

Book Reviews

John Polkinghorne ***Science & Theology: An Introduction***

SPCK, 1998. 144pp. pb., £10.99.
ISBN 0-8006-3153-6

This introduction to science and theology is intended as a textbook for use with the many courses on science and religion which have recently been launched in Colleges and Universities. The material is organised with general considerations of science and theology coming first, followed by issues of greater specificity. A wide range of issues is covered and the comments on each one are very concise. In many instances the condensation of ideas is quite masterly; for instance, good summaries of the Galileo affair and the Darwinian controversies are encapsulated in two pages, and in one and a half pages, respectively. In my own MA course module on science and religion we devote three hours apiece to these two episodes and even that seems short! Chapter 2, 'A scientific picture of the world', also exemplifies a carefully honed treatment of key issues in science which may be seen to have a bearing on religious belief. The counterintuitive worlds of quantum theory and relativity, together with the metaphysical questions raised by certain aspects of science, are not easy to explain. But Polkinghorne, as a former Professor of Mathematical Physics and a clear expositor is an ideal person to attempt the difficult task, which he does with success.

A possible danger for a book which is extremely concise, is that it makes for heavy reading. This is not the case with this text. The potential pitfall has been avoided by first dividing each chapter into between four and eight short parts with clear headings. Then, many of these parts are further divided into several sections, each with their clarificatory sub-headings. Furthermore, these parts and sections are linked by signposting sentences which set out the

logical progression of the ideas. These strategies make for a smooth read and blocks of text which are of manageable size. There is a good balance between the scientific and the theological content, and appropriate comparisons and contrasts are made between the content and methodologies of the two disciplines. Central doctrines of Christianity, such as the resurrection of the Lord Jesus Christ, are dealt with robustly, along with a brief, but sensitive treatment of world faiths.

Readers already familiar with studies in the interplay between science and religious belief will expect to be brought up to date with frontier topics in the debate between science and theology as well as in contemporary thinking about science and about theology. Such readers will not be surprised to find a chapter devoted to the contentious matter of how God acts in a world which exhibits a tight chain-mesh of cause and effect. Of the various views discussed in this chapter, I find myself left with reservations about all of the presently proposed solutions.

I have already recommended this book to my students as a useful introduction to many of the issues in science and theology. The bibliographies included point readers towards more specific texts which enable many issues to be followed up in greater depth. It also needs to be pointed out that the utility of this volume is not confined to participants in courses on science and religion. The text is also an accessible introduction to principal issues in science and theology for the thoughtful reader.

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Robert Barry

A Theory of Almost Everything

One World, 1998. 200 pp. pb. £9.99
ISBN 1-85168-123-X

Readers will recognise the title as reminiscent of the Grand Unified Theory or Theory of Everything that has been sought by Newton, Einstein and, in more recent years, by Stephen Hawking. The author inserted the word 'almost' because he believes that it is impossible to have a complete theory. Robert Barry, a statistician and psychologist, set out on his quest as an agnostic believing that science had all the answers but has written this book with the conviction that the universe can only be understood ultimately if religious faith is included in the overall theory. His objective is twofold: to undermine what he believes to be the illusion of separateness and to show that the universe comprises of seven dimensions – three of space, one of time and three associated with the human mind.

The illusion of separateness is the result of a misunderstanding perpetuated by psychology, that 'nasty little subject', and by science, which in the past broke the world down into parts that could be readily classified. Maslow's humanistic psychology, Einstein's relativity theories and quantum mechanics have, he argues, altered all of this. Starting with the acceptable assertion that we cannot grasp the whole of reality and that our understanding is limited by the level of our knowledge and shaped by our social experience, he goes on to make the controversial claim that the world we experience is a reflection of ourselves. This he achieves by extending Einstein's relativity theory to include the inner reality of the mind and by seeing both of these in the context of quantum theory.

Barry's book is written for the intelligent layperson and, for the most part he is able to make difficult concepts intelligible. This is particularly so in the sections where he discusses relativity and quantum theory. For the readers of this journal the most interesting part will be his attempt to link his worldview with world

religion. Like John Hick he seeks to show that all religions actually speak with one voice. He maintains that, 'When all the superfluous dogma and ritual is stripped away, we find that they all convey the same fundamental message – the need for humanity to recognise and serve an underlying unity, the need for self denial in the path of spiritual progress.' (145) He believes that the truth of a religion is not based on the behaviour of its professed adherents, but rather on the life of its founder and the quality of his teachings. All religions have prophets who have insights into the meaning of life, which must conform to reason and produce benefits for mankind before it can be included in his new scientific-religious synthesis. Although he briefly outlines Hinduism, Judaism, Buddhism, Christianity, Islam and the Baha'i Faith it is clear that the eastern religions and their modern manifestation of the New Age movement best fit into his scheme which ultimately involves the mystic awareness of being part of something greater than oneself. His thesis is essentially that through both the continual expansion of human consciousness allied with progressive divine revelation it will be possible to enter the state of mystical consciousness and '... gain access to the mind of God, according to our own conceptions.' (179)

The book makes interesting reading but whether the author is able to convince his readers of the validity of its message is another matter. It is full of optimism. 'The latest signs from science and the New Age movement are that we are beginning to make the transition to this next stage. The old "universes" are beginning to crumble.' (174) It is inevitable that in a book covering so much ground there will be much oversimplification and the danger of distortion. Certainly Hawking would not be prepared to accept his religious vision as part of the quest for a Theory of Everything and the evolutionary biologist would hesitate in seeing purpose in evolutionary development. It is also doubtful if members of the faith communities he mentions would be content to accept the

minimalist version of their religions as representative.

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John Rendle-Short
Green Eye of the Storm

Edinburgh: Banner of Truth Trust, 1998.
194 pp. pb. £9.95.
ISBN 0-85151-727-7

John Rendle-Short (JRS), former professor in Child Health in the University of Queensland, has produced an unusual biography of four people: Philip Henry Gosse (1810–1888), George Romanes (1848–1894), the author's father Arthur Rendle-Short (ARS) (1880–1953) and JRS (1919–). Each of the subjects has at least one thing in common: they all struggled to reconcile science with their Christian belief. In all cases the science in question was evolution and the age of the Earth. Their responses were all different.

Gosse – in(famous) for his much quoted, but yet largely unread, *Omphalos* – a contemporary of Darwin, Lyell and Huxley, developed the idea of an apparent age of the Earth in an attempt to square the Bible with science. We can be grateful here to JRS for making accessible lengthy quotations from *Omphalos* (ch. 4).

Romanes, lost his faith because of Darwinianism, only to regain it in his last few years as he was dying from what JRS suggests was a 'space-occupying tumour of the brain' (83). His was a journey to and from faith via Darwinian materialism.

Bristolian Surgeon Arthur Rendle-Short struggled throughout his life with the impact of science on the Bible and hence Christian faith. This struggle is well documented by JRS, and provides fascinating reading. ARS was shaken by the

evolution/creation conflict and here JRS traces his father's pilgrimage from a place where 'Darwin stood victorious' (144), through 'the fall, an *impasse* [for evolutionists]' (165) to possibly embracing a 4004 BC date for creation (175). Here JRS draws upon many of his father's sermon notes and we are given tantalising clues on how his views changed over time.

JRS charts his own journey from a strictly evolutionist view to a literal six-day creationist position. A shift that was aided by A.E. Wilder Smith and Francis Schaeffer.

The book contains a number of minor infelicities; e.g. R.E.D. Clark is referred to several times as 'Clarke'; a list of further reading in Appendix 1 omits any date of publication and name of publisher. JRS also has the annoying habit of making unsubstantiated assertions, such as: 'In our day we are seeing increasing evidence pointing to the creation [as opposed to an evolutionary] model' (119). He does, however, deal with some 'major evidences for special creation' (275) in his Appendix 1 but these have been well rehearsed elsewhere. His main source of evidence comes from Werner Gitt's *Did God Use Evolution?* (1993). Gitt is well quoted in the footnotes throughout the book.

JRS admits to writing primarily for Christians who are theistic evolutionists, presumably to help them come to JRS's literal six-day creation position. As a tract for creationism it is mainly unsuccessful, but as an introduction to the life and times of four fascinating Christians who are also scientists it largely succeeds. It will interest all who are likewise struggling to reconcile 'the seemingly irresistible force of science, and the immovable inerrancy of Scripture' and provide them with alternative models to complementarity and theistic evolution.

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Stephen R.L. Clark

God, Religion and Reality

SPCK, 1998. 177pp. pb. £17.99.

ISBN 0-281-05133-X

Clark, Professor of Philosophy at Liverpool, has written very widely in the last twenty years on subjects from Aristotle to environmentalism. In this book he sets out to demonstrate what most readers of this journal will take for granted – that there is such a thing as truth. Further, that truth exists necessarily, must be identified with the Beautiful and the Good, and is best thought of in personal terms. This then is an old-fashioned defence of philosophical theism, a bold thing to attempt in this age of postmodernity and theological anti-realism.

Clark is at his best in his early chapters. As in his important *How to think about the Earth* (1993) he is vigorous in his dismissal of thinking he sees as incoherent. Moreover he makes most interesting use of poets, from Milton to Edwin Muir. He is convincing in his argument that all explanations must terminate in necessary truths (even if we don't unambiguously know any of these). Truth, then, can be said to have given rise to all that contingently is. However, the next step will be far less appealing to, for example, a scientific realist with no theistic convictions. Clark tries to show that this Truth is personal and volitional in character, perfect in a sense demanding worship. This is a conclusion congenial to believers, but hardly inescapable by the agnostic. To accept that there is such a thing as truth does not imply that this truth must be known by a knower. Knowledge, as opposed to truth, need not precede our acquisition of it.

Moreover his effort to argue that scientific realism implies moral realism – asking, would biologically different beings be able to agree not only on various scientific truths, but also on the beauty and appropriateness of certain equations and methods of reasoning – seems slighter than what precedes it. Our own sense of what is beautiful in science changes as the subject changes – unlikely, then, that we

could demonstrate anything from current aesthetic preferences around Alpha Centauri.

However, Clark elegantly shows that personalistic theism does naturally lead to a form of trinitarian thinking, and indeed to incarnation. Much of his own thinking he admits to owing 'as much to Plato as to Abraham'. So it is particularly interesting how rich and Christian his philosophical theism turns out to be.

Towards its end the book becomes repetitive and unpersuasive. This is partly because Clark relies on four thinkers to develop his argument – Plotinus, Bishop Berkeley, G.K.Chesterton, and George Orwell in 1984. The material on Plotinus, interestingly, puts 'the last great pagan theist' nearer to Christian theism than many have supposed. But in the end too much is asked of Clark's scratch team of truth-tellers. It is frustrating, moreover, that he makes no effort to refer to important recent defences of theism such as those of Keith Ward and Ian Markham. For all its intelligence and fascination the book is too compressed and philosophical easily to appeal to the general reader, and insufficiently referenced to satisfy the specialist.

