in which they might have been united we have no record” (*Paläontologie und*

¹ As G. Stanley Hall points out, the embryo heart develops before the blood-vessels, but this reverses the supposed phylogenetic order (*Adolescence*; Vol. I, p. 55). Similarly, E. S. Goodrich remarks that the respiratory surface of the lung “which is the last to appear in the embryo, must have been present from the first and throughout phylogeny” (*Studies in the Structure and Development of Vertebrates*, 1930, p. 612).

² Italicised names within brackets are of genera selected as representing separate families. The terms Cystoidea and Holothuroidea refer to separate classes.

Deszendenzlehre, p. 12); and W. W. Watts says: "If this is really the beginning of life, evolution in these early stages is at once disproved" (*Geology*, p. 99). According to Chamberlin and Salisbury, the great divergence and specialisation of the earliest fossils compel us to believe that "pre-Cambrian" evolution must have been "from sixty to ninety per cent. of the whole" (*Geology: Earth History*, Vol. II, p. 294). Lemoine (*Enc. Française*, Vol V, 1938, p. 5, 82-7) goes further, and calls it at least ninety-nine per cent!

Why, then, is no trace to be seen of this vast previous history of life, which the evolutionist has to postulate? According to Watts (*loc. cit.*) the enigma is increased by the very aspect of the oldest known (Lower Cambrian) fossil fauna, for: "It is distinctly specialized, and shows the characters usually found in a deep-sea assemblage, such as might have been separated out from a richer fauna and to have adventured out into a new environment." On the theory of Creation, there is obviously no difficulty here; but on the theory of evolution it is utterly incongruous that we find so much of a specialised fauna, and nothing of all the rest, in time and space, that should both have preceded *and accompanied* it. Darwin himself was nonplussed, and admitted that he could not explain the absence, below the Cambrian, of the "vast piles of strata rich in fossils" which his theory required. He said that this absence might be "truly urged as a valid argument" against his views (*Origin of Species*, p. 287).

Evolutionists have therefore made many efforts, during the last ninety years, to square this absence with their creed. Some have suggested that pre-Cambrian rocks are too metamorphosed to retain traces of life-forms. But this would neither explain the *suddenness* with which the Lower Cambrian fauna appears, nor the absence of the *contemporary* "richer fauna" postulated by Watts; and the suggestion itself has been definitely disproved by the finding of vast masses of unmetamorphosed pre-Cambrian sediments (like the huge Cuddapah series of India, over 20,000 feet thick) which are perfectly suited to have preserved fossil traces of life—had life existed.¹ Other writers, like Prof. Watts himself (*loc. cit.*), "hazard the conjecture" that lime was

¹ For general remarks on the Cuddapah system, see D. N. Wadia's *Geology of India*, 1939, pp. 86-88; and Prof. J. W. Gregory remarked that "There are among the pre-Cambrian rocks many which might have been expected to preserve any fossils entombed in them" (*The Making of the Earth*, pp. 244-5).

deficient in the early sea, and that pre-Cambrian forms had purely chitinous tests, which would be less easily preserved than calcareous ones. But that also does not explain the suddenness with which the record opens (for Watts says that the Cambrian tests themselves were only "very slightly strengthened with lime salts"); much less does it explain the absence of the richer coastal fauna which he himself postulates, and to which lime from denudation would have been more available. Indeed, since Cambrian faunas include jellyfish, which have no hard parts at all, and show traces of the soft parts of other creatures, like the swimming organs of Pteropods, it is obvious that chitinous tests and even soft-bodied creatures should have left fossil indications long before the Cambrian—had they existed. So the case is still just as inexplicable (from the evolutionary point of view) as it was in Darwin's day.

What is more: Analogous facts appear throughout the fossil record itself; for links are invariably missing just where they are most needed, and should be most numerous. Essentially new types always appear suddenly; the greatest problems being solved outright, without any clue as to how they were solved. Nobody knows how crinoids originated. The first amphibians have true feet, there being nothing to show how any fin became a foot. Swimming molluscs (Pteropods) appear at the base of the record; while their supposed ancestors, the Opisthobranchs, do not appear until the Carboniferous, some two hundred million years later. Those unique reptiles, the Chelonians (Turtles, etc.) are clearly characterised from the first. The great swimming reptiles (Ichthyosaurs and Plesiosaurs) and flying reptiles (Pterodactyls) also appear suddenly, without anything to show how they could have developed from quadrupedal forms. And so one could continue. The first birds have large and perfectly formed feathers, there being *nothing* to put between a feather and a scale. The first bats are perfect bats, and even include a still existing family (the Vespertilionidae). The first whales are as true whales as any existing today, and include quite different types, one of which belongs to the existing order of Odontoceti, and seems to have no connection with the others; so here, again, we find full specialisation and differentiation right from the beginning. The first insects include the largest ones known to us—*Meganeura*—or monster dragonflies, with a wingspan nearly a yard in extent; also numerous cockroaches of

many kinds. The earliest known scorpion is hardly distinguishable from existing ones, and has such a well-developed poison apparatus that it is named *Palaeophonus*, or ancient murderer. It is the same with the whip-scorpions, which are fully characterised from the first. Spiders also appear suddenly, and are practically unchanged from the start. Among the first water-fleas we find the modern genus *Estheria*.

