

Committee 1
Scientific Objectivity and
Human Values

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SCIENTIFIC OBJECTIVITY AND THEISTIC BELIEF

by

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Science and religion are the two most powerful and most important forces in today's world as well as in the past. Their relationship also seems to be as much significant as their activities carried out independently of each other. "Few issues are of such moment in their combination of intellectual and existential dimensions, of head and heart, of the person and his or her culture, of the present and the past in shaping the course of the future".¹ Serious thinkers can approach the relationship between science and religion quite differently. Some maintain that there is outright conflict between science and religion that the two enterprises are essentially in competition. Others believe that there is not conflict but compartmentalisation, because the two enterprises are so very different that a clash is impossible. Still others seek a type of middle way, a complementary relation between science and religion. They hold that science and religion have some contact but without vicious border disputes.² There is also a certain degree of diversity of opinions among the thinkers who can be categorised as representatives of one of these three options.

In this paper, I am going to argue, perhaps with some sympathy and similarity with the third option above, that objective scientific knowledge and theistic belief may be interpreted as ally of each other, the two mutually supporting and complementary enterprises. This mutual and positive relationship has been more evident in recent years. On the one hand, some of the scientific discoveries and changing perceptions about issues of empirical fact have had an important impact on the rational establishment and interpretation of theistic belief. On the other hand, the historical importance of

metaphysical or theistic foundation for the rise of modern science has been recognised by more scholars. "Never in the histories of science and religion have the opportunities been greater for fertile interaction between these fields, with mutual benefits to both".³ In the limited scope of this paper, I will seek to explore only one side of this mutual relationship: the relation of scientific knowledge to theistic belief. In doing this, I will even restrict my interest in the physical sciences and the issue of the existence of God of theism.

It will be helpful to say a little about objectivity first and then explore the relation of scientific knowledge to theistic belief with an objective approach. It seems to us that there is a difference between being objective and being an objectivist, which is worth differentiating. Objectivism with respect to human knowledge is a "view which stresses that items of knowledge, from simple proportions to complex theories, have properties and characteristics that transcend the beliefs and states of awareness of the individuals that devise and contemplate them".⁴ Thus the objectivist "gives priority, in his analysis of knowledge, to the characteristic of items or bodies of knowledge that individuals are confronted with, independently of the attitudes, beliefs or other subjective states of those individuals".⁵ A similar concept employed in the theological context is neutralism. "The neutralist believes that our critical thinking will only be likely to help us toward the truth if it is completely impartial and unbiased. Thus to think rightly about religious matters we must put aside all our commitments, or at least those commitments which are religiously 'loaded,' and adopt a completely neutral stance".⁶

Many philosophers of science and philosophers of religion would today question whether such an objectivist or neutralist thinking is really possible. Even "a large proportion of contemporary philosophers seem convinced that the thing cannot be done - that there is *no* pure, assumption-free standpoint on which our knowledge can be based in a way that is independent of 'where we are coming from'".⁷ Perhaps the objectivist or

neutralist are right in urging us to strive to rationally evaluate our commitments independently of our attitudes and beliefs, to reflect on them critically and honestly in the light of evidence and argument. But "it is a mistake to think that this process of testing can or should proceed from a totally neutral standpoint, the standpoint of a person without any convictions".⁸

In this case, it seems to be possible and desirable to be objective without being an objectivist or neutralist. For "to be objective is not in most cases to be neutral or indifferent; nor does it prohibit the holding of previously gained, presently owned, presumed beliefs. Objectivity requires only that one be willing and anxious to test convictions against experience and logic, and to reform them accordingly".⁹ Objectivity may also be characterised as being conscientious in arriving at the truth and being honest in one's conclusion. "This honesty requires a willingness to see if the evidence really is best interpreted and explained according to one's own theory".¹⁰ This sense of objectivity seems to be both possible and desirable. Religion may share with science a concern for such an objectivity; and both theologians and scientists should seek to meet this reasonable requirement of rational reflection.

