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889TH ORDINARY GENERAL MEETING

HELD IN THE LECTURE HALL, NATIONAL SOCIETY FOR RELIGIOUS EDUCATION, 69, GREAT PETER STREET, S.W.1, ON MONDAY, 27TH FEBRUARY, 1950.

PRINCIPAL J. E. RICHARDSON, PH.D., B.ENG., M.I.E.E., A.M.I.MECH.E., IN THE CHAIR.

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

The following elections were announced :—H. W. Osmond, Esq., B.A., Member; Principal G. A. Williams, Member; J. D. Harte, Esq., A.C.I.I. Associate, A. O. Billinghurst, Esq., Associate.

The CHAIRMAN then called on R. J. C. Harris, Esq., A.R.C.S., B.Sc., Ph.D., A.R.I.C., to read the Langhorne Orchard Prize Essay by Francis I. Andersen, Esq., B.Sc., entitled "The Modern Conception of the Universe and the Conception of God," in the absence of the author.

THE MODERN CONCEPTION OF THE UNIVERSE IN RELATION TO THE CONCEPTION OF GOD.

By FRANCIS I. ANDERSEN, Esq., B.Sc.

(The Langhorne Orchard Prize Essay, 1949)

"*Then go I, my foul-venting ignorance*
With scabby sapience plastered, aye forsooth!
Clap my wise foot-rule to the walls o' the world,
And vow—A goodly house, but something ancient,
And I can find no Master."

Francis Thompson—"An anthem of Earth."

SYNOPSIS.

An integrated conception of the universe is impossible because of the relativity of every approach that begins in the human mind. A consideration of origins suggests that the Universe was created but tells us nothing about the nature of the Creator. The apparent orderliness and beauty of the world strengthen this suggestion, but do not lead to God Himself. Similarly the uncertainty principle makes a rigid determinism less possible, but does not reinstate spiritual qualities. The many difficulties that persist in naturalistic theories, *e.g.*, in evolution, may be explained by reference to God, but do not prove His existence. Certain moral problems make it even more difficult to gain a detailed conception of God from contemplation of the Universe.

However, a conception of God gained independently from special revelation illuminates ideas concerning the natural Universe. It is not possible to create a Natural Theology in its own right.

Introduction.

SOME cry one thing, and some another. The assembly is confused. Some say this modern world is fast approaching inevitable oneness as economic, political and cultural relations interlock; but across it all, tearing the network down, displaying its inner weakness, go deep cleavages in the realms of thought. Basic disagreements and discontinuities create clanging disharmonies whenever men come to speak of meaning and purpose. In the presence of this Babel we can hardly say that there is such a thing as "the modern conception of the Universe." We need always to ask first: "Which particular conception do you have in mind?"

Apart from the persistence of tenacious primitive notions, there is always a wide gap between the conceptions of the pioneers, carving their way into new realms of thought, and the ideas of the average educated men who follow hard after them. But it is not just that they are scattered back along the track. The leaders themselves are not agreed on exactly where they are going.

It is the same with the idea of God. The notions conjured up by that word in the mind of the philosopher or the ordinary man may be—well—almost anything. And this diversity does not arise just because the truth of God is viewed from many angles, like the plan and elevation of buildings that do not look a bit alike; the many voices shouting at one another contain contradictions that we cannot pretend to reconcile by the use of that handy word "paradox."

So, to limit the scope of this essay, we shall attempt to appreciate the conceptions of the average well-informed person and to show their connection, if any, with the idea of God. We shall start along this path: first we shall look at the Universe outside us. What do men think of the Universe as a whole?[1] And then, since we cannot look at God, we must be content with the adventure of thought and ask, further, "What, then of God?" It may be that this road will fail us. Then we must go right back to where we first took the wrong turning, and start along that true road to God whose entrance is Faith and whose sign post is Revelation. Nor need we be surprised if we have fewer fellow travellers along this way, for it leads us past a manger to a Cross.

[1] Prof. Daniel Lamont has reminded us that the word "Universe" means, strictly, "the whole." (*Christ and the World of Thought*, 1935.)

The Universe as a Whole.

But let us try the well-worn track. At the very outset we meet a serious obstacle. Can we really engage in any meaningful reflexion on the Universe as a whole, " this soap-bubble, blown of emptiness " (Jeans) ? That is, using the tools of observation or science ? It is an impossible experiment. As Professor Lamont has so clearly said, " Science deals with relations between things within the Universe, but there is only one Universe and there is no other with which it is related. The scientific method of investigating relations between things is therefore inapplicable to the world as a whole."[1]

This limitation is not simply due to a present restriction of the extent to which the scientific method can be applied. Dr. F. Sherwood Taylor has stated this initial limitation : " Our observations do not tell us all about a thing ; and science does not utilise all our observations, not indeed more than a small constituent element of any of them."[2] However, some scientists hope to extend their techniques to cover everything. But even if they can, our present failure to see things whole is not just because their task is incomplete. Prof. John Macmurray has shown that the establishment of a strict and comprehensive science of psychology creates an interesting inner contradiction because science itself, as a part of human behaviour, becomes part of its own subject matter.[3] Yet Sir James Jeans has said, " The outstanding achievement of twentieth century physics . . . is the general recognition that we are not yet in contact with ultimate reality." His very use of the words " not yet " implies that the physicists are well on the track of " ultimate reality," whatever that may mean. The same delusion is entertained by Sir Arthur Keith, most optimistically : " We may entertain a lively hope that as our knowledge of the economy of the Universe grows in amount and precision science may make a closer and closer approach to the solution of the mystery of Final Purpose."[4]

The mere accumulation or even completion of the data will not bring us one whit nearer to what we please to call " reality."

Nor is this failure to be traced simply to the distorted anthropocentrism of all our reflexions. I am thinking here

[1] *The Anchorage of Life*, 1940, p. 10.
[2] *The Fourfold Vision*, 1945, p. 13.
[3] *The Boundaries of Science*, 1945.
[4] *Essays on Human Evolution*, 1946, p. 17.

of the technical consequences of relativity, not of the emotional appeals made to the insignificance of man. In this latter strain Jeans declaims, " Indeed our earth is so infinitesimal in comparison with the whole universe, we, the only thinking beings, so far as we know, in the whole of space, to all appearances so accidental, so far removed from the main scheme of the Universe, that it is a priori all too probable that any meaning that the Universe as a whole may have, would entirely transcend our terrestrial experience, and so be totally unintelligible to us. In this event we should have no foothold from which to start our exploration of the true meaning of the Universe." (*The Mysterious Universe.*) Stebbing justly criticises this " perverted " attempt " to reduce the reader to a humble frame of mind and to terrify him." (*Philosophy and the Physicists.*) But it is not this mock humility that prevents a man grasping the whole ; the sober fact is that we are each one shut up in the narrow confines of our own consciousness. An " observer " is an essential part of any modern theory. And even though rational communication between consciousnesses enables us to share our findings, and is the only thing that enables us to dream of making some kind of synthesis, we are still like the blind men who encountered an elephant. The final picture does not always hang together. " Limited as we are to knowledge of the physical world, and its points of contact with the background in isolated consciousnesses, we do not quite attain that thought of the unity of the whole which is essential to a complete theory." (Eddington, *Nature of the Physical World.*) However impressive the synthesis we achieve, the imposing genie we have called up can always be traced back to the flickering lamp of an individual mind. And beyond its finitude, Prof. Lamont seriously suggests that a further cause of our pathetic failure to grasp the whole of things is to be found in the moral perversity of the human will.