It seems clear that all this is totally opposed to the Darwinian (materialistic, or anti-teleological) creed. The latter, as we have seen, insists that four-legged creatures, like lizards or mice, became flying ones, like birds or bats, or swimming ones, like ichthyosaurus or whales, by incredibly long series of slow changes, during which every slight modification towards the new end gave its possessor an advantage over those who had not that modification. The very idea is, of course, fantastic, since it is obvious that intermediate stages, in such cases, could not possibly have been advantageous. A leg would be useless as a leg long before it became effective as a wing; so Natural Selection would kill off the intermediate types, and prevent progress along that road. As common-sense experts like L. Vialleton¹ and Prof. D'Arcy Thompson² have insisted, it is impossible even to imagine effective intermediate types in such cases, and it is useless to look for what can never have existed. The marked absence of such types, in the fossil sequence, fully endorses their opinion.³

How, then, does the materialist react to this truly damning aspect of the fossil record—so far as his creed is concerned? It is significant that, at all these crucial points, the neo-Darwinist (or later materialist) *himself discards his supposed agent for evolution—Natural Selection*. However useful he may find it when professing to explain minor and relatively straightforward matters, like the lengthening of a tooth or the shortening of a toe, it becomes his worst enemy instead of his ally where the major problems are concerned, since it guarantees that totally different forms could NOT appear by its help, but only by reason of some force *that runs counter to its operation*. In short, syste-

¹ *Membres et Ceintures des Vertébrés Tétrapodes*, 1924, pp. 395, 421, etc.

² *On Growth and Form*, 1942, pp. 1093-4, etc.

³ "(So) far as concerns the major groups of animals, the creationists seem to have the better of the argument. There is not the slightest evidence that any one of the major groups arose from any other" (Austin H. Clarke: *Art "Animal Evolution"* in *Quarterly Review of Biology*, Vol. III, 1928, p. 539).

matic materialism goes by the board, at all the most critical points, and our anti-teleologist is driven to the wildest speculation. Either, like J. B. S. Haldane, he talks¹ of the Struggle for Existence *easing off*, Natural Selection *slackening* (note how he bows his own agent out of doors!), and a supposed "orgy of variations" producing the astounding new types—with all their marvellous correlations and perfections—by sheer chance; or, like Julian S. Huxley,² he talks vaguely about "preadaptations" effecting the required miracle.

As for Haldane's suggestion, it would be as rational to suggest that Shakespeare's plays were produced by an earthquake in a printer's office; and Huxley's device is equally ingenuous, since it pretends to explain a process by simply giving it a name. And what is this talk of "preadaptation," in any case, but a virtual surrender to teleology? As well might one talk of a casting having the shape of the mould before entering it. The bankruptcy of materialism, and the folly of its advocates, could hardly be more obvious.

Thus the first and second desiderata of materialism are completely negated by the facts. There is no perfect gradation between structures for very different purposes, and never could have been any; much less could there ever have been survival value for each successive step in such gradation. The very reverse is the case.

In this brief review of the facts, much has to be passed by; but it is obvious, as first-rate naturalists have pointed out in criticising Darwin's materialism, that many problems exist which no materialistic system could even hope to explain. Take, for instance, the case of the new-born kangaroo. It is only an inch long and unable to suck; so its mother has an adaptation of the *cremaster* muscle which enables her to squirt milk down its throat; while, to prevent this choking the infant, the latter has *at that stage* a particular adaptation to prevent the milk going down the wrong way. As Owen pointed out: "The parts of this apparatus cannot have produced one another; one part is in

¹ *The Causes of Evolution*, pp. 104-5.

² In reviewing G. G. Simpson's *Tempo and Mode in Evolution* (1944), Dr. J. S. Huxley admits that "no fossils have been found bridging the gaps between orders; and this phenomenon is virtually universal"; so he welcomes Dr. Simpson's suggestion that evolution "may in occasional cases be pre-adaptive" (*Nature*, July 7, 1945, p. 4).

the mother, another part in the young ; without their harmony they could not be effective ; but nothing except design can operate to make them harmonise."

Even A. R. Wallace, the co-inventor with Darwin of the theory of Natural Selection, realised its drastic limitations, and wrote : " What we absolutely require and must postulate is a Mind far higher, greater, more powerful than any of the fragmentary minds we see around us—a Mind . . . which is itself the source . . . of the more fundamental forces of the whole material universe " (*The World of Life*, p. 338).

When we pass to the third requirement of the materialist's case—that there should be no useless features in organic structures, since the existence of such would be a severe reflection on the efficiency of his supposed agent of evolution—it is amusing to see how the vast majority of evolutionists, being an essentially irrational mob, fasten with delight on every suggestion of useless and even noxious features appearing in organisms, as if such features proved evolution and disproved creation—while the reverse is actually the case. The TWO OPPOSED FACTORS of Genesis i-iii allow of the most noxious features appearing alongside the most perfect ; whereas a supposed blind agent of perfection, like Natural Selection, is sadly disparaged by every imperfection. Writers like Darwin, Haeckel, Clodd and others in the past, and Watson, the Wells's and Julian Huxley in the present, exultingly talk of " useless rudiments," little realising the suicidal nature of their claim. Only the clearer thinkers, like T. H. Huxley, P. C. Mitchell and E. S. Goodrich have had some inkling of the boomerang qualities of this plea, and taken the opposite line of insisting on uses for these so-called " rudiments", in order to save the credit of their supposed agent of evolution.

