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STANLEY L. JAKI'S CRITIQUE OF PHYSICS

Disorder and suffering are increasing significantly in our society. Violent crime, unemployment, escape through drug-taking are all on the increase. It is apparent, also, that much of this disorder and suffering, and the anxiety it fosters, is rooted in science and its technological off-spring. The unemployment produced by a micro-technology is only one small example. It is also apparent that one of the principal foundation stones for the scientific enterprise was Christianity.

Gloomy prospects for our society loom up on every side. Many are concerned about this, and many seek in their own ways to do something about it.

Stanley L. Jaki is one such person. He is a Hungarian-born Benedictine priest with doctorates both in physics and theology, and who writes in the philosophy of science from his vast store of knowledge in the history of science. One of his earlier books earned for him the Lecomte du Nouy Prize for 1970, and his reputation was further enhanced by being chosen to deliver the Gifford Lectures at the University of Edinburgh in 1974-5 and 1975-6, and the Fremantle Lectures at the University of Oxford in 1977.

He summarizes his theses as follows:¹

the existence of mind as distinct from matter; the fundamental importance for scientific method of an epistemology embodied in the classical proofs of the existence of God; the limited validity or relevance of exact science or physics; the crucial importance of Christian belief in creation for the unique rise of science.

If scientists do not adhere to these conservative beliefs and their consequences (which I shall elaborate) they are not doing science but revelling in a scientism or an antisience; to propose theories contrary to these theses will and does lead to the undermining of science and society.²

¹ Stanley L. Jaki, *And On This Rock: The Witness of One Land and Two Covenants* (Notre Dame, Indiana: Ave Maria Press, 1978), p. 13.

² In terms modelled on those of William H. Austin in his *The Relevance of Natural Science to Theology* (London: The Macmillan Press Ltd, 1976), pp. 6-8, Jaki is advocating theology's indirect relevance for science, religious beliefs blocking the advocating of scientific theories not comports well with or contrary to them, and also because of their involvement in the origin of scientific theories. Theology is furthermore directly relevant for science in that Jaki would presumably like science to hold theories which reflect his religious beliefs in such things as the linearity and createdness of the cosmos.

Jaki is also following the lines suggested by Nicholas Wolterstorff in his *Reason Within the Bounds of Religion* (Grand Rapids, Michigan: William B. Eerdmans Pub. Co., 1976), chap. 11.

THE LIMITED RELEVANCE OF PHYSICS

Jaki's first book in the philosophy of science is *The Relevance of Physics*.¹ Here he details his third thesis, that the findings and methods of physics should not be extrapolated into other domains. He points out the dangers, using historical examples, of physicists and their followers forgetting the essentially human character of physics and the consequent fallibility, incompleteness and changing nature of physical theories.

Jaki covers four broad topics, and in each his procedure is to start with the Greek idea and, tracing the idea's development through to the present time, to conclude with his cautionary thesis. His first topic is the world model of physics, concentrating especially on the rivalry between the organismic, mechanistic and numerical patterning accounts. The second covers theories of matter, of the cosmos and accuracy in measurement; promoting a view as final or measurement limitation as unsurpassable usually finds refutation within a generation. Jaki's third topic for counselling caution and recognition of limits is the relation of physics to biology, metaphysics, ethics and theology. In the last, for instance, he derides the use of scientific findings and theories to support theological positions and proofs, for they usually only prove false or ambiguous props when new scientific interpretations emerge. Physics is, thus, theistically neutral. His fourth subject area is a generalization from the others and deals with the place of science in society, and with scientism, the holding of a particular interpretation of scientific results or method as universal.

As a prelude to the critique of Jaki's writings, let us say that Jaki's approach of supplying vast historical detail has been criticized by some (Edward MacKinnon calls the conclusions 'disappointing in [their] paucity and superficiality' and 'banal'), and yet it is praised by others (for instance Kenneth Cauthen).²

Jaki hopes that by placing a 'proper' perspective on physics and its originators he can build a bridge across the divide between the sciences and humanities and remove any hostility, indifference or ignorant exploitation of the conclusions of physics'. Writes Cauthen:³

If it is recognized that physics and the humanities are dealing with different human needs within their own respective spheres of competence, it is possible to recognize both the unity and complexity of truth and the diversity of approaches toward its achievement.

In fact Jaki prefaces *The Relevance of Physics* by saying:⁴

Physics moulds history and culture not only by its discoveries but also by the state of mind it fosters. . . . If physics has affected the cultural whole of any age in a harmful

¹ Stanley L. Jaki, *The Relevance of Physics* (Chicago: University of Chicago Press, 1966).

² Edward MacKinnon, review of *The Relevance of Physics*, *Theological Studies*, 29, no. 1 (March 1968), 157-9; and Kenneth Cauthen, review of *The Relevance of Physics*, *Zygon* 2, no. 2 (June 1967), 203-6.

³ Cauthen, p. 203.

⁴ Jaki, *The Relevance of Physics*, pp. v-vi.

way, it has done so because some of its results have been stated as rigid dogmas by its cultivators and (especially) by its often incompetent popularizers.

When physics strictly recognizes its domain of applicability it is brilliantly effective. To recognize this will

help prevent its becoming the vehicle for that pseudohumanism that has respect only for what is quantitative in human reflection... [Its limitation] renders it conspicuously impotent to cope with a host of vital issues and problems. Awareness of this is clearly a paramount duty that, if ignored, will only quicken the pace of cultural erosion.

IRRATIONAL MYTHS IN PHYSICS

In almost all his writings Jaki brings out this theme of the human element in science, and the tenacity with which scientists hold on to prejudiced concepts and irrationalisms. In *The Paradox of Olber's Paradox: A Case History of Scientific Thought*, he details an instance in which scientists held to an idea (in this case that of an infinite universe) in spite of the fact that this idea leads to a paradox and cannot be proved;¹ the concept of a finite universe was unpopular and uncongenial and so was not seriously entertained even though it resolved the paradox. This line of thought Jaki pursued to more depth in his monograph *The Milky Way: An Elusive Road for Science*.² In it he traces the development of an understanding of the Milky Way and why its roughly grindstone shape was not accepted till this century. He puts this down to an unwillingness to accept what such a shape implied: the singularity or finiteness in space and time of a universe of galaxies.³

Again in his book *Planets and Planetarians: A History of Theories of the Origin of Planetary Systems* Jaki retains the theme of the irrational myths of physics, the holding to views despite the lack of evidence for them and the threats they pose.⁴ This time the unsupported myth is the common existence of planets around the suns of the universe, an idea intimately connected with belief in a high probability for the existence of life elsewhere in the universe. This attitude is implied by theories on the formation of our solar system which seek to have a more general applicability to the formation of other solar systems. He writes:⁵

Theories which promised planets in great numbers found... ready acceptance... As long as such theories are being constructed with an *a priori* desire to assure high

¹ Stanley L. Jaki, *The Paradox of Olber's Paradox: a Case History of Scientific Thought* (New York: Herder and Herder, 1969).