All this means that we are not yet over that first large obstacle. The trouble lies in the very limitations of the scientific method itself. The inevitable result of the relativity of the scientific method is that it never takes us beyond the relation " I—my world " to any genuine notion of THE world. And even if it could, the man who uses the inductive method is powerless when confronted by a solitary fact. This truth is not affected by Raven's criticism of the claim " that Science cannot deal with what is unique . . . . " The examples he mentions, the appear-

ance of a new nebula or the extinction of the last dinosaur, though unique, can be built into the body of knowledge because they HAVE relations with other facts. But the creation (or existence) of the Universe or, say, the resurrection of Christ are events which cannot be fitted into the generalisations of science, not even as special cases.[1]

The very attempt to create a synthesis is a daring adventure that usually heightens the sense of frustration. Those who grasp most are usually the ones who feel most baffled. " In the common denominator to which science reduces things, in the sequences where the resultants seem qualitatively different from their antecedents, in the origins from which science starts in its genealogies, there is mysteriousness. All our scientific experience is rounded with mysteriousness."[2] He is not an extraordinary genius but an extraordinary fool who claims to have reached a point of restful satisfaction,

" With wide eyes calm upon the whole of things."
(Francis Thompson, *An Anthem of Earth.*)

Yet, allowing a tentative synthesis without looking closely at the foundations, we cannot begin to relate this final picture of the world to the conception of God until we have given it some kind of meaning. The problem is made even more hopeless if we consider that we cannot explain the parts we know fairly well until we have got to the roots of the whole. " Science, because of its essential method, cannot probe the secret even of an object. If we knew a single object through and through, we should know the entire Universe through and through," writes Lamont.[3]

But however truly we recognise the influence that all these deficiencies will have on any tentative synthetic conception of the Universe, it still remains true that, imperfect and incomplete though they be, we grasp at them, and weave them into our beliefs (or disbeliefs). They colour, to some extent, our ideas of God, if we believe in Him, or provide fuel for our denials of Him, if we do not believe. Our further aim, then, is to look into these

[1] C. E. Raven, *Science, Religion and the Future*, 1943, p. 90.
[2] J. A. Thomson, *Introduction to Science*, Home University Library Ed., p. 207.
[3] Lamont, Ref. 3, p. 154. *Cf.* A. N. Whitehead, " Any local agitation shakes the whole Universe. The distant effects are minute, but they are there. The environment enters into the nature of each thing." *Modes of Thought*, 1938, p. 188.

activities, and to see how valid they are. We may, indeed, give them the appearance of more validity by saying that we discern certain principles in parts of the Universe which it is reasonable to suppose prevail throughout the whole. But that is all.

The discussion falls into two parts. Firstly, the notion that the explanation of things is to be found in their origins leads to a consideration of Cosmogony. Secondly we meditate on the orderliness of things. This leads to a glance at teleology, with a brief comment on determinism. In short, we are concerned first with the Past, then the Present state of the world.

The Past.

The Cosmological argument for the existence of God has always been popular with the ordinary man. He admits the cogency of the tracing backwards of causes (of which he has an intuitive notion because of his first-hand experience of the efficacy of the act of willing) until we reach the First Cause, which is identified with God. The ready-made objection, "If God made the Universe, who made God?" is often enough for him to keep his atheism alive when he wants to. J. W. N. Sullivan says, "There is nothing logically impossible in this conclusion (*i.e.*, creation) but it nevertheless seems to be utterly incredible." (*Limitations of Science.*) We are all on the horns of the dilemma of believing either in "eternal self-existent spirit" or "eternal self-existent matter." And we ought to say in fairness that for difficulty of conception by the human mind there is not much difference between them.

Yet it is of considerable comfort to many to say "Modern Science has proved Creation." Sir James Jeans' statement, "Everything points with overwhelming force to a definite event, or series of events, of creation at some time or times, not infinitely remote," has been quoted *ad nauseam*. But we must look at it more closely.

The old argument for creation—an argument used by Newton—was virtually an appeal to the Second Law of Thermodynamics.[1] Nowadays the basis is in the picture of the Expanding Universe, popularised by Eddington. His conclusion is that "the galaxies are almost unanimously running away from us." Actually the data consist chiefly of the observed shifts towards

[1] See *Hibbert Journal*, 1938–9, **37**, 425.

longer wavelengths of spectral lines emitted by the nebulæ. It is possible to interpret these data in several ways.[1]

Eddington has attributed the red shift to the operation of the Doppler principle on the motion of the nebulæ. From a knowledge of the shift, it is easy to calculate the velocity of recession, and the general result is that the brighter and nearer nebulæ are moving away most slowly, while the more numerous, dimmer ones are receding with greater speeds. If these velocities are constant, then it can be calculated that they began to expand from an infinitesimal volume about two thousand million years ago. " As t (time) is traced back to smaller and smaller values, the system shrinks in dimensions, in the experience of the observer concerned, and in the limit $t = 0$ it approximates to a point. We may say if we like that the complete contents of the system were created once and for a at $t = 0$."[2]

Now it is possible to introduce into Milne's system of kinematical relativity a mathematical transformation so that " the epoch of ' creation ' $t = 0$ on the kinematic scale is measured by $t = -\infty$ on the dynamical scale."[3] J. B. S. Haldane has seen in the replacement of $t = 0$ by $t = -\infty$ an escape from the evidence for creation. He eagerly writes : " If we adopt the dynamical time scale we find that the atoms are not expanding, nor is the universe . . . The spiral nebulæ are not flying apart, and there was no creation at any time in the past. Time stretches backward and forward for ever."[4] Instead of trying to weaken Haldane's specious case by emphasising the speculative nature of Milne's cosmology as R. E. D. Clark has done,[5] it is easy to show that Haldane is deliberately deceiving the uninitiated just by quoting what Milne himself says about the two time scales. " They constitute two distinct languages, . . . there are different (dynamical) scales corresponding to different values of the normalisation constant t_0; the (kinematical) scale is the absolute scale.[6] Or, in the words that immediately follow

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[1] See, for instance, the survey by Guy C. Omer, *Astrophysical Journal*, 1949 **109**, 164, or Hubble, *Science*, 1942, **95**, 212.
[2] E. A. Milne, *Relativity, Gravitation and World Structure*, 1935, p. 134.
[3] E. A. Milne, *Proc. Roy. Soc.*, 1937, **158A**, 324.
[4] *The Marxist Philosophy and the Sciences*, 1938, p. 66.
[5] *Scientific Rationalism and Christian Faith*, 1945, p. 14.
[6] E. A. Milne, *Kinematic Relativity*, 1948, p. 224.

the earlier quotation, " This is simply a way of saying that an infinite number of a given type of dynamical event has occurred since ' creation'." " The epoch $t = 0$ is, in fact, dynamically inaccessible in time."

This latter feature of his theory Milne regards as a rational advance on the relativistic cosmologies of the Einstein, de Sitter type. These " fail because they involve a creation or annihilation of matter within the experience of the observer," whereas in his system the epoch of creation, when $t = 0$, " is not an epoch any observer can experience."[1] This point recurs in other recent theories,[2] in which it is explained why " physically, one may not speak of an initial time."[3] If this is valid, its relevance to our present discussion is that our hope of seeing God at work at $t = 0$ has not been realised. He has kept His secret.

This point of creation has been discussed at length to bring out several extremely important features of modern theories. Firstly, the final theory must be stated in terms of an observer. He cannot be eliminated. Secondly, the imposition of hypotheses on the data leads to diversities ot interpretation. To those already mentioned we must add Hoyle's quaint postulate of " continuous creation " ; matter is always coming into existence, and there was no beginning.[4] It is no use saying that the interpretation we do not like is " highly speculative." They all are. So we can sum up our glance at the Past by saying that there is a general feeling that the best descriptions give the Universe a definite starting point in time. Some go behind this to the action of a Creator. But we may fairly say that this is an extra hypothesis which we are not obliged to make. Indeed it is not customary to introduce a postulate of the supernatural at the many other points where our expanding fields of knowledge meet the unknown. A God who makes His appearance as a postulate possesses doubtful " reality." As the solution to a puzzle He becomes degraded to the role of servant to human speculation, a fancy easily discarded.

