

Book Reviews

Pete Moore

Babel's Shadow: Genetic technologies in a fracturing society

Oxford, England: Lion Publishing plc, 2000. 256 pp. hb. £18.00.
ISBN 0-7459-4423-X

This is an excellent, comprehensible and comprehensive book about a current issue, – how will society use the new genetic technologies that are emerging? Pete Moore is competent to write on this matter with a PhD in physiology and research experience in a team studying fetal and neonatal development. He has written several books on the subject with contributions to peer-reviewed scientific journals. He has a wife, two children and a Judeo-Christian view of life.

Most are aware of the expansion in the application of genetic science in clinical situations. The implications for the society we will live in is already unfolding with the elucidation of part of the human genome. This technology encompasses 'the total knowledge and skills available to society'. Moore believes that the application of these sciences in society should be a matter of interest to individuals. If in meeting this challenge our society becomes divided then perhaps we should recall ancient Babel where their failure in communication and their self-sufficiency resulted in the demolition of this tower.

The author shows that although many experiments have been done only in animals they can be repeated using human cells. There is a vast amount of genetic information in each of our cells. Funding for research into these areas is often now provided by those eager to gain financially from their investment. The preliminary studies on the human genome will have far reaching applications and this

should require careful study of the ethics of the work in each case. He examines many issues including healthcare, designer drugs to cure our ills and designer babies to satisfy 'parents'. In the latter case he explains how it is now possible to select the normal embryo for implantation where both parents carry the gene for mucoviscidosis (fibrocystic disease).

In ch. 2 Moore gives a clear description of some of the functions of the gene, the most important of which is the code for making a protein. This leads into ch. 3 where the tools of the new Babel, a knowledge-based society, are explained. He provides a wealth of detail concerning the gene, the polymerase chain reaction, genetic fingerprinting and the problems associated with the correction of genetic disorders. Ch. 4 deals with the ethics of this technology as applied to medical care. Moore emphasises that the Hippocratic oath was concerned with the care and healing of people in need and this high view of human life was consistent with Christian concepts.

Moore does throw down the challenge that Babel introduces new problems for healthcare workers. Will antenatal screening become *anti*-natal in the light of society's attitude to abortion? This chapter is excellent, presenting issues in detail and it deserves careful assessment. His theme is that today medicine is moving away from its primary role of treating the unhealthy towards one where the decisions are made in the interests of preventing the development of the abnormal, whether embryo or fetus.

In ch. 5 the author explains cloning in simple language. Here he expands on the application of these techniques and dis-

cusses the ethics involved whereas in the next chapter he writes about genetics and the individual. He holds that we are more than our genes and presents a well thought out critique of Dawkin's concept of the 'selfish gene'. Then follows a discussion on when, between fertilisation and birth, does 'it' become a member of the valuable human race because before implantation the embryo has not formed any relationships. Moore refers the reader to what he considers the terms of reference, the Scriptures and the Judeo-Christian ethic. Then follows a discussion on genetics and the person and why genes determine who we are but do not define personality. It is clear that at the genetic level we are far from equal. Moore then states that mutations can be detrimental to, or enhance, intelligence but provides no supporting evidence. He mentions the 'gay gene' (but the reader should note that Hamer's team has now discarded their thesis as 'not proven').

In ch. 8 Moore draws his argument to a close and leaves the reader with a challenge. He advocates that society should be concerned with the ethics and morality of this genetic tower of Babel which could possibly cast a long shadow into their future. How will the community use these new technologies and can the boundaries be agreed upon? Based on this presentation his conclusion is sound. He leaves the reader to consider the use of these new technologies with their promise to bring health, wealth and achievements to future citizens. Most know that in the developed countries the expectation of individuals is high. Will some want a son who excels in sport or a daughter with a bias to music? What will the individual produced by this technology think of this 'designer mentality' of their parent or parents or perhaps even of the unknown donor of the sperms or egg? This service is already operational and has been for two decades. Moore points out that in this designer baby market the embryo and fetus appear to have become a commodity because termination of pregnancy is now accepted by

many. Detection has a cost attached to it.