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Michael Poole

Teaching about Science and Religion

Culham College Institute, 1998, 67 pp.

pb. £5.00. ISBN 0 907957 54 4

The impetus for this booklet was the Science Education Project of the Council of Church and Associated Colleges. Its aim is to engage with the Natural Curriculum for Science education (primarily that drawn up in 1995 for schools in England and Wales), to identify points of interface

between science and religion within the curriculum, and to encourage, and provide materials for, addressing these points within science teaching (rather than from the religious education direction).

The author argues that the religious stance, though primarily Christian, would suit reasonably well any of the major theistic religions; this may be generally so, but at least in one place (18) a very specifically revelational Christian stance is taken. His approach to the interaction between science and religion he describes as on the 'constructive interchange model'. By this he means developing the conviction that at many points the two subjects have things to say to each other, in the fields of Data (the facts), Nature (that is the underlying philosophy) and Applications (for instance in Ethics) of Science. There is virtually nothing in the reverse direction – that is, on feedback into religion of scientific perspectives. The issues are examined for both Primary and Secondary school curricula (with full tabulation of suggested points of contact).

When it comes to suggesting and elaborating actual ideas, and teaching approaches, a booklet of this length is inevitably very cursory. Perhaps one of its most useful features is the sources and reference points it gives in other books, videos and so on where much fuller discussion of the content of the issues is to be found. The author also admits that many of his suggestions are provisional, and that he hopes they will stimulate discussion, as well as the development of much more fully worked out strategies and materials for teaching practice. This, it seems to me, is crucial if real progress is to be made in encouraging from the scientific education side really fruitful and attractive exploration. As here presented, many of the issues look as if they are having the religious component rather dragged in (I think some of the old chestnut problems such as the heliocentric Galileo debate are not burning issues with many of today's young). And I suspect that even Christian science teachers will take some persuading to adopt the author's 'constructive

interchange' approach without more curricular encouragement – there is so much else to be got in. So often the Laplacean approach ('I have no need of that hypothesis' – that is for a different and complementary set of problems) is more comfortable.

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Graham Houston
Virtual Morality: Christian Ethics in the Computer Age

IVP/Apollos, 1998. 224 pp., pb. £14.99
ISBN 0-85111-461-X

'Not the last word, but often the first' – so runs the slogan for a well known series of Christian booklets. Houston's excellently titled book is one of the first words on a Christian understanding of virtual reality.

At the risk of restating the familiar, we should first briefly explain 'virtual reality'. Virtual reality (VR) simulations use computers to simulate a three-dimensional environment, with the use of helmets or surrounding screens to give the user a sense of moving around in and interacting with a real environment. Currently VR techniques are being tried in education, (including medical training), in engineering design, in modelling architectural and artistic heritage (including areas of cities and the cave paintings of Lascaux). VR is also used for entertainment, for computer games – often, for some reason, with simulated violence. It will not be long before the pornographic possibilities are more widely exploited.

The central question suggested by the title is whether moral questions need to be asked of the actor in a virtual world. For instance, is it wrong to inflict violence on one's opponent in a VR game? In order to approach the question the book homes in on its topic from fairly general discussions of Christian ethics, technology, modern computer technology, and virtual reality

itself. Houston defends his contention that there are new moral issues, sufficiently so to justify the book's title. One central conclusion is this:

'Virtual Morality, therefore, focuses on the subjective experience of the agent in a virtual environment, and is ethically significant because of the intentionality and desire involved and not because of any real or imagined harmful effects on others.' (177)

Is this the right question? Finding the right question is the key thing. There are other questions, some of which are raised in the book, and others are suggested to the reader. In what way is virtual reality real? Computers are beginning to offer new ways of presenting information, and making it accessible on a quite unprecedented scale. Will these possibilities work a revolution in human life and society? What are the dangers that we ought to be aware of? What are the risks of escapism? And why is simulated violence so popular with the creators and consumers of computer games? Houston raises these questions, and starts to discuss them. We should not expect too many conclusions; and perhaps it is appropriate that so many discussions seem to be left in a quite open-ended way.

Another large series of questions is raised about the nature of fiction. There are all sorts of intriguing ways of blurring the line between representation and fiction. The author describes a VR simulation of the Lascaux cave painting, in which the paintings are animated as the viewer examines them, and in which a human image comes to life and gives a 'secret' message. What does our responsibility to tell the truth mean for this questionable project?

This book offers us some helpful approaches, background and insights as we enter the computer age. Unfortunately, some of the opportunities to clarify the subject are missed. There is altogether too much offered by way of potted accounts of ethical frameworks. Clarity is too often lost in a cumbersome and cautious style.

We must be grateful that the topic has been raised, and the first word spoken. We must hope that others will climb on Houston's shoulders, and illuminate this new landscape more brightly.

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Harold Turner

The Roots of Science: An Investigative Journey Through the World's Religions

The DeepSight Trust, 1998. 204pp. pb.
NZ\$29.95. ISBN 0-9582012-2-6

This book is a product of The DeepSight Trust, which describes itself as 'a New Zealand Initiative for Religion and Cultures'. This Initiative has its roots in the Gospel and Culture Movement which Bishop Lesslie Newbigin initiated in Britain in the early 1980's. Newbigin himself recognised science as one of the major shaping and defining components of Western culture, and so it is appropriate that the DeepSight Trust should give serious consideration to why science is so intimately linked with Western culture.

The thesis that the fact that modern science was born and flourished in western Europe was no accident but was due in part to the contribution that the Judeo-Christian tradition made to western European culture will not be new to most readers of this journal – though it is still little known to the wider public. However, this book is not just another restatement of this thesis. Harold Turner approaches it from a new angle because he does not write as an historian of science but as an expert in the study of religions. Moreover, he has a particular expertise in the study of tribal (or primal) religions, which he brings to bear on the thesis in an interesting way.

Turner argues that there are basically three broad families of religions. These are

the Primal, the Axial and the Abrahamic. The Primal religions are closely linked with tribal cultures. By the Axial religions he means the great Asian religions: Hinduism, Buddhism, Jainism, Taoism and Confucianism. The Abrahamic religions, Judaism, Christianity and Islam all originated in Semitic culture. He shows that each family has an implicit cosmology. He then goes on to argue that the cosmology of Primal religions is incompatible with science because it sees the world as a unity permeated by a host of uncoordinated gods and spirits of ambivalent nature. There is no room for rational order and coherence. The cultures influenced by the Axial religions produced major advances in technology but their cosmology did not encourage the development of science as an on-going enterprise. Among the reasons for this were their dualism, concentrating on the unchanging spiritual reality and having little interest in the changing world of matter, and their impersonal view of ultimate reality. The key features of the cosmology of the Abrahamic religions which encouraged the development of science were the beliefs that the universe is the result of a free act of creation, and so is contingent but rational and also de-sacralized but not depreciated. To someone who is not an expert in the study of religions, a good case seems to be made for the initial thesis.

Having laid the initial groundwork, Turner goes on to discuss in some detail how the basic Hebrew cosmology was developed by Christian theologians, culminating in the work of John Philoponus in the sixth century. He shows how this work was revived in the later Middle Ages and contributed to the rise of modern science. He discusses why, despite many notable achievements, science did not flourish in Islamic cultures. He argues that what he calls 'the revisionist spirituality' that has grown up in western cultures in the latter part of the twentieth century is a reversion to something like the cosmology of the Primal religions and warns that it is subversive of science. In the final chapter he suggests how science

and theology can be mutually supportive in facing the post-modern relativisation of truth. A concluding 'Provocative Post-script' includes a trenchant reply to those who object to the 'scandal of particularity' in the claim that the Judeo-Christian tradition, among all the religious traditions, has played a special role in the rise of science, and was uniquely fitted to do so.

Turner's exposition of his version of thesis that the rise of science was due to a significant extent to the cosmology developed within the Judeo-Christian tradition is more detailed and nuanced than this brief summary can convey. There are several interesting insights arising out of Turner's knowledge of the study of different religions which occur in the course of the argument, such as why adherents of the Primal religions are more attracted to Christianity than to Hinduism or Buddhism.

The book is attractively produced and written in a style that makes it a fairly easy read. Hopefully this will attract quite a wide readership, but it deserves to be taken note of by the scholarly community too because it is an original and significant contribution to the debate about the contribution of religion to the rise of modern science.

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Edward O Wilson

Consilience: The Unity of Knowledge

Little, Brown and Company, 1998. 374 pp. hb £18.99. ISBN 0-316-64569-9

The academic world is split almost into parallel, non-communicating universes. Most of academia has embraced postmodernism, arguing that all knowledge is socially and historically embedded. There is no tradition-independent rationality; the most we can hope for is an arbitrary consensus. In science, a postmodern

strand can be traced from Toulmin and Hanson in the '50s through Kuhn, Feyerabend, and Radnitzky to Barnes, Bloor, Collins, Fuller, and Shapin today. Yet much of science remains modernist, and Wilson is one of its most articulate defenders. This science claims to have both a (or 'the only') true method of knowing and a true content – an ever-expanding body of true knowledge. Wilson's science is objective and universal, telling a grand story that is unaffected by moral, philosophical or religious beliefs (e.g. 52, 274). Many of the postmodernist theses have been capably disputed, but the foundational role of beliefs ('faith'), even in science, is well established. The refusal of scientists like Wilson to weigh the evidence baffles me. It is hardly a scientific stance!

In the year following its publication in August 1998, *Consilience* has become the best-seller of best-sellers amongst popular science books and Wilson is lauded as the new Darwin and one of the world's greatest scientists (cover quotes). As a word, 'consilience' will be unfamiliar, but the idea is familiar. We have met it as 'materialism', 'evolutionary naturalism', 'reductionism', 'physicalism', etc. Wilson uses the word to mean that sociology, anthropology, economics, arts, ethics and religion can all be subsumed within naturalistic science. You will not find a better – or more readable – summary of the case for that agenda. Of course, most of those who hold richer views of reality will have little problem with Wilson's material – it can be viewed as (potentially) exhaustive in its own terms without being the whole picture, or excluding other dimensions of explanation. Wilson simply doesn't consider any real alternatives. It is an all too common failing in popular science.

Wilson presents consilience as the one true story, but such a story must obviously make sense of life and thinking as a whole. The attempt to subsume everything within the natural(istic) sciences faces all the standard objections so well articulated by, for example, Keith Ward in

his *God Chance and Necessity* (Oneworld, 1996). To take one key example: to account for moral judgement – to meaningfully label any action as good or bad – the naturalist must claim that only chance (i.e. chance processes affecting purely physical entities) and necessity (physical laws) have produced both *free will* and the *standards* by which the freely chosen conducts are judged. It is very implausible to say the least. Wilson does not address such fundamental objections to his programme. Yet it is interesting that there is a theme running through the book that neatly poses the problem. On the one hand Wilson would explain everything human by 'brain circuitry and deep, genetic history' (290). Indeed that leads him to a kinder view of existing moral codes and religions than many of his colleagues – we have been naturally selected to need them (285ff)! Yet, somehow, Wilson can break free: 'The essence of humanity's spiritual dilemma is that we evolved genetically to accept one truth [sic] and *discovered* another.' (294, my emphasis) Science replaces religion. But, how, in his scheme, is such freedom possible? How is his science possible? Or, rather, won't that 'science' be yet another product of evolution, to be replaced in its turn? Truth doesn't come into it. Or, at least, we will never know.