² Stanley L. Jaki, *The Milky Way: an Elusive Road for Science* (New York: Science History Publishers, 1972).

³ See also Stanley L. Jaki, 'Goethe and the Physicists', *American Journal of Physics* 35, no. 3 (March 1967), 200-10.

⁴ Stanley L. Jaki, *Planets and Planetarians: a History of Theories of the Origin of Planetary Systems* (Edinburgh: Scottish Academic Press, 1977).

⁵ *Ibid.* p. 2.

frequency for planetary systems, the chances remain meagre for an objective evaluation of the possibility that a planetary system like ours may be after all an extremely rare phenomenon, a product of a long chain of interactions of very small probability. . . . [This] especially in view of the fact that although a very wide range of mechanisms [for the formation of a plenitude of planets] have been tried, none of them worked.

Jaki obviously is pointing out the functioning of unsupported beliefs in science, and the dangers of shallow thinking that these can engender. However, given the theological history of this issue – the existence of other planetary systems and life elsewhere in the universe – and the conservative Church position on this question, it is highly probable that Jaki is using his extensive knowledge of the history of science to promote that conservative position. I shall return to this comment.

THE EXISTENCE OF MIND AS DISTINCT FROM MATTER

Jaki's book *Brain, Mind and Computers* presents his first anti-physicalism thesis, the dualism of mind and body, which itself is a further elaboration of the theme of the limited relevance of physics.¹ One is reminded of J. C. Eccles' work on the existence of mind and the relevance of this philosophically, theologically, and more especially, scientifically.² Jaki 'argues for both the importance and ultimate inexplicability of the phenomena of consciousness and purposiveness' by examining the identity thesis which claims, for example, that the human brain is only an intricate computer and human beings, therefore, are only complex robots.³ Physics, argues Jaki, does not support the supposition that computers think or reason; this can only be supported by a metaphysical physicalistic scientism. He shows that the identifying of brain with computer cannot be derived from present computer technology and neurophysiology. He shows that teleological notions such as 'purpose', 'desire', and 'emotion', cannot be eliminated from psychology. And he provides philosophical arguments (such as Gödel's incompleteness theorem) to show the inconsistencies in the notion of a thinking machine. Concludes William Charron:⁴

Believing that philosophers' ideas can never remain their own technical possession, but inevitably become part of the common heritage of all men, affecting their actions and valuations, Jaki writes with a sense of practical urgency in his polemic against physicalism, fearing the cultural consequences of what he argues is an erroneous view of man.

¹ Stanley L. Jaki, *Brain, Mind and Computers* (New York: Herder and Herder, 1969).

² J. C. Eccles, *Facing Reality* (London: Longman, 1971).

³ Thomas S. Torrance, Review of *Brain, Mind and Computers*, *Scottish Journal of Theology* 2, no. 1 (February 1974), 98–101.

⁴ William C. Charron, Review of *Brain, Mind and Computers*, *The Modern Schoolman* 49, no. 3 (March 1972), 270–3.

THE NECESSITY OF BELIEF IN CREATION FOR THE RISE OF SCIENCE

The 'cultural consequences', the underlying reason for Jaki's writing in the first place, is something to which I shall return. I want at present, however, to look at another of his theses, and one on which he has written a great deal, 'the crucial importance of Christian belief in creation for the unique rise of science'.¹

The beginnings of science were present in cultures other than the Hebraic-Christian (specifically in Greece, India, China, pre-Columbian America, Egypt, and in Babylon), but science suffered a stillbirth in them. Why? Why has science only developed in Hebraic-Christian rooted culture? Jaki finds the reasons in these factors:² 'the belief in an eternal, cyclic recurrence of everything in a universe which was taken as the ultimate reality. Such a world-view implies a cosmic treadmill and casts the spell of pessimistic hopelessness', a sense of fatalism which inhibits the search for universal physical principles. In fact, these two factors, the cyclic cosmology and the ultimate nature of the universe, can be equated in that the former 'originates in a philosophy which is determined to see the physical world as the ultimate entity, as an absolute self-containing, self-explaining, self-perpetuating being'.³ We should also note Jaki's mention of the Muslim Arabs who also had the opportunity to develop science, but who did not progress beyond the Greek pantheism they exposed, mainly, says Jaki because their God was considered capricious, any physical law putting a constraint on his will.

Jaki traces the chief foundations of seventeenth century classical physics, the ideas of inertial motion and the conservation of momentum, to Medieval Christian concepts, specifically the absolute beginning of the world in which God started the motion of things. Furthermore, as Bacon observed, the contingent nature of the world, its being the product of a wholly transcendent mind, implied an observable world open to experimentation. This is necessary if laws of nature are to be discovered at all. The world is rational because its creator is. Similarly, says Jaki, an appreciation of the quantitative method, another essential feature of classical physics, derives from the biblical faith in the creator. These beliefs were not present in the other cultures mentioned and that is why in them science did not develop beyond its

¹ See Stanley L. Jaki, 'The Role of Faith in Physics', *Zygon*, 2, no. 2 (June 1967), 187-202; 'God and Creation: A Biblical-Scientific Reflection', *Theology Today* 30, no. 2 (July 1973), 111-20; *Science and Creation: From Eternal Cycles to an Oscillating Universe* (New York: Science History Publishers, 1974); 'Theological Aspects of Creative Science', in *Creation, Christ and Culture: Studies in Honour of T. F. Torrance*, ed. by Richard W. A. McKinney (Edinburgh: T. and T. Clark Ltd, 1976), chap. 11; 'The History of Science and the Idea of an Oscillating Universe', in *Cosmology, History and Theology*, ed. by Wolfgang Yourgrau and Allen P. Breck (New York: Plenum Press, 1977), chap. xvi; 'Lambert and the Watershed of Cosmology', *Scientia* 113, no. 1 (1978), 75-95; and *The Road of Science and the Ways to God* (Edinburgh: Scottish Academic Press, 1978).

² Jaki, 'God and Creation', p. 114.

³ Jaki, 'The History of Science and the idea of an Oscillating Universe', p. 247.

rudiments. But they were present in the Christian Medieval West, in fact they permeated it, and that is why science has developed there.