The chapter on 'Information Wars' is again excellent and well researched especially his comments on 'unjustified genetic discrimination' based on 'genetic fingerprinting' and whether this should be required before insurance is obtained or workforce employment gained. Fathers are already using this latter service in paternity disputes. The 'remarkable is now achievable'. Will Babel's technology become our master or servant?

I can unequivocally commend this book. It is attractively presented, written on good quality paper with clear typeface, with excellent binding and carefully presented illustrations. There is in-depth discussion of issues which will challenge the geneticist, ethicist, clinician and theologian, hopefully leading to a useful dialogue on scientific and religious matters. The author achieves his purpose in presenting this complex subject in an understandable way. Most statements of fact are supported by relevant references in footnotes. There is an adequate glossary, a comprehensive appropriate bibliography of recent publications and the Index is extensive and easy to use. The book could be used as the basis of a seminar.

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Arnold Benz

The Future of the Universe – Chance, Chaos, God?

London: Continuum, 2000. 176pp. hb.
\$24.95. ISBN 0-8264-1220-3

Professor Benz's book is a wonderful example of professional science informing a lively, devotional, and creative faith. As a detailed discussion of academic interaction between science and theology, though, it is to be read only as a curiosity, if at all. From the outset he manages to alienate himself from anyone conversant with journals such as *S&CB*.

The following is from his introduction:

'To be sure, the divorce between theology and science is well accepted, at least from the theological side... Rules of polite distance now prevail.'

He is also convinced that there exists an objective standpoint on which the suitably informed observer may watch the spheres of science and theology, and carefully discern how these two disparate spheres interact with one another. His conclusion from this objective standpoint is, seemingly, not at all. This is observed throughout the book by writing one section from science and the next from religion, each detailing how that discipline views a certain topic. Never the twain shall meet.

Most of the time it seems the sphere of theology gazes in amazement at the sphere of science. And it is this devotional amazement which appears to be Benz's paradigm for what meagre interaction might be possible.

While God is seen to be wholly orthodox in nature which is refreshing, my concern rests on the need Benz has for concluding that *any* creative act of God is necessarily indiscernible among the afterglow of that which he creates. This includes the initial act of creating the universe. While I might agree with Benz for any act of God which is *creatio continua*, I think it is a bit beyond us to declare that the initial *creatio ex nihilo* is devoid of God's fingerprints. Until science can explain how the laws of science come into play where there is no universe, it remains for me quite compelling that the very presence of the universe is a mark of God's existence and creative power.

A delightful aspect of the book is Benz's frequent recourse to personal creative reflection, which is a wonderful thing coming from someone who is so obviously prolific in the enterprise of writing scientific papers. It is a joy to read his reflective offerings. My favourite part of the book is his modern rendering of Psalm 19.

Sadly though, as a whole I find that while the book is very accurate on a scientific basis, it is nevertheless fundamentally lacking in terms of its theological and philosophical basis. For a book which purports to speak of the interaction of science and theology there is no engagement with the modern writings on this topic, apart maybe from Pannenberg who is described as 'interesting'. Torrance and Polkinghorne are not mentioned, either in text or bibliography. Also notable by their absence are Newton-Smith (for philosophy of science) and Barbour.

It remains then an honest book by a very well acclaimed astrophysicist who opens himself to the wonders of the universe through his living faith. Sadly he does not take note of the modern conversation between the two siblings of science and theology and so his book suffers greatly.

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**Board for Social Responsibility of the Church of England (BSRCE)
*On Dying Well***

London: Church House Publishing,
2000. xviii + 94 pp. pb. £4.95.
ISBN 0-7151-6587-9

A recent newspaper front page headline story, 'After three hundred ops, I just want to die' (*Metro*, 2 February 2001) would indicate that the subject of euthanasia still arouses public interest. In this case, a 20 year old man with a rare congenital disorder, who had already made two suicide attempts, was reported to have refused further surgical intervention, with the exception of having a rarely undertaken and high risk transplant if made available to him. His decision was supported by his mother and the 'Voluntary Euthanasia Society' and, while having nothing but sympathy for

him, was opposed by the 'Pro-Life Alliance' who suggested that better palliative care would ease the chronic pain associated with his condition. This story illustrates the two sides of the euthanasia debate and so it is timely that this report of the BSRCE's Working Party set up in late 1970 is now back in print. It will enable a new generation of readers to inform themselves of the ethical, legal, medical and theological background to euthanasia.