Another important point to make is that this book, and the many others like it, reveal a growing divide between the 'official' and 'popular' faces of science. 'Officially' science is value free and has nothing to say about morality and religion – whenever relevant issues surface, we are assured that people can believe in both God and (say) evolution. But, when you turn to the popular writings of leading scientists like Wilson, you find an undisguised naturalism and the uncompromising message that science has abolished (theistic) religion (e.g. 268, 292).

I have restricted this brief critique to general matters, but I must stress that, even within the natural sciences, naturalistic explanations are far less secure than

the popular books assert. For example, neither Darwin nor Dawkins, Williams nor Wilson, has refuted the thesis that the world and life is intelligently designed. Many of us would claim that the 'design thesis' has never been better supported. So, yes, read this book for a comprehensive and reliable survey of the naturalistic programme, but read it too to appreciate how fatally flawed it really is.

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William Ryan and Walter Pitman

Noah's Flood: The New Scientific Discoveries about the Event that Changed History

Simon & Schuster, UK, 1998. 319pp. hb. £17.99. ISBN 0-684-81052-2

The story of the flood at the time of Noah is one of the most compelling in the bible. Even in modern secular society it remains probably the best-known biblical story.

Records of a universal flood near the beginning of human history are deeply ingrained in the memories of many cultures. Other than the biblical account, the best-known is probably the Gilgamesh epic from Mesopotamia, which has many elements in common with the biblical record. Indeed, the oldest surviving cuneiform tablet containing the Gilgamesh epic was written considerably earlier than the estimated date of composition of the Genesis account of Noah's flood. It seems likely that these two accounts, at least, stem from the same event, the memory of which was then transmitted orally for maybe as long as 2000 years before being written down. Although the written biblical version is younger, its internal structure and more straightforward form suggests that it may actually be the more reliable record of the historical event.

So when did the great flood occur? Floods are not in themselves uncommon, and indeed are perhaps the most frequent cause of natural disaster affecting humans, of all cultures and at all times. Usually they occur in river valleys when a river bursts its banks; in coastal areas from inundation by sea water as a result of storm surges or earthquake-induced tsunami (tidal waves); or in rarer cases still from a temporary dam being breached, as may happen, for example, when water accumulated in a volcanic crater or caldera is suddenly released. But the biblical flood was of an unprecedented and unrepeatable magnitude and extent in the history of humankind.

Most professional geologists, including myself, are convinced that the geological evidence does not support a truly global flood. If such a global flood had occurred, it would have left clear records in the sediments. Because large floods are such an important and common mechanism in the deposition of sediments, their effects are well understood and easily recognisable. So there can be little doubt that such evidence would not have been overlooked, had it existed.

The most likely scenario, therefore, is that there was a massive flood which affected all of the then-known population and the cultures from which Abraham eventually came: his descendants are the focus of the Old Testament record of the dealings of God with humankind and so the history of his ancestors was of particular interest to the biblical authors. In the early parts of this century most archaeologists considered that the so-called fertile crescent of Mesopotamia was the likely arena of Noah's flood. This region was inhabited from the end of the last major ice age some 11000 years ago, and contains some of the earliest known examples of people living in settled villages and beginning to cultivate cereals, rather than surviving as hunter-gatherers. The fertile crescent suffered numerous locally devastating and unpredictable floods of the Tigris and Euphrates rivers, caused mainly by

spring-time snow thaws in the Taurus Mountains, and flood deposits within city streets have been recorded in many archaeological investigations of ancient Mesopotamian cities. Here, it seemed, was evidence of widespread catastrophic flooding with associated thick sedimentary deposits. Yet as dating of these flood deposits improved, it became clear that they were not continuous nor contemporaneous, but the result of numerous different localised floods. This is in accord with the behaviour of river floods: they tend to affect a relatively small area and to be temporary. People could usually move back in days if not weeks. They also occur rather suddenly and without the long prior warning that is a strong feature of both the Gilgamesh epic and the biblical account of the flood. So a Mesopotamian flood seems an unlikely candidate for the big one.

There is, however, a third possibility and this is the one that Ryan and Pitman champion in this book. It is that the flood occurred some 7500 years ago when rising sea levels at the end of a final burst of the ice age caused the sea to break through the Bosphorus and catastrophically flood the entire Black Sea basin. At the time, argue Ryan and Pitman, the Black Sea basin was a warm haven because it was well below sea level in an otherwise cold and barren hinterland. The Black Sea had probably shrunk to a fresh-water lake some 400 feet below sea level, surrounded by fertile deltas and river valleys which would have attracted people from all around to a relatively settled, village-based life.

If such a large-scale, catastrophic flooding of the Black Sea sounds surprising, there is in the geological record an even more astonishing parallel. Some 7 million years ago plate tectonic movements closed Spain against North Africa and blocked off the marine connection between the Atlantic Ocean and the Mediterranean Sea. As a result the Mediterranean dried out, leaving a basin thousands of feet deep and floored by thick layers of salt deposited from the sea water as it evaporated.

This unusual isolation lasted for over 2 million years, during the geological period known as the Messinian. Eventually, around 5 million years ago, continued plate tectonic movements opened the Straits of Gibraltar and allowed the sea to flood back into the Mediterranean Basin. As it did so, it scoured huge channels into the slopes at the side of the basin, some of which have been mapped by oceanographic surveys. All this happened long before any humans were on the scene, so it cannot be the flood recorded in Genesis. But it seems entirely plausible that the same thing could have happened in the Black Sea at a much more recent date when modern humans were undoubtedly around to be affected by it.

There is little doubt that the Black Sea underwent episodes of isolation from the Mediterranean Sea as the ice ages waxed and waned. During an ice age, considerable quantities of water are locked up in the ice cap, and as a result the global sea level drops by as much as 400 feet. During such a time the Black Sea would have been cut off from the Mediterranean, since the inter-connecting Bosphorus channel is relatively shallow. Indeed, as the flow through the Bosphorus dried up, it would have become sedimented and silted up, thus making it an even more effective barrier. The only water input to the Black Sea would then have been from rivers like the Dnieper and the Danube, themselves greatly reduced in flow rates by the general aridity that accompanies an ice age. So gradually the water would evaporate, its level would drop, and it would become fresher. Oceanographic expeditions to the Black Sea have documented both the transitions from fresh to salt water, with the attendant abrupt changes in fauna, and also have mapped the underwater channels gouged out by water flooding through the Bosphorus when the sea level eventually rose again.

So Ryan and Pitman's hypothesis that the Black Sea was flooded rapidly is entirely plausible. However, whether humans were indeed living by the shores of a lowered Black Sea lake and whether

they were faced by an inundation of such ferocity that it left an indelible mark on early human literature, is much more conjectural. We simply do not have the evidence to know for certain whether humans were living in the Black Sea basin at the time.

Ryan and Pitman explore their hypothesis with many vignettes and anecdotes drawn from their own experiences. They range across a wide variety of topics. There are descriptions of early scientific expeditions to the Black Sea, before the end of the Cold War, which established the outline of the history of marine inundations. Much of the discussion is of archaeological evidence for the ways people lived and where they migrated from and to, particularly around the time of the last marine flooding of the Black Sea about 7500 years ago. There is also some discussion of linguistic evidence for the ways in which stories can be transmitted orally with relatively little loss of the major story-line, even over tens and hundreds of generations. But at the end of the day, much of this evidence is hard to tie down to specific dates and chronologies, mainly because it pre-dates written human history.

Ryan and Pitman's style of writing is rather breathless and flowery, perhaps because it is aimed at a popular market. But provided you are not in a hurry to get to the meat, it makes an easy read. Is it plausible that flooding of the Black Sea was the origin of the flood stories? Certainly so, in my opinion, though a lot more evidence is needed to test this hypothesis. Tighter and better dating of the ages of key events, both in the oceanography of the Black Sea and of the archaeological remains and pattern of migrations of large bodies of people in the surrounding regions, is one obvious requirement. It is certainly possible that detailed studies of the Black Sea floor could reveal evidence of ancient human settlement 7000 to 8000 years ago, and it is likely that climatic changes that might have driven regional migrations around that time will be understood better in the future.

Is there a congruence between the

biblical account of Noah's flood and the evidence we can deduce from the Black Sea flooding? This is an area that would benefit from further work. Apart from the title of the book, which presumably is designed to attract the attention of potential readers, Ryan and Pitman devote relatively little space to addressing the biblical account of Noah's flood: indeed, they spend considerably more time in discussing the Gilgamesh epic. But there are some interesting avenues that would repay further work. For example, Ryan and Pitman estimate from hydrographic arguments that when the Bosphorus was finally breached by rising sea levels, the water flow would have been such that the level of the Black Sea would have been raised by an average of about 6 inches per day. They suggest that it would have taken between one and two years to raise the water level the 400 feet or so required to match the sea level in the Mediterranean. The huge flow of water cascading down the slope of the basin would have created large clouds and mists which may then have caused heavy rainfall in the region, particularly in the early stages when the difference in water levels between the Mediterranean and the Black Sea was greatest.

Maybe there is a parallel here between the lake level rising and biblical account of waters rising from the deep (Gn. 7:11; 8:2) for some 150 days (Gn. 7:24), accompanied by heavy rains from above for the first 40 days (Gn. 7:4, 12).

But there are apparent discrepancies, too, between the biblical account of the flood and the physical evidence we can deduce from the Black Sea. Most notably, the waters of the Black Sea have not receded in the way that the biblical account indicates (Gn. 8:3, 14). And though the inexorable rise of the Black Sea would have forced any lake-side settlers to keep retreating for a frighteningly long time, the inferred rate of rise of about 6 inches per day, corresponding to a horizontal distance of perhaps a mile or so per day in the flattest areas, would not have caused widespread deaths except perhaps

amongst the old and the infirm, or those stranded and cut off on temporarily higher areas of land. Though the Black Sea flooding may have left a vivid folk memory among the people displaced by it, there certainly were many others who continued living throughout this period in northern Europe, in Mesopotamia, Africa, India, China and Australia, without being affected at all by the flood.

So although the idea of a Black Sea flood as the origin of the flood story in Genesis is an intriguing one, it leaves plenty of loose ends still worthy of further investigation. Whatever the strength or otherwise of the scientific explanations of the flood, the Genesis account remains important theologically in the consistent statements it makes about the root cause of the flood in humankind's wickedness, of God's purpose in eradicating that evil, and of his plan to save one family group from whom came eventually a far greater Saviour, Jesus.