As a believer in special Creation, I have looked for the useless in nature just as keenly as Haeckel did—but with the opposite view of its significance ; and I hold that some vestigial features, by their very nature, testify to the doctrine of the Curse. Consider, for instance, the teats of male mammals. All male mammals (except Monotremata) have them ; whatever the order, family, genus or species of the individual concerned. In every case, the male has the same number and arrangement of teats as the corresponding female. And the teats in man, as Darwin remarked, are as fresh as those in any other creature. His remarks are worth noting : " The mammary glands and nipples,

as they exist in male mammals, can indeed hardly be called rudimentary; they are merely not fully developed and not functionally active They often secrete a few drops of milk at birth and at puberty In man and some other male mammals these organs have been known occasionally to become so well developed during maturity as to yield a fair supply of milk" (*Descent of Man*, 2nd ed., p. 252). And yet even in the lowest mammals, the Monotremata, which "have the proper milk-secreting glands with orifices, but no nipples," the female alone suckles the young (p. 250). Darwin was driven to suppose that "long after the progenitors of the whole mammalian class had ceased to be androgynous, both sexes yielded milk, and thus nourished their young,"¹ and he went on to give instances showing how, throughout nature, one finds cases of the male parent assisting—sometimes taking the main part—in hatching or otherwise tending the young (pp. 251, ff.). How, then, are we to explain the relatively recent and universal stoppage of this custom of suckling by the males, throughout the class Mammalia, whether with or without teats? Darwin never attempted to explain the stoppage, which he indicated as implied by the facts; and so colossal an event, universally affecting every species throughout the class after all its present subdivisions had been established, is one which would have taxed the ingenuity even of that tireless speculator to explain on naturalistic lines. But does the Bible doctrine of the Curse not fit the facts? Why should not male mammals, in an uncursed world, have been physically and physiologically capable of assisting in nursing their young? It is easy to see how, under the Curse, the male would be specialised for fighting, etc., to defend the family, while the entire office of early feeding the family fell on the female (whose enhanced trouble over procreation is specially mentioned in the Curse).

Think, also, of thorns,—specially mentioned as typifying the Curse, and as crowning our Divine Lord when He bore our Curse on the cross. For thorns are undoubted abortions. As spines,

¹ He thus suggests that the earliest mammals were androgynous; although reptiles (not to mention amphibians, and even fishes), from which they are supposed to be descended, are not. This is typical of his fuddled thinking. On his own theory, mammals could never have been androgynous; and yet since male reptiles have no teats—nor even mammary glands—male mammals could only have acquired them in order to use them. But in no species, throughout the whole class, can mammals use them today. No wonder that T. H. Huxley cited the case of male teats as peculiarly hard to explain on Darwinian lines ("The Genealogy of Animals," in *The Academy*, 1869).

they are vestigial branches or leaves; as prickles,¹ they are altered epidermal hairs, etc. Yet they are no shapeless or feeble objects, like rotten twigs or withered leaves, but highly effective daggers and claws. The spine is often, in the east, robust enough to pierce the sole of a sandal or shoe; and nothing could be more purposive than the briery prickle, well defined by its hard and glossy surface, from its elongated base to its sharply pointed tip, curved *downwards* in the longer axis of that base—thus inevitably seizing, and retaining or tearing, any passing object. That such deliberately, and (it would seem) profitlessly offensive structures should be independently produced by many different species in all parts of the world, is extremely difficult for the materialist to explain. The savage thorn, like the rudimentary teat, is far better accounted for by Moses than by Darwin.

And now as to the last Darwinian requirement here considered—that no structure in any one species should be of use solely to members of another species—it is clear that this also is contradicted by nature. Thus, Karl Frank points out that the plant *Duvana dependens* provides a special gall to cherish the moth *Cecidosis eremita*, shaping a cover of “precisely” the right size “at the right time, not earlier and not later, so that when the moth creeps out of the gall the chrysalis skin and that alone is torn off.” As Frank asks: “What need is there for the plant to keep and cherish a moth, since it only does so by a constant expenditure of nutrition?” (*Theory of Evolution*, pp. 232–233). That question still seems to be unanswered. Yet, as we saw, Darwin said that even one such instance would “annihilate” his theory.

3. INORGANIC ADJUSTMENTS.

When we turn to inorganic nature, the problem is rather different. Here is no question of arriving at results by struggle and selection. Data are relatively permanent, on any showing; and so the question of their adjustments to suit the living creature has to be considered on other lines.

¹ Scripture refers to both prickles and spines as thorns, often mentioning briars and brambles in this connection. The Hebrew term used in Gen. iii, 18 (and in the parallel Hosea ix, 8) is *qots*. Its application is obviously broad, for other terms as well as itself are used in reference to particular structures. Thus, the term *sir*, or hook, obviously indicates the prickle, etc.

It is impossible, in short space, to deal adequately with this very large question. I have discussed it in the first five chapters of my book *The Bible and Modern Science*; and a more extensive treatment of it appears in Dr. R. E. D. Clark's excellent work *The Universe and God*. We can only consider a few of the main points here.

As Dr. Clark points out, the advance of modern science—real science, which deals with the verifiable present instead of the hypothetical remote past—shows how extraordinarily intricate are the physical adjustments required to permit the existence of organic life in a universe like ours; especially if the organisms are to be of such high types as are found in our animal creation. Among the chief of these desiderata we may mention (1) a world of similar size to ours, within quite narrow limits; (2) its similar constant distance, within narrow limits, from a source of heat-bearing light similar to our sun; and (3) a similar bulk of water, and distribution of land and water over its surface. There are also many other essentials, such as the peculiar properties of carbon compounds, on which the very existence of complex organic structures depends, and the peculiar properties of water which so wonderfully subserve the needs of that existence; but these, although so significant, are the same throughout space—and it is only in our own minute fraction of space that the detailed adjustments seem to be found which make that existence possible. Even our solar system is unique; there being probably not another like it in the universe, despite the unthinkable numbers of the stars.