Besides making an interesting historical comment – and one made by many others, such as A. N. Whitehead, Michael Foster, Eugene Klaaren and R. Hooykaas – Jaki is warning us of the modern tendency in cosmology towards cyclic models, towards ideas of an oscillating universe, forever expanding and contracting.¹ He is doing this for two reasons. The first is a concern for science itself. In turning away from its origin, science might undermine prospects for its progress and development since this is contingent on a belief in the rationality of the universe, itself contingent or derived from belief in the universe's createdness and consequent linearity. In fact, all the great and creative physicists have held persistently to the rationality and real existence of the universe. 'As long as this urge [to see the physical world as the ultimate entity] dominated man's thought, science was condemned to repeated stillbirths, and in whatever circles this urge made its reappearance in modern times, it gave rise to a parody of science.'²

Jaki's second reason has religious and social roots. In our world, he says, human anxiety has increased:³

Much of that anxiety is rooted in the awesome tools produced by science. Science, in isolation from its source, the biblical knowledge of the Creator, is unable to generate a scientific knowledge or rather recognition of the Creator. This is all the more tragic because more than ever science needs that knowledge for its own and for mankind's survival. Without the recognition of man's and of nature's dependence on a Creator, the scientific enterprise is clearly unable to impose on itself the necessary ethical norms to control its own tools.

When scientific knowledge moves away from its biblical foundations (as with cosmology postulating an oscillating universe) it moves even further from the one key it has for helping solve humanity's problems, relieving its 'anxiety'. There is no hope for humanity's future in any form of paganism:⁴

The fundamental issue facing our scientific age is not about scientific know-how, but about the proper use of scientific knowledge and tools. Constructive judgement on this point is simply impossible without defining individual and collective purpose. Yet, if man and mankind are only a chance ripple on dark, unfathomable cosmic waves, which swing cyclically back and forth, any reference to purpose will amount to mere equivocation and to a rank abuse of meaningful discourse. The future of man rests with that judgment which holds the universe to be the handiwork of a

¹ Alfred North Whitehead, *Science and the Modern World* (New York: The Macmillan Co., 1925); M. B. Foster, 'The Christian Doctrine of Creation and the Rise of Modern Natural Science', *Mind* 43, no. 172 (October 1934), 446–68; Eugene M. Klaaren, *Religious Origins of Modern Science: Belief in Creation in Seventeenth-Century Thought* (Grand Rapids, Michigan: William B. Eerdmans Pub. Co., 1977); and R. Hooykaas, *Religion and the Rise of Modern Science* (Grand Rapids, Michigan: William B. Eerdmans Pub. Co., 1972).

² Jaki, *The History of Science and the Idea of an Oscillating Universe*, p. 247.

³ Jaki, *God and Creation*, p. 117.

⁴ Jaki, *Science and Creation*, p. viii.

Creator and Lawgiver. To this belief, science owes its very birth and life. Its future and mankind's future rests with the same faith.

Thus Jaki would probably like to see science revising its theories to ones which at least comport well with its biblical origins, even if not replicating them. Moreover, he would like Christians to have a 'sincere attachment to the first and last tenets of the Apostles' Creed'. But the 'belief that the universe is a product of a personal Creator, that the universe has a beginning and will have a supreme consummation, and that every man has a personal destiny for eternal happiness or for its very opposite... the world is not going to tolerate.'¹

SCIENTIFIC METHOD AND THE PROOFS OF GOD'S EXISTENCE

Before moving into a critique of Jaki's work, based especially on his last thesis, let me describe a little of a thesis more recently elaborated in his Gifford Lectures, *The Road of Science and the Ways to God*, namely 'the fundamental importance for scientific method of an epistemology embodied in the classical proofs of the existence of God'. It is a point he has made in his previous works as well. He maintains that science arose in a cultural atmosphere permeated by the firm conviction that the human mind can find in the world of persons and things pointers to its creator. Moreover, all the great creative minds of science have held strongly to beliefs germane to this, and when it has been vigorously resisted science appears to be deprived of its firm foundation. Jaki pursues his theme of potential disaster for the cultivation of science from the radical criticism of such an epistemology through Bacon, Descartes, Newton, Hume, Kant, Hegel, Comte, Mach, Planck, and Einstein. He sees a connection between the rejection of such natural theology and implicit assertion of the incoherence of the universe in the Copenhagen interpretation of quantum mechanics, in logical positivism, and in the subjectivist and psychological interpretations of the doing of science. That is, attacks on natural theology can readily become attacks upon science if they are consistently and rigorously pursued: both are based on a similar vision of the rationality and contingency of the universe. This book, like most of Jaki's works, is monumental and masterly.

In a later paper on the primaeval embryo which exploded to develop our universe, Jaki's theme is consistently the same: the universe is finite, objectively rational and coherent, even to that embryo. This is so because it 'points beyond itself to a creative reason transcending all the cosmos'.²

His aims in the Lectures are much the same as for his previous works:³

¹ Jaki, *God and Creation*, pp. 119-20.

² Stanley L. Jaki, 'The Chaos of Scientific Cosmology', in *The Nature of the Physical Universe*, ed. by Douglas Huff and Omer Prewett (New York: John Wiley and Sons, 1979), pp. 103-4.

³ Jaki, *The Road of Science and the Ways to God*, p. 323.

In helping to bring about the reversal of the change [away from the religious mode of thought towards the scientific] . . . and to help redirect intellectual and cultural energies toward the mode of thought which alone secures a firm foundation for the improvement of mankind. . . This mode of thought is the one in which the secular or scientific is not set at cross-purposes with the sacred or philosophical.

Deviation from the epistemological and metaphysical ways of God are responsible, suggests Jaki, for deviations from social morality; war, genocide and totalitarianism resulted from Darwinian evolutionism and Hegelian dialectics.

JAKI'S HISTORICAL ANALYSIS

Many questions can be asked of Jaki's theses and his means of establishing them: on his interpretation of history, on his motivation, on whether his programme will further his quest, on the consequences of following his theses to their logical conclusion, and on his respect for scientific 'factuality' as opposed to Christian dogma. As I said, I will concentrate criticism on the most thoroughly promulgated of his theses, that of the finite linear cosmos, his drive against the idea of an oscillating universe, although the criticisms are often more widely applicable. I shall start with a consideration of his interpretation of history.

The question I am asking by presenting these criticisms is simple: is the contribution Jaki wishes theology to make to science a valid or practicable one? Are the grounds on which Jaki wishes to make the contribution impelling and correct?