This second edition of the report, originally published in 1975, remains largely unaltered, although Stuart Horner in his introduction commends it as being 'a highly topical, relevant contribution to the current debate.' (xv). According to Horner, the key changes over the intervening 25 years have been: the advances in cardiopulmonary resuscitation techniques, the increase in the number of elderly, the AIDS pandemic largely affecting young people, the growth of the hospice movement and increased experience of palliative care, and euthanasia legislation in the Netherlands.

In addition to this new introduction, chapter 6 has been partly revised by Jonathan Montgomery to include discussion of some recent legal cases, most notably that of Tony Bland who entered a permanent (persistent) vegetative state following injuries sustained at Hillsborough. Other new material is a half page commentary by Henry McQuay on the original data on pain relief presented in Appendix 1 and the inclusion of the 1993 joint submission from the Church of England House of Bishops and the Roman Catholic Bishops' Conference of England & Wales to the House of Lords Select Committee on Medical Ethics (Appendix 2). The Bibliography has almost doubled in size following the addition of 40 references published since 1974.

Euthanasia may be defined as '*the bringing about of a gentle and easy death in the case of incurable and painful diseases.*' (The Concise Oxford Dictionary, 1990) or '*the act of killing someone pain-*

lessly, esp. to relieve suffering from an incurable illness.' (Collins English Dictionary, 1998). It is interesting to note how these two definitions give quite distinct impressions, the former suggesting a process that enables the patient to 'die well', the literal meaning of 'euthanasia' (3) and the latter, a more active deliberate ending of life – 'mercy killing'.

In the UK, Voluntary Euthanasia Bills have come before Parliament in 1936 and 1969 but in terms of getting onto the statute books, the most important development was 'The Suicide Act (1961)' which made attempting suicide no longer a criminal offence. However, a doctor taking a decision to end life in response to a request from a patient, assisted suicide, remains illegal. Supporters of euthanasia argue that many patients with terminal illnesses live in agony because of severe, uncontrolled pain but, as Horner states, 'There is almost no reason today for patients with an incurable condition to die in agony and distress...(and the fact) they do...is a disgrace to the medical profession.' (xi). He exposes the false logic of allowing bad terminal care to be used as a justification for introducing legislation to solve this problem by active euthanasia.

The case histories presented in Chapter 4 illustrate how even the most difficult situations can be successfully managed by proper palliative care, changing patients who wanted 'to be put out of their misery' into people who enjoyed their last weeks of life. Indeed, both Horner and the Working Party are concerned that if a Voluntary Euthanasia Bill were introduced, it would be the poor and powerless who would be the most likely to suffer from its consequences, the very members of society who Christians are particularly called to stand alongside (22). 'Experience suggests that, although it is an articulate minority who would like to see changes in the existing [legal] framework, it will be the poor and disadvantaged who suffer from the consequences...with active killing; those who are powerless will be least likely to

receive a proper hearing.' (Horner, xiv). 'A Bill to authorise euthanasia, while it might bring comfort to a sophisticated few, could well bring unease of mind to a much larger number of ordinary patients and their relations.' (65).

Is the taking of human life ever justifiable or is there an absolute prohibition against it? In examining this question in Chapter 3, the Working Party arguing from both the Doctrine of Creation (18-19) and the moral teachings of Jesus on our behaviour towards our neighbours (Matt. 7:12, 22:39), would support killing only in extreme cases. Examples given are: to shoot a terrorist bomber to prevent the death of innocent people (18; although not relevant to euthanasia) and to end the life of a soldier fatally wounded in battle, who if captured could be tortured (10, 18) or a seriously injured road traffic accident victim who has little hope of immediate medical attention (10, 18). Exceptional cases, and there would still be many Christians who would seek alternatives to such mercy killings, even assuming they had the means at their disposal to end the individual's life swiftly and painlessly. To legalise euthanasia on the basis of exceptionally rare cases is not a good precedent. The conclusions of the Working Party includes the statement: 'To justify a change in the law in this country to permit euthanasia, it would be necessary to show that such a change would remove greater evils than it would cause. We do not believe that such a justification can be given.' (68).