On these central facts we must concentrate here, because—as Dr. Clark so well insists—the essentials for organic existence were not appreciated in ancient times; and it was quite reasonably supposed, until quite recent years, that life might exist on countless other worlds—and even on the sun itself! We have now much more reason to regard our world, although utterly insignificant in size by comparison with the rest of our stupendous universe (as sceptics are careful to insist), as being incomparably the most significant part of the universe with regard to its contents, which alone include organic beings capable of appreciating and studying the rest of that universe. In short, we return—in transcendent form—to a geocentric concept of the universe. So the question arises as to whether the unique fitness of our earth, as the scene of organised existence, is due to design or chance.

The sceptic no doubt relies on the theory of chance, pleading the unthinkable number of the stars as a justification. But it distinctly weakens his case when we find that our solar system also appears to be unique; for countless such systems would have to exist before we could attribute to chance just such a luminary as ours at its centre, with an earth of similar size to ours at similar distance from it, and with similar ocean basins giving similar proportions of land and sea areas. The appeal to chance wears rather thin.

Again: As I try to point out in my book, it is a remarkable fact that, thousands of years before the importance of these particular desiderata was recognised by human science, it was indicated in the Bible as a fact which wisdom would appreciate. Incidentally, while ancient astronomers (*e.g.*, Hipparchus in 150 B.C., and Ptolemy in 150 A.D.) estimated the total number of the stars at only about 3,000, the Bible had already, many centuries before, indicated the truth by bracketing the stars, for unthinkable numbers, with the sand by the seashore (Gen. xxii, 17), and declared that "the host of heaven *cannot be numbered*" (Jer. xxxiii, 22). Modern scientists have taken to using similar expressions, Sir J. Jeans saying that "There must be more stars in the sky than there are blades of grass on the whole surface of the earth" (*Listener*, Oct. 8, 1942, p. 454).

The significance of the size of the earth is indicated in Job xxxviii, 5, where the Almighty is represented as drawing the patriarch's attention to the fact that the earth has certain dimensions, and asking him who settled them: "Who determined the measures thereof, if thou knowest? Or who stretched the line upon it?" (R.V.). The picture is that of one who saw that the earth should have certain dimensions, neither more nor less; the implication being that this particular size was a matter of importance. And modern scientists have learnt to appreciate some of that importance; thus we find a meteorologist like Douglas Archibald saying: "The fact, therefore, that we possess at the present time a gaseous atmosphere of exactly that particular degree of tenuity that suits our breathing apparatus, remarkable though it may seem, is a direct consequence of the particular size of the globe on which we stand" (*The Atmosphere*, pp. 12-13). This is only one of the beneficial consequences of that particular size; some others will be seen indicated in my book and still more in Dr. Clark's.

The importance of the position of the earth is clearly indicated in Job ix, 6, which classes it as a major judgment of God that the earth should be shaken "out of her place." Fools have ridiculed this passage; yet the philosopher Locke, who knew all that they know about astronomical facts, endorsed its significance, saying that: "Were this earth removed but a small . . . distance out of its present situation . . . the greatest part of the animals in it would immediately perish" (*Essay*, Bk. iv, c. 6, s. 11).

As regards the third of our principal desiderata, I would refer to the passage where it is said, as showing God's understanding of "wisdom," that:

"He looketh to the ends of the earth,
And seeth under the whole heaven,
To make the weight for the winds;
And He weigheth the waters by measure"

(Job xxviii, 24-25).

This is typical of the way in which ancient Scripture embodies advanced appreciation of scientific facts in cryptic terms which amuse the foolish, comfort the simple, and awe the wise. For if, instead of brushing the above passage aside, we look into it, we may note that "the ends of the earth" suggests the two poles, or ends of its axis of rotation; while "under the whole heaven" must mean the whole surface of the earth (everything above that surface being *in* the external heaven). Now these factors are truly related to what follows. For the distance between the poles gives the diameter of the earth, and hence its mass, which determines the amounts of air and water held to its surface; while the extent and shape of that surface determine both the consequent atmospheric weight at any point on it, and also the amount of water to be specially stored to give adequate land area.

So note that the origin of our abrupt and colossal ocean basins is one of the greatest enigmas of modern physics; while the exact adjustment of the size of those basins to the total amount of water in them astounded A. R. Wallace (the bulk of the water in the basins being no less than *thirteen times* the bulk of the land which rises above their surface). Pointing out that if the amount of water were only 10 per cent. more, or the capacity of the basins 10 per cent. less, most of our present land surface would be submerged and the possibilities of life on land greatly reduced, Wallace remarks in perplexity "How the adjustments

occurred, it is difficult to imagine. Yet the adjustment stares us in the face" (*Man's Place in the Universe*, p. 217). What more striking comment could we have on the above passage, and on the parallel Scripture statements that God "measured the waters in the hollow of His hand" (Is. xl, 12), and "layeth up the deep in storehouses" (Ps. xxxiii, 7)?¹

We may also note that striking talk of making *weight for winds*. Its significance could hardly have been appreciated at the time, or even when this passage was translated into our present A.V. English (1611); for it was not until 1648 that scientists discovered that the atmosphere has weight—and so learned the secret of wind action. It is because the atmosphere has weight (a fact which even Galileo did not know, for it was discovered by Blaise Pascal) that differential heating causes differences in weight, bulk for bulk, between adjoining parts of the atmosphere, and consequent movements between them, the heavier air passing under the lighter. Weight is thus essential "for" winds, just as here indicated; and the greater the normal atmospheric pressure, the greater will be the force of winds due to differential heating. Significantly, therefore, the weight "for" winds is correlated with the size and surface area of the earth. But who taught the ancient writer to indicate that correlation?