Arthur Peacocke questions Jaki's bias in historical analysis; for instance, Jaki considers the Renaissance 'as only an "interlude" and not conducive to the emergence of natural science in Western Europe', and describes 'Romanticism and Naturphilosophie as a "murky backwater"'.¹ Kenneth Thibodeau dwells, in reference to Jaki's book, *Science and Creation*, with particular succinctness on this 'lopsided picture of the history of science':²

To read his account of the Middle Ages . . . one would assume that the overwhelming reaction to Aristotle was criticism and rejection. He is so intent on showing that the Greeks were committed to cyclical concepts like the Great Year that he barely mentions their great scientific achievements. Given Jaki's intention, this imbalance might be justified. Actually it reveals a serious bias in his selection and interpretation of evidence. He is very unsympathetic towards non-Christian cultures and consistently minimizes their achievements, while he often exaggerates the merits of various Christian thinkers and concepts. . . . Jaki takes a nonhistorical stance toward Christianity by accepting one doctrinal tradition as authentic. Thus much of the diversity in the history of Christianity can be discounted as heretical or wrong.

¹ Arthur R. Peacocke, review of *Science and Creation*, *Journal of Theological Studies* 26, no. 2 (October 1975), 512-3.

² Kenneth F. Thibodeau, review of *Science and Creation*, *Isis* 67, no. 236 (March 1976), 112.

Peacocke also asks serious questions about Jaki's contrasting the supposed "Greek, cyclic" view of time with a "Hebrew, linear" one'; James Barr, Peacocke notes, has successfully demolished this contrast, throwing doubt on the general validity of Jaki's contrasting the Judeo-Christian culture with other non-Hellenistic cultures. Moreover, continues Peacocke, there are many different ways in which time can be considered cyclic, and Jaki is throwing together cultures whose conceptions of cyclicity are very different.¹

In addition we might choose to follow further the suggestion of Richard Jurgensen that Jaki might have taken his causal investigations back a step further to a belief in monotheism.²

Thomas Torrance asks whether the development of a system of knowledge such as science can be considered solely the result of Christian beliefs (the Hindu-Arabic decimal system, for instance, is indispensable for science). We can only say, suggests Torrance, that Christian Europe of the thirteenth to seventeenth centuries was more conducive to the development of science than were other cultural settings, and that Jaki would probably agree with this.³ In fact, he does:⁴

Needless to say, many factors – geographical, social, economic, and political – played part in the stillbirth of the scientific enterprise in the various ancient cultures. The only common factor in all cases seems, however, to be the commitment to the cyclic world view. This partly cosmological and partly theological factor deserves a special attention all the more as ultimately all science is cosmology.

Nonetheless, his argument that science (and society) will falter unless we move to a linear cosmology is still weakened.

In opposition to Jaki's presenting the unsupported myth of the infinite universe as the cause of science's not realizing the shape of the Milky Way, P. A. H. Seymour suggests unmythical causes.⁵ Such a shape, for instance, was not relevant to the social issues of times past, to their interest in astronomy for calendar making, time-keeping, astrology and navigation. It also required not only a conceptual breakthrough (which Jaki suggests the Greeks were capable of) but also the right instruments and techniques of observation.

On a similar note, Peacocke reiterates that the Christian beliefs of creator and creation are not necessary conditions for the rise of science; neither are they sufficient since science did not arise in Eastern Christendom.

Thibodeau adds a point along the same line. Jaki, he says, has not acknowledged the tremendous contribution of the Greeks, their provision of a 'training in rigorous logical thought', something 'essential to the articulation

¹ Peacocke, p. 513.

² Richard Jurgensen, 'Awesome Awareness', *The Christian Century* 96, no. 2 (6–13 June 1979), 648–9.

³ Thomas S. Torrance, review of *Science and Creation*, *Zygon* 11, no. 1 (March 1976), 76–8.

⁴ Jaki, *The History of Science and the Idea of an Oscillating Universe*, p. 240, n. 10.

⁵ Jaki, *The Milky Way*; and P. A. H. Seymour, review of *The Milky Way*, *The British Journal for the History of Science* 10, pt. 2, no. 35 (July 1977), 162–4.

of the Christian belief in a personal, rational Creator in the direction of science'.

Torrance also asks why the pessimism which Jaki believes derives from a cyclic cosmology did not stultify, say, Greek technological innovation.¹ Is this defeatist climate always a result of cyclic cosmology and cosmos-is-deity ideas? He notes also that cyclic beliefs in respect to celestial cosmology do not necessarily imply cyclic beliefs at the human and social levels.

George Hendry lists further steps Jaki should have taken in his argument.² He fails to see the connection between 'faith in a Creator who sets his handiwork on a uni-directional course in time' and scientific progress. One cannot deductively conclude that the universe is rational from belief that its creator is rational. It is rather to be concluded from belief in the rationality of God's salvation history. It is a further step to believing that the rationality of the universe is a possible object of scientific investigation.

Moreover, says Hendry, present biblical theology suggests that history, as opposed to nature, is the main theatre for God's purposive activity. Is Jaki misrepresenting the thrust of Christian belief at the time of the rise of science? God's purpose in nature, Hendry continues, would have been imported from Greek philosophical cosmology. In fact, the biblical emphasis on a contingent world implies that the cosmos has powerful shaping forces within it other than a rational creator.

Thus from a logical point of view, belief in the rationality of the cosmos does not derive from biblical Christian belief. However, in fairness to Jaki, it should be noted that the above are the views of present biblical theology, and not necessarily of the early and great scientists themselves. In fact, against the first comment of Torrance, that there is no causal chain from a belief in a rational creator to the universe being rational and open to investigation, such scientists as Newton clearly thought that this chain argument holds even to the imperative nature of such investigations; at least so Jaki tells us.³

Following along the lines of illogical reasoning from biblical sources once again, is Jaki correctly interpreting the biblical account of creation? One could argue, for instance, that creation *ex nihilo* is not really a biblical concept, and that continuing creation is; this is a matter with which I shall deal in more depth later. At present it could be noted that this may be another instance of Jaki's reading sources according to conclusions made already.

As a final point here one could bring in the thoughts of P. E. Hodgson on Jaki's Gifford Lectures.⁴ Hodgson questions Jaki's thesis that to do science properly necessitates the Christian belief in a rationally created universe. The

¹ Torrance, review of *Science and Creation*, p. 77.

² George S. Hendry, review of *Science and Creation*, *Theology Today* 31, no. 4 (January 1975), 370-3.

³ Jaki, *The History of Science and the Idea of an Oscillating Universe*, p. 244.