The Cosmological Argument and the Big Bang Theory

Scientific developments have had various effects on religious ideas of contemporary people. In this context, the Big Bang theory is one of the striking examples. It has some direct implications particularly on the cosmological argument for the existence of God. The Cosmological argument has been presented in many forms. They usually start from the very fact that there is a world or from such general features of it as change or motion or causation, and posit God as the cause of the world or of those general features. In one version or another, it has been used by Greek, Muslim, Jewish and Christian thinkers. By

the nineteenth century, however, philosophical theology, including the cosmological argument, began to feel the powerful sceptical influence of Hume and Kant. They argued that reason could never reach a justified conclusion about the existence of God by way of philosophical arguments.

Nevertheless, in recent years, some forms of the cosmological arguments have been effectively defended especially by two eminent philosophers, Richard Swinburne, and William Lane Craig. Swinburne formulates his 'Inductive Cosmological Argument' as mainly based on Leibnitz's version, which considers the universe as being an eternal entity. He puts it in simple words as follows: "There is quite a chance that if there is a God he will make something of the finitude and complexity of a universe. It is very unlikely that a universe would exist uncaused, but rather more likely that God would exist uncaused. The existence of the universe is strange and puzzling. It can be made comprehensible if we suppose that it is brought about by God. This supposition postulates a simpler beginning of explanation than does the supposition of the existence of an uncaused universe, and that is grounds for believing the former supposition to be true".¹¹ As Swinburne's version is mainly based on the principle of simplicity and not on the beginning of the universe in time, it does not have a close relationship with the Big Bang theory.

William Craig, on the other hand, formulates his '*Kalam* Cosmological Argument' as based on the version of such Muslim thinkers as al-Kindi and al-Ghazali. It is in this form of the argument that it has a close relationship with the Big Bang theory. According to Craig, the argument can be displayed in this manner:

- 1) Everything that begins to exist has a cause of its existence.
- 2) The universe began to exist.
- 3) Therefore, the universe has a cause of its existence.¹²

Craig holds that the first premise is intuitively obvious; nobody seriously denies it. The key premise is certainly the second: the universe began to exist. This premise had been

defended in the past by only philosophical reasoning such as the impossibility of actual infinite temporal series. Even if these sorts of arguments could have found some contemporary defenders, many other philosophers have been sceptical about them. In the view of Richard Swinburne, for example, there is not much hope for any *a priori* arguments to show that the universe had a beginning. But he argues, on the other hand, that there is some possible future in *a posteriori* arguments to show it.¹³ Indeed, the view that the universe have a beginning in time has received strong empirical support from scientific cosmology in recent years. Now the prevailing cosmological view among scientists is that the universe did have a beginning.

There are two rival theories related to the explanation of the universe, the one envisages a distinct origin of the universe in time, and the other simply describes it as being an eternal entity. In recent years, the Steady State explanation of the universe has diminished in influence because of the increasing evidence for its alternative, the Big Bang theory. The Big Bang theory was initially a pejorative nickname coined by detractors of the theory, suggesting that the universe began at a distinct point in time, in a cataclysm of unparalleled and unimaginable violence. Before the universe there was no time, no space and no matter, and it is thought that the potential for the universe was concentrated in one mass, known as a singularity. This singularity suddenly expanded about 15 billion years ago, resulting not only in the creation of vast amounts of hydrogen from which larger elements were produced by nuclear reactions, but also space itself. An interesting by-product of the origination of matter and space was time, which in effect a function of matter. So, a model of the universe which has an absolute beginning is not only logically consistent, but it also fits the facts of scientific experience and is now therefore easier to understand and to accept.

