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THE LIMITATIONS OF NATURAL THEOLOGY

By R. T. LOVELOCK, A.M.I.E.E.
(*Being the Gunning Prize Essay, 1952.*)

SYNOPSIS.

The natural theology of our day is a lineal descendant of a philosophy which took its rise in the Middle Ages. The circumstances of that rise are noted, and the background against which it has developed summarised; thus is emphasised the dependence of natural theology upon the natural science which forms its basis.

The progress of thought in physical science, philosophy, and metaphysics during the last half-century is discussed. Particular emphasis is laid upon the modern theories of knowledge, since the limitations of natural theology spring from the principle of uncertainty pervading modern physics.

These limitations, which arise from physical uncertainty, are noted in detail as they are found in several important arguments of natural theology. The ontological arguments based on probability and on design, and the argument from analogy, are discussed in this connection.

Finally, the Bible attitude to natural theology is summarised. St. Paul's views of the limitations involved are found to emphasise the necessity for faith and revelation if these limitations are to be overcome.

INTRODUCTION.

MODERN science bases its methods on the technique of experiment, and has progressed steadily since the clear elucidation of such principles in Bacon's *Organum*. Thus it has by now accumulated a vast mass of data concerning the cause-effect sequence in the universe, and on the basis of such data synthesising theories are erected which serve to indicate the optimum direction for further experiments.

The ancient Greeks had an equally active mind, and they also spent time and energy enquiring into the functioning of nature. They, however, were not addicted to experimental methods, but preferred to erect a huge edifice of logical deduction on a foundation of 'obvious axioms.' Unfortunately, many of the

axioms which seemed so obviously true to them are now known to be false, and while we are greatly indebted to them for supreme examples of deductive logic, the detailed systems which they evolved are valueless today. As a lesson in how to reason the work of Euclid is 'timeless,' but when we try to measure a distant planet instead of a neighbouring field it requires supplementation because all of its axioms are not necessarily true.

When Christianity began to spread from Palestine throughout the Roman world, it was a 'breaking in' on Greek philosophy. It had none of the intricacies of that philosophy, and did not necessitate the exercise of complicated mental gymnastics in its acceptance. It was a simple moral way of life based on the authoritative teaching of Jesus and the prophets concerning the nature, will, and purpose of God. Emphasis was placed on the fact that God had *revealed* Himself to man, and man's duty followed simply from the details of that revelation. Originally, there was little attempt to explain 'why' or 'how,' nor to link up the 'way of life' with the involved systems of natural philosophy.

As Christianity spread, however, it began to draw within the net a few of the professional philosophers, and they continued to practise their old vocation, but exercised it in a new direction. In attempting to construct a philosophy of religion on the basis of God's revelation they gradually formed a 'system of theology.' In the first of his *Hibbert Lectures* Hatch comments thus on early Christian activity :

"It is impossible for anyone, whether he be a student of history or no, to fail to notice a difference of both form and content between the Sermon on the Mount and the Nicene Creed. The Sermon on the Mount is the promulgation of a new law of conduct ; it assumes beliefs rather than formulates them ; the theological conceptions which underlie it belong to the ethical rather than the speculative side of theology ; metaphysics are wholly absent. The Nicene Creed is a statement partly of historical facts and partly of dogmatic inferences ; the metaphysical terms which it contains would probably have been unintelligible to the first disciples ; ethics have no place in it. The one belongs to a world of Syrian peasants, the other to a world of Greek philosophers.

"The contrast is patent. If anyone thinks that it is sufficiently explained by saying that the one is a sermon

and the other a creed, it must be pointed out in reply that the question why an ethical sermon stood in the forefront of the teaching of Jesus Christ, and a metaphysical creed in the forefront of the Christianity of the fourth century, is a problem which claims investigation."

To avoid a hopeless confusion through the clash of rival systems, the ecclesiastical leaders were forced to choose among them and define an authoritative set of dogmas; hence arose the 'authority of the Church' which was destined to play so totalitarian a part in Church history. Thus, no sooner did speculation get under way in any new direction, than the Church intervened and gave a ruling which served to freeze the debate from that point. A few centuries of this practice narrowed down the available fields of speculation, and, as the secular arm of the Church developed, made it a dangerous practice. A revival of Aristotelian studies about this time stirred up the minds of scholars, making them restless and impatient of restraint. The result was a fresh outburst of speculation, religious in nature, since religion was the mainspring of all activity in those days, but directed towards natural philosophy and away from the authoritative revelation which the Church had made its especial care. Out of this activity came 'natural theology,' the limitations of which we are to consider.

Thomas Aquinas was one of the most brilliant of these philosophers, and his presentation became the basis of natural theology for many years to come. He sought, on the foundation of *a priori* assumptions, to prove the existence of God and investigate His nature. The genius of the ecclesiastical oligarchy ran more to organisation than to philosophy and, when atheists such as Spinoza sought with the aid of pure reason to demonstrate the non-existence of God, they eagerly encouraged philosophers within the Church to take up the cudgels. Thus, many ideas, such as the impassibility of the Godhead, which had been adopted from ancient Greece and were in opposition to the implications of revelation, came to be accepted into the Church. Since philosophers were discouraged from developing further the implications of revelation, the inconsistency was largely unnoticed, and has served to confuse and retard later theological development.

Only with the rise of the Protestant movement was attention turned once more to an analytical examination of revelation, and by that time so many alien postulates had come to be

accepted that the battle to advance the implications of revelation was long and arduous. That struggle is now past history, and there would be little gain in examining the natural theology of earlier times, because much of its detail has been since discarded. Instead, it is proposed firstly to consider the reliability of present-day scientific postulates, since it is upon them that natural theology is built, and it will partake of any limitations inherent in natural science. The operation of such limitations will then be considered in relation to *modern* discussions of natural theology. Finally, the Bible attitude to natural theology as a system will be reviewed briefly.

LIMITATIONS OF KNOWLEDGE.

Throughout the nineteenth century experimental science made tremendous progress on the assumption that nature was a vast machine which could be completely comprehended by meticulously examining one feature at a time until the whole had been covered. The progress of atomic physics may be considered as typical of scientific method during that period. From the immense complexity of many thousands of substances confronting the chemist, the concept of an atom as the smallest non-divisible component of matter allowed all chemistry to be expressed as relationships between less than one hundred distinct elements. This comparative simplification was still further advanced by claiming that all atoms were composed of two fundamental particles, and that these same particles were themselves responsible for all 'non-material' electrical phenomena. As the century closed, vigorous efforts were being made to resolve these two particles into states of motion in a non-material ether, which should also be responsible for the transmission of electro-magnetic radiation.