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Karl R. Popper

All Life is Problem Solving

Routledge, 1999. Translated by Patrick Camiller. 171pp. hb. £30.
ISBN 0-415-17486-4

This is vintage Popper. Most of his favourite themes – especially objectivity, epistemology, falsifiability, the preciousness of civilisation and the dangers of notions of ‘historical inevitability’ – are touched on in this collection of talks and occasional pieces delivered during the last twenty years of his long and distinguished life (1902–1992). Titles range from ‘Notes of a realist on the body-mind problem’ to ‘The collapse of communism’ and ‘On the theory of democracy’. The latter is a critique of proportional representation written for *Der Spiegel* in 1987 and one of the best things in the ‘political and historical’ half of the book. The other half is concerned with the philosophy of science.

Amid this diversity (and inevitable fragmentation) there is at least one connecting motif: the virtue of *corrigibility*. If we, our democracies or our science are to become better adapted to the realities of the world around us, an alertness to criticism should be our way of life. A mismatch need not remain a painful failure for it points to opportunities – a new problem to tackle, a new potential growth point. Thus in speaking of the attractive Kepler, Popper says, ‘Like all seekers after truth, he makes many mistakes. But he learns from his mistakes as few others have done’ (74).

‘Error correction is the most important method in technology and learning in general. In biological evolution it appears to be the only means of progress’ (100). But how *do* we progress after finding ourselves in a no-way street? Popper has long told us ‘there is no such thing as induction’ (from data) (54). Certainly, there is no *automatic recipe* for a more adaptive course of action. Subsequent attempts at a better fit depend upon the existence of a varied population as in evolution, or upon intuition or inspired guesswork. ‘Theories (scientific or otherwise) are trials, inventions’ (72), ‘. . . especially in science, hypotheses come before . . . the “data”.’ (71).

This stance Popper applies not only to our conscious activity of scientific problem solving but also to the largely unconscious processes involved in everyday perception of the world. Minds are not passive ‘buckets’ (72) waiting to be filled. Rather they are ever-active in pursuit of goals and desires (52) and it is while in pursuit of these that they throw up hypotheses, conjectures, Gestalts (which may well be influenced by expectations and hopes) in an attempt to fit the incoming flux from the sense organs. ‘We keep trying to compare these conjectures with reality and in this way to improve them and bring them closer to reality’ (55). ‘I really do not see how one can speak of the perception of shapes and so on, as if my perception were rather like a photograph’ (52).

Popper is keenly aware of our biological substrate. He sees minds, bodily activity (67) and sense organs (63) as intimately linked products of a very long biological history of trial and error, of active seeking of solutions to problems posed by the environment. So when he comes to epistemology – how do we arrive at our knowledge? – he wants to stick his neck out even further than Kant in emphasising the huge innate component (70, 53), ‘all knowledge is a priori, genetically a priori in its content. For all knowledge is hypothetical or conjectural: it is *our* hypothesis. Only the elimination of hypotheses is a posteriori, the clash between hypotheses and reality’ (47).

It is to be hoped that the emphasis on error as the key to progress in science, and particularly the tale (11–13) of Sir John Eccles’s delight when his theory, which had been refuted, was yet judged by his friend Popper to be a good theory because falsifiable, will not be misread as saying that if a theory is falsifiable it is *ipso facto* worth experimental time and expense. That the moon is made of green cheese was a falsifiable hypothesis. Popper has, of course, for years written about other factors required in a good theory: ‘the better theories are those with the greater content and the greater explanatory power’. Moreover he allows for ideas, such as Freud’s (17) and Darwin’s, which are not testable (and so not properly theories) which yet provide valuable insights.

This is an old man’s book. It contains more personal and autobiographical touches than most of his works. He comes urgently through the page to bequeath to us his yearning for truth, his concerns for humankind and his optimism – his outlook at times so *very* positive as to remind one of Voltaire’s *Candide*! Sixteen near relations lost to Hitler, yet he can say, ‘I think that our world and the human beings in it are both wonderful’ (99). ‘We all have a duty, instead of predicting something bad, to support the things that may lead to a better future’ (144). ‘The future is open and we all help to decide it through what we do’ (143). ‘It is a

paradoxical thing about human well-being that, while it is based on vigilance against a host of dangers, it also undermines that vigilance. Freedom easily comes to be taken for granted – which means that one can again fall victim to a dictator’ (122). ‘One must focus on the things that need to be done and for which one is responsible’ (125).

The translation from German reproduces the warmth, the vigour and clarity of Popper’s English style. As ever, he is a stimulus to one’s own thinking, even where one does not agree with him. And this is what he desires: ‘our drawing closer to the truth is more important than the question of who is right’ (85).

This book is well indexed, nicely printed and has a winsome photo of the author on the front dust jacket. Its price of £30 for 171pp., however, triggers the thought that better value for money could be obtained from the companion collection *In search of a better world* (1992, at £14.99 for 145 pages) plus his autobiography *Unended Quest* (1974, at £12.99 for 270 pages), both of which are still available.

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Jeffrey G. Sobosan
Romancing the Universe: Theology, Science, and Cosmology

William B. Eerdmans, 1999. 212 pp, pb.
£10.99. ISBN 0-8028-4648-3

Jeffrey Sobosan is a theologian, in fact a specialist in Christology, who has read widely in the scientific, especially cosmological literature. Introduced to the constellations by his father one night when he was six years old, Sobosan was struck with a sense of wonder that has remained with him ever since. In this book he invites the reader to share in his imaginative reflections on the cosmos triggered by that and many subsequent encounters with the night sky. In the

book he tries to bring together his theology with the insights of modern cosmology, since, as he says, the two must interact.

Sobosan argues that the pursuit of beauty should be central in any unified theological/cosmological vision. The breadth of the vision he proposes is an antidote to narcissism and hubris: beauty is not confined to ourselves, or even the earth, but is cosmic. He sees this point strengthened by his advocacy of extraterrestrial intelligence, demonstrating the largesse of the creator, and by a readiness to embrace novelty.

Whilst there is much in the book to commend – it is good to share the author's excitement, and his basic thesis that theology and cosmology can only gain in vision from their encounter must be right (contra Barth and his followers) – there are a number of points at which I found myself disturbed by Sobosan's stance. I think his ready espousal of extraterrestrial intelligence is premature. If the probability that life, and more particularly intelligent life, arises given the right planetary conditions is very tiny (eg 10^{-1000}), then the number of suitable planets in the visible universe will *not* be adequate to give us a high probability of intelligent life elsewhere in the universe. I agree that Christians should not be frightened of the possibility of extraterrestrial intelligence, and need to do some careful theological thinking about it. A central problem, which needs a good deal more discussion than found in Sobosan's book (perhaps surprisingly), would be Christology – in particular the uniqueness of the incarnation and, even more important, the atonement. Sobosan seems to think Christ can be born and die and rise again ad infinitum – and indeed that we all can (102). This is, to say the least, controversial.

Connected with the above is Sobosan's embrace of the cyclical universe (after J A Wheeler), now out of favour with most cosmologists. His view thus seems to be closer to that of Eastern mysticism than of orthodox Christianity in which the universe has a direction and goal. Indeed

Sobosan is sceptical of eschatological fulfilment in a heavenly realm: rather, Christian hope is but 'a commitment to a mission whose agents are ourselves' (125).

Sobosan denies being a pantheist, though if he does not deify nature he certainly animates it. Indeed he regards everything as being alive, a position which leads him to describe electrons as having a 'will' and to regard nuclear reactions in stars as 'evil'. This view leads him to a violent anti-anthropocentrism. He believes killing animals for food wrong. Remarkably, he seems to think that animals have no value on the Biblical world view (95). It seems to me that one can perfectly well hold a reverence for, and assert the redemption of, all creation (see Rom. 8:18–25), whilst still recognising that nature comprises a variety of forms from the inanimate up to the self-consciously aware.

In summary, I would recommend the book as a refreshingly original contribution to the literature in the science (especially cosmology)/religion debate, but caution the reader to be aware that imagination and creativity do not always lead in the direction of orthodoxy!

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Richard Dawkins
Unweaving the Rainbow: Science, Delusion and the Appetite for Wonder

Allen Lane: The Penguin Press, 1998.
337 pp. hb. £20.00.
ISBN 0-713-99214-X

A 'cold, bleak message'; 'it had persuaded her that life was empty and purposeless'; 'nihilistic pessimism'; these, according to Richard Dawkins, are a few of the remarks which have been made about some of his other writings. In this latest book, the author sets out to rebut comments like these and defend his world-view.

On the first page of the preface he demarcates where he considers there is purpose and where he considers that no purpose is to be found: 'Presumably there is indeed no purpose in the ultimate fate of the cosmos' (ix) and he looks closer to home in 'all sorts of closer, warmer, human ambitions and perceptions.' He passionately responds to some of his detractors, saying that 'To accuse science of robbing life of the warmth that makes it worth living is so preposterously mistaken, so diametrically opposite to my own feelings and those of most working scientists, I am almost driven to the despair of which I am wrongly suspected . . . The feeling of awed wonder that science can give us is one of the highest experiences of which the human psyche is capable' (x).

So Dawkins finds purpose (or would 'satisfaction' be a more apposite word?) in relationships and in his work: 'Isn't it a noble, an enlightened way of spending our brief time in the sun, to work at understanding the universe and how we have come to wake up in it? This is how I answer when I am asked – as I am surprisingly often – why I bother to get up in the mornings. To put it the other way round, isn't it sad to go to your grave without wondering why you were born?' (6). Others, too, find satisfaction in these ways, but when Dawkins' detractors talk about his world-view as 'purposeless', surely they are not castigating him for these human satisfactions? I shall return to this point later.

At the outset I want to agree totally with Dawkins about the fascination of the world uncovered by science, the elegance of its theories and the intricate ways in which its many departments mesh in with one another. Since this review appears in the journal *Science and Christian Belief*, whose readership includes many of the thousand strong combined memberships of Christians in Science and the Science and Religion Forum (to identify but two such organisations) I know that Dawkins has many supporters in this view. Like him, I am puzzled why scientific

explanations are seen by some as detracting from, rather than enhancing, awe and wonder about our world. A counter to this belief forms the central motif for this book, hence the title 'from Yeats who believed that Newton had destroyed all the poetry of the rainbow by reducing it to the prismatic colours' (x).