This is a valuable and readable report that should be commended to a readership beyond that of health professionals working with the terminally ill in hospitals, hospices and the community. I have only one criticism, that is in terms of presentation, where the four case histories described in chapter 1 have been detached from their commentaries which appear in chapter 4, together with a further seven cases plus commentaries. There are also discrepancies between

citations #12 (xv) and #1 (xviii) in the text and the Notes at the end (81).

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Robin Marantz Henig
A Monk and Two Peas: The Story of Gregor Mendel and the Discovery of Genetics

London: Weidenfeld & Nicolson, 2000.
278 pp. hb. £14.99. ISBN 0-297-64365-7

There is always a demand for heroes, and the history of science offers its share. Especially suited to the role are those, like Babbage with his computers, or Wegener and continental drift, who were ignored or rejected in their lifetime, only to be posthumously vindicated. No case is more striking than that of Gregor Mendel.

Born to a Silesian peasant family in 1822, Mendel, like many gifted youths before him, found wider opportunities through the Church. After entering the Augustinian monastic order, he was able to study science at Vienna and then to conduct years of botanical experiment in the monastery gardens. Combining patient observation with theoretical insight, Mendel discovered simple fundamental laws of heredity. But his results, published modestly in a local scientific journal in 1866, were ignored by the few biologists who knew of them, and remained unknown to the wider scientific world until sixteen years after his death, when they were hailed as the foundation of modern genetics.

This, in outline, is the heroic story, and it is more true than false. Admittedly, Mendel's ideas were not as unprecedented as the simple account would have it, nor was his work wholly unknown before its 'rediscovery'. Mendel's achievement has also been clouded by two controversies. In 1936 R. A. Fisher reanalysed Mendel's data, and concluded

that they were 'too good': they must have been adjusted to fit Mendel's theories, perhaps by some over-eager assistant. More recently, Robert Olby has argued that in an important respect 'Mendel was no Mendelian', for he nowhere recognised that (in modern terminology) paired alleles still exist separately in the homozygote. The resulting controversies have not been fully resolved.

Much else about Mendel's work remains obscure. What was the role of initial hypotheses in his discoveries? How and when did he devise his experiments? And how did he see the significance of his work for wider theories of heredity and evolution? These questions are unlikely ever to be fully answered. Beyond the cautious prose of Mendel's published work, and a handful of letters from Mendel to the botanist Carl Nägeli, the material to satisfy our curiosity simply does not exist.

There is however still a place for a popular account of Mendel's work. The success of Dava Sobel's *Longitude* has revealed a demand for scientific biography, and Mendel is a promising subject. With some reservations, *A Monk and Two Peas* may be welcomed. Henig's approach, like Sobel's, is largely in the heroic vein. All doubts about the integrity of Mendel's work are brusquely dismissed, beyond the possibility that he may have simplified his published account for the sake of clarity (117). The Fisher controversy is alluded to only in a note (260). But Henig is aware that Mendel's work is difficult to interpret, and she gives some sense of the issues involved. She skilfully weaves together material from dry academic works – including the most recent results of Mendel scholarship – and enlivens it with anecdotes and local colour. Readers of this journal may be especially interested in her discussion of the role of liberal Catholicism in Moravian cultural life (23, 63). Another strength is her treatment of the complex 'rediscovery' of Mendel, which has recently been a focus of historical study.

My first reservation is that Henig does not distinguish clearly enough between fact and speculation. She admits disarmingly (7) that in places she has filled out the meagre records of Mendel's life with imaginative reconstruction. If this approach is taken at all, it is essential that the speculative elements should be identified as such.

Second, when the book strays outside the specialised field of Mendel studies it falls into careless errors. One is surprised, for example, to be told that Erasmus Darwin was a devout Christian (103), that Francis Galton's African explorations followed his experiments on Pangenesis (114), or that the term 'sport' to describe sudden variations was introduced by Fleeming Jenkin (112, 203). Henig's first-hand knowledge of early writings on heredity, apart from those of Mendel himself, appears very limited. She cites few such works in English, and none in French. Her notes (263) imply that she does not read German. This is no crime, but for a writer on Mendel it is a handicap.

