Science and the Future of Mankind
Pontifical Academy of Sciences, *Scripta Varia* 99, Vatican City 2001
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NATURAL THEOLOGY IN THE LIGHT OF MODERN COSMOLOGY AND BIOLOGY

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In this conference we are being told of many great discoveries of modern science about how the world works. I seek to persuade you that these discoveries in no way diminish, on the contrary they reinforce, the force of natural theology – of arguments from the existence and very general characteristics of the Universe, to the existence of its creator God. There are many such arguments which can be ordered by the generality of their premises – arguments from the existence of the Universe, from its being governed by laws of nature, these laws and the conditions of the Universe being such as to lead to the evolution of animals and humans, these latter being conscious, humans having certain limited powers to hurt or harm each other, etc. Having only limited time I shall discuss only the two arguments to the existence of God from there being laws of nature and their being such as to lead to the evolution of humans. The mistake made by the form of natural theology developed in the Aristotelian tradition in the Middle Ages was to suppose that such arguments are deductively valid. But fairly evidently they are not. If an argument from "there are laws of nature" to "there is a God" were deductively valid, then it would be self-contradictory to assert "there are laws of nature, but there is no God"; but that does not seem to be the case. "There are laws of nature, but there is no God" seems to describe a logically possible state of affairs.

I have argued, however, for many years[1] that these arguments have considerable probablistic force. Each one gives some probability to its conclu-

[1] See my *The Existence of God*, Clarendon Press, revised edition, 1991; and the short simplified version, *Is There a God?*, Oxford University Press, 1996. Much of this paper uses material published in these places and in shorter articles elsewhere.

sion; they are cumulative, and together they make the conclusion – "there is a God" – significantly more probable than not. I have sought to show how such arguments work with the aid of confirmation theory (that is, the calculus of probability, used as a calculus for stating relations of evidential support between propositions). I represent by $P(p|q)$ the probability of a proposition p on evidence q. I use Bayes's Theorem,

$$P(h|e \,\&\, k) = \frac{P(e|h \,\&\, k)}{P(e|k)}\, P(h|k)$$

to elucidate the relation between the probability of a hypothesis h on evidence of observation e and background evidence k, and other probabilities. To use this calculus does not involve supposing that exact values can be very often given to the probabilities involved. Often, all we can say is that some probability has some rough value – more than this and less than that, and that in consequence some other probability has some other rough value – close to 1, or fairly high, or less than that. The calculus sets out in a formal way the factors which determine how observational evidence supports a hypothesis (or theory). The relevant points can be made easily enough in words, but less rigorously and with their implications less clear. The calculus brings out that a hypothesis h is rendered probable by observational evidence e and background evidence k, in so far as (1) $P(e|h \,\&\, k)$ (the posterior probability of e) is high, (2) $P(h|k)$ (the prior probability of h) is high, and (3) $P(e|k)$ (the prior probability of e) is low. Background evidence is evidence about how things behave in neighbouring fields of enquiry (e.g., if you are investigating the behaviour of argon at low temperatures, there may be background evidence about how neon behaves at low temperatures). But when we are dealing with big theories of physics, and above all theories of metaphysics, there are no neighbouring fields of enquiry, and so we can ignore k by putting k as a mere tautology. $P(h|k)$ and $P(e|k)$ will then have values determinable a priori.

We have two different ways of explaining events which we use and think it right to use all the time. One is the way of inanimate explanation, typical of physics and much ordinary-life explanation. Here an explanatory hypothesis consists of initial conditions and purported laws. We explain the expansion of some object by it being copper and being heated (initial conditions) and there being a law that all copper expands when heated. The other way of explaining events is the way of personal explanation, typical of psychology, history and much other ordinary-life explanation. Here an explanatory hypothesis consists of a person (or other rational being), their

powers, beliefs and purposes. We explain the movement of my hand by me (person) having the purpose of catching your attention, the belief that I will do so by moving my hand, and my power at will to move my hand.

The first condition above ($P(e|h \& k)$ high) is satisfied to the extent to which you would expect to find e if h is true. Obviously a scientific or historical theory is rendered probable, in so far as the evidence is such as you would expect to find if the theory is true.

However, for any e you can devise an infinite number of different incompatible theories h_n which are such that for each $P(e|h_n \& k)$ is high, but which make totally different predictions from each other for the future (i.e predictions additional to e). Let e be all the observations made so far relevant to your favourite theory of mechanics – let's say General Relativity (GTR). Then you can complicate GTR in innumerable ways such that the resulting new theories all predict e but make wildly different predictions about what will happen tomorrow. The grounds for believing that GTR is the true theory is that GTR is the simplest theory. When k is a mere tautology, $P(h|k)$ is the intrinsic probability that h is true, that is, the measure of the strength of the a priori factors relevant to the probability of h. These factors are its scope and it simplicity. A hypothesis has large scope in so far as it makes many precise claims; and the larger the scope, other things being equal, the lower its intrinsic probability. But we can ignore this factor if we are comparing theories of similar scope, and, even when we are considering theories of differing scope, scientific examples show that simplicity is more important than scope for determining prior probability – for theories (which satisfy the other criteria well) of large scope are regarded as probable, so long as they are simple. The simplicity of a theory, like its scope, is something internal to that theory, not a matter of the relation of the theory to external evidence.