J. L. Mackie, a leading contemporary atheist philosopher, objects that "we should infer that it must have had *some* physical antecedents, even if the big bang has to be taken as a discontinuity so radical that we cannot explain it, because we can find no laws which we can extrapolate backwards through this discontinuity".¹⁴ This objection does not seem to be a strong one. For to speak about some "physical antecedent" does not seem to fit scientific descriptions of the Big Bang. Indeed, four prominent scientists describe the Big Bang in these words: "the universe began from a state of infinite density about one Hubble time ago. Space and time were created in that event and was all the matter in the universe".¹⁵

A condition of "infinite density" is "precisely equivalent to 'nothing'". There can be no object in the real world that possesses infinite density, for if it had any mass at all, it would not be *infinitely* dense. . . . What a literal application of the big bang model really requires, therefore, is *creatio ex nihilo*".¹⁶ It seems, therefore, that the Big Bang theory has clearly supported and confirmed the crucial premise of the cosmological argument for the existence of God. Thus, since everything that begins to exist has a cause of its existence, and since the universe began to exist, it may be concluded that the universe has a cause of its existence, a creator God.

The Argument from Design and the Fundamental Constants

The argument from design comes in different forms. However, it can be defined as an argument which usually proceeds from observations of teleological order in the world, through some sort of probabilistic or analogical reasoning, to the conclusion of God's existence. It is one of the oldest arguments for the existence of God. Historically, the golden age of the argument was the two centuries following the rise of modern science in the 17th century. The natural theology of Newton crowned it; and during the 18th century

numerous thinkers repeated and reinforced it. However, it was in the later years of the 18th century and during the 19th century that the argument met the philosophical criticisms of Hume and Kant, and the scientific criticisms of Darwin, which, for many people, demonstrated that it has no force.

In the twentieth century, however, it has been restated and revived, and has very recently gained acceptance among many scientists, philosophers, and theologians.¹⁷ Many factors could have played a role in this. To begin with, there has been a recent change of attitude to religion and science. As Alvin Plantinga says, "there is more interest in religion generally now than there was say 20 to 30 years ago in the Western world and there is a sort of loosening up with respect to science, in ways of thinking about science".¹⁸ Moreover, there has also been a more theistic and traditionalist turn in the philosophy of religion. As Kai Nielsen expresses regretfully, "The philosophy of religion in Anglo-American context has taken a curious turn in the past decade. . . . What has come to the forefront . . . is a group of Christian philosophers of a philosophically analytical persuasion, but hostile to even the residues of logical empiricism or Wittgensteinianism, who return to the old topics and the old theses of traditional Christian philosophy and natural theology".¹⁹

There have also been more specific or more precisely related developments which have contributed to the revival and reformulation of the argument from design in recent decades. During the last twenty or thirty years, cosmologists, physicists and astronomers have identified a number of special conditions which had to be fulfilled in the structure and evolution of the universe if human life was one day to exist within it. The discovery of these special conditions, which are often called the 'cosmic coincidences', has led physicists to formulate the Anthropic Principle, which relates these cosmic coincidences to our own existence. These have demanded some satisfactory explanation; and it has not been

difficult for some scientists and philosophers to see a relationship between the cosmic coincidences and the argument from design. Indeed, it is interesting to note that the argument has very recently gained acceptance among many scientists. For some people, it has even been resurrected more at the hands of the scientists than the theologians.²⁰

The argument from design may be said to be an illustrational argument which is essentially based on some sort of intuition or insight supported by various examples of design in the world. One kind of illustration has been used in this argument for some time, but it especially dominated the argument after the apparent decline of the Paleyan version: the fitness of the inorganic to minister to life. According to Frederick Tennant, the teleologist of today would call attention to the continuity of apparent purposefulness between the inorganic and organic realms, or, to the dependence of adaptation in the one and adaptiveness in the other. He argued that "the fitness of our world to be the home of living beings depends upon certain primary conditions, astronomical, thermal, chemical, etc., and on the coincidence of qualities apparently not causally connected with one another".²¹ Both Tennant and his followers could speak of this sort of anthropic argument for the most part only in generalities, and could furnish few specific examples of experimental fact to illustrate this.