In very real contrast to any barren deistical construction, the Christian (already knowing much of God from other sources)

[1] E. A. Milne, *Relativity, Gravitation and World Structure*, 1935, p. 134.
[2] G. Gamow, *Nature*, 1948, **162**, 680, *Physical Review*, 1948, **74**, 505.
[3] R. A. Alpher and R. C. Herman, *Phys. Rev.*, 1949, **75**, 1089.
[4] For review and criticism, with references, see *Science and Religion*, 1949, **2**, 102.

can rightly see in this act of creation the hand of his Heavenly Father. He may fit these theories as a small piece into the almost completed jig-saw of his theology; but it would be hopeless to try to map out a full conception of God from just that small piece. Milne expresses this in fine words, "The physicist and cosmologist then need God only once, to ensure creation . . . For man as more than cosmologist, as more than biologist, as possessing mind, possibly endowed with an immortal soul, God is perhaps needed always."[1] Truly God is needed, not just for thought, but for life and salvation; but of this the cosmogonies tell us nothing.

The Present.

Turning now to what lies immediately about us, it has been argued that the world as everyone sees it bears the marks of its Maker's hands. The difficulties in the idea of "the present," revealed by relativity theory, and the sorting out of the subjective from the objective need not worry us here. We do see the world, and into our present experience come conceptions of order and beauty, of the fitness of things, and, sometimes, of the supernatural. And all these make us think of God.

The Bible itself states that the eternal power and Godhead of the Creator are understood by the things that are made. The whole of Romans 1 is relevant to our discussion, because it raises the questions of whether this knowledge of God is attainable by any person simply by contemplating nature, or whether faith is necessary, and whether this knowledge has any connection with a saving knowledge of God.[2] One of the difficulties is that so far as conceptions are concerned the knowledge of God so far as it is clarified in thought and expressed in intellectual propositions would appear the same in the minds of a believer and unbeliever. Unbelievers can read in works of Natural Theology things that believers have discovered only because of their faith, and most of them have their ideas coloured by some of the thoughts given originally in Special Revelation. Only "faith in the Mediator" can distinguish the genuine from the false, and places the Christian religion "in irreconcilable, unbridgeable, fatal opposition" to "the religion of general

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[1] R. A. Alpher and R. C. Herman, *Phys. Rev.*, 1949, **75**, 140.

[2] An interesting, but not completely satisfying discussion is found by John Baillie in *Our Knowledge of God*, 1939.

revelation."[1] The argument of Romans seems to be that in point of fact men have no true knowledge of God because they have stifled the hints that nature gives them about God, and that they are altogether inexcusable because the hints were so plain. But even if the suggestions of nature were followed up, " This knowledge of God, which avails only to take away excuse, differs greatly from that which brings salvation " (Calvin on *Romans*); it can at best serve to drive a man to seek a more direct personal encounter with God Himself, which, in the situation of faith, means Revelation and salvation.

But what hints does the Universe give about God ?

The Uniformity of Nature.

It is generally recognised that before the scientist can do a single thing he must take it for granted that the Universe is going to behave itself. He assumes the uniformity of nature. This in itself is a great act of faith. It is reasonable enough, but it cannot be proved. Thus J. W. N. Sullivan says, " Science itself provides no ground, beyond the pragmatic one of success, for supposing that nature forms an orderly and coherent whole. Science, therefore, rests not upon a rational basis, but upon an act of faith."[2] The details of the orderliness discovered in the Universe are summed up in the " laws of nature," but often the hypotheses behind these laws are stretched to preserve the original principle of uniformity. Sullivan, who examines the concept of potential energy, suggests that the Law of Conservation of Energy is more correctly an article of faith. Using an interesting quotation from Preston's *Theory of Heat*, he shows how the ether was invested with the most fantastic properties in order to secure the non-violation of this law, properties which made experimental verifications impossible. (*Limitations of Science*, 1933, p. 248.) Exactly the same thing has occurred in modern theory in the concept of the neutrino. Its only claim to existence is that it would account for a little energy that disappears in some nuclear reactions. But now it has been invoked on a grand scale to explain some problems in stellar evolution.[3] Its properties, absence of charge and of rest mass,

[1] Emil Brunner, *The Mediator*, Eng. Trans., 1934, p. 40.

[2] *The Bases of Modern Science*, p. 4. There is an equivalent statement in A. N. Whitehead, *Science and the Modern World*, O.U.P., p. 20.

[3] Eg. by Gamow and Schoenberg, *Phys. Rev.*, 1941, **59**, 539. For review, see A. W. Stern, *Philosophy of Science*, 1941, **8**, 614.

make it difficult to carry out direct observations in confirmation. But in spite of what appear to be tricks, the orderliness of nature is not a projection of the scientist. It is really there.

When an explanation of this is sought, some people suggest that it is an expression of the mind of God. At the other extreme some say that is due to the reign of impersonal law, so supreme that miracles are impossible. The orderliness is a meaningless fact. It is true that if we postulate a personal God there is nothing impossible in regarding both the laws of nature and the occurrence of miracles as expressions of His will, and in no sense contradictory. That is satisfactory to a man of faith, but the orderliness itself does not prove such a God.

Let us see how far it was able to lead one scientist to a conception of God. In *The Mysterious Universe* Sir James Jeans tells us that " nature seems very conversant with the rules of pure mathematics," and then steps to the position, " the Universe seems to have been designed by a pure mathematician." Yet even if some are wooed and won by Jeans from this point to the position that " the Universe can be best pictured . . . as consisting of pure thought, the thought of what, for want of a wider word, we might describe as a mathematical thinker," and if the Christian apologist, in particular, is tempted to snatch this morsel gratefully, then they should heed Eddington's caution that " the crudest anthropomorphic image of a spiritual deity can scarcely be so wide of the truth as one conceived in terms of metrical equations," to say nothing of Stebbing's blunt comment : " The Physicist, in so far as he is concerned with physical science, cannot establish that there is a God—or a Devil—unless He is an entity of the kind studied by the physicist as such. If He is an entity of such a kind, then there is no reason at all to suppose that He is God the Comforter, and many reasons for supposing that He is not. If He is not an entity of such a kind, then no changes in physical theories can provide any reason at all for saying anything about Him " (*Philosophy and the Physicists*). This is the whole difficulty of linking the two categorically different concepts such as " the Universe " and " God," when we start from the lower. " Is it possible that by contemplating the consequences of something as they unfold themselves more and more one might by a simple inference from them produce another quality different from that contained in the assumption ? "[1] No ! It is not possible. Unless we begin with God,

[1] S. Kierkegaard, *Training in Christianity*, Trans. W. Lowrie, 1941, p. 30.

we shall never reach God. "The scientific method . . . is the worst of all methods to employ in thinking about God. Intellectually it is absurdity; religiously it is presumption."[1]

So even if we would like to pass through Jeans' inductions to Berkeley's Eternal Being in whose mind all objects exist, we need to remember that all such a deity needs to meet the case is the power of universal perception—nothing more. We are left with a barren deism. What a God! He is again the servant of human thought. The mathematician has created Him in his own image, and we must say of the product, with the logic of the prophet, "The workman made it; therefore it is not God" (Hos. viii, 6). If God is in any sense to be considered like Jeans' pure mathematician, then no Satan ever mocked the ignorant masses of men so cruelly as this deity, who discloses his secrets only to those rare minds who can grasp the mathematics of His toy, the Universe. He deserves Dean Inge's facetious enquiry, "How does one pray to a mathematical God? 'O x^n, have mercy upon us!'"[2] Eddington says more wisely: "The religious reader may well be content that I have not offered him a God revealed by the quantum theory."

But what does the mathematics mean? It is simply another way of saying that the Universe is orderly. The equations describe the phenomena, they sum up the scientists' generalisations in a quantitative description where the quantities involved are symbolised by mathematical signs. They "are meaningless unless they are fed with metrical quantities" (*i.e.*, pointer readings) (Eddington). Yet see how Jeans begins with the fair remark that "our efforts to interpret nature in terms of the concepts of pure mathematics have, so far, proved brilliantly successful," and then makes the strange claim that "the final truth about a phenomenon resides in the mathematical description of it"; leading to the absurd conclusion that the successful formula "expresses the ultimate reality" (though he virtually denies this later). That the equations are our own inventions and in no sense "ultimate reality" is shown by the frequent occurrence of a variety of concepts in connection with one set of data, ranging from the cosmos, as we have seen in the case of the red shift, to the quantum. In wave mechanics, "agreement with experiment is no proof of the validity of the particular postulates, neither does it imply that they have any

[1] Lamont, *Christ and the World of Thought*, 1935, p. 11.
[2] W. R. Inge, *The Fall of the Idols*, 1940, p. 40.

definite physical significance. It will be seen that the fundamental equation of quantum mechanics may be obtained on the basis of two entirely different sets of postulates."[1] Mathematically, of course, the postulates amount to the same thing. But they appear different, conceptually. However, it would be just as effective to write down the Schrödinger equation and forget the postulates, but it could not be called the ultimate reality.