Let me illustrate the importance of the criteria of simplicity from an example when we are considering rival personal explanations. A detective investigating a burglary finds various clues – John's fingerprints on a burgled safe, John having a lot of money hidden in his house, witneses reporting seeing John near the scene of the burglary at the time when it was committed (which we summarize by e). He then puts forward a hypothesis (h) that John robbed the safe, which is such that it leads us to expect the clues which were found – $(Pe|h \& k)$ is quite high. But there are an infinite number of other hypotheses which have this property. We could, to take but one example, suggest that Brown planted John's fingerprints on the safe, Smith dressed up to look like John at the scene of the crime, and

without any collusion with the others Robinson stole the money and hid it in John's house. This new hypothesis would lead us to expect the phenomena which were found just as well as does the hypothesis that John robbed the safe. But the latter hypothesis is rendered probable by the evidence, whereas the former is not. And this is because the hypothesis that John robbed the safe postulates *one* object – John – doing *one* deed – robbing the safe – which leads us to expect the several phenomena which we find. The simplicity of a theory is a matter of it postulating few entities, few kinds of entity, few properties, few kinds of property, and ways of behaving which are unchanging in simple respects. The latter, if we are postulating persons as our entities, involves attributing to them purposes, beliefs, and powers which are constant over time, or only change in regular ways. If we are postulating natural laws, it involves using few mathematical terms and mathematically simple operations.[2] Of course, many accepted scientific theories these days seem to some of us quite complicated, but they are accepted because they are simpler than any other theory which satisfies the other criteria equally well.

$P(e|k)$, the prior probability of e (which for tautological k, is an intrinsic probability) is a measure of how likely e is to occur if we do not assume any particular theory to be true. The normal effect of this term in assessing the probability of any particular theory h, is that e does not render h very probable if you would expect to find e anyway (e.g. if it was also predicted by the main rivals to h which had significant prior probability). $P(e|k) = P(e|h \,\&\, k)\, P(h|k) + P(e|h_1 \& k)\, P(h_1|k) + P(e|h_2 \,\&\, k)\, P(h_2|k)$ and so on for all the h_n rival to h (where all these together with h are such that at least and at most one of them must be the true theory in the field). This value will clearly be determined largely by the terms n for which h_n has a relatively high prior probability, and which give to e a relatively high posterior probability. To the extent to which rivals to h which give e a relatively high posterior probability, themselves have a low prior probability (in comparison with h), the posterior probability of h will be high.

The hypothesis that there is a God is the hypothesis of the existence of the simplest kind of being whch there could be. A physical being will have spatial extension and thus consist of parts. Persons, as mental subjects, *need* not have spatial extension. God is the simplest kind of person they could be. A person is a being with *power* to bring about effects, *knowledge*

[2] For a full account of the nature of simplicity, see my *Epistemic Justification*, Clarendon Press, 2001, chapter 4.

of how to do so, and *freedom* to make choices of which effects to bring about. God is by definition an omnipotent (that is, infinitely powerful), omniscient (that is, all knowing), and perfectly free person; he is a person of infinite power, knowledge and freedom; a person to whose power, knowledge and freedom there are no limits except those of logic.[3] In virtue of his omnipotence he will not be tied down to operating on the world and learning about it by means of a body, and so he will not have spatial extension. The hypothesis that there exists a being with infinite degrees of the qualities essential to a being of that kind is the postulation of a very simple being. The hypothesis that there is one such God is a much simpler hypothesis than the hypothesis that there is a God who has such and such limited power, or the hypothesis that there are several gods with limited powers. It is simpler in just the same way that the hypothesis that some particle has zero mass or infinite velocity is simpler than the hypothesis that is has 0.32147 of some unit of mass or a velocity of 221,000 km/sec. A finite limitation cries out for an explanation of why there is just that particular limit, in a way that limitlessness does not. Although the existence of anything at all is perhaps enormously improbable a priori, the existence of God (h) as the existence of the simplest kind of being there could be has a far higher intrinsic probability ($P(h|k)$) than does the existence of anything else (except in so far as the latter is rendered probable by the former). Taking the inductive procedures of science and history seriously forces that conclusion on us.