About the middle of the century, Herbert Spencer, the agnostic philosopher, attempted (in *First Principles*) to undermine the whole structure of natural theology by postulating that the complete universe could be divided into two types of entity. The first of these, christened by him 'the knowable,' consisted of all external media capable of stimulating one or more of our five senses; within this category falls the whole material world which may be subjected to controlled experiment in the laboratory, and which comprises the proper domain of science. The second classification he named 'the unknowable,' since, if it existed at all, it gave no direct stimulation to our natural senses. To Spencer, the verb 'to know' had a fundamental meaning.

He, in common with most scientists of his age, thought of the brain concept resulting from sense stimulation as possessing a unique reality, a reality which was denied to anything which could not become the subject of a 'pointer reading' in the laboratory; it was only such concepts which we could really *know*, and he attempted thus to create an impassable gulf between the natural world and the domain of 'spirit.'

With the opening of the twentieth century grave doubts began to accumulate concerning the fundamental nature of our *knowing*. Karl Pearson was one of the first to publish this "scientific sacrilege" when (in *The Grammar of Science*) he questioned the reality, or absolute existence, of such fundamental concepts as 'force.' He saw the whole domain of classical mechanics as but a convenient set of rules by means of which an observed sequence of sense stimuli could be forecast, and he denied the logical necessity for absolute existence as fundamental entities of any factors represented by symbols in the equations. Pearson's attitude is summed up in the opening words of his preface to the first edition :

"There are periods in the growth of science when it is well to turn our attention from its imposing superstructure and to carefully examine its foundations. The present book is primarily intended as a criticism of the fundamental concepts of modern science, and as such finds its justification in the motto placed upon its title-page (*La critique est la vie de la science*)."

Out of this attitude, under the brilliant leadership of Einstein, emerged the theory of relativity, based on the axiom that none of the measurable quantities of physics has an absolute magnitude, but that a combination of measurements called the '*interval*' is invariant for all observers. Even though the minutiae of the theory are still the subject of controversy, observation has adequately confirmed the truth of the axiom. For an excellent and original presentation of the purely relative significance of symbols employed in the higher geometries reference should be made to Schrodinger's recent book *Space-Time Structure*.

In a similar manner, the efforts which sought to resolve proton and electron into vortices in a continuous ether have been doomed to bitter disappointment. It is now known that the concept of two fundamental particles was a gross over-simplification, and each decade of this century sees the postulated number of such particles increase. Not only has confusion been

created by the discovery of many more types of particle, and by the denial that there is any continuous medium such as ether to transmit energy, but further observation has revealed that particles do not obey the laws of classical mechanics which had been supposed universally valid. Thus, while relativity questioned the existence of the machinery, quantum mechanics came to suggest that it did not function as a machine. The vast uniformity of nature was seen to be but a statistical average applicable only on a macroscopic scale, but when attention was focused on the individual constituent, not only was its behaviour unpredictable, but its very dimensions and nature became doubtful; it could be legitimately represented either as a material particle with indefinite location, or as electro-magnetic radiation distributed throughout space. Several 'popular' presentations of these matters are available for those desiring more detailed discussion of the point.

The trend of thought away from the concepts of certainty and the machine, which has been noted in physics, has also occurred in other fields. It was normal for nineteenth-century biologists such as Huxley, and philosophers such as Haeckel, to assume as an established fact that the human brain was no more than our most complex machine, and the whole nexus of human motives and volitions was assumed as predictable as the performance of a locomotive. Our inability to make the prediction was considered due to ignorance of the machine, and in no way a function of its nature. The present century has seen great advances in psychology and psychical research, which indicate that the brain does not conform to the pattern of a machine any more than particles conform to the laws of classical mechanics: later advances in biology have confirmed the impression, and it has been suggested that both failures may be intimately related. For a summary of the biological position reference should be made to a small work by Schroedinger¹ and two recent series of broadcast talks, since published.²

Recent advances in metaphysics have been guided by this general trend of thought, and the nature of connection between sense stimulus and the responsible external agent has been seriously considered. Although the mental concept resulting from stimuli is not identical with them, so that a series of

¹ *What is Life?* (Cambridge, 1948).

² *The Physical Basis of Mind* (Blackwell, 1950); Young, *Doubt and Certainty in Science* (Oxford, 1951).

electromagnetic waves impinging on the retina of our eye can produce the sensation of a tree waving in the breeze, yet there is a one-to-one correlation between stimulus and concept. When, however, we pass to consider the relationship between any given stimulus and the external agency responsible for it, we are in complete ignorance; nor can we, in this case, resolve the point by experiment, and the true nature of external *things* falls within Spencer's category of 'unknowable.' To provide some definite basis on which progress may be made, it is usual to assume that a close 'analogy' exists between concept and percept (using 'percept' for external agent): it is vital that in doing this we are basing the whole of our knowledge concerning the external world on an 'act of faith,' an act which postulates the analogy which cannot be proven. It is ironic that the external reality on which Spencer placed so much reliance should be found within his despised category of that which cannot be known. Dorothy M. Emmet has given an extremely interesting analysis of these matters, and concerning scientific truth she says:

"We shall now ask in what sense, if any, the explanatory concepts of physical science may be taken to make assertions which go beyond phenomenal experience, and in particular ask how realistic an interpretation should be put upon the 'models' with the help of which scientific explanation seeks to make its world intelligible. . . .

"Yet its models can hardly be literal representations of 'how nature works.' They are rather illustrative analogies drawn from relations which we find intelligible. . . . But it looks as if the idea of 'mechanism' was a regulative principle, that is to say, a guiding principle of method rather than an explanation in the realistic sense. . . .

"But we cannot with any assurance go so far as to claim structural identity between processes in nature and the intellectual relations between the ideas in which we symbolize them, and say with Spinoza *Ordo et connexio idearum idem est ac ordo et connexio rerum*. For mind is not a mirror, but a selective and interpretative activity which builds up symbolic constructions. But the mode of activity which constructs symbolic forms, and which, following Whitehead, we may call the 'mental pole,' grows out of the total experience of a 'bipolar' being whose 'physical

pole ' consists in activities which are not constructive, but responsive to processes acting upon it.'¹

Thus, not only has science found that its pointer readings do not yield exact knowledge of entities, but only the magnitude of probabilities concerning them—philosophy has now discovered that each personality is a closed system which can never obtain knowledge of such reality through experiment. It seems likely that these two limitations, the scientific and the philosophic, are two aspects of the same underlying principle. The application of the principle of uncertainty to the domain of religion has been brilliantly discussed by Alan Richardson, who stresses that since all scientific advances are based on an 'act of faith' analogous to that on which revealed religion rests, we cannot attain to a greater certainty not necessitating faith by basing religion on scientific investigation. He formulates his position thus :

" In science, no less than in philosophy or religion, *fides praeceedit intellectum*. This applies not merely to the process of arriving at such categories as those of 'mechanism,' 'natural selection,' or 'the unconscious,' but also to those very broad and prior categories, without which there could be no science, and yet which cannot be proved, such as the principle of the uniformity of nature. Science itself, including its most distinctive and valuable feature, the inductive method, is based upon an act of faith, and this faith is not formally different in quality from the faith about which the religious man speaks."²

Since physical science has now reached the stage when it denies any unique and fundamental reality to its postulates, it follows that all Aristotelian schemes of natural theology based upon the axioms deduced by physical science will inherit the limitations of those same axioms : they also can have no external objective reality. Natural theology can present but a logical schema consistent with all that is known today about the external world ; it cannot, however, claim any necessary existence for its postulates, and must rest upon the same act of faith which supports its scientific foundations. In the following sections certain important arguments of natural theology will be con-

¹ *The Nature of Metaphysical Thinking* (Macmillan, 1945), pp. 68, 88, 89, 95.