CONCLUSION.

Limits of space prevent our discussing this matter more fully; but perhaps enough has been said to indicate the aptness with which Scripture meets the ethical issue, indicating two opposed factors—perfect Creation and universal Curse—which exactly suit the seeming anomalies found in nature. We have also seen something of the way in which the facts of organic nature flatly oppose all the requirements of any materialistic explanation of the same, while definitely endorsing the Biblical explanation.

¹ Many authorities regard these abrupt and deep basins as being due to the tearing out of great masses of lighter surface rocks (the "sial" of Suess) to form our unique satellite, the moon; the remaining sial floating on the relatively heavier, more viscous and more basic "sima" to form our continents. But how (on this theory) was just the right amount of sial removed to afford exactly suitable accommodation for the ocean waters? For the equivalent weight of sima would rise to replace the sial; and, on the same principle of isostasy, the *weight* of the waters would have to be considered (just as Scripture implies) when allowing for their *measure*, owing to the viscosity of the sima.

And we have noted something of the uniqueness of our earth in regard to its size, its setting, and its extraordinary ocean basins, as specially suited to support a highly organised animal population; and seen how the Bible indicated the importance of these adjustments long before human science was in a position to appreciate them.

It is modern science, in the truest sense, which has brought out all these points; so we may well claim that the case for teleology has progressively increased in strength, despite all the efforts of materialistic philosophers to decry it.

WRITTEN COMMUNICATIONS.

MR. DOUGLAS DEWAR wrote: In his most valuable paper Col. Davies says many things which greatly need to be said, since they are so commonly overlooked. It seems to me that his paper should be entitled "the Rightful Status of Teleology" rather than "The Present Status," because it shows that the position of Teleology is impregnable and no other theory can replace it. Dr. Davies is not responsible for the title, because the Council asked him to write under this title. When I suggested that the paper should be written I had in mind the somersault made by biological opinion during the past 90 years. In 1857 McCosh and Dickie expressed (*Typical Forms and Special Ends in Creation*, p. 30) in the following words the views which had been held by men of science for centuries: "Order is Heaven's first law, and the second is like unto it, that everything serves an end. This is the sum of all Science. These are the two mites, even all that she throws into the treasury of the Lord." The first of these the authors designated Cosmology, The Science of the Order in the Universe, and the second had already been given the name Teleology, the Science of Special Ends.

Then Darwin came along and turned biological opinion topsy turvy by substituting for the above basis the proposition that natural phenomena are the result of the action of blind forces. This was eagerly accepted by the majority of biologists, and, as early as 1869, T. H. Huxley wrote in *The Academy*: "The Teleology which supposes that the eye such as we see it in man, or one of the higher vertebrata was made with the precise structure it exhibits for the purpose of enabling the animal which possesses it to see, has undoubtedly received its death blow."

Thus was inaugurated what Arnold has well called "The Flight from Reason" of biologists. In the last decade of last century the number of biologists who did not participate in this flight could have been counted on the fingers of the two hands. Thanks to the few who refused to be stampeded, a reaction set in early in the present century, and the view that "everything in nature serves an end" is a scientific law, began to gain ground. Teleology is now rapidly recovering its rightful status. The great biological somersault is nearly complete. A number of biologists now realise that biological facts cannot be explained by means only of mechanical conceptions and that teleology in some form or another must be admitted. A few to-day still cling to the ideas that prevailed in the latter part of the 19th Century, such as Prof. D. M. S. Watson and Dr. Julian Huxley. Col. Davies has dealt with Prof. Watson. Dr. Julian Huxley has been compelled to adopt what he styles "a scientific pseudo-teleology" (*Rationalist Annual* [1946], p. 87). "Natural Selection," he writes, "is a mechanism for introducing apparent purpose in nature. After Darwin it was no longer necessary to deduce the existence of divine purpose for the facts of biological adaptation. Instead of *conscious purpose* we can now say *adaptive function*, and the old theological teleology can be replaced by a scientific pseudo-teleology Natural Selection is able to accomplish simultaneously two apparently contradictory results—it can both discourage and encourage change We have this glorious paradox that this purposeless mechanism, after a thousand million years of its blind and automatic operations, has finally generated purpose—as one of the attributes of our own species."

The credulity of Dr. Julian Huxley appears to have no limits. Another rationalist, Prof. J. B. S. Haldane, admits that there is much to be said for Paley's argument for design, but, pointing to what he deems to be useless, harmful or defective structures in animals, he contends that the designer cannot be both omnipotent and perfectly good. Indeed, when arguing with Arnold Lunn, he goes so far as to say *Science and the Supernatural*, p. 140): "no respectable telescopemaker would make a series of instruments with so many optical defects as a group of human eyes taken at random." To this argument Col. Davies' paper makes a most effective reply, in that it shows that the third chapter of Genesis provides the essential means

of reconciling the deplorable state of nature as found to-day with the ideal state resulting from God's works described in the first two chapters. Davies also points out that the existence of useless or harmful structures, while explained by the third chapter of Genesis, is a formidable objection to those who regard Natural Selection as ever on the look-out for, and destroying, every useless or harmful structure. It is, of course, possible for the materialist to counter this to some extent by contending that harmful structures may be correlated with or linked to highly useful ones, and that on the balance the combination is beneficial. But this has not been proved.