Determinism.

On the other hand, an insistence on the orderliness of the Universe may ruin our conception of God. The reign of rigid laws with mathematical precision leads to a strict determinism. This enabled T. H. Huxley to say, " That the existing world lay potentially in the cosmic vapour ; and that a sufficient intelligence could, from a knowledge of the properties of the molecules of that vapour, have predicted, say, the state of the fauna of Britain in 1869." In particular, it was said that our consciousness of free will is an illusion, and the application of chemistry and physics to biology, and the study of genetics tended to strengthen this. Spirit disappeared. Then a growing knowledge of quantum phenomena lead to Heisenberg's Uncertainty Principle, a recognition that indeterminacy is a common feature of the world of quanta. While the over-all behaviour of a great number of particles is amenable to description in terms of laws of probability, in the case of, say, any individual electron, we cannot tell what it is going to do.

In this fact was seen a way of escape from the bondage of law. It was seized eagerly by those anxious to rehabilitate free will on the respectable basis of modern physics. For free will leads to a spirit in man, and thence to personality in his Creator. Indeterminacy leads to a breaking of iron law, and so to miracles and other exciting things. Or so it is supposed. Indeed it is amusing to see how rationalists, materialists and others, fearful of the use that theologians may make of this concept, go to the fantastic lengths of saying that " freedom," far from having any spiritual connotation, is simply a property of nature. The *naïve* say that the electron has free will ; the more subtle elaborate some kind of pan-psychism in which all matter is invested with mental qualities.

But the whole chain of inference seems hardly valid. It is a

[1] S. Glasstone, *Theoretical Chemistry*, 1941, p. 18.

colossal jump from the uncertainty of the behaviour of a quantum to all that is involved in the freedom of the human spirit. Choice and decision is not a matter of indefiniteness, an indefiniteness for which, given enough cases, we could discover probability laws ; it is free, yet purposive, directive, controlled, indeed determinate in the highest sense. " If human conduct is dependent on quantized changes, it would be even more unpredictable than it really is ! Such action would have no recognisable and intelligent cause whatever, and this is not what we mean by free will."[1]

Eddington has explained quite clearly that we can only connect the freedom of the electron with freedom of the will by the " possible though difficult hypothesis that very few atoms (or possibly only one atom) have this direct contact with the conscious decision." But this he regards as " too desperate a way of escape for us." If free will is just " tampering with the odds on atomic behaviour," yet requires interference with large numbers of atomic processes, we are faced with an improbability as difficult as the straight-out breaking of a law. " Determinism comes back with a vengeance, and we are substantially where we were before."

Freedom of the will is as much a fact as the freedom of an electron. There is no reason why the latter should be considered basic. Again this modern conception about the Universe fails to afford a safe foundation for any conception of God.

Teleology.

The perception of beauty and purpose in the Universe makes a more direct appeal to human feeling and thought than the more academic notion of uniformity. Harmony and design are discovered on every hand, and from them conceptions of God are often formed.

In many cases the beauty that thrills us is a result of the reign of law, as in the perfect symmetry of crystal forms. If William Paley had known what we do today about the structure of silicates he might have found in the stone he kicked while crossing a heath more material for Natural Theology than in the watch he preferred as his example. In a sense this falls under the preceding discussion of uniformity in nature. But it

[1] W. Sefriz, *Philosophy of Science*, 1943, **10**, 32.

is not, as Malisoff has imagined,[1] a complete explanation of its loveliness to show that the symmetry of form follows from chemical properties. The grace and charm are more than that, and the appreciation of it more than the analysis of the experience by chemists and psychologists.

" What heart could have thought you ?—
Past our devisal."

(Francis Thompson, *To a Snowflake.*)

is always the more genuine utterance of the human soul.

It is a sad fact that the transfer of the study of nature from the field to the laboratory seems to have stifled this utterance. In Charles Darwin this capacity for appreciation atrophied. He confessed in later life, " In my ' Journal ' I wrote that whilst standing in the midst of the grandeur of a Brazilian forest, ' it is not possible to give an adequate idea of the higher feelings of wonder, admiration, and devotion which fill and elevate the mind.' I well remember my conviction that there is more in man than the mere breath of his body. But now the grandest scenes would not cause any such convictions and feelings to rise in my mind. It may be truly said that I am like a man who has become colour-blind."[2a] In an autobiographical note, which, it is said,[3] was not intended for publication, he spoke of a " curious and lamentable loss of the higher æsthetic tastes," saying, " My mind seems to have become a kind of machine for grinding general laws out of large collections of facts."[2b] His close friend, George Romanes, also felt deeply " the appalling contrast between the hallowed glory of that creed which once was mine, and the lonely mystery of existence as now I find it . . . the universe to me has lost its soul of loveliness."[4] In the average scientific worker of today, the charm of nature has become a datum without meaning. H. S. Shelton says : " The snow peaks as islands in a sea of cloud which I once saw was perhaps the most moving sight I ever remember. Why I have not the least idea."[5]

Again we find that the conception of the Universe as beautiful remains unrelated to any conception of God in those minds in which the dark dogmas of naturalism are unrelieved by the

[1] W. M. Malisoff, in " Chemistry: Emergence Without Mystification," *Philosophy of Science*, 1941, 8, 39.

[2] (*a*) *The Life and Letters of Charles Darwin*, 1887, Vol. 1., p. 313. *Cf.* remarks on this incident by Romanes in Vol. III, p. 54, 55. (*b*) Vol. 1, p. 101.

[3] *Cf.* J. T. Hackett, *My Commonplace Book*, Unwin, 1919, p. 318.

[4] G. J. Romanes, *Thoughts on Religion*, Ed. Charles Gore, 1896, p. 28.

[5] Dewar and Shelton, *Is Evolution Proved ?*, 1947, p. 34.

light of faith. But from the vantage point of faith the admiration of nature becomes full of new and wonderful significance. But the mere contemplation of the universe cannot produce that faith.

But there is much apparent design in the Universe in which the operation of law seems to have been interfered with in some way to bring about a highly improbable set of circumstances suited to some special end. The existence of life on this planet is perhaps the most wonderful illustration. The appearance of life required that improbability be piled on top of improbability until we have the fantastically impossible.

Firstly, conditions suited to the occurrence of living things must be produced. This requires a simultaneous occurrence within narrow limits of a great number of highly variable factors. Any one of these factors alone, *e.g.*, the state of the atmosphere,[1] may depend on a great number of independent variables. Alfred Wallace discussed this matter fully, enumerating nine chief requirements, all of which occur suitably on the earth. Summing up with the words: "The combinations of causes which lead to this result are varied, and in several cases dependent on such exceptional peculiarities of physical constitution, that it seems in the highest degree improbable that they can all be found again combined either in the solar system or even in the stellar Universe."[2]

A second requirement is that elements should exist having a great number of highly specialised properties all absolutely indispensable for the existence of life. The study of living matter opens to us a world of incredible delicacy and beauty. "Life . . . becomes a chemical symphony based on the simple melodic line of water . . . As in great musical masterpieces only the initiated can fully appreciate the versatility and the amazing chemical beauty of this creation."[3] The particular dependence of life on the peculiar properties of carbon, hydrogen and oxygen was worked out in great detail by L. J. Henderson, "one of the most tough minded of biochemists" (Lewis Mumford), to the conclusion that, "There is, in truth, not one chance in countless millions of millions that the many unique properties of carbon, hydrogen, and oxygen . . . should simultaneously occur."[4]

[1] F. T. Farmer, "The Atmosphere, Its Design and Significance in Creation," *Trans. Vict. Inst.*, 1939, **71**, 38.
[2] A. R. Wallace, *Man's Place in the Universe*, 1907, p. 314.
[3] E. J. Witzemann, *Philosophy of Science*, 1943, **10**, 178.
[4] L. J. Henderson, *The Fitness of the Environment*, 1913, p. 276.