² *Christian Apologetics* (S. C. M., 1947), pp. 47-48.

sidered, and the detailed operation of the limitation in each case will be noted as illustrative of the general principle.

ONTOLOGY.

One of the cardinal aims of natural theology has always been to establish beyond all doubt the existence of God. Within recent years Sir Edmund Whittaker has examined afresh the classical presentation of this argument by Thomas Aquinas. In his book (*Space and Spirit*) he examines minutely the whole of the older argument in the light of modern cosmological theories. He finds that while much which Thomas advanced would be considered irrelevant today, nevertheless there are no established concepts of modern science which are inconsistent with the existence of God. On the other hand, he finds many indications in modern physics which agree so well with the type of God expected by Thomas that they may be said to contribute to the probability of His existence. Having covered the whole field, however, he is unable to find any train of reasoning which could establish as a logical necessity the existence of a transcendent God.

Since such a God is conceived as an 'ultimate reality,' such a failure should occasion no surprise. The principle of uncertainty considered above would lead us to expect a failure of any attempt based on a 'physical' foundation. In fact, the failure of so many keen intellects to find such a proof after seven centuries of unremitting effort should in itself be considered a pointer to the limitations of natural theology.

THE ARGUMENT FROM PROBABILITY.

An argument which has been frequently used during the last century, particularly in combat with rationalism, is that based on the probability that our universe could have arisen 'by chance.' The narrow range of temperature within which forms of higher life are possible, the very exacting physical and chemical requirements for its continuance, and the extremely complicated structure essential for the functioning of the living body, are all stressed, together with the requirement that all must co-exist before any form of life is possible. It is then argued that the probability of just this combination of circumstances arising from an initial chance shuffling of primeval energy is so infinitesimally small as to be equivalent to a practical impossibility of arising 'by chance.'

Whereas mathematical statistics involve much complicated algebra, and it is universally recognised that an amateur may obtain a meaningless answer by their use, there is a popular misconception that the fundamentals of 'probability' are so simple that they are obvious to the man who knows nothing about mathematics or systematic logic. In actual fact some of the most brilliant minds of our day are still engaged in controversy over the foundations of probability, a state of affairs which should give us pause in the making of hasty assumptions. While the ontological argument from probability is often thought of as a 'demonstration,' it can be shown to be indefensible mathematically.

To adopt a standard mathematical example, if one spins a perfectly balanced coin 1,000 times and records the sequence of heads and tails it can be calculated that the chance of obtaining the same sequence by a second set of 1,000 is infinitesimally small. To speak, however, of the probability that the first sequence will arise by chance is to use a term without meaning. Every time the coin is spun some sequence must result, and the first sequence did, in fact, arise by chance. The concept of probability in this case can only be applied to the duplication of a previous sequence by a second experiment, or to the generation of a particular sequence specified *before* the coin is spun. Thus, we may speak of the probability that a second universe identical with this one will arise in the future through some chance shuffling of energy, but we cannot speak with any mathematical meaning of the probability that our present system did so arise.

It may be argued that the conditions essential to life are eternally valid, and in this sense the specification of our present universe was laid down before its generation, and hence it is possible to speak of a probability that it would not arise by chance. This argument is not valid, however, for the question can only be raised subsequent to generation *by the life thereby made possible*. Thus it is only because it has arisen, and only because it is just that kind of universe, that we are here to speak of it; some sequence with infinitesimally small probability of repetition must arise from every chance shuffle of many independent entities, but human knowledge of such a system is only possible if it is our own particular type.

We, who cannot exist as animals outside of our present critical framework, can have no conception through our own reasoning powers of that which lies in the infinity of time before and after

our transitory 'present,' nor have we yet attained to certainty as to what lies in space beyond the horizon of observation. We only know for certainty that within an extremely narrow range of time, and on a planet of infinitesimal size, life is possible. Hence we have no solid basis of fact on which to calculate the probability that within the bounds of space and time a single planet such as ours might arise by chance: only by faith in a 'revelation' can knowledge of such matters be obtained.

However strongly therefore we may feel that 'downright common sense' makes obvious the correctness of this particular argument, we must reluctantly lay it aside as one of those mathematical paradoxes which exist as a trap for the unwary. The argument is useful only in so far as no second universe is known to exist identical to ours, and the Bible implication that the earth is a unique system remains unchallenged.

THE ARGUMENT FROM DESIGN.

A second ontological argument, which is closely akin to that from probability, stresses the existence of design in the living body. Although used considerably before his day, it was Paley who made this argument so popular, and who exploited it to the full in terms of his contemporary knowledge. An excellent and powerful statement of the same argument in terms of our own scientific outlook has recently appeared from the pen of Dr. R. E. D. Clark (*The Universe, Plan or Accident?*), and the reader is referred to this for the vast mass of detail with which it may be supported. The book may be summarised by saying that it demonstrates beyond all reasonable doubt the existence of design throughout the universe.

The ontological argument, however, requires a further step beyond this point, and it is in this step that the weakness lies. It is argued that the existence of design necessitates the existence of a designer, and hence the existence of God as a purposive cause is demonstrated. The weakness is seen at once when we realise that this step is an argument from analogy. Every non-living mechanism on this earth constructed of minerals and other materials is the product of a human designer: it is argued by analogy that every living mechanism on this earth constructed from organic chemicals in the form of living cells must be the product of a superhuman designer. Unfortunately, argument from analogy can never at best be a certain demonstration, but can only yield a probability.

Man, beyond all question, is the product of his framework, and the rationalist who does not believe that God forms any part of that framework would argue that the universe which has arisen by chance is one which chances to produce the consistent pattern which we call 'design.' Hence man, the creature of a universe manifesting design in every direction, himself works in accord with the pattern 'built in' to him, and produces his own smaller designs. Hence, he would argue, design in nature is the cause of human design. Argument by analogy back to a divine designer really rests on acceptance of the Bible statement that man was made 'in the image of God.'

It appears therefore that the 'design argument' is not a logical demonstration of the existence of God, but depends on an act of faith to justify use of the analogy between man as a limited cause, and the universe as a comprehensive effect of a primal cause. It does however serve an extremely useful purpose as a negative argument; if the Bible is correct in claiming God as universal creator, and man as made in 'His image,' then we would expect just such a design pattern as is found in the universe: no inconsistency can be advanced by science, but the existence of God is logically consistent with the observed facts.