While agreeing with Davies that the existence of useless structures is not inconsistent with the statements in the first three chapters of Genesis, I am inclined to think that the only structures which are not of use to their possessor at some stage of existence are a few which Vialleton calls embryonic remains, *i.e.*, the consequences of the way in which embryos develop. Every fertilised ovum is endowed at an early stage with the tissue-producing cells or primordia of each of the major structures or organs that occur in any member of a group or class of animals, even of those which some species do not need. These do not develop fully unless subjected to successive stimuli provided by the embryo whenever required. If any of these organs be not needed by the species, either these stimuli are withheld or other stimuli develop which counteract them. Thus, at an early stage the embryo of every individual possesses the primordia of both male and female structures, but in the embryos which will develop into males the only stimuli which operate are those which cause the male primordia to develop completely. Those which stimulate the primordia which give rise to female structures are inhibited, with the result that the male ordinarily does not develop milk glands, but only the rudiments of these. In this way the nipples on the adult male are formed. In this connection we must bear in mind the existence of the organ of Rosenmüller in the adult female.

Watson and Huxley are part of a small minority of modern biologists. The vast majority recognise that a teleological explanation of the phenomena is unavoidable. One has but to read such recent books as *God's Masterpiece. Man's Body* by Arthur I. Brown (1946), or *The Directiveness of Organic Activities*, by E. S. Russell (1946), to see that there are in the bodies of both man and

the animals scores of activities which can only be accounted for as being designed. Brown frankly writes (p. 188) that in everyone of these in man's body "we can easily see an omniscient planning by a Supreme Intelligence." Russell, on the other hand, seems unable to rid himself of the ideas on which he was nurtured, and to be enveloped in a dense mental fog, for he writes (p. 176): "Instead of attempting to explain the 'teleological' nature of organic activities in terms of concepts derived from man's knowledge of his own purposive activity, as do the mechanist and the vitalist, we should take precisely the opposite view, and regard human purposive activities (including machine-making) and modes of thought as being a specialised development of the fundamental 'purposiveness,' or as I prefer to call it, the directiveness and creativeness of life. If this be, as I maintain, the right view to take, then we must accept the 'teleological' nature of vital activities as something given and fundamental, not to be explained in terms either of physico-chemical action or of purpose."

Mr. W. F. SPANNER wrote: We are under a deep debt to Lt.-Col. Davies for this valuable paper and I should like to thank him for it.

I agree with Col. Davies that Scripture calls the existence of God as God obvious to all but the mentally defective. There appear to be at least three reasons for this. Firstly, all men have an inward sense of the divine or as Calvin puts it (*Institutes*, Vol. I, Ch. iii): "The human mind, even by natural instinct, possesses some sense of a Deity." He quotes Cicero (who did not enjoy the light of the Christian revelation) as follows: "No nation is so barbarous, no race so savage, as not to be firmly persuaded of the being of God." The accumulation of modern knowledge has not weakened the evidence which establishes this point but has rather strengthened it. Nations which have abandoned Christianity have had to find substitute religions and thus has arisen the modern worship of the superman in Germany, Italy, and Russia. Dr. Julian Huxley appears to be thinking in terms of a "planned religion." "Insofar as religion means spiritual welfare," he says, "we ought to be able to apply to it the same methods of unified survey and later of unified planning that are now beginning to bear fruit in the field of

economic and social welfare" (*Rationalist Annual*, 1945). To fill the vacuum caused by the rejection of Christianity a "planned religion" is to be substituted. This at least presupposes the existence of "spiritual needs" in mankind; and to what are these due if not to the latent "sense of Deity" possessed by the unregenerate human mind?

Secondly, the knowledge of God is evident from the creation of the world. The learned author has adduced powerful evidence to support this, and in spite of all that has been argued by evolutionists and agnostics the question presses itself upon every thinking mind, How did the universe originate? Even the acceptance of the evolutionary view (and it has to be remembered that some Christians have accepted this view) does not solve this problem, for a further question presents itself. How did the universe acquire the marvellous property of evolving from itself the most diverse and wonderful forms of life? Surely there must have been a God to create this remarkable evolutionary universe. Some have sought refuge from this dilemma in pantheism, which is a very popular present-day philosophy. Unfortunately for this view, the physical facts as we know them are opposed to it. The second law of thermodynamics (to take one example) compels us to the conclusion that the universe is like a clock running down. And as Dean Inge pungently remarks (about the pantheistic view of the universe): "A God under sentence of death is no God at all" (Dean Inge on *Protestantism*). The argument from creation is as powerful as ever. I will add a few further remarks to what Col. Davies has said about the material evidence for design which is truly remarkable. Think of two substances which we are able to prepare, steel and chloroform. How came there to be two such substances? Is this not a clear evidence of the provision made by a beneficent Creator for his creatures? Without steel there would be no motor cars, no steam ships, no aeroplanes—in fact one would be safe in saying that our modern civilisation could not exist. Again consider the merciful properties of the substance called chloroform introduced into medicine by Simpson in 1847. Is this not a singular instance of the beneficence of the Creator? We are reminded of the Psalmist's words: "The works of the Lord are great, sought out of all them that have pleasure therein" (Ps. cxi, 2). The third evidence by

which all men have some perception of the existence of God is to be found in God's works of providence which are always marked by a discriminating justice. Is it by accident that the misuse of the sacred powers of reproduction which God has bestowed on men and women is so often attended by horrible diseases? Is it by accident that Germany, the home of the destructive criticism of the Bible, has suffered the most terrible fate that has ever befallen a great nation inside the body of Christendom? These facts must not be brought forward in a self-righteous way but must be observed that we may have a true fear of God. These are solemn and terrible things. It may be argued that there is much wickedness which appears to go unpunished in this world and also much that righteous men suffer. This is true. Calvin says on this point: "God so regulates his providence in the government of human society, that while he exhibits, in innumerable ways, his benignity and beneficence to all he likewise declares by evident and daily indications his clemency to the pious and his severity to the wicked and ungodly." The judgments of God which are thus so evident in the earth should lead us to consider the certainty of a future judgment when sins which now go unpunished will bring their final retribution (*Institutes*, Ch. v).