The whole subject has more recently been presented in a delightful popular form by R. E. D. Clark. "The Universe has something very odd about it. It is a gigantic freak . . . It seems to be designed for people like us."[1]

This conclusion is based on an argument from improbability.[2] Its force seems overwhelming. But, however powerfully its weight is felt, the argument may fairly be urged against it that, "One cannot make any judgment as to the probability, in the mathematical sense, in an event which has, to our knowledge, occurred only once, like our Universe. Granting that there is a Universe at all, it must have *some* properties, and there seems no sense in saying that the properties we actually find in it are less probable than any others it 'might have' had."[3] It seems that without enlightenment from Revelation, a scientist may recognise the tantalizing suggestions of all these wonderful facts, but remain agnostic as to why "the Universe in its very essence (is) biocentric" (Henderson). Henderson says, "For the answer to this question existing knowledge provides, I believe, no clue."

But even if everything is suitable for the existence of life, its appearance and development into the diversity and complexity we see requires such a continuous violation of the Second Law of Thermodynamics,[4] that to say it occurred "naturally" would require at best an improbability so astronomical as to be absurdly impossible.

As the examination passes higher through catalysts, with the delicacy of their function and the mystery of their origin, to hormones and the controlling functions, each stage is adding wonder to transcendent wonder, and with it, impossibility to transcendent impossibility. Indeed, "the probability of this occurring on the scale of complexity of processes known to be

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[1] *The Universe and God*, 1939, p. 8; *The Universe: Plan or Accident?*, 1949.

[2] The opposite conclusion of Jeans that "It seems incredible that the Universe can have been designed primarily to produce life like our own; had it been so, surely we might have expected to find a better proportion between the magnitude of the machine and the amount of product" (*The Mysterious Universe*, p. 16), is based on a pointless argument from size, and is irrelevant.

[3] Prof. W. E. Agar, T. S. Hall Memorial Lecture, *Some Philosophical Problems of Biology*, delivered in the University of Melbourne, 7th Oct., 1949 (unpublished). This is similar to the difficulty met in the earlier discussion on "The Universe as a Whole."

[4] This has, I think, been conclusively proved by R. E. D. Clark, "Evolution and Entropy," *Trans. Vict. Inst.*, 1943, **75**, 49.

involved in the life of a higher organism is so remote, that only the facts of the situation could establish it as true."[1] It is no use saying that life is what it is *because* the elements have those properties, or that, in spite of the impossibility of a chemical synthesis of living material, there is " no escape from the conclusion that the capacity for the manifestation of life must be inherent in matter just as are its properties."[2] It is as meaningless to say atoms have life as to say that electrons have free will.

In spite of the persistence of naturalistic theories of evolution there seems to be a growing recognition of the fact that beyond all our analysis there is a " Wholeness of the living organism "[3] which is its main feature, and which ultimately admits of nothing short of a teleological explanation. There is an integration in the patterns of nature that all the Darwinism in the world can never explain, a multitude of beautiful wonders that speak of God. To pick one homely and relatively simple illustration. The Australian lyrebird builds a nest nicely suited to the shape of the mother and the size of the baby. The mother feeds the newly-hatched infant in the nest for about six weeks. But the nest is kept scrupulously clean, because when the baby is fed it turns round and delivers its dropping into the mother's mouth. The dropping is contained in a tough rubber-like gelatinous bag which facilitates transportation ! The mother disposes of it in a nearby creek, or buries it in the ground.[4] Here several independent acts and organs are geared into a wonderful pattern of behaviour. Now it is no explanation to label this " instinct." That tells us nothing. It is only a name. And it tells us little more to point out its " survival value," which cannot account for its production in the first place. Most of these behaviour patterns must be perfect to be of any use at all. To the man without imagination or faith, they remain a mystery without explanation.[5] Their charm is wasted on the unbelieving because " both their mind and their conscience are defiled " (Titus i, 15). But in the thoughts of the man with faith, all these things are related to rich conceptions of God.

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[1] R. E. D. Clark, *The Universe and God,* 1939, p. 180.
[2] E. J. Hartung, *Chem. Eng. and Mining Review,* 1934, **26**, 173.
[3] W. E. Agar, *Philosophy of Science,* 1948, **15**, 179.
[4] *Wild Life,* 1949, **11**, 401.
[5] Dewar and Shelton, *Is Evolution Proved?* Ch. ix.

Difficulties.

There are additional problems that believers also meet. There are things in the Universe whose existence makes it hard to construct a consistent picture of God as the Creator of them all. They fall roughly under three headings : calamities, ugliness and imperfection, and positive evil.

Calamities. We may say that things like earthquakes and floods, which make a harmonious conception of the Universe difficult for some people, are a consequence of the same laws as usually call forth our admiration. It is true that the orderly operation of these laws does give an unchanging background which serves as a point of reference for the exercise of human freedom.[1]

Imperfection. Paley began his discussion of "Natural Theology" with an examination of the eye. "That conformity to optical principles which its internal constitution displays . . . amounts to a manifestation of intelligence having been exerted in the structure." Charles Darwin (*Origin of Species*) confessed that "the belief that an organ so perfect as the eye could have been formed by natural selection, is enough to stagger anyone," and "absurd in the highest degree." Consequently he so eagerly seized on supposed imperfections which would weaken any argument based on design, that he lost the power to see what was beautiful. He gladly incorporated in the sixth edition of *The Origin* a statement that Helmholz had made on the imperfection of the human eye.[2]

Since this reference is frequently made,[3] probably popularised by Darwin's use of it, it is interesting to look at Helmholz's original remarks, *in their context.* He said, "The eye has every possible defect . . . but they are all so counteracted, that the inexactness of the image which results from their presence very little exceeds . . . the limits which are set to the delicacy of sensation by the dimensions of the retinal cones."[4] Darwin's quotation is actually of little weight. The most up-to-date

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[1] "If matter is to serve as a neutral field it must have a fixed nature of its own." C. S. Lewis, *The Problem of Pain*, 1940, p. 19.

[2] Yet in spite of this I doubt if Darwin deserves the full weight of the rather unkind *argumentum ad hominem* in R. E. D. Clark's *Darwin Before and After*, 1948, Chap. V.

[3] E g. by J. B. S. Haldane in *Science and the Supernatural*, 1935, p. 140. (*b*) p. 310.

[4] *Popular Lectures on Scientific Subjects*, by Hermann von Helmholz, translated by Atkinson, 1893, First Series, p. 201.

knowledge demonstrates the surpassing perfection of the eye.[1] And again it is found that for the necessary simultaneously favourable alterations to go on until the eye reaches perfection requires an improbability overwhelmingly impossible.[2]

Evil. If the objection based on imperfection is often superficial, there are truly evil things that constitute a genuine difficulty. To dismiss them lightly is to ignore facts and to do injustice to many a human soul. There is much less difficulty to Christian faith if the significance of the Fall as outlined in Genesis iii is fully appreciated. Lt.-Col. L. Merson Davies has recently made some valuable suggestions in this regard,[3] though it may not explain as much as he thinks. It is recognised that the evil and harmful things in nature (organisms and organs) display the same perfection of design as the good and useful. While J. B. S. Haldane says that "The obvious theory is that they are thought out by different gods,"[4] L. Merson Davies puts all the difficult things down to the Curse. This makes it very easy. But Palæontology gives facts that are hard to fit into the Eighteenth Century picture of the pre-fall world. "There were no tempestuous winds . . . there were no weeds, no useless plants . . . the spider was then as harmless as the fly," and so on.[5] The early scorpions and spiders and Mesozoic carnivores and many others refute this. Nor does Scripture allow "that we should find traces of similar curses . . . in very ancient strata,"[6] for it teaches that "through one man sin entered into the world, and death through sin" (Rom. v, 12), and that the ground[7] was cursed "for his sake."[8] But in spite of the difficulties we must note that the only suggestions of an explanation come not from reflection, but from Revelation.