During the last twenty or thirty years, however, the scientific community has been stunned by the discovery of how complex and sensitive a nexus of conditions must be given in order for the universe to permit the origin and evolution of intelligent life on Earth. Today, in the various fields of physics, astrophysics, classical cosmology, quantum mechanics, and biochemistry, various discoveries have repeatedly disclosed that the existence of intelligent carbon-based life on Earth at this time depends upon a delicate balance of physical and cosmological constants, such that were any of these quantities to be slightly altered, the balance would be destroyed and life would not exist.²² In this case,

along with some scientists, some philosophers have developed Tennant's argument with these newly discovered cosmological data, and have formulated a strong version of the design argument. In fact, the number of the anthropic coincidences constructs a long list "upwards of thirty factors would appear to have needed tuning".²³ However, we can quote only a few of them briefly:

Had *the nuclear weak force* been appreciably stronger then the Big Bang would have burned all hydrogen to helium: there could then be neither water nor long-lived stable stars. Making it appreciably weaker would again have destroyed the hydrogen: the neutrons formed at early times would not have decayed into protons. . .

For carbon to be created in quantity inside stars *the nuclear strong force* must be within perhaps as little as 1 per cent neither stronger nor weaker than it is. Increasing its strength by maybe 2 per cent would block the formations of protons - so that there could be no atoms - or else bind them into diprotons so that stars would burn some billion billion times faster than our sun. On the other hand, decreasing it by roughly 5 per cent would unbind the deuteron, making stellar burning impossible. . . .

With *electromagnetism* very slightly stronger, stellar luminescence would fall sharply. Main sequence stars would then all of them be red stars: stars probably too cold to encourage Life's evolution and at any rate unable to explode as the supernovae one needs for creating elements heavier than iron. Were it very slightly weaker then all main sequence stars would be very hot and short-lived blue stars. . . .

The need for electromagnetism to be fine tuned if stars are not to be all of them red, or all of them blue, can be rephrased as a need for fine tuning of *gravity* because it is the ratio between the two forces which is crucial. Gravity also needs fine tuning for stars and planets to form, and for stars to burn in a stable manner over billions of years. . . .

Various *particle masses* had to take appropriate values for life of any plausible kind to stand a chance of evolving. (i) If the neutron-proton mass difference - about one part in a thousand - had not been almost exactly twice the electron's mass then all neutrons would have decayed into protons or else all protons would have changed irreversibly into neutrons. Either way, there would not be the couple of hundred stable types of atom on which chemistry and biology are based. (ii) Superheavy particles were active early in the Bang. Fairly modest changes in their masses could have led to disastrous alterations in the ratio of matter particles to photons, giving a universe of black holes or else of matter too dilute to

four galaxies. Further, the supermassives had to be very massive to prevent rapid decay of proton.²⁴

Evidential force of these cosmological fine-tunings are strengthened when attention is also paid to the extraordinary concurrence of terrestrial circumstances that favour the sustenance of life on the Earth. Because the Earth is "a planet of the right size, orbiting a star of the right kind, enveloped by an atmosphere with right composition, and with a hydrosphere unique among the planets. It harbours elements and compounds with extraordinary properties, all propitious and most of them indispensable for the propagation and maintenance of life".²⁵

The discoveries of contemporary science in this regard seem so impressive that they enable one to speak about the existence of God. It seems that fundamental constants of the universe which are necessary conditions of the existence of intelligent life on the Earth are some of the newest and most impressive illustrations of the argument from design. They have shown that the universe is not just ordered, but incredibly and remarkably ordered and fine-tuned; and it is so not only at recent points in cosmic history or in the area surrounding the Earth, but also in all parts of the universe from its very early stages.

Recognising these cosmic coincidences as a simple accident would be too naive an explanation. Given that this pattern of discoveries has compelled many scientists and philosophers to conclude that such a delicate balance cannot be simply dismissed as coincidence, how will they be explained? There seem to be two main alternatives to explain them: one is the atheistic interpretation of many world hypothesis, and the other is the theistic hypothesis of God's design and creation.