Mr. W. E. LESLIE wrote: Col. Davies holds that God could not, prior to the fall of man, have been responsible for certain "harsher facts of nature." Since some of these harsher facts go back to the earliest fossils it would follow that man is older than the oldest fossil deposits. Why, then, are his remains only found in very late deposits?

From the Biblical point of view the author's theory requires that much of the creative work (both benevolent and harsh) took place after the fall of man.

Would it not be simpler, and more modest, to enquire what God has in fact done, instead of laying down *a priori* what we consider He must have done, or not done?

The Rev. J. S. BAXTER wrote: Col. Davies has asked me to give some facts regarding the "doctrine of the curse" from the standpoint of historical Christian theology. That the vegetable and animal kingdoms were involved in the divine curse on fallen man has been uniformly held by all orthodox Jewish expositors. It is reaffirmed in the New Testament; and has been held by Christian

theologians right down from the ante-Nicene fathers to the present day. Those who do not accept it to-day are those who have accepted that German-originated brand of "higher criticism" which explains away the supernatural inspiration of the Bible. All who take the older view of the Bible accept the "doctrine of the curse," and would never attempt to explain the enigmas and problems of the present physical order on earth apart from it. The chairs of all evangelical theological colleges to-day would subscribe to this. To say, therefore, that this "doctrine of the curse" is a new invention or something peculiar to Col. Davies is absurdly wide of the mark.

Dr. L. R. WHEELER sent a lengthy communication of which the following is a summary :—

Some of Col. Davies' criticisms of materialism are admirable, but a number of points call for criticism.

Few theologians now take Genesis iii in a literal sense and to do so is, in fact, to present us with an idea of Nature fundamentally opposed to that of the Bible as a whole. The Psalms, notably civ, represent created things as attesting God's wisdom and goodness, and organisms rejoicing therein. Christ saw ravens and lilies as the reverse of accursed (Luk. xii, 24 seq.), etc. In view of these facts, it is difficult to believe that the entire creation has been cursed. And, in any case, we should observe that the talking snake was not the source of evil taught by Christ (Matt. xv, 19).

The view that previous creations were destroyed wholesale has long been rejected by scientists. It is difficult to see how, if these events had really occurred, it would now be possible to find an argument for teleology in Nature. Again, Col. Davies apparently believes that "the whole existing world of life" was created in six literal days. But some of these days are allocated solely for the creation of light, the firmament, and the heavenly bodies. Were these, too, created many times over? If not, why is re-creation suggested for the organisms made on the other days.

Well-known modifications of plants which are clearly for their good, such as spines for leaves in cacti, branches reduced to thorns in bushes, and hooks or prickles developed for climbing or seed-dispersal—are ascribed by Col. Davies to the effects of the curse.

Surely this view is unreasonable. A book published in 1851 is quoted for ascribing the noxious properties of thistles to the abortion of their calyces; but *Cnicus arvensis* is troublesome because it spreads mainly by underground rhizomes.

Col. Davies seems to ignore the prime factor in the life of all organisms—reproduction. Reproduction is expressly mentioned in Genesis i and Darwin's famous statement of *potential* multiplication by any species till its descendants filled the world is surely correct. This being the case, death, as Paley observed earlier, is necessary to balance birth and there is no need to regard it as essentially evil. Indeed, predators do much to maintain the wonderful harmony of Nature. Col. Davies seems to accept the theory of Haeckel and similar writers who could only see unrelieved struggle in Nature; but in opposition to this, innumerable facts show that co-operation rather than struggle is the main principle of organic existence. (See the writings of Drummond, Kropotkin, Allee, etc.; also my forthcoming book *Harmony of Nature*, 1948 (E. Arnold).

The richness of the marine remains in the Cambrian rocks is indeed an argument for creation; similarly the absence of connecting fossils between the large groups of organisms is an argument for large, later, creative mutations. But there is also abundant evidence for what scientists call evolution within such groups as orders, families and genera. To-day, it is generally accepted by the neo-Darwinians that small mutations, comparable to the small changes which Darwin envisaged, are sufficient to explain evolution at least within these narrow limits. Col. Davies seems to ignore this modern point of view.

The statement that Galileo did not know that air has weight is wrong. Cajori shows that he did (*History of Physics*, 1929, p. 71).

AUTHOR'S REPLY.

I thank Mr. Dewar and Mr. Spanner for their kind remarks. As regards the suggested explanation of sexual rudiments; I think that this may well apply to some other features, but not to male teats. For the sex of the human embryo becomes apparent during the second month of its existence, while its mammae appear later. It seems significant that male mammae not only *develop after the sex is determined*, but also continue to the end in almost functioning condition—as Darwin himself remarked.

As regards the alleged defects of the human eye: it is worth remembering that Helmholtz himself, though so often cited as emphasising them (*Vorträge und Reden*, i, 253, etc.), showed that they do not affect the serviceability of the eye, which might be less practically useful if more theoretically perfect. He said that probably 'any elaboration of the optical structure of the eye would have rendered it more liable to injury,' so that the eye is a thing which 'the wisest Wisdom may have designed.' It is not the marvellously intricate and suitable eye, but the bothersome appendix that I would refer to the Curse, contrasting the one with the other as exemplifying the Two Opposed Factors mentioned in Gen. i, 3, and found in nature.