SYSTEMS OF NATURAL THEOLOGY.

A broader, and possibly less ambitious, aim of natural theology has been to establish by observation and pure reason the nature of God and the principles of His operations with man. This argument also proceeds on analogy; assuming that there is one transcendent God, who has created the universe and is directing it towards an intended consummation, and whose mode of action is analogous to that of man, the design pattern of the natural world is projected on to the 'spiritual nexus' and thus the form of those things which cannot be seen and handled is postulated. There are two directions in which this argument may proceed: either the revealed system in the Bible may be compared with the natural world and a close analogy demonstrated, thus arguing for the truth of the Bible; or, by assuming such analogy and ignoring much of the biblical detail, an independent system of theology may be constructed. In many cases treatments have been given which are a mixture of the two methods.

As typical of the first approach, the presentation by Butler (*The Analogy of Religion*) may be cited. It was assumed by Butler that if he could successfully demonstrate the same design pattern in nature and revelation, he had established the truth of the latter. We have already seen, when considering the ontological aspect, that the establishment of design does not necessarily prove the existence of a designer, and the same answer can be extended by the rationalist to cover this case. Since he assumes the Bible to be a human product, he would argue that the design in revelation is the work of the human intellect, and that man as nature's child will reproduce the design pattern of his greater parent. All therefore that Butler has been able to prove by establishing the analogy is that the contents of the Bible are consistent with its being the revelation of the God who designed, created, and maintains the universe. Again we meet the inherent limitation which restricts natural theology to the rôle of providing a negative argument. In this case, however, the value of the argument is extremely great: the rationalist has done all in his power to produce reasons for disbelieving in the God of the Bible, and the series of negative arguments which natural theology presents are of positive value in preventing a charge that the Bible is logically inconsistent with observed facts.

As an example of presentation which is a combination of both methods we may note the book *Natural Law in the Spiritual World*, by Henry Drummond. He seeks to demonstrate the same analogy as Butler but, having done so, to press that analogy in extra-biblical directions to expand and supplement revelation. The limitations of both methods will apply to such a treatment.

The second approach is one which may be exploited in a myriad ways: it has been handled so diversely by many writers that it is difficult to find any common denominator, or typical method. Two very different examples may be cited to illustrate both the breadth of field covered and the diversity of aim and result. To show how widely the results may differ with the personality of the writer, the two examples were chosen from men in a similar walk of life—leaders of English religious thought. As a first example we may consider the Gifford Lectures of Dr. Barnes. The spirit of the work is best illustrated by the opening words:

“ The Christian Church at an early period of its existence

took over from the Jews beliefs as to the creation and early history of the world and as to the origin of man. Such beliefs, as every educated person knows full well, can no longer be accepted. The beliefs, however, formed a background to Catholic theology and were consequently associated with the Christian idea of God. That idea rests primarily on the teaching of Jesus of Nazareth; and it is not erroneous to say that He regarded it as an intuition which man's richest and deepest spiritual experience would confirm. But human thought naturally and rightly refuses to rest content with such an intuition. The God to whom man's spiritual experience leads him must be also the God revealed in Nature."

Thus, all idea of an authoritative revelation is set on one side; it is man who approaches to God, not God to man; it is from the laws of mathematical physics that we are to infer the nature of God. The fact that science changes with each generation is cheerfully accepted as a reason why religion and theology shall also be different in every age.

The second example is that of Dr. Temple who, in his two books *Mens Creatrix* and *Christus Veritas*, seeks to explain æsthetic value in terms of Christianity. He also may be quoted for aim:

"The argument of this book is as follows. It traces the outline of the Sciences of Knowledge, Art, Morality, and Religion, as the author understands these, not pausing to discuss what is disputable, but merely affirming the position which is adopted. The four philosophical sciences are found to present four converging lines which do not in fact meet. Man's search for an all-inclusive system of Truth is thus encouraged and yet baffled.

"Then the viewpoint changes. The Christian hypothesis is accepted and its central 'fact'—the incarnation—is found to supply just what was needed, the point in which these converging lines meet and find their unity."

His second book starts from the position established in the first, and works out a system of theology which is based upon revelation as the primary authority, but which uses all philosophy to supplement it and yield still further information concerning God.

However strongly these approaches may be pressed, Herbert Spencer's objection still robs them of supreme authority as a

demonstration. Christian theology is concerned with a spiritual world where gravity and molecular forces do not exercise the supreme rôle which we find in nature: the risen Christ could pass through wall or door into a locked room, and His presence only excited the physical senses of His disciples when He chose that it should. Spiritual entities are not susceptible to experimental examination in the laboratory, and hence the analogy between natural and spiritual, however probable, may never be demonstrated and must remain a postulate of faith. As an aid to the Christian philosopher in the synthesis of his knowledge it can, however, be invaluable.

The new Continental school of theologians, of whom Karl Barth is a notable example, would deny to natural theology any useful function whatsoever, and would postulate that any knowledge of God can only be assimilated with direct and miraculous intervention by God in the mental life of the believer. This point of view is as inaccurate an extreme as is that which would say that only through physical science may we find knowledge of God. Though natural theology may not, due to its limitations, usurp the authority of revelation, it can act as an extremely useful supplement to infuse fundamental meaning into the values of philosophy, and to add extensively to our knowledge of God as the architect of the universe. This matter will be more fully considered in the next section.

THE BIBLE VIEWPOINT.

A Christian is one who accepts the authority of Christ, and, in consequence, has his Lord's reverence for Scripture as God's revelation. The rationalist, on the other hand, does not accept the fact that God has spoken: from his viewpoint, out of primitive awe sprang animism, and hence, in slow succession, demonism, polytheism, monotheism, agnosticism. To him, the Bible is but one of many human records of man's slow progress through the later stages of polytheism into the heights of monotheism; it is a human effort, albeit a great one, and not a divine revelation. Unfortunately, this view is not the prerogative of the rationalist, but has been accepted by many Christians without realising how widely it is astray from their Lord's teaching. If this outlook be adopted, then the Bible is considered to be only the earliest record of Jewish natural theology, and as such will be subject to all the limitations inherent in natural theology. To the man thus placed there can

be no certainty or authority, but due to the limitations considered above he is lost in a haze of uncertainty.