⁴ P. E. Hodgson, review of *The Road of Science and the Ways to God*, *Nature* 278, no. 5707 (26 April 1979), 796-7.

relationship between the Christian Churches and science has not always been harmonious, and science has found acceptance by radically different cultures, neither of which one would expect if a prerequisite for science is that sort of belief.

JAKI'S STYLE

Jaki's arguments, therefore, meet with severe criticism as far as the ways Jaki has interpreted history and biblical sources are concerned. One may even infer from the way he develops his themes that history is being interpreted rather than being laid out plain (the latter of which he claims to be doing in *Planets and Planetarians*). Concerning his book, *The Road of Science and the Ways to God*, Hans Schwarz says that Jaki's relentless chiding of everyone who thinks other than his way is an 'overkill... , if not [a] distortion'.¹ William Austin says it is 'long on rhetoric, short on argument, and vitiated by Jaki's penchant for impugning the motives and caricaturing the views of those he dislikes'.² Norriss Hetherington dubs Jaki's style (in his *Planets and Planetarians*) as 'irritatingly iconoclastic'.³ And S. J. Dick's review of that same book does not like Jaki's subjective and disputable theme of scientists' metaphysical meddling in cosmology, attempting to fill the universe with intelligent beings.⁴ Dick finds Jaki's sweeping generalities and his move to try to prove this influence 'disturbing'. It 'is based largely on the 20-20 vision of hindsight, a vision that can often make past theories seem ridiculous'. He continues: 'It is not beyond the realm of possibility that the conscious or unconscious prejudices that Jaki – a Benedictine priest – deplors in scientific research have, consciously or unconsciously, crept into his own historical research.'

Frederick Ferré calls Jaki's interpretations of the history and philosophy of science in his Gifford Lectures 'peppery' and 'hostile'.⁵ 'This is an angry book, in which the dominant role is polemic... [,] a tendency to resort to unfairness or to mere dismissive or abusive language.' Ferré concludes: 'I merely wish that he gave evidence of listening with a little more openness of mind and speaking with a little more generosity of spirit.'

It is hard to accept, therefore, that Jaki is presenting a rational case for theology's use or critique of physics and one that is as free from bias as

¹ Hans Schwarz, review of *The Road of Science and the Ways to God*, *Journal of the American Academy of Religion* 47, no. 1 (March 1979), 169.

² William H. Austin, review of *The Road of Science and the Ways to God*, *Religious Studies Review* 5, no. 2 (April 1979), 147.

³ Norriss S. Hetherington, review of *Planets and Planetarians*, *Science* 202, no. 4371 (1 December 1978), 968-9. See also P. A. H. Seymour, review of *The Milky Way*, *The British Journal for the History of Science* 10, pt. 2, no. 35 (July 1977), 162-4.

⁴ S. J. Dick, review of *Planets and Planetarians*, *Physics Today* 32 (January 1979), 84-8.

⁵ Frederick Ferré, review of *The Road of Science and the Ways to God*, *The Journal of Religion* 60, no. 1 (January 1980), 88-90.

possible. But let us now look at Jaki's appreciation of the scientific method, especially in relation to cosmology, and see whether he is not himself trying to violate the empirical basis of physics.

THE SCIENTIFIC METHOD

One can excuse Jaki for his onslaught on physicalism, the belief that all can be explained by quantitative analysis or the belief in the non-existence of mind, if there is no scientific evidence for it, being merely a metaphysical dogma held up to us as scientific. But it may be a different matter when we come to cosmological theories, for despite any relative paucity of experimental evidence in respect to cosmological theories as opposed to, say, in respect to theories on the mechanical interaction of macroscopic bodies, there are corpora of evidence which arbitrate between cosmologies, and in recent times this has become noticeable.¹ Cosmologies are not mere figments of people's imaginations; they must at least comport with observational fact if not proffer tests which might falsify them or count towards their verification. It does seem that modern cosmology is more generally disposed to accept a linear and not a cyclic model and this no doubt would meet with Jaki's jubilant approval, but this cannot be guaranteed for future cosmologies. Factual evidence may point decisively to an oscillating universe. What can Jaki say to such a possibility? He cannot rule it out as an impossibility since it is a possibility. He cannot say, 'The Bible and Creeds disallow it', and be convincing, if the factual evidence really does warrant perpetual expansions and contractions of the universe.

Jaki may be falling into the trap about which he previously warned theologians: although science at present has no answer to a question or does say something definite about some topic, it may be that within a generation those ideas will be changed or that question answered.² Theologians should not use such opportunities for justifying, aiding or applying a particular theological stance. Jaki maintains that theology and physics are concerned with different sorts of truth and should pursue them, presumably, through different methods. Yet his vehement arguments against science's being directed by non-scientific faiths or beliefs or myths are his own attempt to influence science towards what he deems to be Christian beliefs. If the two types of truth are distinct, should he be dictating the use of a theological idea in physics?

That is to say, I fail to see how Jaki can properly preach his thesis to cosmologists with evidence only from the history of science, from theology and from ethics. He needs, if his thesis is to be convincing, to support it with a cosmology which is linear and comports with known evidence, which

¹ For one example, see Robert Jastrow, *God and the Astronomers* (New York: W. W. Norton and Co. Inc., 1978), epilogue.

² Jaki, *The Relevance of Physics*.

suggests ways for scientifically testing or arbitrating between it and cyclic cosmologies, and which in some scientific ways can be seen as more suitable than its competitors. Jaki needs to get back into physics itself. He may succeed; his belief in the linear version is, surely, the impetus required to drive him into that task. It is not enough for theology to impress upon science that it might be wrong. Theology can only argue that on science's grounds; it needs to show science that a better science (better in science's terms) results when using Christian ideas.

A similar point can be made about his criticism of the attempts of scientists to provide a theory explaining the origin of our solar system based on the assumption that solar systems and life might exist elsewhere in the universe. Jaki has concluded that modern attempts at such theories have only been confusing, inconclusive and nowhere near satisfactory.¹ In another recent review of the state of theories on the origin of our solar system, Bernard Lovell similarly concludes that, even though modern attempts accept the belief that planetary systems around stars might be a common feature of the universe, there are a host of difficulties and uncertainties which remain from these attempts.² However, and here is the rub, he points to the discovery of inorganic molecules in space, a fact which counters Jaki's beliefs, and further points to the unscientific nature of his insistencies, ignoring as he does the possibility of future discoveries and developments in science.