Dawkins starts to develop 'the dominant thrust of the book [which] is in favour of good poetic science . . . science inspired by a poetic sense of wonder' (xii) by first citing a chapter's worth of facts and figures to marvel at, saying some wise things about the anti-science lobby and then starting to 'unweave a rainbow'. In the first of three fascinating chapters he indicates how 'Newton's dissection of the rainbow into light of different wavelengths led on to Maxwell's theory of electromagnetism and thence to Einstein's theory of special relativity' (42). We are conducted from prisms to raindrops to Fraunhofer lines as fingerprints – or 'barcodes as a symbol of precise analysis' (81) – of the elements of distant stars, to a section on vision and the eye. Our insight is extended as we are led to understand how 'Newton's unweaving paved the way for the nineteenth-century discovery that the visible rainbow, the band that we actually see, is a narrow chink in the full spectrum of electromagnetic waves' (52). From thence our 'vision' is extended to include radio waves, radar, Doppler shifts and Hubble's interpretation of the 'red-shift' in spectral lines as pointers to an expanding universe, while orbital perturbations in stellar orbits indicated by Doppler shifts betray the presence of otherwise invisible planets – 'all this we infer from unweaving the rainbow' (60).

The following chapter is linked with this one by the 'wave' metaphor; the subject matter shifting from the transverse waves of the electromagnetic spectrum to the longitudinal ones of sound and other waves of low frequency with their associated set of wonders. The last of the trilogy of 'barcode' chapters looks at DNA fingerprinting with its intriguing forensic and other uses and introduces probability

theory in connection with the reliability of this technique as an identifier.

The next three chapters bring us to a well-worn theme covering superstition, the paranormal, astrology and religion, linked to the earlier trilogy by probability theory. At first sight this might appear to be the interjection of a 'hobby horse' but their relevance can be seen as part of the puzzle as to why wonder often seems to be reserved for the unexplained, yet lost when the scientific mechanisms of, say, the rainbow are explicated. Dawkins performs a useful task in showing that some 'uncanny', 'spooky' coincidences are more probable than we might think before we calculate the chances, while the 'supernatural' claims beloved of popular television can amount to no more than good conjuring. In a climate of postmodernism, with its relativisation of 'truth', the cautions are timely as there seems no end to the associated fantasy and revelling in pompous-sounding obscurity which he rightly deprecates.

These criticisms of the supernatural, however, are extended to include traditional Christian theism. The theme of the 'gullibility' of children (140) is again evident, accompanied by a suggested evolutionary account of it. It finds its place alongside 'Father Christmas, the tooth fairy, angels, heaven' as well as 'Merlin', 'baby Jesus' and 'the Three [*sic.*] Wise Men' (139,142). Miracles, too, come under the axe, although citing Hume's short, influential essay is not the last word on this topic as it contains philosophical inconsistencies. At this point I part company with Dawkins as he lumps together charlatans and magical ideas with the content of orthodox Christianity – 'astrologers, mediums, gurus, evangelists [*sic.*] and quacks' (143). I have written in another place¹ that 'I find it difficult to conceive how a serious – or even a superficial reading of, say, the New Testament gospels could lead one to equate their value with stories about fairies . . .' but Dawkins appears to find this easier to believe than I do.

Before returning to those specifically Christian matters which will be of concern to readers of this journal, let me say something about other parts of the book. The panorama of wonders is extended to those of genetic character and, particularly fascinating is a chapter ('The Genetic Book of the Dead') which spells out how 'in an indirect sense . . . our DNA is a coded description of the worlds in which our ancestors survived'. The penultimate chapter looks at mental models of our world, while the last chapter is devoted to the human brain, fitting as the culmination of a book resplendent in stimuli for thought. Dawkins makes some interesting and careful speculations about possible reasons for the rapid, (evolutionarily) recent growth of the human brain.

I want now to return to the matter of Dawkins' attempt to answer his critics' charge of purposelessness in his worldview. I shall argue that Dawkins does not really address the concerns of the many who cannot go along with this worldview. Rather he appears to answer two significantly different questions which may give an appearance of having successfully defended his corner. The first is linked with two different meanings of the word 'purpose' and the second with two different meanings of the word 'why'. In addition there appears to be a failure to recognise a plurality of types of 'explanation'. I shall comment on these in reverse order.

'Explanation'

For completeness I think I must say similar things to those which I have said in other reviews of Dawkins' philosophical position. In this latest book he states 'I believe that an orderly universe, one indifferent to preoccupations, in which everything has an explanation even if we still have a long way to go before we find it, is a more beautiful, more wonderful place than a universe tricked out with capricious, *ad hoc* magic' (xi). The explanations referred to are scientific ones and the 'capricious, *ad hoc* magic' appears to include religious beliefs. But explanation

is *not* a monolithic concept. Religious explanations of divine agency and purpose are different *types* of explanations to mechanistic explanations of the kinds we are concerned with the science. It would be nonsense to claim that explanations of plan and purpose could be treated as *alternatives* for explanations of mechanisms. In everyday life it would never be countenanced that explanations of the plan and purpose of a human creation such as the family car were pushed out by explanations of its mechanisms. Still less would anyone allow that Henry Ford was thereby removed from the picture! Yet logically similar assertions often seem to be made and accepted uncritically in talk-about-God. The muddle seems to occur both among religious believers and non-believers. The former may see scientific explanations of structures, processes and events as threatening their world-views. They may adopt a 'god-of-the-gaps' mentality which imagines divine activity as confined to that which science has not presently explained. The latter group by contrast may pursue their science with greater zest, hoping thereby to excise God. Both positions rest on the insecure foundations of an explanatory type-error which imagines reason-giving explanations of agency and motives, and reason-giving explanations of mechanisms, are interchangeable.

'Why?'

The word 'why' is ambiguous. Early in this book Dawkins says 'isn't it sad to go to your grave without wondering *why* you were born?' (6) and speaks of 'the value of a life spent finding out *why* we have life in the first place' (23). He closes the book with the words 'The spotlight passes but, exhilaratingly, before doing so it gives us time to comprehend something of this place in which we fleetingly find ourselves and the reason that we do so. We are alone among animals in foreseeing our end. We are also alone among animals in being able to say before we die: Yes, this is *why* it was worth coming to life in the first place' (312f) (italics mine in all three quotations). In the first of these

quotations 'why' seems to refer to purpose for living rather than mechanistic accounts of conception and birth. In the second 'why' seems to refer to straightforward accounts of human origins since scientific study is the context in which the words are uttered. In the third instance, 'why' appears to refer both 'to comprehend something of this place' and 'the reason that we do so.'

'Purpose'

I have to say that I continue to find ambiguity in Dawkins' views about the purpose of life. On the one hand – and I am not aware that he has withdrawn the assertion – he has said 'We are machines for propagating DNA, and the propagation of DNA is a self-sustaining process. It is every living objects' sole reason for living . . .'¹² Yet he returns in this book to the sentiments he expressed in those (1991) Christmas lectures concerning 'the use of bringing a baby into the world', saying, 'If everything is judged by how 'useful' it is – useful for staying alive, that is – we are left facing a futile circularity. There must be some added value. At least a part of life should be devoted to *living* that life, not just working to stop it ending' (5). He can't have it both ways.

I said earlier that when Dawkins' detractors talk about his world-view as 'purposeless', I don't think they are castigating him for the satisfaction of time spent in investigating the world. I think they are pointing to this as a restricted purpose for living. Also it is not of interest to all. It would have little appeal to the multitudes whose lives are being dehumanised in prison camps or the far greater numbers who live, though free, in the twilight of starvation and disease. What is absent is any concept of ultimate purpose, other than the satisfactions we can find in our 'three score years and ten'.

I found a lot to interest me in this book. Dawkins is a good communicator of the content of science. But for me he has not succeeded in successfully defending his world-view against his critics.

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- 1 Poole, M.W. (1995) 'A response to Dawkins', *Science and Christian Belief*, 7 (1) 52
- 2 Christmas Lecture study guide, *Growing up in the universe*, BBC Study Guide to the Christmas lectures, p. 21, London: BBC Education 1991

Joel J. Shuman
The Body of Compassion: Ethics, Medicine, and the Church
Westview Press, 1999, 216 pp. hb.
£19.50. ISBN 0-8133-6704-2

This book is published in a series entitled *Radical Traditions* which is described as cutting 'new lines of inquiry across a confused array of debates concerning the place of theology in modernity and, more generally, the status and role of scriptural faith in contemporary life'.

The book is concerned with bioethics and is divided into four sections with the following titles: Before Bioethics; The 'Birth' of Bioethics; After Bioethics, and Beyond Bioethics. Bioethics is regarded as a product of the late twentieth century, although in the book nine lines of text are devoted to traditional medical ethics, with one reference to the *Corpus Hippocraticum* (but not specifically to the Oath) and one to Dr Thomas Percival's 1803 *Medical Ethics* (52). The origin of the term itself (from biology + ethics) is dated to the early 1960's, when it was used to describe the debate about how patients should be selected for the allocation of scarce resources such as the haemodialysis facilities required for the treatment of advanced kidney disease. Out of this debate came a new profession in the United States, that of a bioethicist. Today, every hospital there is expected to have a bioethicist on its staff. Such a person 'is understood to have legitimate medical authority rooted in the exclusive possession of expert knowledge, knowledge analogous to that possessed by

medical specialists' (53).

To begin with, bioethicists were theologians, but as time passed, the subject was increasingly secularised. One influential secular textbook today is *Principles of Bio-medical Ethics* by Beauchamp and Childress based on the four principles of autonomy, non-maleficence, beneficence and justice, an approach now called 'principalism'. This textbook is one of the three which Shuman examines critically, and he describes it as naïve and unhelpful (66–67). However, an increasing number of books are seeking to recall bioethics to its theological roots. Shuman's own book is one of these. Shuman is a Methodist lecturer in theological ethics at Duke University. Much of his theological position in bioethics is based on his understanding of the Christian sacraments of baptism and communion, which he maintains are significant for the physical and social health of Christians. These sacraments unite us with the model for our care for our bodies and for each other. Although the series in which the book is published is about the status and role of scriptural faith in contemporary life, there are relatively few scriptural quotations in the book.

There are features of the author's style, which some readers may find irksome. These include the author's deliberate use of the feminine personal pronoun throughout the text; his sometimes-ambiguous use of words such as body, charity, liturgy and virtue; and the overloading of his pages with quotations and references (631 in 159 pages).

However, the book is useful as an introduction to the present state of bioethics in the United States and as providing a welcome example of the increasing insistence on the theological basis of bioethics there.

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Holmes Rolston III
Genes, Genesis and God: values and their origins in natural and human history

Cambridge University Press, 1999. xvi + 400 pp. hb. £40.00 ISBN 0 521 64108 X, pb. £14.95 ISBN 0 521 64674 X.