The view that man's religious history is a record of gradual development and progress from animism upwards is not so universal among scholars as some would like to think, and several authorities competent to speak on the subject have denied its validity. The Bible itself lends little support to the position, for some of the earliest books contain theology approaching in ethic the final Christian outlook, and textual critics have been forced to postulate fragmentary assembly by a late editor to explain the lack of 'religious evolution' in its present arrangement. Stephen Langdon, who was one of our most competent Assyriologists, interpreted Sumerian and Accadian sources as indicative that monotheism was the original Semitic religion.¹ Wilhelm Schmidt² has also argued for a primeval *revelation* of a supreme God, with the rudimentary religion of present-day 'backward peoples' as a degeneration normal to a backward race. Since these two scholars published their work, publication of the Ras Shamra texts has revealed that primitive Phoenicia had a supreme God instead of the pantheism supposed. In his fourth Schweich Lecture on the subject, Schaeffer says: "This supremacy of El is a clear indication of a monotheistic tendency in the Canaanite religion." C. H. Gordon, in his translation of the texts (published by the Vatican), notes that these records have shown how false was the basis on which Frazer's advocacy of development in *The Golden Bough* rested:

"As an object lesson, we may turn to the accepted view of the fertility god Baal who is incorrectly identified with a mixture of real and imaginary motifs including the Dying God of Frazer's *Golden Bough* . . . the evidence for this is of the most specious character. . . . Before the discovery of the Ugaritic texts, this Greek version was read back into Phoenician mythology . . . the widespread notion that the year in Canaan is divided into fertile and sterile seasons is false. No part of the year is sterile. . . ."

The Bible teaching on this matter is very clearly set forth by St. Paul in the first chapter of his epistle to Romans. We are told that God revealed Himself to early man as recorded in

¹ *The Mythology of All Races*, Vol. V, *Semitic Mythology* (Arch. Inst. of America).

² *The Origin and Growth of Religion* (trans. H. J. Rose).

Genesis, and that man fell away into cruder forms of polytheism and idolatry. This statement of St. Paul is of much more importance than a mere support for the Genesis account, it gives his own views on the limitations of natural theology. It was man's dissatisfaction with revelation, and his desire for something more complicated which should be the product of his own intellect, that led to the degeneration. Hence, St. Paul, in this argument, points to a general natural theology which led earliest man seriously astray, and was instrumental in his moral degeneration. When he says that "the invisible things of Him since the creation of the world are clearly seen, being perceived through the things that are made," he is not invalidating the argument, for he specifies that it is the "everlasting power and divinity" to which creation witnesses. He refers to the perpetual witness of creation to the greatness of the Creator Whose existence had been *revealed* to man.

That St. Paul did not view the natural theology of his own day in any more favourable light we may gather from his first letter to Corinth. With an eye to the Gnostic absurdities then springing up, he outlines the impotence of human wisdom unguided by divine revelation. When he came among them, he determined not to speak in terms of man's wisdom which had led to the crucifixion of Jesus, but to adopt God's way which he describes as the "foolishness of the preaching." His words in this connection form an excellent summary of his views :

"For seeing that in the wisdom of God the world through its wisdom knew not God, it was God's good pleasure through the foolishness of the preaching to save them that believe."

The teaching of the Old Testament on this subject is so vast, as to require a paper on its own to examine the details: with this as excuse, only the judgment of a single scholar well fitted to judge will be quoted as evidence that it relies primarily on revelation rather than scientific investigation. Dr. A. B. Davidson says :

"Now, thirdly, as to the channels through which this knowledge reaches man, or the regions moving in which man knows or comes to the knowledge of God. Those that Scripture recognises are very much what we insist upon to this day, viz. *nature*, *history*, the human *soul*. But I think Scripture does not make quite the same use of these

things as we do in our Natural Theology. For example, I doubt whether it regards these as primary sources of our knowledge of the existence or of the character of God. The position it assumes is not this: Contemplate nature and you will learn from it both that God is, and what He is; but rather this: You know that God is and what He is; and if you contemplate nature, you will see Him there—the heavens declare the glory of God . . .

“The Old Testament, as it spoke chiefly to a people having a knowledge of God from revelation, insists mainly on recognising that God of revelation in nature; but it also appeals to nature to correct the ideas of God given by revelation when the people had perverted them.”¹

In a recent work (*Revelation and the Modern World*) Thornton has analysed the various aspects of revelation. He would see in nature the instrument of God through which and by which He supplements His special revelation through prophets. By viewing the course of history with the eye of faith, recognising in it the working of God and fulfilment of His purpose, a fuller and more detailed appreciation may be obtained of His nature. Thus his definition of ‘natural religion’ is not that usually adopted, but it points decisively towards the Bible attitude, and indicates the divinely intended use for natural theology in all its aspects.

CONCLUSION.

The circumstances of early Church history tended to divorce the development of natural theology from a close consideration of revelation, and in consequence it has come to be considered as an alternative and independent method of obtaining knowledge of God. Modern philosophy has probed the subject of ‘reality’ behind scientific concepts, and indicated that a knowledge of the transcendent can never be obtained by physical experiment. Since all natural philosophy will inherit the limitations inherent in the observations upon which it is based, it follows that through natural observation alone a certain knowledge of the spiritual world can never be attained. Only by an ‘act of faith’ in revelation may the initial step of postulating the existence of God be taken, and natural theology becomes an adjunct to revelation rather than an independent source of information.

¹*The Theology of the Old Testament* (T. & T. Clark, 1911), pp. 78–79.

While failing in their object to demonstrate the certainty of God's existence, the various modern arguments of natural theology have succeeded in demonstrating that there is no inconsistency between the observations of physical science and the revealed God of the Bible. Despite their limitations, therefore, they have been of considerable value in combating the attacks of rationalism, and in this direction have performed a task which revelation by itself was powerless to achieve. It is suggested that in this field of rapprochement between religion and science lies the most effective exercise of natural theology.

Perhaps the least useful exercise lies in the endeavour to obtain knowledge of God's nature from natural observation. Since the 'act of faith' in a revelation must in any case be the basis for a belief in His existence, and since that same revelation in the Bible contains a fund of information concerning the personality of God, the amount of information to be obtained from science is small indeed by comparison. The Bible itself would suggest that when exercised in independence of revelation, human speculation upon God tends to lead men seriously astray, and that the main use of such enquiry is to correct initial errors of men who are still bound to revelation, but not as familiar with it as they should be.

It is seen therefore that any relationship with the 'absolute' must be founded upon faith. Natural theology is powerless apart from revelation, and can never therefore be its enemy; the proper rôle of natural theology is as hand-maid to revelation, and its limitations are such that it can never become the more important partner of the two.

DISCUSSION.

The Chairman (Dr. E. WHITE) said: Perhaps one could sum up Mr. Lovelock's paper by saying that the existence of God can neither be discovered by science nor proved by logic. Thousands of years ago it was written by an old sage, "Canst thou by searching find out God?" Ultimately we can know anything about God only by revelation.

Perhaps it is an unduly sceptical attitude toward the universe to say that "philosophy has now discovered that each personality is a closed system which can never obtain knowledge of such reality through experiment." I very much doubt whether all philosophers would accept this view. It depends upon what is meant by

“reality.” If by reality we mean an external world which is “not-me” in antithesis to me, it is surely necessary to accept such reality as existing. Otherwise how could we carry out any experiments at all? The fact that we can weigh and measure things surely implies that there are things to be weighed and measured. It seems to me a fallacy in Berkeley’s philosophic reasoning to conclude that the universe exists only in our minds and in the mind of God. As Bertrand Russell pointed out, however successful we may be in reducing everything to terms of our own sensations and perceptions, we cannot escape the inference that something real causes those sensations and perceptions. Otherwise we are apt to fall into the delusion of some insane people who believe nothing is real, and withdraw into a world of fantasy and illusion of their own making.