Various theories have been offered for generating multiple universes or a World Ensemble. For example, J. A. Wheeler proposes a model of the oscillating universe: Big Bang, Big Squeeze, Big Bang, and so on, in which each cycle emerges with a new set of physical laws and constants. A. D. Linde suggests an inflationary model according to

which our observable universe is but one of many different mini-universes which inflated from the original larger Universe. One of the most widely and seriously discussed World Ensemble scenarios in the scientific literature is H. Everett's Many-World quantum theory. It is usually understood as giving us a capital-U Universe which branches into more and more Worlds that interact hardly at all. Each World represents one choice among the sets of events which quantum mechanics views as having been truly possible.²⁶

However, each of these above scenarios faces serious scientific and philosophical objections. Considered in general, from a philosophical point of view, they represent about the most extreme negation of "Ockham's razor", according to which the most plausible of a set of possible explanations is that which contains the simplest ideas and least number of assumptions. To invoke an infinity of other universes just to explain the remarkable features of our one observable world is surely carrying excess baggage to cosmic extremes.²⁷ From a purely scientific view, many worlds hypothesis is neither verifiable nor falsifiable by any conceivable experiment. There is simply no experiment that could reveal the existence of these other worlds. For "the many-universe theorists concede that the 'other worlds' of their theory can never, even in principle, be inspected. Travel between quantum 'branches' is forbidden. Moreover, the ordered regions in the infinite or oscillating model universes are separated by such huge expanses of space or time that no observer can ever verify or refute empirically the existence of the many universes".²⁸

In this case, as Richard Swinburne puts it, "to postulate infinitely many worlds in order to save a preferred interpretation of a formula, which is no way obviously simpler than the alternative explanation, and to avoid having to postulate a very narrow range of boundary conditions (which have to lie within a certain range anyway), seems crazy".²⁹ For "It is hard to see how such a purely theoretical construct can ever be used as an *explanation*, in the scientific sense, of a feature of nature. Of course, one might find it

easier to believe in an infinite array of universes than in an infinite Deity, but such a belief must rest on faith rather than observation".³⁰ Therefore, "faced with such difficulties, we could judge it altogether better to reject the many-universes approach, putting our trust instead in the God hypothesis".³¹ And if the many world hypothesis, the only competing alternative of divine design, are not physics but metaphysics, then, as John Polkinghorne says, "A metaphysical suggestion of equal coherence and greater economy would be that there is only one universe, which is the way it is because it is not 'any old world' but the creation of a Creator who wills it to be capable of fruitful process".³² Consequently, one more recent scientific discovery, fundamental constants of the universe, seems to provide quite sound and reasonable grounds for the theistic belief in the existence of God.

The Argument from Providence and the Anthropic Principle

The argument from providence may be traced up to the early history of philosophy. The eighteenth-century writers saw the workings of providence primarily in the general constitution and course of things. The world is orderly, subject to law, and its parts are wonderfully suited to each other and to the needs of living beings. God's providence has provided it as a setting for moral discipline of human beings. It is a world admirably adapted to the purpose for which it was designed. The meaning of providence in general terms for the eighteenth-century can be summed up as "the provision by God in his benevolence of a beneficent constitution and course of events which provide the stage and the opportunity for man's preparation for a future life".³³ According to Richard Swinburne's argument from providence, our world is "providential in giving normally to man (and animals) the opportunity to satisfy their own biological needs for food, drink, safety, etc. ; and providential in giving to man (and animals) the opportunity to satisfy the biological

and psychological needs of other men and of animals, and so to satisfy their own psychological needs for co-operation, friendship, etc."³⁴

The providential state of nature for the needs of human beings seemed so striking to some scholars that they dared sometimes to use the term 'purpose' and to consider human beings as the purpose of nature in some weak or strong sense. Frederick Tennant, for example, sees a close relationship between teleological explanation and an anthropic world-view, which is a good example for the weak form of purposive or providential argument. He describes and defends a kind of anthropocentrism, but in his view, it does not assert that "man . . . is the highest being under God, or the final stage of progressive cosmic evolution, or the end and the whole end of the divine design . . . anthropocentrism rather means that, whereas in the realm of Nature beneath man no final purpose can be discerned, such purpose may be discerned in beings possessed of rationality, appreciation, self-determination, and morality".³⁵ The providential and privileged position of human beings in nature would make a sign for the existence of God.