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[1] Prof. Frank Allen, "The Eye as an Optical Instrument," *Bulletin of the American Scientific Affiliation*, Vol. 1, No. 2, p. 9, 1949.

[2] Discussion (without reference) in Alfred Noyes, *The Unknown God*, 1934, p. 73, *et seq.*

[3] "The Present Status of Teleology," *Trans. Vict. Inst.*, 1947, **79**, 70.

[4] *Science and the Supernatural*, p. 310.

[5] John Wesley's "Collected Works" Eleventh Edition, John Mason (1856), Vol. VI, pp. 194–200.

[6] L. Merson Davies, *The Bible and Modern Science*, 3rd ed., p. 89.

[7] Gen. iii, 17. The word is אֲדָמָה not אֶרֶץ.

[8] The preposition בַּעֲבוּר means "for, or because of, marking the cause on account of which anything is done (Gesenius' Hebrew Lexicon, p. 742). *Cf.* ἐν τοῖς ἔργοις σου in LXX.

Conclusion.

We are now in a position to sum up. When we examine the conceptions of God related to the modern conception of the Universe, we find that they are usually an imposition on tentative philosophical speculations of notions of God obtained elsewhere, *i.e.*, from a different dimension of knowledge. So our conclusion is that the mere study of nature in any way at all, and at any length, can never lead to a full conception of God. For that God Himself must speak. We need Revelation. If the Christian is at first disappointed to learn that science cannot prove his God, let him take heart that his confidence is grounded on something firmer than the everchanging structures of human speculation; and let him take what comfort he can from this, that, because his idea of God can be fitted without strain into the modern conception of the Universe, science cannot ever contradict his beliefs. This leads to a more constructive proposal. The basic Christian certainty of God, and the clear understanding and renewal of the mind that is given in the redemption in Christ; together with the comprehensive doctrines of God, and of Creation given in the Bible, would give preliminary stability to all research and speculation. God is not then the aim of our enquiries, but their necessary starting point[1] just like the scientists' faith in the orderliness of nature and, indeed, the rational basis for that faith. We will not be discovering evidences, but interpreting nature in terms of our preliminary knowledge of God. There is absolutely no *a priori* reason why our conception of the Universe should be normative of our conception of God, and many reasons for believing that the conceptions from the higher dimensions of experience should impose themselves on those of the lower dimensions. It is only the vain conceit of scientists (fed by technological triumphs), and their obsession with the idea that the material is more real than the spiritual, that makes them reverse this process.

To the conceptual framework of a personal Christian knowledge of God we are then in a position to fit our conception of the Universe. We have been too long cutting and trimming God to fit our passing notions of the Universe itself. Now if many of our conceptions of the world must be carved differently to fit the eternal foundation, so much the better. In the words

[1] Lamont, *Christ and the World of Thought*, 1935.

of John Calvin, " It is vain for any to reason as philosophers on the workmanship of the world, except those who, having been first humbled by the preaching of the Gospel, have learned to submit the whole of their intellectual wisdom to the foolishness of the Cross." (*Commentaries on Genesis.*)

Discussion.

Principal J. E. Richardson (Chairman) said : The paper gives a useful analysis of possible approaches to the idea of God through modern concepts of the Universe and illuminates their inadequacies. There is, however, a lack of balance, some sections being accorded greater detail than others. The section on Difficulties, wherein are raised issues very much in the mind of " the average well informed person," could have been covered to advantage in greater detail.

The appeal to Romans i is interesting in the context of the paper and on this the following two points are made :—

(1) It should not be overlooked that while Romans i, 20, declares that " the invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made," the previous verse declares that " that which may be known of God is manifest in them for God hath showed it unto them."

From this it is clear that the eternal power and deity of God are evident from the universe to those who in any case have already received and accepted a revelation of the fact of God.

(2) Is there any hope that in measure at least verse 20 is true without the pre-requisite condition of verse 19 ? The arguments on page 89 conclude that it is not true, being summarised in the sentence, " Unless we begin with God, we shall never reach God."

Frankly, I find Jeans' " discovery " of the pure mathematician as the designer of the Universe very encouraging despite Eddington, Stebbings and Inge. The best scientist can only deal with a fraction of knowledge and cannot comprehend the whole, but if each in his own narrow track discovers from his appreciation of the design a designer, be he mathematician, chemist, physicist, biologist and so on, at least this will lead, or could lead to an appreciation of the eternal power of an integrating designer. Admittedly with Calvin this " can at best drive a man to seek a more direct personal encounter with God Himself," but there is that " at best " and surely it is worth encouraging.

A summary of the paper is given in Keble's hymn :

There is a book who runs may read
Which heavenly truth imparts,
And all the lore its scholars need
Pure eyes and Christian hearts.

The conclusion of the paper is perhaps best found in verse 6 of the great chapter on faith—Hebrews xi : " He that cometh to God must believe that He is and that He is a rewarder of them that diligently seek Him."

Dr. ERNEST WHITE said : More than two thousand years ago one of Job's friends said, " Canst thou by searching find out God ? Canst thou find out the Almighty unto perfection ? " It seems to me that the doubt implied in that question is as much present to-day as it was all that long time ago.

It is not the function of science to find God. Nor can our telescopes or microscopes discover Him. He is not discernible by any instrument, for all our scientific instruments are but extensions of our sense, and can deal only with the material universe.

As Mr. Andersen so ably points out, the usual arguments for the existence of God are open to criticism on logical or philosophical grounds, and His existence cannot be proved like a mathematical proposition.

St. Paul states that " the invisible things of Him are clearly seen, being perceived through the things that are made, even His everlasting power and Divinity " (Romans, i, 20 R.V.) but this supposes a prior knowledge of the existence of God. If we postulate God, and begin with the hypothesis of His existence, we can discover various reasons in support of our hypothesis. I agree with Mr. Andersen that the arguments from the necessity of a First Cause, or from Design, are not valid as proofs, and that it is as difficult to conceive the eternity of spirit as to conceive the eternity of matter.

We can only know God by faith, and that faith is founded upon the revelation which He has given of Himself in His word and by the Mediator, Jesus Christ.

Such faith can only be born in us by the Spirit of God, the " light, which lighteth every man." God is a Spirit and ultimately

can only be spiritually discerned. All this is outside the realm of science, and belongs to a category with which science does not deal.

The physical sciences are not in a position either to affirm or to deny the existence of God. To those who believe in God "the heavens declare the glory of God," but they do not prove His existence to those who have not believed. If we clearly grasp this principle, we shall not be shaken or disturbed in our faith by any new discovery or hypothesis put forward by men of science, and we shall not depend upon science to support our faith.

Mr. B. C. MARTIN said that the full knowledge of God was only obtained by faith and revelation; but there was a passage on page 99 which implied that a certain degree of knowledge was obtainable by other means.

Mr. TITTERINGTON said that in this connection the passage in Rom. i distinctly laid down the limits of such knowledge—"His eternal power and Godhead."

Mr. GORDON E. BARNES said: I should like to comment on the following passage of Mr. Andersen's very valuable essay: "So our conclusion is that the mere study of nature in any way at all, and at any length, can never lead to a full conception of God. For that, God himself must speak. We need Revelation. If the Christian is at first disappointed to learn that science cannot prove his God . . ."

I quite agree that for a full conception of God we need a divine revelation. But how are we to recognise that revelation if and when it is given? Both the Bible and Al Koran claim to be divine revelations, and how are we to know which, if either, is a true revelation? I suggest the answer is that both are tangible documents, part of the material Universe, and can therefore be examined by the method of science. The documents can be *observed*, information can be *abstracted* from them, *deductions* from these abstractions can be tested by *experiment* (or its logical equivalent), and in this way the original statements can be confirmed or disproved. In the case of the Bible (but not in the case of Al Koran) many thousands of statements have been tested and confirmed, and it is possible, by *induction*, to generalise, with ever-increasing certainty, about the accuracy of the record. Hence I conclude that because the Universe includes the Bible, a scientific study of

the Universe can lead us to a knowledge *about* God. (Of course it does not enable us to know God. That is the result of faith.) It does not prove with absolute certainty anything about God (Christian certainty comes from the work of the Holy Spirit alone), but then neither has science ever proved anything with absolute certainty.