What Mr. Lovelock says about the support given by Natural Theology to revealed religion is of value. As far as possible we should seek to synthesize our knowledge and beliefs into a consistent whole. It is a great aid to our faith if we are able to integrate it with our scientific and philosophical knowledge.

Mr. B. C. MARTIN said: Whilst appreciating as a whole Mr. Lovelock’s interesting paper, I do not find myself in entire agreement with his remarks (on page 147) in regard to St. Paul’s view of natural theology. Whilst agreeing that “it was man’s dissatisfaction with revelation and his desire for something . . . of his own intellect that led to the degeneration,” surely it was not natural theology which led him thus astray, but his neglect of it!

St. Paul’s argument in Rom. 1 seems to be that in spite of man’s forgetfulness of God’s original revelation of Himself, He can know enough of God in nature to be “without excuse” if he fails to glorify Him as God, and to be “thankful.” Man as a whole failed to respond to this limited revelation—he turned his back on this “natural theology,” which expression I take to mean the theology based on God’s revelation of Himself in Nature, Providence and Conscience.

But there were exceptions as is clear from the next chapter—those “who by patient continuance in well doing seek for . . . eternal life” (v. 7); those who “do by nature the things contained in the law . . . which show the work of the law written in their hearts, their

conscience also bearing witness" (v. 14 f.); and the "man that worketh good" (v. 10). Such had genuine "natural religion"—in spite of Karl Barth! "In every nation he that feareth God and worketh righteousness is accepted with Him" (Acts 10 : 34).

This natural theology, however, had severe limitations. It had nothing to say on the nature of man, his sin, his destiny, nor on God's essential character, His purposes and will for mankind. It is therefore somewhat of an anachronism in a day of "special revelation." Nevertheless, it was God's witness—without which He never left Himself (Acts 14 : 17)—in other times and climes, and man, if he chose, could rise to considerable heights under such a regime, as can be seen in such a man as Socrates who "confessed his ignorance and deplored the want of superior direction," and the Athenian poets who, without debt to "special revelation," were able to say with remarkable insight, "For we are also His offspring."

Mr. TITTERINGTON said : I should like to express my appreciation to Mr. Lovelock for a very interesting and stimulating study. I like particularly the way in which he has shown the inadequacy and inconclusiveness of Natural Theology in every field of approach.

But I was rather surprised to see that at the outset he seemed to take a somewhat limited view of what is comprehended in the term, and thus gave Natural Theology so late a date for its beginnings. Later on, it is true, when he comes to discuss the system of Natural Theology, he broadens the scope of his study ; but in the main he seems to have confined himself largely to the modern form of Natural Theology, rather than to Natural Theology in its wider sense. I think, if I may be pardoned the suggestion, that it would have conduced to clarity if he had given us a definition of that of which he was intending to speak.

If I may venture a definition of my own, I would suggest that Natural Theology is that Theology that is the product of man's own mind. It can be based on observation and deduction, or, as in the case of the Greek thinkers, on argument from *a priori* assumptions, the insecure basis of which Mr. Lovelock has very clearly expressed. But in its earlier form Natural Theology was mainly of the former kind ; that is, it was based on a consideration of natural phenomena, and the limitations of this kind of Natural Theology are not the same

as those of the more speculative kind, though they are real enough. Modern Natural Theology seems to be a compound of the two elements, and this is particularly apt to be dangerous, because it is not easy to disentangle the elements, and indeed the attempt to do so is not always made. The result is that purely philosophical speculations are given a validity that belongs only to ascertained fact. This is very often seen in Natural Science, and is equally true of Natural Theology.

Natural Theology of any kind must, from the very nature of the case, take its content from the knowledge of the time, and this is always coloured by the mode of thought of the time—what I suppose Alan Richardson would call the “ideology” of the age. This is something which is subject to constant variation—how much it can change in the course of a single lifetime can be seen even from a comparison of our own *Transactions* during the course of our short history. The shape of Natural Theology thus varies from time to time ; it must therefore be always unstable and inconclusive.

It is true that in Old Testament times, and in Bible lands, this instability was not apparent. Knowledge did not increase rapidly, nor was there much change in the mode of thought ; and the position was more static. But this position was again illusory, as the limitations of both knowledge and thought were so easily concealed.

The conclusions of Natural Theology are therefore vitiated at all times by the imperfection of our knowledge and our reasoning ; but, as St. Paul shows, they are still more vitiated by the “depravity” of our minds in consequence of the Fall, so that when man *could* have arrived at some measure of truth, he has always, in the mass, failed to do so.

The well-known passage in Rom. 1, which has been so often quoted in our recent discussions, as well as in this paper, calls for a closer examination than I think it has yet received. In the first place it is a complete answer to what I understand to be the Barthian position, that would deny to Natural Theology any value at all—and here I am in hearty agreement with our author. But I am not sure that I can wholly accept his argument that its value is only supplemental to Revelation. St. Paul’s argument seems to be that even where Revelation has been entirely lacking, God has not left Himself without witness (cf. Acts 14 : 17 on this point), and that

men are to be judged according to the heed they have paid to this witness, and condemned where they have neglected it, or distorted its message. That knowledge derived in this way is not sufficient to bring man into saving contact with God is not the point; God judges men according to the light they have, and this light is not wholly lacking (see Acts 10 : 35).

At the same time, St. Paul does in this passage define the limitations of this kind of knowledge: "His eternal power and Godhead." It would be interesting to consider at length precisely what is comprehended in these expressions. Here, I would suggest that Scripture itself gives a clue, from the form of argument from natural phenomena in such passages as Is. 40, or the later chapters of Job.

On one point I must part company with Mr. Lovelock, and this is in the quotation from Hatch in reference to the Creeds, which he appears to cite with approval. Surely the antithesis Hatch draws between the Sermon on the Mount and the Nicene Creed is false. The antithesis would not be nearly so apparent if, instead of the Sermon on the Mount, he had based his comparison on some other pronouncements by our Lord, such as in the fifth or eighth chapter of St. John. The purpose of the Sermon on the Mount was wholly different. Historically too, the Creeds were not designed to "freeze debate"—at least legitimate debate—but as a very necessary safeguard against very definite and very dangerous errors and heresies, more particularly the Arian heresy. The Apostles' Creed is composed almost entirely of phrases taken direct from the Scriptures, and the amplifications found in the Nicene Creed are surely legitimate deductions from the Scriptures. Statements in credal form are indeed not lacking from the New Testament, as for instance in 1 Tim. 3 : 16.