A serious objection has been made here by A. J. Ayer. He argues that to regard the purpose for which the world was created as something to do with the emergence of human beings is "a view which it is perhaps natural for men to take but hardly one that would be supported by a dispassionate consideration of the scientific evidence. Not only did man make a very late appearance upon the scene in a very small corner of the universe, but it is not even probable that, having made his appearance, he is there to stay".³⁶

It seems that this objection which apparently seemed quite persuasive for a long time could still have some force. But it could be said that its impressiveness is much less than it was before the anthropic coincidences and principle were discovered and developed. For Tennant's classical reply to this kind of objection has been strengthened by recent scientific discoveries. He replied in 1930s that "the ordered oasis is not an isolable

fragment. It and the supposed desert or 'chaos' are interdependent. It is because the desert is what it is that the oasis is what it is; and the one has orderedness only by permission, so to say, of the other".³⁷ It can be said that it is exactly this 'interdependence' and 'permission' that the Anthropic Principle have shown scientifically in much more detail recently.

After first being proposed by the physicist Brandon Carter in 1974, the Anthropic Principle has frequently been seen in scientific and cosmological works. Then it has attracted the interest of philosophers of science and many works have been written on it by them. It has also driven philosophers of religion to think over it and to assess it from the point of view of belief in God's existence. The Anthropic Principle has assumed a number of different forms, generating a great deal of confusion concerning what it is precisely that the Anthropic Principle means to assert. Faced with such a diversity of ideas, it seems best to begin with direct quotations from Carter who first proposed the weak and strong anthropic principles. Weak Anthropic Principle (W.A.P.) is stated as follows: ". . . we must be prepared to take account of the fact that our location in the universe is necessarily privileged to the extent of being compatible with our existence as observers".³⁸ Strong Anthropic Principle (S.A.P.) is expressed like this: ". . . the Universe (and hence the fundamental parameters on which it depends) must be such as to admit the creation of observers within it at some stage".³⁹ Particularly the 'teleological' version or interpretation of the Strong Anthropic Principle supports the argument from providence. The terms "must be" and "must have" in the cited formulations of the S.A.P. are understood and interpreted teleologically. This is to claim that "*There exists one possible Universe 'designed' with the goal of generating and sustaining 'observers'.*"⁴⁰ This purposive formulation of the Strong Anthropic Principle "explains the efficacy of the W.A.P. by asserting that the universe evolved properties sufficient for the generation of life in order to bring about life. It is the presence of the term "in order to" which of course identifies this model as teleological, that

is goal-directed. In this case, the goal is the existence of life . . . Moreover, although several different versions have been breached, ultimately, they all lead back to some sort of supernatural entity".⁴¹

Physicist Freeman Dyson writes in support of a list of anthropic coincidences thus: "I do not feel like an alien in this universe. The more I examine the universe and study the details of its architecture, the more evidence I find that the universe in some sense must have known that we were coming. . . . The peculiar harmony between the structure of the universe and the needs of life and intelligence is a third manifestation of the importance of mind in the scheme of things".⁴² Paul Davies has similar ideas. He points out first that four hundred years ago science came into conflict with religion because it seemed to threaten mankind's cozy place within a purpose-built cosmos designed by God. The revolution begun by Copernicus and finished by Darwin had the effect of marginalizing, even trivialising, human beings. People were no longer cast at the centre of the great scheme, but were relegated to an incidental and seemingly pointless role in an indifferent cosmic drama. However, he rightly indicates that "far from exposing human beings as incidental products of blind physical forces, science suggests that the existence of conscious organisms is a fundamental feature of the universe. We have been written into the laws of nature in a deep and, I believe, meaningful way".⁴⁴

Therefore, the objection to the argument from providence that our comparative place in the universe should be seen as supporting a naturalistic world-view, as Ayer suggested above, cannot be urged with the same force as it formerly had. The argument from providence for the existence of God seems to be quite tenable from the perspective of current scientific knowledge of the physical universe. For the Anthropic Cosmological Principle has supported it providing new evidences and interpretations.