Jaki has attempted to answer such criticism, with reference to his linear-cosmos thesis, but his comments are still negative and not constructive in the sense of offering a scientific alternative. He says:³

Clearly, it would be a great mistake to see any meaningful parallelism between the fantasies on individual and collective rebirths [referring to pagan cyclic cosmologies]...and the mathematical formalism of the cosmology of an oscillating Universe in its strict scientific sense. The oscillating Universe as a physical theory, let alone a true description of physical reality, is a different matter.

And he continues by describing three major, if not extraordinary, difficulties which he considers beset any cyclic cosmology of physics;⁴

The enormity of such difficulties and the almost complete absence of any clues as to how to cope with them can be minimized only at the price of becoming trapped in a most unscientific attitude.

The point still holds that these and other difficulties may be overcome and physics produce a consistent, well worked-out and supported cyclic cosmology, a cosmology making more sense of data than competing linear cosmologies.

¹ Jaki, *Planets and Planetarians*.

² Bernard Lovell, *In the Centre of Immensities* (London: Hutchinson and Co., 1979), pp. 24-5, 45-51.

³ Jaki, *The History of Science and the Idea of an Oscillating Universe*, p. 246.

⁴ *Ibid.* p. 247. See also Jaki, *Science and Creation*, pp. 350-1.

WHAT CREATION DETAILS ARE ACCEPTABLE TO JAKI?

In the twentieth century a number of prominent astrophysicists have either advocated a linear 'big bang' cosmology (in which the universe started with a primordial fireball which exploded and is still expanding) or remarked on its close parallel to the Genesis account of creation. In 1952 E. A. Milne talked of the divine creation of the universe demanding it be at a 'point-singularity'.¹ 'For the creation by God of an extended universe would require an impossibility... [for] a rational God.... This equally rules out the idea of continuous creation of matter everywhere in space.' More recently, Robert Jastrow indicated how the 'big bang' theory of creation, in which all evidence of the cause of the gigantic explosion which was the start of the universe was destroyed, resembles the biblical creation story.² Comments Lance Morrow:³

Most astronomers now accept the theory that the universe had an instant of creation, that it came to be in a vast fireball explosion 15 to 20 billion years ago. The shrapnel created by that explosion is still flying outward from the focus of the blast. One of the fragments is the galaxy we call the Milky Way.... The so-called Big Bang theory makes some astronomers acutely uncomfortable, even while it ignites in many religious minds a small thrill of confirmation. Reason: the Big Bang theory sounds very much like the story that the Old Testament has been telling all along.

Jastrow is thus able to say, despite the theological simplicity of his assertion:⁴

For the scientist who has lived by his faith in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries.

It appears then if we are to believe Jastrow, that the non-oscillatory 'big bang' cosmological theory is the most scientifically acceptable at this time.⁵ This as mentioned before may please Jaki. However, to plump for a linear cosmology may not be all that is needed to please Jaki, for even if it may match or 'validate' the Genesis story on some counts, it may not on others, and those may be considered very important for Christian theology. On what basis are we to decide theologically what details are essential?

Let me elaborate. Is, for instance, creation *ex nihilo* a biblical concept, as opposed to continuing creation? Following more of Barbour's line, one could,⁶

¹ E. A. Milne, *Modern Cosmology and the Christian Idea of God* (London: Oxford University Press, 1952), p. 157. See also Ian G. Barbour, *Issues in Science and Religion* (London: S.C.M. Press Ltd, 1966), p. 367; and Jastrow, pp. 111-2.

² See p. 12 n. 1 above.

³ Lance Morrow, 'In the Beginning: God and Science', *Time*, 5 February 1979, pp. 69-70.

⁴ Jastrow, p. 116. See also W. Paul Jones, 'Did It Begin?', review of *God and the Astronomers*, *The Christian Century* 96, no. 2 (17 January 1979), 56-7.

⁵ Jastrow, pp. 119-23.

⁶ Barbour, p. 368. See also *ibid.* pp. 383-6, 417-8; Arthur R. Peacocke, *Science and the Christian Experiment* (London: Oxford University Press, 1971), pp. 128-9; Donald M. MacKay, *Science, Chance and Providence* (London: Oxford University Press, 1978), pp. 4-9; Jones, p. 56; and Denis Dutton, review of *God and the Astronomers*, *Sky and Telescope* 58, no. 1 (July 1979), 66-7.

suggest that the Christian need not favour either theory [continuous creation or 'big bang' once-and-for-all creation], for the doctrine of creation is not really about temporal beginnings but about the basic relationship between the world and God. The religious content of the idea of creation is compatible with either theory, and the debate between them can be settled only on scientific grounds, when further data are available.

One cannot class Jaki as an extreme Creationist, one who is pushing for a literal reading of the Genesis account of creation. The question is what aspects of a biblical theology does he wish to espouse, and why those and not others?

Furthermore, a 'big bang' scientific cosmogony may not parallel even an *ex nihilo* theological cosmogony. *Ex nihilo* implies that the universe was willed into being by the divine intellect. But even though the 'big bang' concept implies that the world has come 'into being as a result of forces that seem forever beyond the power of scientific description', the primordial fireball destroying all evidence of what went before, it is not necessary that there be nothing before it.¹ Yet this would seem necessary for Jaki's theology. To satisfy Jaki's argument one would need, for instance, to rule out the possibility of a cyclic universe, each cycle of which started with a 'big bang'. Says Harvey Tanabaum: 'That first instant of creation is not relevant as long as we do not have the laws to begin to understand it. It is a question for philosophers and religionists, not for scientists.'² Jaki may well agree: this is a barrier for physics which it should acknowledge and not attempt to answer scientifically. Again this is only a present barrier which does not mean a forever insurmountable barrier for science; science may one day find itself able to answer the question of the beginning and the before.

A comment made by Paul Jones on Jastrow's book is helpful in our appreciation of Jaki's linear-cosmology thesis.³ Such a cosmogony implies that the continuing expansion of the universe will eventually lead to darkness, stars burning out one by one with fewer and fewer new stars replacing them. But does not this, asks Jones, 'undercut wisdom as the heart of any beginning'?

WHAT DETAILS ARE WE TO ACCEPT?

Jaki needs to decide what parts of the creation story are essential for any scientific cosmology and then whether any linear 'big bang' theories are to be commended. But this criticism could be applied in other areas too. For if we were to follow the vein of Jaki's thesis more fully, we would rule out of order, on at least theological and ethical grounds, such scientific theories as behaviourist and Freudian/Jungian psychology, and evolution both

¹ Jastrow, quoted in Morrow, p. 70.

² Quoted in Morrow, p. 70.