Mr. W. E. FILMER said: Mr Lovelock dismisses the argument from probability as "one of those mathematical paradoxes which exist as a trap for the unwary." It is true, as he says, that it is without meaning to discuss the probability that any one sequence of events came about by chance. But it is not without meaning to discuss the probability that a sequence of ten letters drawn out of a bag would make sense as an English word. If the five letters MANIP had already been drawn, the odds would be 255 to 1 against a further

five letters making an English word, since the sequence ULATE is the only one which would do so.

In the same way, having been given the chemical properties of carbon, oxygen, hydrogen, etc., it is not without meaning to calculate the odds against a world existing where the temperature lies between 0 and 150° F., for unless such a world exists, no sense can be made of the chemical properties of the elements, for these demand a world of this kind in which to manifest themselves. I consider that the argument for the existence of God as set forth, for example, in Dr. Sutherland's Gunning Prize essay of 1940 is sound.

Nor do I consider it scriptural to dismiss Natural Theology as virtually valueless. Weymouth's translation of Rom. 1 : 18-20 reads, "For God's anger is revealed from heaven against all the impiety and the wickedness of men who through their wickedness suppress the truth; because what may be known of God is plain to their minds; for God has made it plain to them. From the very creation of the world, His invisible perfections—namely, His eternal power and divine nature—have been perceptible and clearly visible from His works, so that they are without excuse." Moffatt gives a similar rendering of Paul's argument that man is without excuse if he does not know that much about God. This seems to me a clear statement that Natural Theology does provide certain evidence about God, although very limited without the special revelation given in the Bible.

WRITTEN COMMUNICATIONS.

Mr. F. F. BRUCE wrote: First of all, I should like to congratulate Mr. Lovelock on winning the Gunning Prize. I have much enjoyed reading his essay, although I think he dates the emergence of Natural Theology too late.

Even before New Testament times, the interaction of Hebrew and Greek thought, especially in Alexandria, led to a considerable advance in Natural Theology, of which the writings of Philo and the Book of Wisdom are outstanding monuments. In the second half of the first century A.D. a Hebrew Christian of Alexandria went further than his fellow-citizens of an earlier generation had been able to go, and declared that Jesus Christ was the true Divine Wisdom which one of these writers had described as "a clear effluence of the

glory of the Almighty . . . an effulgence from everlasting light, an unspotted mirror of the working of God, and an image of His goodness." Nor is he the only first-century Christian writer to find in Greek philosophy a general preparation, as Hebrew revelation was the special preparation, for the advent of Christ and the full manifestation of God in Him.

In the second century, Justin Martyr very suggestively develops a rudimentary synthesis between the Logos of the Fourth Gospel and the Logos of the Greek philosophers. And Augustine, more than two centuries later, was led a good distance forward on his pilgrimage towards Christianity by studying the works of Plotinus and other Neoplatonists in Victorinus's Latin translation. But Augustine's account of these writings shows the inevitable limitations of Natural Theology. In them he read in substance what he also found in John 1 : 1-10 ; " but that . . . ' as many as received Him, to them gave He the right to become children of God, even to them that believe on His name '—this I read not there. Again I read there, that God the Word was ' born not of blood, nor of the will of the flesh, nor of the will of man, but of God ' ; but that ' the Word became flesh and dwelt among us ' I read not there." True incarnation and redemption, it appears, must be divinely revealed ; Natural Theology does not reach far enough to discern them clearly. So even the Christians of the earliest centuries A.D. grasped the fact which Mr. Lovelock establishes on the basis of more recent work in this field, that " the proper role of natural theology is as handmaid to revelation, and its limitations are such that it can never become the more important partner of the two."

If Mr. Lovelock were a theologian I should be inclined to comment in some detail on his quotation from Hatch contrasting the Sermon on the Mount with the Nicene Creed, and on his account of the definition of dogma in the early Church. In both these respects I think he over-simplifies the issues. But that a distinguished engineer should make this incursion into the theological field at all, and acquit himself so creditably as to bear away the palm, calls for hearty felicitation.

Dr. H. TOWNSEND wrote : Had I been able to be present on 17th March, I should have warmly congratulated Mr. Lovelock on his essay. The construction, and the contribution to the Philosophy

of Religion are admirable. I hope the essay will have wide publication. His evidence on the scientific aspect would have been helpful to me had I still been lecturing.

A fair amount has been written in recent years on "Natural Law." The revival of the mediæval argument by small groups of theologians has been seriously discussed. The conception of the law of Nature has had considerable influence on Christian ethical theories: *jus naturale*, *lex naturalis*, *jus gentium*.

The Stoic conception of Natural Law was based on the claim that the Universe was rational and moral. When a man ordered his life according to reason, which was immanent in the Universe and in his own nature, he attained the highest moral standard. The Church Fathers followed Plato and the Stoics and argued that such natural law was expressed in the Decalogue: that such natural law was identified with God's Law. And Canon Law was based on Natural Law. Also *jus gentium*—the Law of Governments—was based on Natural Law. By such arguments the schoolmen built a system of Natural Theology. I prefer Mr. Lovelock's argument of the Limitations of Natural Theology.

Mr. DOUGLAS DEWAR wrote: Although I greatly appreciate Mr. Lovelock's most valuable paper, I am constrained to say that it seems to me that the author does not realize the potency of the argument from probability. To compare the origin of a living organism from inanimate matter with the sequence of heads and tails in a thousand spins of a perfectly balanced coin is on a par with comparing Mount Everest to a molehill.

So complicated is the simplest living organism that it can safely be asserted that it cannot have come into existence by the chance combination of atoms and inorganic molecules, and that no living organism will in future originate in this manner.

In support of this contention I here reproduce some remarks I made in letters which were published in *The Listener*, of November 1st and 15th, 1948:

"As Prof. V. H. Mottram pointed out in a B.B.C. broadcast in April, 1948, the odds against the chance formation of a protein molecule are one hundred multiplied by itself 100 times to one. And the simplest living organism is composed of a number of different kinds of protein molecules. Not only would at least one of each of

these kinds or molecules have to originate simultaneously and in close approximation, but one of each of these would have to combine with one of each of the other kind so as to form a living organism, and this would have to maintain itself intact and undergo a number of changes before it acquired the known (to say nothing of the unknown) characters of a living organism.

“One of these characters is the ability to capture inorganic elements and compounds, assimilate these and convert them into its tissues. This process would involve a series of co-ordinated chemical reactions which no chemist has succeeded in bringing about, and which apparently are only made possible by the concerted action of a number of enzymes and co-enzymes, each of which is of so complicated a nature that the odds against its arising by spontaneous chemical processes are very great. Each of this array of enzymes must be a catalyst taking part in a different chemical reaction. Therefore, in the words of Kermack and Eggleton (*The Stuff we are made of*), we must imagine the enzymes to be arranged in the right order so that each one comes into action at the exact point at which it is required, just as in the mass production of motor cars each worker does his little part and the car passes on. Unless the chain of reactions is complete the required result is not attained. As Dixon points out (*Multienzyme Systems*), the appearance of one or even several enzymes would be entirely ineffective unless they happened to form a complete chain with no link missing. The odds against all this happening by chance approach infinity.