As a result of this paper, one can say that recent scientific discoveries has not caused any serious conflict between objective scientific knowledge and theistic belief. On the contrary, it has been much more evident lately that current position of scientific knowledge has confirmed or at least supported the basic theistic beliefs, particularly the belief in the existence of God. Most elements of the traditional theistic belief, which have been held and defended by pure faith or philosophical arguments through ages, have very recently gained strong scientific support. In this context, we explored and saw firstly that the scientific Big Bang theory has provided a strong support for the most crucial premise of the theistic cosmological argument; secondly that the scientific knowledge about the fundamental constants of the universe has really strengthened the theistic argument from design; and finally that the Anthropic Cosmological Principle has supported the traditional argument from providence. Therefore, it can be concluded that objective scientific knowledge and philosophical inferences and interpretations based upon them have provided reasonable grounds for the theistic belief in the existence of God. It should perhaps be added finally here that theistic belief in God's existence does not of course depend on the confirmation of scientific knowledge. But nevertheless this scientific support is not unimportant. On the contrary, the mutual positive relationship between scientific knowledge and theistic belief seems to be very important and useful for human beings to believe in and to seek for the unity of the truth.

Notes

- ¹ Holmes Rolston III, *Science and Religion: A Critical Examination* (Philadelphia: Temple University Press, 1987), p. vi.
- ² Michael Peterson, William Hasker, Bruce Reichenbach, and David Basinger, *Reason and Religious Belief: An Introduction to the Philosophy of Religion* (New York and Oxford: Oxford University Press, 1991), pp. 197-98.
- ³ Rolston III, *Science and Religion*, p. vii.
- ⁴ A.F. Chalmers, *What is This Thing Called Science?: An Assessment of the Nature and Status of Science and Its Methods*, 2nd ed. (Buckingham: Open University Press, 1982), p. 113.
- ⁵ *Ibid.*, p. 115.
- ⁶ C. Stephen Evans, *Philosophy of Religion: Thinking about Faith* (Illinois: InterVarsity Press, 1982), p. 22.
- ⁷ Peterson et al. *Reason and Religious Belief*, p. 37.
- ⁸ Evans, *Philosophy of Religion*, p. 26.
- ⁹ Rolston III, *Science and Religion*, p. 22.
- ¹⁰ Evans, *Philosophy of Religion*, p. 28. Also see Peterson et al., *Reason and Religious Belief*, p. 11.
- ¹¹ Richard Swinburne, *The Existence of God* (Oxford: Clarendon Press, 1979), pp. 131-32.
- ¹² William Lane Craig, *The Kalam Cosmological Argument* (London: Macmillan, 1979), p. 63.
- ¹³ Swinburne, *The Existence of God*, p. 121.
- ¹⁴ J.L. Mackie, *The Miracle of Theism: Arguments for and against the Existence of God* (Oxford: Clarendon Press, 1982), p. 94f.
- ¹⁵ J. Richard Gott III, James E. Gunn, David N. Schramm, and Beatrice M. Tinsley, "Will the Universe Expand Forever?," *Scientific American*, (March 1976), p. 65.
- ¹⁶ Craig, *The Kalam Cosmological Argument*, pp. 116-17. For a recent discussion regarding the theistic and atheistic implications of Big Bang cosmology, see William Lane Craig and Quentin Smith, *Theism, Atheism and Big Bang Cosmology* (Oxford: Clarendon Press, 1993).
- ¹⁷ For a recent discussion and defence of the argument, see Cafer Sadık Yaran, *The Argument from Design in Contemporary Thought* (University of Wales, Lampeter, 1994, unpublished PhD thesis.)
- ¹⁸ Alvin Plantinga, "Modern Philosophy and the Turn to Belief in God," in *The Intellectuals Speak Out about God*, ed. R.A. Varghese (Chicago, Illinois: Regnery Gateway, 1984), p. 165.