³ Jones, p. 56; Jastrow, p. 117.

biological and geological.¹ It might be thought, for instance, that the Bible suggests that the cosmos was made literally in six days, which is, of course, quite contrary to evolutionary theory. We may even gather support from the history of culture and of science, showing that belief in the complete creation within six days was a necessary pre-condition for the rising and flourishing of science.

The question really is, where does one stop Jaki's type of argument, and why does one stop where one does? Why does Jaki argue for the linearity of time and a creator who transcends the cosmos, and not for the creation of the cosmos in six days? The strength with which he proposes the linearity of the cosmos and argues against its being cyclic, may presuppose a very strong personal conviction of his, and one which he may hold for many other 'conservative' doctrines. Given that strength, it would be hard to see him holding some and not others; in fact, would he be consistent in not being a biblical fundamentalist?

Perhaps Jaki's writings would be more persuasive and useful besides as references if he dealt head-on with this problem: how much of a Christian belief system is one to accept, and what is the basis for this decision? What reasons can he give for saying that certain things are to be accepted; and why, for him, are certain other things – matters which might equally be part of a traditional Christian theology – open to dialogue and change. I do not believe that his history-of-science arguments, namely, that the present foundations of science need the linearity and created nature of the cosmos, answer this, nor are they really intended to; I think they are meant to justify and convince scientists and others of a stand which he has already made on other grounds (some of which will be examined shortly). Such beliefs *may* be sufficient, even necessary, causes for the rise of science, but that does not necessitate by itself their being retained now.

Thus if theology wishes to contribute to or admonish physics it needs to decide what is to be its method and content. The present wide range of theological positions and approaches only confuses any attempt in this vein; unless theological systems be open to falsification (or verification) by an agreed standard then they cannot hope to be effective for or against physics.

There is another and related point of belief which Jaki upholds and over which he spurns competitors. We should perhaps ask ourselves whether it is true that science cannot function without the three metaphysical pillars bequeathed to it by Christianity: 'the existence of an objectively existing, rationally ordered universe which can be investigated by the human mind'. Jaki tells us that:²

¹ See, for instance, Stanley L. Jaki, 'Knowledge in an Age of Science', *University of Windsor Review* 11, no. 1 (1975), 80–103, especially pp. 86–90.

² Jaki, *The Road of Science and the Ways to God*, pp. 326–7.

it is only the theoretical and experimental techniques of science that can change and increase. The essence, or quantum of science represented by those factors is an attainment to which nothing can be added. Nothing can be subtracted from them either without undermining the scientific enterprise itself.

This is what Jaki has tried to show to be the case in the past, and we are to infer that it should be so also for the present and future. But need it be? He uses this metaphysical consistency to deride Whiteheadian process philosophy and theology, since process is not ultimate, since reality is not progressive at its deepest, and similarly that natural theology should show no progress.

Many of Jaki's examples and chosen opponents – those who advocate other metaphysical necessities for science than his – could understand the changes they propose to be advances in this matrix of science, with no undermining of the scientific enterprise. The metaphysical basis of science can and does change, under pressure of experience and the givens of reality.¹ I do not believe that honesty to theism or to the biblical conception of God necessitates seeing theology as non-progressive, and unable to learn methodologically from science.² Neither does it necessitate a ban on the revising of the foundational beliefs of science; not that this can be lightly or hurriedly done.

Jaki has rightly pointed out the necessary existence of faiths or metaphysical beliefs for the work of science.³ Some beliefs, such as those mentioned above, he supports and some, such as belief in plenitude, the existence of many solar systems and life elsewhere in the universe, he derides in the name of the future good of science and society. I have been saying that Jaki needs further to support his thesis that the beliefs he sees as necessary for science should not change. He also needs to relate metaphysical beliefs and their changing to experience and observation. Hetherington notes:⁴

One might then ask, granted that philosophical values are immensely important in science, whether observational considerations eventually doom an otherwise esthetic theory and whether a theory that satisfied observational criteria but was in conflict with fundamental human values could ever win general acceptance. And is the preference for a frequently employed planet-creating mechanism a manifestation of a more general philosophical insistence upon the uniformity of nature that appears also in geological uniformitarianism?

Perhaps it is only on the basis of experience that we can decide between differing fundamental planks for science, between those Jaki upholds and those evident in modern quantum mechanics, for instance. I am sure Jaki's polemics are not a sufficient ground on which a decision can be based.

¹ See Ian G. Barbour, *Myths, Models and Paradigms* (New York: Harper and Row, 1974), pp. 116–7.

² See in this regard Jaki's especially negative criticism of Bernard J. F. Lonergan's *Method in Theology* (New York: Herder and Herder, 1972), in his *The Road of Science and the Ways to God*, p. 457, n. 45.

³ Jaki, 'The Role of Faith in Physics', for instance.

⁴ Hetherington, p. 969.

Another reviewer, namely Eileen Barker, has expressed a similar reservation about the necessity of following the 'ways to God' for the following of the 'road to science'.¹ She does hold, however, that belief in a contingent, consistent and knowable universe must be a starting point, but yet is compatible with alternative secular cosmologies. Can Jacques Monod's denial of a creator, declaring that blind chance has produced everything, force us to negate 'the creative achievement of his work on proteins? If we consider Crick, Watson or Wilkins, none of whom is exactly renowned for his exploration of the ways of God, are we to deny that they were on the road of science when they revealed the double helix structure of the DNA molecule?'²

Thus not only do I ask for an elucidation and justification of Jaki's insistence that the metaphysical beliefs of science should not change, if science and social morality are to prosper, but also I would question the truth of Jaki's basic claim. Science will prosper without the full gamut of beliefs Jaki upholds as essential, especially his theistic emphasis. And metaphysical beliefs are subject to experience, and will gradually change accordingly.

JAKI'S MOTIVATION FOR WRITING

Peacocke concludes his review of Jaki's *Science and Creation* by wondering if it really is significant for science or Christian theology that we should be convinced of its central hypothesis, that science owes its only viable birth to a faith in a contingent and linear world.³ The answer to this lies in Jaki's underlying motivations, which he says are his concern for mounting human anxiety and the need for ethical control of the products of science. However, I suspect that his real reasons are much deeper and stem from a personal conservatism, a staunch upholding of Catholic dogma, the motivation for which itself is very personal. I say this because I have more or less the same stated reasons for quite a contrary approach to the theology-science relationship.