Mr. Leslie's point is not very clear; but if he thinks that creations prior to man could not have been cursed, that is his own *a priori* assumption, for which he will find no support in my writings.

I welcome his closing suggestion, and hope that he will now begin to act on it by reading Gen. iii. He will there find that, even in our own creation, the brute fell before man fell, and was cursed before man was cursed.

I thank Mr. Sidlow Baxter for his valuable note.

Lt.-Col. Davies also sent a reply to the comments by Dr. Wheeler, of which the following is a summary:—

Though he rejects my literal interpretation of the six days of Genesis, Dr. Wheeler does not attempt to answer my arguments. As for Gen. iii, while it is true that most modern theologians do not take the passage literally, it is important to note that the literal interpretation was accepted by the whole Christian Church until quite recent times—a fact confirmed to me by Prof. G. T. Thomson of the Chair of Theology of the University of Edinburgh. Cruden (1701–1770) expressed 18th century orthodoxy when he wrote: "God pronounced his curse against the serpent which seduced Eve, and against the earth, which henceforth was to produce briars and thorns . . . He [Adam] enjoyed nature in its original purity . . . before it was blasted with the curse. The world was . . . not as it is since the fall, disordered and deformed in many parts . . . By the fall of man all the powers of nature were depraved, polluted and corrupted" (*Concordance*). It is clear, therefore, that the view I put forward is by no means novel.

I cannot assent to Dr. Wheeler's view of the general teaching of the Bible with regard to the curse. Psalm civ, for example, far from speaking only of God's goodness, actually suggests the doctrine of special creations to which Dr. Wheeler takes exception. Thus it speaks of God hiding His face, of the animal creation being troubled and perishing and then of God sending forth His Spirit, creating a fresh population and renewing the face of the earth. This clearly recalls Gen. i, 2 ff. While it is true that our Lord cited the lilies as types of the beautiful in nature; it is also true that he called evil men vipers because of their noxious qualities (Matt. xxiii, 33). The Bible repeatedly cites thorns, briars, nettles and thistles as matters for lamentation and evidences of ruin and judgment (Is. xxxii, 12-13; xxxiv, 13; Hos. x, 8; Heb. vi, 8, etc.). Again, it is not true that our Lord ignored Satan's part in seduction, for he spoke of the Devil's murderous lie as operating "from the beginning" (John viii, 44). Paul, like our Lord, accepted the literal details of the temptation account (1 Tim. ii, 14). Paul also flatly contradicts the view that everything in the world of nature is as it should be (Rom. viii, 18-23), while the prophecies of conditions when the curse is removed (Is. xi, 6-9, etc.) show what God calls "very good" (Gen. i, 31).

Dr. Wheeler asks whether light, the firmament and the heavenly bodies were created many times over. This is not necessary to my view as I have already shown in my book, to which reference may be made. It should be noted that, in my view, the grounds on which a belief in separate creations was generally abandoned were philosophical rather than scientific.

I am not clear as to the relevance of Dr. Wheeler's comments on evolution. I was discussing the essentials for an *atheistic* explanation of nature. If teleology is to be ruled out, infinitesimal links must be shown to have connected all structures, with survival value for each link over the last. Neither Darwin nor the neo-Darwinians have satisfied this demand. Nor does Dr. Wheeler's belief in exceedingly great mutations appear to me to be relevant. It seems to be contradicted by Genesis i which speaks of living creatures bringing forth "after their kind." Dr. Wheeler is unjustified in explaining away the evidences of the curse in nature. To say that thorns, etc., were developed "for the good of the plants in their natural environment" explains nothing—since the need for such

adaptations only shows that the environment is hostile. Dr. Wheeler quotes Paley for the idea that carnivores are necessary checks on population. But this is theory, not proved fact; the actual checks on population being "most obscure" as Darwin himself admitted (*Origin of Species*, Chap. III). Thus, although "no growl of beast of prey" has been heard there, the Galapagos Islands are not overcrowded, and their "wild" fauna has been astonishingly tame for centuries (*cf.* Prof. J. Ritchie, *Edin. Univ. Jour.*, 1943, xii, pp. 95-105). Such facts cannot be ignored.

As for plants, prickles are rarely advantageous—they entangle plants with their neighbours, to their mutual disadvantage; or catch and tear passing animals to the detriment of both beast and plant. If some thistles make a nuisance of themselves by adaptations other than prickles, the point is unaffected. In any case Balfour (*op. cit.*, pp. 145-6) says: "The injury which thistles and plants like them, cause . . . is . . . owing to the mode in which the fruit is scattered by the winds, and this altered hairy calyx is the means employed for doing so." Prickles are similarly alternative to thorns and the python's strangle grip is alternative to the viper's elaborate poison fangs.

Dr. Wheeler is wrong in asserting that I refuse to recognise co-operation in nature. I emphatically do so and expressly claim instances of it as proving beneficent creation. Genesis, however, also tells us of another opposing factor in nature and it is this which Dr. Wheeler apparently ignores.

The doctrine of the curse certainly does seem terrific to our minds. But how can we, living in sin, judge our own deserts? It is not the persons sitting in a closed room who realise the state of their atmosphere, but the visitor from outside who makes startling and seemingly excessive remarks about it. So the very shock given to fallen man, by the doctrine of the curse, bespeaks its eternal source.

Dr. Wheeler is right about Galileo who, did, apparently, finally realise that the air has weight. But Cajori confirms that he did not deduce atmospheric pressure from atmospheric weight. It is to Pascal (1648) that we owe the discovery that the atmosphere acts like a fluid, exerting pressure in all directions and so confirming the truth of Job's expression—"weight for winds."