“Moreover, if life originated in a liquid medium, the first bit of living matter would have to be surrounded by a membrane ‘to keep the constituents of the system in effective concentration.’ The odds against this membrane with its peculiar properties being formed by chance in the nick of time are prodigious.

“Then the first living organisms must have had the power of self-propagation, and this power necessitates exceedingly complicated structure.”

In fact the simplest living organism seems to be more complicated than any man-made machine. If it be improper to say that such an organism cannot possibly have been created by blind physical forces, it is equally improper to say this of the wheeled vehicle.

I submit that, in order to believe that the argument from proba-

bility can be successfully met, a man has to refuse to exercise his common sense—an attribute which distinguishes him from all other members of the animal kingdom.

The above submission applies equally to the belief that the argument from design can be successfully met. The use of the term design implies a designer, i.e., a being endowed with the capacity of conceiving a plan and with the power of carrying out the plan.

I agree that “the existence of God is logically consistent with the observed facts.” To this I would add “But the observed facts are inconsistent with the non-existence of a Designer.”

Lt. Col. L. MERSON DAVIES wrote: While appreciating Mr. Lovelock’s paper as a whole, I cannot follow some of his reasoning. As a lifelong Bible student, and a working palæontologist of many years’ standing, I regard the Bible as being unique among religious books, and the evidence of design in nature as being of such a kind that its origin without a Creator is unthinkable.

As Mr. Lovelock says, Dr. R. E. D. Clark has demonstrated “beyond reasonable doubt the existence of design throughout the universe”; and even Prof. Einstein declared that this “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, p. 28). It is also remarkable that the Bible indicated the importance to man of many factors upon which his comfort and very existence depend, long before human science learned to appreciate their importance. Was that due to chance? Besides this, the Bible abounds with genuine prophecies undoubtedly written many centuries before the events which fulfilled them. Was that also due to chance? One cannot detail these things in a letter, but I have discussed them elsewhere (e.g., in *The Credentials of Jesus, The Bible and Modern Science*, and in my paper “The Present Status of Teleology,” *Trans. V.I.*, 79, 1947). Indeed, our modern doctrine of exclusive Continuity (*alias* Uniformity) was expressly foretold as characterising the last days, although it was only accented by geologists about a century ago; and it led—just as Scripture predicted—to denial of the Noachian Deluge, and to belief in wholesale organic evolution. See my papers on the doctrine of Continuity, and on the Flood (*Trans. V.I.*, 61, 1929 and 62, 1930).

The rationalist who, as Mr. Lovelock tells us, argues "that the universe which has arisen by chance is one which chances to produce . . . 'design';" is assuming that the universe did actually arise by chance; and that assumption he is unable to justify, as I showed in my 1947 paper. And if, as Mr. Lovelock rightly says, the rationalist "assumes the Bible to be a human product," how does it come to possess its unique qualities—anticipating scientific appreciations by thousands of years, and likewise predicting events and developments many centuries in advance?

AUTHOR'S REPLY.

I would like to thank all eight of the commentators for their kind remarks and the interest they have shown in the paper; it is inevitable from the controversial nature of the subject that there should be considerable scope for discussion, and in replying briefly to the various points raised I would like to stress that I feel much less certainty upon them than the brevity of the reply might lead them to infer.

Dr. White raises the question of our knowledge concerning the external world, and I would agree with him that we have as certain a knowledge of the *existence* of that world as we may have concerning any entity; when we descend from pure existence to the nature of that world, however, we have knowledge only of the interaction between it and ourselves—not of its own absolute nature.

Mr. Martin, Mr. Titterington and Mr. Filmer all made reference to the fundamental passage in Rom. 1, and I would plead in excuse for any ambiguity in the paper that this one passage would require the whole length of the paper for consideration in detail. Perhaps here it may suffice to point out that St. Paul was writing to a Church which accepted the Scriptures, and with them the postulate presented in Genesis that at the dawn of human history God revealed Himself to man. In actual fact man has never existed on the earth prior to the granting of a revelation, and the consideration of how man would react to nature in the absence of all tradition concerning or based upon revelation is hypothetical and not under consideration by the Apostle. He is saying that in the actual circumstances, man having descended from ancestors who had received a revelation, his observations of nature should have con-

firmed and supplemented his tradition so that he was not led away into the excesses which resulted from a positive attitude of "putting God out of their mind."

Mr. Titterington and Mr. Bruce both point out, quite correctly, that Natural Theology is of much earlier origin than those aspects considered in the paper: I must apologise for lack of definition in the paper of the very limited scope there considered. It seemed to me that the intentions of the Victoria Institute in seeking an essay were to combat the modern attitude of self-sufficiency for which excuse is sought by its adherents in Natural Theology, and the limitation of scope was intentional. My only excuse for ignoring what amounts to the major portion of the field lies in the subject. It was not natural theology as a system, but the limitations of that system which were to be considered, and it was possible to consider more detail in the limited scope of a single paper by dealing only with those limitations as met in our present century.

The same two commentators raise the matter of the Nicene Creed, and I am sorry if the quotation from Hatch was taken as an equation of Creed and Sermon as similar documents—this is not done by Hatch in the context, and was not intended in the paper. It is true, as pointed out in the comments, that the Creed was a comment and limitation on heresy, but its very existence is a comment on the type of thought which was then occupying the early Church, and the spirit of philosophy was obviously abroad in those days to a much greater extent than in Palestine A.D. 29. The only purpose of the quotation was to demonstrate briefly the existence of philosophy within the Church, and any criticism of the Creed would have been out of place in a paper on *Natural Theology*.

The question of "probability" is raised by two critics who question the paper in a fundamental point. It is true that the probability of repeating 1,000 spins of a coin is very much greater than that of repeating the universe—the argument did not proceed on magnitudes, but on the meaning of mathematical terms. To argue further on this point would necessitate the use of specialised vocabulary such as I have striven to avoid in this paper; as a practising statistician I would be happy to continue the discussion privately in much more detail should either of the commentators desire.

The final point calling for comment is that of "design." In this case there is not the rigorous certainty of mathematics, and the issue is the controversial one concerning the logical weighing of philosophical hypotheses. The existence of design cannot be in question, only the nature of it is under discussion. Two types of design fall within our experience, that produced by man, and that produced by nature; it is tempting to conclude that the greater design of nature is the product of a "greater man" (speaking in all reverence to point the analogy), but this does not *necessarily* follow from the facts. Until we are able to grasp within our own minds the totality of the universe, we shall never be able to say with certainty that only A can produce B.

In conclusion, thanks are due to all those who by contributing to the discussion have added materially to consideration of this subject, both by production of new facts, and by presenting a new outlook on old ones.