In reply to Mr. Martin's question, I think it is correct to say that Scripture never implies that an investigation of the Universe can, apart from revelation, ever lead to a knowledge of the *existence* of God. If the investigator previously knows—by faith, which is extra-scientific (Heb. xi, 3)—that God created the Universe, then his investigation may lead to some knowledge of the *character* of God. Thus, it is because the heathen knew God (Rom. i, 21) and assumed a creation (*v.* 20), that " the things that are made " should have led them to a knowledge of His " eternal power and divine nature " (*v.* 20). It was just this knowledge that was missing. " When they knew God, they glorified Him not as God " (*v.* 21). Other passages *e.g.*, Psalm xix, 1-3, which argue from Nature to the God of Nature were either written by or addressed to people who already believed that God was the Creator of the Universe. " The heavens declare," not the existence of God, but " the glory of God."

WRITTEN COMMUNICATIONS.

Mr. D. DEWAR wrote: I feel sure that Mr. Andersen correctly attributes the fact that scientists are all at sixes and sevens in their conception of the Universe to their attitude towards God.

A recent example of the effects of adopting this attitude is to be found in Sir Robert N. Kotzé's book *The Scheme of Things*, published in 1949. The author accepts the notion of continuous creation! He writes (p. 23): " Modern theology seems still to favour the idea that it (the Universe) was brought into being out of nothing by the Creator. . . . For myself, I prefer to think of the Universe as having neither a beginning nor an end. . . . With an unlimited past the Universe is to be pictured as being in a continuous state of creation and recreation. . . . The question as to the ' when ' and ' how ' of the creation of the Universe can now be easily answered. Creation takes place now and always, and the manner of it has been and always will be ' as at present '."

He does not deal with the " how " but writes (p. 28): " If there

be a Creator of the Universe, the majesty of this Being so greatly exceeds the stature of man that it is totally impossible to comprehend that transcendent Being."

But, Kotzé writes: "We cannot ignore the facts and realities of religious experience," and he seeks to solve the problem of relations which appear to be "preposterously impossible."

His working hypothesis is (p. 145): "There is a great consciousness, which we may term the Absolute, sustaining and guiding the whole vast Universe must . . . be conceded . . . which may be regarded as the Creator of all, but in a sense that is beyond our conception even although various religions identify Him with the God they worship."

The fact that man cannot have any relations with the Absolute "can be harmonised with the evidence that man has relations with the Divine" (p. 147) "by postulating that there are, besides the transcendent Creator, other great beings in the Universe who are of lesser standing. . . . Amongst these there may be a class of Being that has the function of controlling a part of the Universe, such as the solar system or even a larger portion. He is the representative of the Absolute for that part of the Universe. Such a Being may be the God contacted by our great souls. He would be the Creator of the solar system in the sense that He has utilised the stuff that now comprises that system and all that it contains and guided it into its present form. He did not create that original stuff but used it and transformed it. . . Such a God may be deemed to have fashioned the solar system and all life in much the same way as man creates things on earth . . . and such a God may himself be conceived as the result of an evolutionary process. If we think of man as continuing to evolve in intellectual and spiritual powers, we must admit that in a million years time he must attain a much higher level than that now reached by us. If we continue such a process, there will emerge a Being incomparably superior to ourselves. It is only a natural consequence of such reasoning to think that a Being possessed of all the power we attribute to God can thus be evolved, given time and opportunity. The Universe is old enough and vast enough to have given time and ample field for the evolution of such a Being thousands of millions of years ago. In the fulness of His maturity He would take charge of a

portion of the Universe and develop it as the solar system with the earth and its sentient inhabitants have been developed."

The time has indeed come of which St. Paul wrote when men shall turn away their ears from the truth and shall be turned unto fables!

Lt.-Col. L. MERSON DAVIES wrote: I cannot, in short space, adequately discuss Mr. F. I. Andersen's paper; but I must say that, while agreeing with some of his remarks, I strongly dissent from his idea that the geological record testifies against John Wesley's picture of conditions in our creation before Adam's fall. Apparently Mr. Andersen (who is not a geologist) cannot see that his very appeal to conditions during the Mesozoic counters his own use of Rom. v, 12. Does he not realise that all fossils are of *dead* creatures? So what "man" does he suppose to have existed before the Mesozoic —not to mention the Palæozoic?

Obviously, Rom. v, 12, only refers to our own *Adamic race*; and the brief original uncursed state of our associated animal creation, *represented by no fossils*, could have left no recognisable trace in geology. But the nature of that state is indicated by the creation account, by the terms of the curse itself, and by the prophecies regarding future conditions after the curse is removed. John Wesley obviously, and rightly, based his picture on these.

Apparently Mr. Andersen, although citing my paper on Teleology,[1] never noticed my reference, on p. 74 of it, to the geological doctrine of separate creations; nor has he realised how definitely the Bible, from Genesis to Revelation, endorses that doctrine, clearly indicating (as I have often shown, *pace* Mr. Andersen) that those prior creations were cursed ones, and were treated even more drastically than our own has been.

Mr. Andersen should also note my answer to Mr. Leslie (*ibid.*, p. 99), which equally applies to himself. For Genesis shows that one of our own brute creation fell before Adam fell; and that that brute creation was cursed before man was cursed.

Mr. P. W. PETTY wrote: Mr. Andersen's is a most stimulating paper. Probably he did not wish to introduce ideas of personality, as the subject has usually been treated from a scientific rather than

[1] *Journ. Trans. Vict. Inst.*, **1947, 79**, pp. 70–101.

a psychological standpoint. I think they can further enforce his main argument. It is a matter of common experience that we cannot gain knowledge of another person—that is to say we cannot really meet that other " I " which stands over against us—unless that other person consents. We may amass facts about them, or imagine that we are doing so, but all the time the other may be acting, or pulling our leg. If this is true of another individual, how much more must it be true of God ? Only as He wills to reveal Himself can we know Him. But I think we cannot rule out the possibility that God may choose to come through nature, even although the only way by which He bids us approach Him is through the written Word.

Mr. W. E. Leslie wrote : If the problem of the Universe is to be approached from the standpoint of Revelation, we must ask whether some direct revelation to the individual or statements in the Biblical writings is meant. If the latter, we have to bring in a long line of reasoning establishing that this or that statement is in fact a Revelation.

There are suggestions that certain arguments are defective because of sin in their authors. What then about sin in the redeemed ? We must remember that the moral obliquity of the redeemed in tolerating the horrors of the Industrial Revolution, and many things in our own times, are serious stumbling blocks to many.

Mr. H. K. Airy Shaw wrote : Mr. Andersen's remarks on the effect of the " transfer of the study of nature from the field to the laboratory " are profoundly true. It is a transfer that all too often stifles the expression of wonder and even the sense of it. Few who have passed through an average university course in zoology or botany can have failed to notice the sense of aridity or barrenness which academic methods and approach seem to bring to the study of nature. Whereas the student in his early school years may have learnt (if he was fortunate) to associate the term " nature study " with something fresh, " open-air," vital, dynamic, even uplifting and inspiring—something indeed that spoke to his heart of the " wholeness of the living organism," and of the marvellous " integration in the patterns of nature "—when he has entered upon his university course he has found himself in a curiously artificial, mechanical,

technical, *dead* world of laboratories, test-tubes, reactions, experiments, measurements, formulæ and apparatus of every description: in a word, surrounded by all the "un-natural" accoutrements of *science*: and, slowly but surely, the "charm of nature" has begun to fade, till ultimately it may well have "become a datum without meaning."