'There's a new *explanation* (my italics) for all those theatrical and political dynasties: research into identical twins with spookily similar career paths suggests that our choice of job may be prompted by our DNA.' Thus writes Oliver Burkeman in an article entitled *Wear your genes to work* in *The Guardian* of November 3 1999. Of course I can now see the error of my previous thinking! The three successive generations of men in the same family working in the same coal mine or farming the same land has nothing to do with socio-economic conditions or the daughter who follows her father or mother into medicine has not been inspired by their example. All are simply following the pathway mapped for them by their genes. In fact, the work on which Burkeman bases his bold statement leads to rather less cut-and-dried conclusions. Professor Nancy Segal's study of twins leads her to suggest 'that choice of any job reflects many characteristics that are genetically based' while she is at pains to emphasise that she is 'not saying that there is a single gene for being a carpenter or a single gene for being an artist.' Segal's statements correspond much more closely to the actual data and yet Burkeman's apparent desire for a totally genetic explanation is a symptom of the pervasive genetic reductionism that the media seem to have espoused so enthusiastically. I share with my more distinguished colleagues Steven Rose and Steve Jones an utter frustration at the mentality that simply looks for a gene for this, a gene for that, a gene for everything.

It is against this background that I set my review of *Genes, Genesis and God*. The book is based on the Gifford Lectures given by the author at the University of Edinburgh in November 1997 and if ever the 'book of the play' made one wish one had seen the play this book did that for me in

respect of the Gifford Lectures. I found the book inspirational and I am sure that the lectures would have been at least equally so. The book's theme is succinctly summarised in the 'blurb' on the back cover: 'Can the phenomena of religion and ethics be reduced to the phenomena of biology? Holmes Rolston says no . . .' In the development of this theme the author takes us through six long, extensively subdivided chapters. It is worth listing the chapter headings because they reveal clearly the plot of the book: 1, *Genetic values: diversity and complexity in natural history*; 2, *Genetic identity: conserved and integrated values*; 3, *Culture: Genes and the genesis of human culture*; 4, *Science: naturalized, socialized, evaluated*; 5, *Ethics: naturalized, socialised, evaluated*; 6, *Religion: naturalized, socialized, evaluated*. Reading the book straight through (although certainly not at one sitting) is like listening to a long, beautifully crafted, stirring piece of music that gradually works towards a memorable finale or slowly climbing from the plains through the foothills, with views getting better and better, until one finally reaches the summit. The author starts with the naturalistic setting for genes and their action. He then discusses what genes can and cannot do, pointing out that even in the realm of developmental biology, there are some things that genes cannot directly specify. As also pointed out by biologists such as Brian Goodwin and Steven Rose, these include the development of neuronal connections, the possible number of which exceeds the number of genes by many orders of magnitude. Having dealt with the biological background, he then moves into areas where humans start to be different from even their closest relatives. Thus human culture is firstly compared to the 'cultures' seen in social animals, including primates, but is held to rise above the level of the genes, even though it is acknowledged that many of the actual processes that enable us to participate are obviously rooted in our genes. Rolston then moves to extensive discussions of three aspects of human culture, namely science, ethics and religion. Again it is held that, although they are

physically out-worked in our nature as biological beings, these activities, which are specifically human, take us above the level of our genes and out of the purely biological. In the earlier chapters, the author had seriously questioned whether the progress of evolution could be entirely compatible with a selfish gene hypothesis and had further suggested that many facets of the behaviour of higher animals actually run counter to that hypothesis. In these later chapters he continues to counter the ultra-reductionist selfish gene approach and also the less molecular, although philosophically equally bleak approach of socio-biologists such as E.O. Wilson. The discussion is conducted at too great a depth and length to reproduce here but let me just draw our readers' attention to Rolston's satirical re-interpretation of the parable of the Good Samaritan, based on the socio-biologists' view that there is no such thing as altruism. I particularly liked the lines on page 253: 'The Good Samaritan . . . really assisted the luckless victim on the Jericho road in order to leave more genes in the next generation. What a hypocrite! The selfish bastard!'

For many readers of this journal, the last chapter, dealing with religion will be especially interesting. The author does actually discuss religion, and not specifically Christianity, although he is clearly coming from a Judaeo-Christian background.

There is not much in the way of a developed theology here. Rather, Rolston identifies common themes in what he calls the world's great religions, ie those that have survived and spread across the globe. The themes are ethics, dealing with attitudes to other people (and in some, to the natural world) and God, ie the concept of a supernatural being. There is some very telling discussion of the limits of science, and a clear rejection of the attempts to reduce religion to a biological phenomenon. He discusses at some length the emergence of life, concluding 'It hardly seems coherent to hold that non-biological materials are randomly the more and more de-randomized across

long structural sequences and thus ordered up to life. That is quite as miraculous as walking on water.' I was reminded at this point of Paul Davies who, in his recent book *The Fifth Miracle*, suggests that the origin of life, even given the existence of proteins, was like a kite assembling itself into a radio-controlled aircraft. This then leads to the author's last sub-theme where he moves clearly to a statement of the reasonableness of belief in a creator God who is able to make 'informationless matter-energy' into a 'splendid information maker'. 'Biologists cannot deny this creativity; indeed, better than anyone else, biologists know that Earth has brought forth the natural kinds, prolifically, exuberantly over the millenia, and that enormous amounts of information are required to do this.'

Finally I have some general comments about the book. It is, as already hinted, a real masterpiece. The author's grasp of a wide range of disciplines including theology, philosophy and various scientific disciplines, but especially biology, is mind-blowing and the width of his reading is immense. Having said that, I should also say that there are a few minor biological errors: however, although these might lose marks in a biology exam they do not in any way detract from the thrust of the author's arguments. Like many masterpieces, the book requires a little effort to appreciate it fully. Of its 400 pages, 370 are actual text and it is very meaty stuff. It is not, as I discovered, a book to be dipped into as one sits by a gently lapping Aegean or by the Atlantic rollers of North Cornwall (I abandoned both those attempts to get into the book and started again in less distracting surroundings!). It needs concentration to get the best out of it, coupled with a willingness to take notes. However one approaches this book, it is certainly well worth reading and I hope that many readers of this journal will be able to have access to a copy.

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Paul Davies

The Fifth Miracle

Penguin, 1998. 260pp. hb. £18.99 ISBN 0-713-99215-8.

Subtitled 'the Search for the Origin of Life,' Paul Davies' latest foray into the world of popular science/philosophy attempts arguably life's greatest mystery: how life, itself, began. The 'Fifth Miracle' of the title is God's fifth creative act – the bringing forth of plants in Genesis 1:11 – the first report of life in the Bible. Not that Davies has much time for the Bible; he stresses from the start that he sees no need for a creator God, or for 'a life force or other discredited notions.' According to him, while the origin of life is a truly astonishing event, it should not be viewed as 'miraculous,' but rather as something which can, and eventually will, be explained by the laws and principles of natural science.

But Davies gives only a cursory nod to the theological issues (covered in detail in earlier books such as 'The Mind of God'), doing little more than to state his position. Starting from the premise that a scientific explanation for life exists and is waiting to be elucidated, he begins searching for clues as to what that explanation might be.

What follows is a fascinating panorama of ideas and discoveries, spanning fields as diverse as biology, geology, computation and chemistry. The author has clearly done his homework, too; although not trained in the field, his account of the biological evidence is accurate, and I can only assume that his reports in other areas are similarly up-to-date and accurate. Equally importantly, Davies has a real gift for communicating ideas clearly, for example through the well-chosen analogies with which he illustrates relatively difficult concepts like entropy and complexity theory. This skill, combined with his obvious enthusiasm for his subject matter, makes the book very readable and thoroughly accessible to the informed layperson.

Perhaps most impressive, however, is the

fair and critical way in which Davies evaluates the evidence – a refreshing contrast to the one-sided polemics that have come from both sides of the creation/evolution debate over the years. He really is on a genuine search for answers, not just part-truths which support his point of view.

So, spending the vast majority of the book on this quest, does he succeed? Well, the answer he constructs is fascinating, and takes good account of the best information available; something in it will be new to everyone who reads this. Of course, the ideas presented are speculative, but that is an inevitability in our current state of knowledge.

For his final chapter, Davies returns to the philosophical debate surrounding the origin of life. Although not interested in asking whether God is involved, he is interested in the question of whether the universe is 'rigged' in favour of life. As he points out, this concept (which is growing in popularity) 'represents a decisive shift away from orthodox Darwinism. . . . It is enough to make most biologists shudder' – and, one feels, Davies himself! Nonetheless he gives the idea a fair hearing. It's a shame this chapter could only give a glimpse of the issues at stake.

In summary, therefore, as a scientist I found this book thoroughly enjoyable, interesting and informative. As a Christian I found aspects of Davies' initial approach unsatisfactory, but this did not impinge upon my enjoyment of the rest of the book. As an amateur philosopher I'd have loved him to spend more time on the issues raised in the final chapter, but then, that's not the purpose for which the book was written. All in all, thoroughly recommended to anyone who wants a comprehensive introduction to, or refresher course in, this most fascinating of scientific conundrums.

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John Habgood
Being a Person: Where Faith and Science Meet

Hodder & Stoughton, 1998. 307 pp. pb.
£8.99. ISBN 0-340-69073-9

The end of the twentieth century has seen such remarkable scientific advances that the very boundary of what it means to be human has become blurred. The advent of cardiopulmonary resuscitation and artificial breathing machines has no doubt saved thousands and perhaps millions of lives. But they have also created the iatrogenic dilemma of brain death. Thus, what it means to be dead is no longer the black and white issue it had been for all but the last 50 years of human existence.

Similarly, in vitro fertilization and cloning have forced us to reconsider what defines the beginning of human life. Is conception the key? Is pluripotency enough to mark the beginning of a new human life? My field is transplantation and the search for organs to fill the growing disparity between those waiting for a transplant and the number of donor organs available is soon to challenge the boundaries even further. How many organs can we grow in a dish before we have grown a human? How much human DNA can we insert into a pig before we transfer humanness to the pig? Can we purposefully generate headless humans as organ donors?

As never before, science is facing questions about human meaning and not just human biology. Scientific exploration will better define questions about what it means to be human, but science cannot answer questions about human meaning. John Habgood is correct when he argues that defining personhood is the place where faith and science meet. Either alone is likely to misrepresent what it means to be human. Altruistic medical researchers are going to push society to define what it means to be human because if it is not human, then it can be manipulated for the good of a human. As Habgood writes: 'the ascription of personhood in our society carries with it an automatic moral status.' (p. 12) We cannot do research on people

without their consent. This is not true for anything else in our world. So the fact that researchers have now broached the boundary of what it means to be human in their effort to heal human disease, carries with it moral questions that strike at the very core of the meaning of human existence. The thrust of Habgood's argument is that when we consider what it means to be a person we are forced to go beyond biology. We must consider human meaning.

And there are few better qualified to consider human meaning than John Habgood. He is the former Archbishop of York, has served on several governmental committees including one that helped define the treatment of human embryos in the United Kingdom, and currently chairs the government's xenotransplantation advisory board. He is a trained physiologist and his wealth of background in church history, philosophy, and theology makes the book worth reading if only for his description of the etymology of the word person.