Let me elaborate. Because of the need for personal integration of life and a useful system of morals in this scientifically oriented society, I have suggested elsewhere the need for the integration of science and theology along the lines of what I have called the 'ladder' model.⁴ This means that each system of knowledge builds on much the same set of metaphysical assumptions and methods, while proceeding from different motivations and sharing where relevant the other's knowledge. This might mean theology's accepting an

¹ Eileen Barker, 'The Purpose of Science', review of *The Road of Science and the Ways to God*, *The Times Higher Education Supplement*, no. 353 (18 August 1978), p. 13.

² Jacques Monod, *Chance and Necessity: an Essay on the Natural Philosophy of Modern Biology* (New York: Alfred A. Knopf, 1971).

³ Peacocke, review of *Science and Creation*, p. 513.

⁴ See my 'Beyond Complementarity: The "Ladder" Model for the Integration of Science and Theology', ms.

oscillating cosmos if it be factually established, or perhaps even science's accepting a linear cosmos if that makes more sense of all our experience.

I would argue against a closed and conservative theological stance which wishes to impose on society its own norms and beliefs, some of which conflict with scientific knowledge, as unable to fulfil the needs which Jaki and I see that science and theology should meet. I say this because such a theological stance separates itself off from society, drawing people away from the problems. These need facing and solving in their own terms, drawing on our Christian wisdom, and not by redefining in another context. Thus I advocate not a return to traditional Catholic dogma or to a biblical metaphysics and cosmology, but rather a grounding of biblical understandings of the character of God, humanity and the relations of each to the world, in modern scientifically informed cosmology. This does not mean the acceptance of any scientism, a warning rightly given by Jaki. I concur, therefore, with Kenneth Cauthen:¹

I am more of an integrationist than Jaki apparently is, for I think it is useful... to seek correlations between science, philosophy, and theology at a given stage in the development of each. As a liberal Protestant theologian, I am not as convinced as he assumedly is of a perennial philosophy and a development of scientific theory. Philosophy and theology are historically and culturally relative and subject to development... [and] I would insist that any proposed correlation or synthesis of science, philosophy, and theology be frankly recognized as tentative, incomplete, experimental and subject to revision as new evidence from science and new intuitions of reality dictate. We have no choice, I think, but to engage in this kind of continuing effort to see reality as a whole on the basis of what will always remain fragmentary evidence.

An apology for a traditional Christian stance, especially one as vast as Jaki's, needs a more persuasive and convincing motivation than the one supplied by Jaki. In fact I do not believe Jaki's very extensive polemics will alter the course of our society and its beliefs one iota. His thought on science, for instance, is on the whole only available to scholars,² and his conclusions on present and future science and society rest on grounds—namely his highly controversial comprehension of the *history* of science—probably not of sufficient strength to generate change. Jaki believes that historians are in a plumb position for combating scientism, a root of our culture's problems. They are able to dispel the notion that the whole real difference between things is expressible quantitatively by drawing the inadequacies of such philosophies and the humanistic undergirding of science out of past examples. Jaki introduces Pierre Duhem's history of science thus:³

¹ Cauthen, p. 205.

² See Jurgensen's (p. 648) comment.

³ Stanley L. Jaki, 'Introductory Essay', in *To Save the Phenomena: an Essay on the Idea of Physical Theory from Plato to Galileo*, by Pierre Duhem, transl. G. Edmund Doland and Chaninah Moschler (Chicago: University of Chicago Press, 1969), pp. xxv–xxvi.

Modern culture seems to be in the throes of an unbridled quantification, in which individuals are on the road to becoming mere numbers, if not mere holes in punch cards. . . . To strike a middle course [a remedy,] as sanity demands, between the extremes of romantic primitiveness (if not illusory anarchism) and of dehumanising scientism, one must be fully aware of scientific method. This is not an easy task. To cope with it there are several avenues, of which one, that of historical studies, should have special appeal. History is a great equaliser. Sooner or later it cuts all things and all men down to their true size.

Jaki considers that poets can help in this task too:¹

Only poets have the verbal tools to ring a resounding alarm about the colossal robbery which is at the bottom of our cultural crisis and of its century-long split in two [into the subjective-oriented and the objective-oriented]. The robbery is a sustained campaign to declare valueless any knowledge which is not quantitative, which is not expressed in terms of measurement.

Our culture is loath to recognize historical argument or poetic imagery as convincing for present and future action: one cannot deactivate a firing tank with a rolled-up newspaper, no matter how many times one hits it. Jaki may be seen as merely a learned prophet of doom. In fairness he does suggest further that scientists can help by recognizing the faith that their craft is built on, and by being careful that their conjectures be not made into truths which one day may infect our culture.² And this is a proper course to be taken. I am sure, though, that the desired result – an alleviation of cultural ills – would be more certain if that which is seen as the pinnacle of truth by our culture, namely the physical sciences, were to adopt theories which are at roots ethical, or less ambitiously, came to terms with a theological-religious-ethical system by an integrative process. This not only supplies the moral code, but would make it convincing.

In a broader perspective, the Church will probably lose this battle typified by Jaki in the continuing modern culture (including science)-religion debate, just as Christianity has lost in the past. In fact, this is a weak fight by the Church as compared with, say, that spearheaded by Bishop Wilberforce against evolution. The Church loses when it redefines the problem and its beliefs so as to remove the confrontation, weakening and accommodating its stand so as to remove any possible conflict. Hendry's response to Jaki is typical of this accommodating and defeated attitude: modern biblical theology sees God acting in history and not in the material world. Such a disengagement of religion will only help it lose its force and relevance for everyday life. We need neither Jaki's nor Hendry's response, neither a firm holding to the past nor a sidestepping. We need a theology-science inter-

¹ Stanley L. Jaki, 'A Hundred Years of Two Cultures', *University of Windsor Review* 11, no. 1 (1975), 55-79, especially p. 76.

² Jaki, *The Relevance of Physics*, p. vi; 'The Role of Faith in Physics', p. 200.

action with a combined dialogue on, exchange of, and decision on mutually relevant facets of knowledge. Creation is one of them.

As a conclusion, let me briefly express my support for his earlier (and elementary) aims, but my scepticism for his later ones. That physics does not provide an absolute truth, that its mentors held faiths and rested their investigations on conjectures, that there is a difference between science and scientism, that some Christian beliefs were in part necessary ingredients for the rise of science, are all admirable theses. However, his demands for present-day science, that it should be wary of concepts such as an infinite or oscillating or non-rational universe, that it should not consider theories on the formation of planetary systems which imply or depend on their plenitude, I find questionable.

If I am to disagree as much as I do with Jaki's programme for the use of theology in physics I am removing from consideration one of the largest corpora of recent writings in this vein, and give myself the very difficult task of doing something better.