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- ¹⁹Kai Nielsen, "Foreword," in *God and the Burden of Proof: Plantinga, Swinburne, and the Analytic Defence of Theism*, Keith M. Parsons (Buffalo, New York: Prometheus Books, 1989), pp. 7-8.
- ²⁰Paul Davies, *The Mind of God: Science and the Search for Ultimate Meaning* (London: Simon & Schuster, 1992), p. 203; John Polkinghorne, "A Revived Natural Theology," in *Science and Religion: One World - Changing Perspectives on Reality*, ed. J. Fennema and I. Paul (Dordrecht: Kluwer Academic Publishers, 1990), p. 88.
- ²¹Frederick R. Tennant, *Philosophical Theology*, vol. 2 (Cambridge: Cambridge University Press, 1930), pp. 85-86.
- ²²William Lane Craig, "The Teleological Argument and the Anthropic Principle," in *The Logic of Rational Theism: Exploratory Essays*, ed. W.L. Craig and M.S. McLeod (New York: Edwin Mellen, 1990), p. 128.
- ²³John Leslie, "Creation Stories, Religious and Atheistic," *International Journal for Philosophy of Religion* 13 (1993), p. 68.
- ²⁴John Leslie, *Universes* (London, and New York: Routledge, 1989), pp. 3-6.
- ²⁵Errol E. Harris, *Cosmos and Anthropos: A Philosophical Interpretation of the Anthropic Cosmological Principle* (New Jersey, and London: Humanities Press, 1991), p. 58.
- ²⁶Craig, "The Teleological Argument," pp. 142-43; Leslie, *Universes*, pp. 6-8.
- ²⁷Paul Davies, *God and the New Physics* (London: J.M. Dent & Sons, 1983), p. 173.
- ²⁸*Ibid.*, p. 173.
- ²⁹Richard Swinburne, "Argument from the Fine-Tuning of the Universe," in *Physical Cosmology and Philosophy*, ed. John Leslie (New York: Macmillan, and London: Collier Macmillan, 1990), p. 171.
- ³⁰Davies, *God and the New Physics*, p. 137f.
- ³¹John Leslie, "Modern Cosmology and the Creation of Life," in *Evolution and Creation*, ed. Ernan McMullin (Notre Dame: University of Notre Dame Press, 1985), p. 112.
- ³²Polkinghorne, "A Revived Natural Theology," p. 90.
- ³³N. Goldhawk, "William Paley: Or the Eighteenth Century Revisited," in *Providence*, ed. Maurice Wiles (London: S.P.C.K., 1969), p. 51f.
- ³⁴Swinburne, *The Existence of God*, p. 198.
- ³⁵Tennant, *Philosophical Theology*, p. 80.
- ³⁶A. J. Ayer, "The Claims of Theology," (1973) in *Does God Exist?: A Believer and an Atheist Debate*, Terry L. Miethe and Antony G. G. Flew (New York: HarperSanFrancisco, 1991), p. 207.

³⁷Tennant, *Philosophical Theology*, p. 80.

³⁸Brandon Carter, "Large Number Coincidences and the Anthropic Principle in Cosmology," (1974), in *Philosophical Cosmology and Philosophy*, ed. John Leslie (New York: Macmillan, and London: Collier Macmillan, 1990), p. 127.

³⁹*Ibid.*, p. 129.

⁴⁰John D. Barrow, and Frank J. Tipler, *The Anthropic Cosmological Principle* (Oxford, and New York: Oxford University Press, 1986), p. 22.

⁴¹George Gale, "Whither Cosmology: Anthropic, Anthropocentric, Teleological?," in *Current Issues in Teleology*, ed. Nicholas Rescher (Lanham: University Press of America, 1986), p. 106f.

⁴²Freeman Dyson, *Disturbing the Universe* (New York: Harper & Row, 1979), pp. 250, 252.

⁴³Davies, *The Mind of God*, p. 20f.

⁴⁴*Ibid.*, p. 21.

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