Habgood argues that: 'the threat of meaninglessness and the devaluation of persons are part of the same intellectual, moral and social processes of change which have encouraged many people to see religion as meaningless and have for them devalued the idea of God.' (12) He goes on to argue that an essential part of human meaning is to be found in our relationships; that we become a person through our relationship with our parents and other humans. He spends time developing the importance of language in forming and maintaining these relationships and as a necessary component for human reason and thought. This book has helped me to put into words one of the key aspects lost in brain death. I have always viewed the irreversible loss of brain function as the loss of personhood because consciousness and thinking were the central core of personhood. I was careful of not falling into Cartesian dualism, yet still believed 'I think therefore I am' summed up the key aspect of human life. But Habgood has convinced me that was a limited view.

A part of the reason a brain dead person is dead is because they have lost the ability to have relationships.

‘The isolated individual is an abstraction. We may *make* ourselves isolated, but none of us can *start* isolated, because our humanity is shaped by our relationships with each other. Children do not deduce that other minds exist; their own minds are formed by those other minds. Thus the philosopher wondering whether other minds exist cuts a rather absurd figure, because knowing other minds is a necessary part of becoming and being ourselves. He can only doubt their reality by ignoring the very factors which have enabled and developed his own capacity to think.’ (94–5)

Habgood makes the interesting point that even in scientific reasoning, relationships with others is crucial to success. Just consider the concept of peer review. In this way, Habgood attacks postmodernism:

‘To suppose that each solitary individual can only finally depend on his own insights is to be led into the kind of impasse in which some parts of our own culture now find themselves. As a science-based culture, it makes great claims to objectivity. But in so far as it is built on a philosophy of the isolated individual, the claim to objectivity is being steadily eroded. Many people talk happily about ‘my truth’ or ‘your truth’, but shy away from awkward questions about whether there is any such thing as ‘the truth’ to which they might approximate.’ (96)

Habgood is careful, however, not to make our relationship with others the ‘be-all and end-all of being a person.’ (117) He argues that we need to be something before we enter into a relationship while recognizing that we can only become something in so far as we do relate to others. He states: ‘we need the confidence and security of being rooted in a tradition, the strength which comes from the possession of clear, internalised values, and the breadth and receptivity entailed in being responsive to others.’ (118)

Habgood develops this theme in the last few chapters of the book to show that human meaning is to be found in relating to each other and to God. He argues that we intuitively know that human life has meaning and that there is a problem with the modern view he so hauntingly describes: ‘The universe has no centre and no meaning. We make of it what we will, and find its emptiness reflected in our own souls.’ (236) If human life does have meaning and how we interact with other human beings matters, then issues of faith cannot be ignored because they determine how we understand ourselves and relate to others.

For Habgood, ultimate reality is found in the Christian faith. ‘This, then, is the Christian answer to the problem of identity. Amid all the flux of changing relationships, different periods of life, developing and diminishing capacities, gains and losses, tragedies and triumphs, there is that which remains secure, held in the mind of God.’ (227–8) The book ends with an interesting observation: ‘We have to be loved into personhood, and find our greatest fulfillment in loving others.’ (297) As a scientist and surgeon, I wouldn’t have put it that way until reading this book; Habgood has convinced me that love is as vital as the brain in understanding what it means to be human.

Any book review would be lacking, however, if it failed to report on potential shortcomings. While I think Habgood clearly articulates the view that human meaning must be considered in any discussion of personhood, I think his description of being a person from the biological perspective looks etiolated by comparison. Like Donald MacKay, Habgood stresses that: ‘To believe that the bottom line of explanation must be in terms of some underlying personal reality does not jeopardise the integrity of other kinds of explanation at other levels.’ (216) But his explanation of personhood in terms of in vitro fertilization, cloning, brain death, organs and DNA suffers from his

lack of personal experience in the same way that his descriptions of human meaning come alive from his depth of experience in philosophy and theology.

For instance, in chapter 12 Habgood confuses amino and nucleic acids in explaining the genetic code. In describing the minimum necessary in order to recognise that the one with whom we have to do is another human being, Habgood states: 'It seems to me that on this level, being conceived and born of human parents is the bottom line.' (294) Would he really not view a human being generated from a somatic cell and grown in an artificial, non-human womb as anything other than a person?

In his discussion of genetically manipulating human embryos he writes: 'Though we may frequently want to change other persons and in the case of our own children to mould their characters by the way we treat them, this always involves relating to them as persons, not treating them as objects. By contrast, to manipulate an embryo is precisely to treat it as an object. It is to insert into our relationship with the person who grows from it an intervention which, however well meaning, touches the genetic core of that person's being and does not acknowledge its otherness.' (276-7) I strongly disagree with this approach. Every time I operate on someone I touch the core of that person's being. Whether I am cutting something away or adding something new, I am changing them in every way as much as if I manipulated their genome. Just because it is genes we are operating on, doesn't make the operation any more or less significant.

In spite of these criticisms, I highly recommend this book. John Habgood has changed my perspective on what it means to be human. I think you will find he will do the same for you.

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Brian Appleyard
Brave New Worlds: Staying Human in the Genetic Future

HarperCollins, 1999. 188 pp. hb.
£16.99. ISBN 0-00-257021-1

This is powerful prose. The book is enjoyable to read because it is so well written. There is moral intellectual passion here in partnership with clarity of expression.

Brian Appleyard believes that the present trends in science, in genetics in particular, are seriously dangerous. It is not just that we are discovering powers to shape our life which we may not be able to cope with but that an ideological assumption remains unquestioned which is undermining what we think and value about ourselves. Genetics raises crucial questions about what it means to be human which we may not be facing.

The book argues that perceptions we have of ourselves are changing without our being aware of the consequences. For example, what is illness? What we might call appropriate treatment depends on the answer to an apparently simple question. If I have cancer, then the question is what suitable forms of treatment are available. But suppose it can be shown that while I do not have cancer I have a genetic propensity to develop cancer, is that a disease needing appropriate treatment? It may be that genetic treatment is possible to change my condition, or that I can be given good advice about life-style which may go some way towards preventing the disease happening. That seems helpful and good. But suppose it could be shown that the genetic make up of a foetus indicates a propensity to obesity, or a hair lip, or some other feature which I do not like, then what do I do? Does this count as an illness? Appleyard believes that genetics has come a little way out from under the dark cloud of eugenics because it is concerned with disease and human flourishing. But for the child yet unborn, disease and treatment may be redefined in that now treatment (or cure?) can take the form of abortion. Or maybe we can redesign our children, having decided what is good and normal.

Fundamental questions are raised here, such as, is there such a thing as moral responsibility? Can we go on saying, in the light of manifest genetic diversity, that we are all created equal? If we do insist on affirming the value of all human life, then what is the moral basis for that affirmation and will it stand up in a society which stresses plurality when it comes to ethics? How do we sustain a higher law than that of individuality? Is ethics possible if the gene explains all?

Appleyard believes we need a new humility against what he sees as the outrageous claims of science. We need to treat science with a healthy scepticism if it claims to explain everything. And if that is what it does then we must resist the reductionism it implies about human existence. The book will delight some and exasperate others with its arguments and conclusions. However, it is raising with admirable clarity and passion some fundamental questions about the soul of science and human soul.

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**National Academy of Sciences
*Teaching About Evolution And The Nature Of Science***

National Academy Press USA, 1998.
140pp. pb. \$19.95.
ISBN 0-309-06364-7

Educators in the state schools in the USA have for many years faced a problem in respect of what should be taught to children about the origin and development of life on earth. Whilst the Constitution has kept any ostensibly religious dimension out of the classroom, certain pressure groups in recent decades have attempted to insist that so-called 'creation science' be allocated time in science lessons alongside evolution as an alternative explanatory framework. The problem has in my view been exacerbated in American public

schools, by the lack of what the British recognise as Religious Education, which provides a natural forum for an informed discussion of origins and the relationship between scientific and religious points of view.

The National Academy of Science have produced a useful handbook for both teachers and in their words, 'parents and community officials as well as scientists and educators'. The position of the NAS clearly rules out any claim that 'creation science' is science and various sources, legal and other, are cited in support of this. The book proceeds to offer a justification of the importance of children learning about evolution, maintaining throughout that an evolutionary perspective is neutral with regard to belief in God. There is no attempt made to explore how belief in evolution as the mechanism God may have used might affect aspects of theological belief, even though this is of course a legitimate and important concern for those who do not see the two discourses as completely separate or uninterested in each other.

Having offered a rationale for teaching evolution, the authors outline with great clarity: Major Themes in Evolution, Evolution and the Nature of Science, Evolution and the National Science Education Standards, Frequently Asked Questions About Evolution and the Nature of Science, Activities for Teaching About Evolution and the Nature of Science. There is also a chapter on Selecting Instructional Materials, which was curious in that it gave guidance on how to select them without any examples of what books actually fit the criteria! Appendices cover significant court cases and statements from interested bodies that chime in with the NAS line. Charts, diagrams and photographs are on most of the pages, the majority of them in colour. There is also an index.

I appreciated this work. Within its stated remit it does a good job. If I were teaching science in the States, and new to the topic and the classroom, this would

help me a great deal. There are some worthwhile teaching ideas that are transferable to other topics and disciplines which if used well ought to make students more self-conscious of what is going on in science and not just add to their routine apprenticeship.

However, as an ex-science teacher who now specialises in Religious Studies and Philosophy and who plies his trade in England, I have some reservations about the book. Despite some helpful dialogue in the text, it still has an overall feel of highly prescriptive guidance for the teacher. This is a tendency resented by a number of professionals. I would have liked to have seen some outline of the remaining puzzles within the evolutionary paradigm, not least in order to illustrate a cardinal weakness in the argumentation of its opponents, namely that unsolved problems do not by themselves constitute a falsification of the whole explanatory framework. Something drawing on the work of Kuhn and beyond might have been usefully added here. As I have already hinted, the book lacks any interaction with other disciplines bar jurisprudence. I regret the failure to open up religious perspectives, which do have a passionate interest in both evolution and the nature of science and how it is similar to and different from religious beliefs. Moreover so do children regardless of their own faith or none. This is a delightful nettle still to be grasped over there and I believe a key to progress. Over here we might learn from this work more about the importance of both the teaching of evolution and of a more explicit engagement with the nature of science and its history in our curriculum. As yet there is a lack of these features in our own schools, and I would submit that these are keys not least to a better understanding of the dynamic of science as it develops as a human enterprise.

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Alister E McGrath

Science & Religion: an introduction

Blackwell, 1999. 250 pp. Pb. £14.99.

ISBN 0-631-20842-9

Alister McGrath is almost uniquely qualified to write on science and Christian theology given his doctorate in molecular biophysics as well as his Oxbridge theological training. This book does not disappoint. It takes a long and wide view: long in the sense that it goes back at least as far as Anselm and Aquinas and wide in the sense that a range of sciences is considered – physics, biology and psychology – and issues arising from hermeneutics, models and analogies are given adequate space.