The tragic story of how the universe "lost its soul of loveliness" for Darwin and Romanes is one that could probably be paralleled in the experience of countless less distinguished men—especially during the ninety years that have elapsed since Darwin first blazed the bitter trail that he surely knew was leading him away from Truth. For he spoke of his "*lamentable* loss of the *higher* æsthetic tastes"; he realised that it was his higher senses that were becoming atrophied, and he recognised that this was a matter for the deepest concern. Before 1860, it was no unusual thing to find, even in serious scientific works, references—if sometimes formal—to God and the wonders of His creation, and to the inevitable connection between "nature and nature's God"; but from that time onwards such references became more and more rare, till at the present day they would be considered as almost in bad taste. Darwin followed his intellect rather than his instinct, and led many astray after him; and that is ever the way with inanimate science. Truly, "the world by wisdom knew not God."

I welcome with all my heart Mr. Andersen's statement, in his concluding paragraphs, of the true position of the study of nature *vis-à-vis* our knowledge of God. It is magnificent, and deserves the widest publicity.

AUTHOR'S REPLY.

It is necessary for me to say at the outset how grateful I am for the kind words of encouragement and the valuable points of criticism that the discussion has brought forward. In particular there could not have been a more powerful illustration of the thesis of the Essay, that a search for God in the modern conceptions of the Universe will remain superficial and fantastic so long as it is not guided by revelation and untaught by God's Spirit, than Mr. Douglas Dewar's quotations from Sir Robert Kotzé's book. It appears that some scientists will believe any kind of supersition rather than open their minds to the one Lord.

Apart from the many things which the paper left unsaid, there are two points arising from the discussion which need clarification. Firstly, the significance of Romans i. There are three possibilities concerning the knowledge of God :—

(*a*) Man can arrive at knowledge of God simply by reflexion on the world.

(*b*) God Himself by direct activity on a man's mind uses his reflexions on the world to bring a man to an awareness of God.

(*c*) A man who has received revelation (a believer and new creature in Christ) is wonderfully enabled to see the hand of God in nature.

The truth of (*c*) is fully agreed upon, and this is the only finally true saving knowledge of God. (I Cor. i.) But this does not appear in Romans i, which proves the guilt of the Gentiles " which have not the law " (Rom. ii, 14), " the oracles of God " (Rom. iii, 2), " the things that are revealed " (Deut. xxix, 29). Dr. Richardson's first point seems to interpret Rom. i, 19, in terms of (*c*). I do not think this is right. In the sphere of special revelation through Christ a knowledge of God and perception of His glory in nature are a result of salvation in faith as in (*c*). Outside this sphere, the *guilt* of men is established because there is a limited (non-saving) revelation through nature and their own minds. This revelation requires more than man's unaided reflexion. God is active in it, *i.e.*, (*b*) not (*c*) is the meaning of verse 19, and (*b*), not (*a*) is the meaning of verse 20. This verse cannot be true without the pre-requisite condition of verse 19. This is confirmed by Paul's statement that the heathen " knew God " (verse 21) and *that* without faith or revelation or Christ. In point of fact no man can think at all without God being present. " In Him we live and move and have our being " (Acts xvii, 28) was spoken of all men.

Granted, then, this revelation, we find that it is limited in its scope, as pointed out by Mr. Titterington. " That which may be known of God " (19) in this way amounts only to δύναμις καὶ θειότης (20). A lot depends on the precise meaning of θειότης. It does seem to be a more general and vaguer term than is suggested by the translations " godhead " (A.V.) or even " divinity " (R.V.). " St. Paul is declaring how much of God may be known from the

revelation of Himself which He has made in nature, from those vestiges of Himself which men may everywhere trace in the world around them. Yet it is not the Personal God whom any may learn to know by these aids. He can be known only by the revelation of Himself in his Son; but only his divine attributes, his majesty and glory" (Trench, *New Testament Synonyms*, p. 7).

This general revelation leads either to a repentant or to a reprobate mind. It cannot suffice to produce a full natural theology, which is properly the work of a regenerate mind, as Dr. White and Mr. Barnes pointed out with reference to Psalm 19. Hence, when Mr. Leslie asks whether this is to be based on "some direct revelation to the individual or statements in the Biblical writings," I reply that both are equally necessary, *i.e.*, the inner illumination of the Holy Spirit and the outer guidance of Holy Scripture. This point is magnificently set forth in Calvin's *Institutes*, Book I, chapter ix.

The second point arises from the remarks of Lt.-Col. L. Merson Davies, though this question of the Curse is not directly involved in the argument of my paper. I mentioned it simply to indicate that the only idea which partly solves some of the problems of evil (the idea of a Curse) comes from Revelation and not from reflexion.

Yet I should like to answer Col. Davies, because the matter involves important principles of Scripture interpretation. The fact that I am not a geologist (an accusation of ignorance which I gladly admit) is quite irrelevant, though it may not be out of place to remember that many believing scientists consider that Col. Davies's theories introduce more difficulties into both science and scripture than they solve.

I believe that the Lord's warning to Adam "in the day that thou eatest thereof thou shalt surely die" (Gen. ii, 17) was literally fulfilled. Adam died at the very instant of his disobedience. The fact that his life on earth lasted many more years shows that this primary death was a spiritual death, a severing of his living relationship with God. This death passed to all men so that people walking about as large as life are called "dead in trespasses and sins" (Eph. ii, 1). The death of the body which followed later was a further result of sin—not in God's original plan for man—and this, too, passes to all mankind. Clearly Romans v, 12, only refers to our own Adamic race, the only creatures I have ever heard of who

were made in the image of God. Human death, both spiritual and physical, is the result of sin (even though a curse is not directly pronounced on Adam in Gen. iii, in spite of which Col. Davies says "man was cursed"). Sin is disobedience to God on the part of a creature bearing His image. On no grounds whatever can it be supposed that the death of animals not made in God's image must have the same significance as it has for man. Fossils prove that animals died, but not that they were cursed, or that there was any fall or sin connected with their death.

Romans v repeats again and again that it was *one* man's disobedience that brought death. "By one man [we agree that this is Adam] sin entered into the world." Nothing could be plainer, and the existence of a serpent in Eden prior to the Fall must not lead us to deny this clear statement of Scripture. Yet Col. Davies says "that one of our own brute creation fell before Adam fell." This denies that sin *entered* the world through Adam. It introduces the strange idea of the fall of a brute. It presupposes that the serpent is Gen. iii is (or was) just a brute creature in spite of the plain statement that he was "more subtil than any beast of the field" (N.B. not ". . . than any *other* beast") and in spite of his identification (Rev. xii, 9) with Satan, a supramundane spirit.

The curses described in Gen. iii are the results of Adam's sin. There was no curse before he fell. Therefore those unpleasant features in organisms which existed as much before Adam's sin as after it are not to be put down to a curse. Col. Davies, on the other hand, says (*Trans. Vict. Inst.*, 1938, **70**, 80) that the earlier rocks "are packed with evidences of death, disease, fear, pain, abortions and internecine strife," and concludes from this (not from scripture) that this is the result of earlier curses. We are not obliged to believe Col. Davies's theory of an "uncursed state" that "left no recognisable traces" (which makes proof and disproof very hard) existing for a short time prior to the fall, nor *his* doctrine of separate creations as the explanation of Gen. i, unless he can prove from Scripture, and not by uncertain inference, that the vast geological ages were cursed creations. He says "those prior creation were cursed ones and were treated even more drastically than our own."

I hold that the traditional Christian romanticising about the pre-

fall world cannot correspond to a state which suggests to Col. Davies a powerful curse. He makes it correspond to a brief interlude between two cursed states, an interlude of which we have no geological evidence. Whatever he supposes to have been the cause of these preliminary curses, Scripture gives no hint of them except a very disputable interpretation of the second verse of Gen. i.

If the Curse is the explanation of all the unpleasant and evil things in nature as we know it now, then *on the surface of it* a curse presumably accounts for the same features in the world before Adam sinned. But while the curse of Gen. iii is clearly the result of Adam's sin, the earlier curses postulated by Col. Davies are entirely without explanation from either Scripture or reason.