It follows from God's omniscience and perfect freedom that he will be perfectly good. For being omniscient, he will know which actions are good. The goodness of an action provides a reason for doing it; and being perfectly free, he will be subject to no irrational influences. The worth of an

[3] In the Christian tradition God is "three persons in one substance", i.e. three persons each of whom have the listed divine characteristics, and have an essential unity – the Son and the Spirit being eternally and necessarily caused to exist by the Father. Arguments to the existence of God are then best construed as arguments to the existence of God the Father, from which the existence of Son and Spirit follows – in my view by logical entailment. The simplicity of God which I consider in the text is the simplicity of God the Father – that a simple theory has complicated consequences does not make it any less simple. I ignore this complication in subsequent discussion, for the sake of ease of exposition. For my own developed account of the divine nature see *The Coherence of Theism*, Clarendon Press, revised edition, 1993; and *The Christian God*, Clarendon Press, 1994. See chapter 8 of the latter book, for why the existence of the Father entails that of the Son and Spirit.

action alone will move him to perform it. So if there is a God, he will seek to bring about good things; and being omnipotent, he will be able to do so. So it is not improbable that he should create a universe, an orderly universe, and within it embodied rational creatures such as humans. It is good that there should be a beautiful universe. Beauty arises from order of some kind – the orderly interactions and movements of objects in accord with natural laws is beautiful indeeed. It is a further good thing that there should be human beings who can choose between good and bad, make differences to themselves, each other, and the world; choose whether to grow in power and knowledge, and so choose whether or not to enter into a loving relationship with God himself. Limited power means power over a limited region of the world, that is a body; and growing in power involves using our bodies to control things at a distance. But we have to know which bodily movements will make what difference to the world, in order to have an effective choice of which differences to make to the world – and that involves there being regularities in the world which are simple enough for us to detect. We can then use them to mould the Universe for good or ill – to develop an agriculture, and to make houses and bridges or bombs and prisons, and to send humans to the moon. With e as the operation of laws of nature, and their being such as (with initial conditions) to lead to the evolution of humans, P(e|h & k) is not too low. But unless there is a God, it is immensely unlikely that any Universe would be governed by simple natural laws. For natural laws are not entities. To say that all objects obey Newton's laws is just to say that each object in the Universe behaves in a way that Newton's laws state, i.e. has exactly the same properties of movement in reaction to the presence of other objects, as does every other object. It is immensely unlikely that every other object should behave in exactly the same way – a priori, unless there was a common cause of their having the properties they do. And any other possible cause (e.g. many gods) is much less simple than God. (Even if you suppose some impersonal cause to be just as simple a postulate as God, the simplest kind of person there could be, there is no reason why it should bring about this sort of universe.) And, in a world with natural laws, it is immensely unlikely that there would be humans unless either God made them by a special creation, or made just those natural laws and provided just those initial conditions which would allow the evolution of humans from some initial state of the Universe.

In 1859 Darwin produced his explanation of why there were complexly organised humans and animals in terms of the laws of evolution operating on much simpler organisms. His explanation is surely correct. But the ques-

tion then arises as to why there are laws of evolution which have the consequence that over many millennia simple organisms gradually give rise to complex organisms. No doubt becauuse these laws follow from the basic laws of physics. But then why do the basic laws of physics have such a form as to give rise to laws of evolution? And why were there the primitive organisms in the first place? A plausible story can be told of how the primeval 'soup' of matter-energy at the time of the 'Big Bang' gave rise over many millennia, in accordance with physical laws, to those primitive organisms. But then why was there matter suitable for such evolutionary development in the first place? With respect to the laws and with respect to the primeval matter, we have the choice, of saying that these things cannot be further explained, or or postulating a further explanation. In recent years scientists have drawn our attention to the strength of this argument by showing how 'fine-tuned' is the Universe. It needed a certain density and a certain velocity of recession of its matter-energy at the time of the Big Bang if life was to evolve; and increase or decrease in respect of density or velocity (or some other respects) by one part in a million would have made the Universe non-life-evolving. Likewise the physical constants of the natural laws had to lie within narrow limits if life was to evolve. If God made the natural laws and the initial state of the Universe, then – for reasons already given as to why he might well bring about humans – it is to be expected that he would give the initial state and the laws these features (or make some underlying laws – e.g. those of string theory – such that they gave the initial state + laws these features.) But if God was not responsible, the probability of such an initial state and laws of the requisite kind would be immensely low – even if there are laws of nature of some kind. With e again as the conjunction of the premises of our two arguments, $P(e|k)$ is not going to be too much greater than the top line of the right side of Bayes's Theorem – $P(e|h \& k)\ P(h|k)$ – because hypotheses rival to theism either have a far lower intrinsic probability than theism (e.g. the hypothesis that the Universe was created by a million gods)[4] or do not make it in the very least probable that e would occur (e.g. the hypothesis that chance determined the character of natural laws).

[4] Among the hypotheses rival to theism which make it probable that e would occur is the hypothesis that there are an infinite number of worlds, each with different kinds of law or different kinds of chaos and different kinds of initial conditions. But that seems a wildly less simple hypothesis than theism – to postulate an infinite number of (causally independent) entities in order to explain the occurrence of one entity runs against all the rules of inductive inference.

So arguments from the two phenomena which I have considered give significant probability to the existence of God. There is not time to develop the case further here, but my own view (argued elsewhere) is that when we add arguments from other phenomena and even when we bring into the equation arguments against the existence of God (e.g. from evil), we get a strong case for the existence of God.