Additionally, the book is well laid out with headings and subheadings, suggestions for further reading at the end of each chapter, useful boxed summaries, copious references and an index. The first chapter provides an outline of historical landmarks (Copernicus and Galileo), the second a discussion of varieties within Christianity and possible models for interaction between them and science, the third deals with the philosophy of science and the fourth with the philosophy of religion. From there the book moves to creation, natural theology, models and analogies, current issues and case studies that focus on the work of 20th-century contributors, including Barbour, Coulson, Pannenberg, Peacocke, Polkinghorne, de Chardin and Torrance.

Because the book is pitched only at an introductory level one must say that it achieves its aims superbly. Of course there are issues here about which one would have liked further comment. The case studies are brief and the summaries of modern contributors too short to be other than 'tasters' and occasionally there is repetition between these and earlier sections of the text. Further, the book is really about Christianity and science rather than religion as a whole and science, although there is a discussion of the Muslim kalam argument for the existence of God. This said, we can see here the outlines of possible future McGrath

publications. Each chapter really deserves a book on its own.

I liked the discussion of Barth and natural theology (its relation to German culture in 1934 is relevant (130)) and was glad to see the work of Torrance contextualised both in relation to Barth and to Einstein. Equally, the anthropic principle which has sometimes been used to dismiss the remarkable fine-tuning within the universe is concisely commented on so as to demonstrate its fallaciousness (185, 186). Similarly, Feuerbach's argument against religious belief is nailed and shown to be as dismissive of itself as it is of religion (196). Likewise, Freud's religious views, when speculative primeval history is stripped away, become almost puerile (206). Perhaps most telling is the discussion of Darwin which manages to avoid the choppy waters of polemicism while showing how Darwin's offspring in the shape of Richard Dawkins (190f) or Jacques Monod (191) may lead to a form of vulgar atheism or, in another direction, to a re-thinking of God's providential dealings with all living beings (192f).

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Christopher Southgate (Editor)

God, Humanity and the Cosmos: A Textbook in Science and Religion

T&T Clark, 199. 449 pp. pb. £17.50.
ISBN 0-567-08679-8.

Designed as a text for university students and their teachers, this book provides a wide compass of material pertinent to the dialogue between science and religion. It is readable, with clear illustrations of the concepts that are introduced, although readers with little scientific background may find aspects of particle physics, evolutionary biology, and psychology difficult to follow. The cross-referencing within the text helpfully allows readers to make

connections between the various parts of the book, for example between methodology, epistemology and scientific discoveries, or between ethical aspects of technological advances and scientific worldviews.

The authors provide a review of the nature of science and religion, and explore something of the diversity of relationships between them, as exemplified by the origin of the universe, the evolution of life, and the nature of the human mind. They include a discussion of the models used by a variety of twentieth century theologians and philosophers, who seek to understand the reality of God, and the ways in which God might be understood to act in the world. These explorations provide a useful basis for further investigations by the reader, journeys of discovery which are sign-posted by the suggested exercises that punctuate the text.

Considerable emphasis is put on the theological and philosophical questions raised, and in places the reader may wish for more practically earthed discussion, for example, in the section which explores the ecological debate. Here the argument is centred upon the nature of God in relational terms as Trinity, and in responsive terms as Creator. The more immediate concerns for human beings are reserved for a later discussion in the chapter dealing with technology. However, it would have been helpful if greater emphasis had been placed on Green issues and Green Theology at this point in the argument.

In the last quarter of the book (Book Four) the authors helpfully develop themes that are rarely found in books exploring the dialogue between science and religion. The importance of dispelling the image of conflict between the two subjects for education is stressed through an emphasis on the content, nature and application of science. A most helpful insight is provided through the examination of the relationship between teaching of Islam and science. This provides an interesting comparison with the relationship between science and Christianity, which might have been fruitfully developed further.

The final two chapters address the issues raised by technology and bio-technology. The authors rightly observe that neglect of considering the relationship between technology and Christianity 'cannot be defended in a technological age, where education, industry, government, health, agriculture and communication all affect and are affected by technology'. Means and ends, danger, risks and consequences are all debated and helpfully related back to earlier scientific and philosophical discussions.

This is a comprehensive text, which will be of great use for students tackling the science and religion debate, whether from an ethical, scientific, philosophical or doctrinal point of view. For example, it is an ideal text for the first year *Doctrine of Creation*, course at Oxford, for which I teach.

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Warren S. Brown, Nancey Murphy and H. Newton Malony (Eds)

Whatever Happened to the Soul?

Fortress Press, 1998, 252 pp., £11.99.
pb. ISBN 0-8006-3141-2

This book is a contribution to an important current area of debate amongst Christians and should be read by anyone interested in understanding more about human nature and how to reconcile theological and scientific views of it. A compendium from a group of scientists and theologians who worked together and presented a set of papers at the 1998 ASA/CiS Conference, the views in it are not always uniform. They share, however, the basic tenets that:

1. Humans don't 'have an immortal soul' rather the soul is a physically embodied property of human nature.

2. Humankind is a biological species that has evolved from other nonhuman species.
3. 'Physicalism' is true, ie the 'person' involves no metaphysical entity separate from the body. No form of dualism is necessary, though 'non-reductive' physicalism implies a denial that the person is 'nothing but' the body.

Though there are still some dualists who speak of us 'having' immortal souls, many of us would join the authors in recognising that the word 'soul' is just not used like this in Scripture. 'Immortality' in Scripture is inherent only in God, and is something which humans may aspire to and receive as a gift. Paul speaks of a 'resurrected body' albeit a 'spiritual' one, and the perspective that personal identity ceases between death and the resurrection (if time means anything there) is not inconsistent with dualism.

The book takes a moderate Lakatosian view of science, and on the same page a welcome note of caution is sounded: 'no amount of evidence can *prove* a physicalist account of the mental' (139).

After this caution one is surprised by the book's triumphalism eg 'Philosophers see dualism as no longer tenable'. So are Oxford figures like Swinburne and Foster not philosophers? One supposes that a book written in the forties could likewise have said: 'Philosophers no longer believe that anything unverifiable has meaning' as though all philosophers were Logical Positivists. There is also an assumption that Dennett and the Churchlands are at the forefront of scientific thinking – rather than a desperate rearguard action in a slide from strict behaviourism to identity theory to functionalism. It is admittedly sometimes difficult to distinguish a temporary philosophical bandwagon from a long term convergence to truth, but one feels that the book might have better followed its own note of caution.

One basic issue is that the Hebrews were always adamant that God had no body: 'God is Spirit'. Angels and demons, one supposes, likewise can be persons without physical bodies. So in this sense surely *all* Christians have to be dualists? If a

non-physical God created the physical universe, what other view can we take? It is, of course, another question in what exact way (if at all) this dualism extends to human persons made in his image, but surely monism (even dual-aspect monism) cannot be true in the strict sense, and the more common definition of physicalism as a belief that only the physical exists must also be rejected. Murphy contrasts God and 'purely physical creation', but does not mention angels (148).

Reductionism is obviously a key question, and Murphy distinguishes causal reductionism ('the behaviour of the parts of a system studied in subatomic physics is determinative of all higher-level entities') from ontological reductionism ('no immaterial mind or soul is needed to get consciousness'). She accepts the latter but not the former, because 'Consciousness and religious awareness are emergent properties and they have top-down causal influence on the body' (151 the latter presumably including the brain). Well as she has now moved from her earlier view which related this to quantum indeterminacy, Murphy presumably believes that each sub part of the brain is (effectively) functioning deterministically according to the laws of physics. So is this behaviour modified when they are linked together? Does 'top-down causality' cause individual particles to physically react to each other differently? And if not then what does it do? Old fashioned dual-aspect monism (espoused in a MacKay tradition in a chapter by Malcolm Jeeves) would not mix I-story 'consciousness' and O-story 'brain mechanism' causally at any level – they are seen as different aspects of one reality. Murphy sees consciousness as having causality (albeit 'top down') on the brain. A 'cause' is surely something which alters behaviour from what it otherwise would have been. So does 'top-down causality' do this, and if not then what does the phrase mean? A concept introduced to explain this is 'supervenience'. Though this (133) is said to have no accepted definition, it is taken to mean that the individual organism is a part

of a great interconnected whole. But then surely the whole universe becomes a system behaving deterministically and *in principle* all its trains of causality can be described completely in terms of subatomic reactions. In this case the concept of top down causal influence is surely redundant to the whole system? I actually believe that some kind of causal interaction is essential to make sense of consciousness and divine action – but 'top down causality' (whether from Murphy or from Brown on p. 117) is unclear and I am unconvinced that 'nonreductive physicalism' has any meaning.

The essentially deterministic approach of the book opens up two other parallel issues. The first is human freewill. This is dealt with by arguing for a compatibilist interpretation of it – that freewill is the absence of external constraint. But if God really made and sustains the physical world, then it would seem odd that he should let it run deterministically along the kind of lines it does with human beings making the kinds of choices they make. There are already many critiques of compatibilism from philosophers, and this book does nothing to meet the objections.

The second problem concerns the freedom of God to act in special providence. As theists, of course, we all accept that the whole universe exists only because God keeps it existing, but the Bible seems to speak frequently of God 'acting' in a more special way than this. Nancey Murphy addresses this on p. 147, and her solution is to toy with the ideas of the liberal theologian Arthur Peacocke – who even from his own 'anti-miracle' perspective seems to struggle with it. Under physicalism, either *everything* which happens is an act of God or *nothing* is – but the Bible seems to speak as though *some* particular events are acts of God in a way different from others.

Actually, Warren Brown's suggestion (123–4) that humanness is defined by the way God chooses to act towards 'all humankind' raises similar questions. If it is God's decision rather than any innate capacity or some kind of soul entity which

is crucial, then would the lack of that decision have made any difference to the physical history of the particular human organism? Would its brain have functioned in the same way, and the experience of consciousness have been the same? Or does God's decision to 'relate to it' change in some way its ideas? But how could this be, if ideas arise in the brain simply from physical mechanisms? So is the sole effect of God's 'decision' to determine whether or not that particular consciousness will be reconstituted in a resurrection? And how anyway can this fit with Murphy's assertion that 'consciousness and religious awareness are emergent properties'? There is little to help us here with the problems of an espoused slow human evolution or, indeed, on the nature of consciousness.

To explain *religious* experiences Murphy again uses a concept of Supervenience. It seems, here, to be a principle under which

some experiences arising from regular physical causality are interpreted by the church (using developed criteria which relate to circumstances) to be genuinely experiences of God. If this explanation works at all, it again seems to leave God with little scope for much personal or free-choice action.

Overall, this is an interesting book, and it raises again some of the really basic issues which confront anyone trying to reconcile physicalist determinism with Christian theism. I can accept its critique of some of the populist forms of dualism, but do not share its apparent view of the imminent triumph of physicalism, nor believe that in its present form it constitutes a 'breakthrough' (as claimed on the back) or solves the basic theological and philosophical problems which a deterministic physicalism raises.

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