One factual error is serious enough to be highlighted. Henig claims (140) that an uncut reprint of Mendel's paper was found in the library of Charles Darwin. If this were true, it would be important, for it would show that Mendel tried to bring his theories to Darwin's attention. This in turn would have implications for Mendel's own view of their significance. But it is not true. As stated authoritatively by Peter Vorzimmer, no work of Mendel's has been found in any of Darwin's collections.

Overall, the book is acceptable as a popular introduction to Mendel and Mendelism, but serious students will need to consult more scholarly works, notably those of Robert Olby and Vitezslav Orel.

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Cherry Lewis

The Dating Game: One Man's Search for the Age of the Earth

Cambridge: Cambridge University Press, 2000. 253 pp. hb. £17.95, US\$24.95. ISBN 0-521-79051-4

By the middle of the nineteenth century it was widely accepted by geologists and biologists that the Earth must be several hundred millions of years old in order to give sufficient time for it to develop to the state in which they found it. Around the end of that century the debate about the age of the Earth became quite heated as calculations from physicists suggested that it was much younger than the geologists required. The renowned geologist Walcott was to write in 1893 that 'The physicists have drawn the lines closer and closer until the geologist is told he must bring his estimate of the age of the Earth within a limit of ten to thirty million years. The geologist masses his observations and replies that more time is required, and suggests to the physicist that there may be an error somewhere in his data or in the method of his treatment.' It was prescient in its sentiments.

The most powerful and respected of the physicists was Lord Kelvin, who used thermodynamic arguments based on the cooling of the Sun and the Earth to argue that the Earth was only 20-40 million years old. He thought it likely that the best estimate was at the younger end of that range.

The discovery of radioactivity at the end of the nineteenth century threw all these arguments back into the melting pot. Here was a long-lasting source of heat which not only upset Kelvin's thermodynamic calculations on how long the Earth took to cool down, but also gave a method for deducing the age of rocks by measuring how much radioactive decay had occurred. Barely had a general theory of the rates of radioactive decay been published (by Rutherford and Soddy in 1902), than Rutherford proposed (in 1905) using the decay rate to calculate

the age of minerals. By 1906 Rutherford had published an age of 497 million years for a mineral sample, and the era of radiometric dating had arrived.

This book is about the life of one influential geologist, Arthur Holmes (1890-1965), with a particular emphasis on his life-long work of deducing the age of the Earth. It is part-biographical and part-scientific in its interleaved description of Holmes' life story and the technical methods of radiometric dating that he developed. Perhaps surprisingly, this is an excellent way to learn how radiometric dating works: the author, Cherry Lewis, is herself a geologist and brings a deft touch to describing the science. One advantage of this historical approach is that we start at the same base level as Holmes did, and we can follow his thinking on methodology, together with the blind alleys, corrections and refinements that he developed as he went along. This is in many ways a more satisfying route than simply being presented with a *fait accompli* in a textbook of how the method works. I can recommend it for both specialists and non-specialists alike.

But to get back to Holmes, at the time radioactivity was discovered he was a schoolboy, fascinated by science, and on his way to embark on a degree in Geology. With a (fairly meagre) scholarship he started in 1907 as an undergraduate at the Royal College of Science (now Imperial College) in London. Almost immediately he became fascinated by the possibility of using radioactive decay to date the Earth. In later years he was to reflect that during his childhood with staunchly Methodist parents, he was fascinated by the age of 4004 BC for the date of Creation written in the marginal notes on the first page of the family bible. 'I was puzzled by the odd '4', he wrote, 'why not a nice round 4000 years? And why such a recent date? And how could anyone know?'

By 1911, Holmes had published a paper using his own and other people's measurements of the uranium and lead

contents of rocks to assign ages to the major sections of the geological column. In its essence it laid the framework for dating the fossiliferous geological sequences which have been refined, but not grossly changed over the succeeding period of nearly a century. The only respect in which it was wrong in a big way was in the age of the oldest rocks: Holmes' oldest measurements yielded 1,640 million years. He considered at the time that this was representative of the age of the Earth, and indeed it was much older than almost all other firm age determinations. More recent work using isotopic data, then unknown, shows that the Earth is about three times older than Holmes' oldest measurement.

In 1913 Holmes published an influential booklet entitled 'The Age of the Earth', which marked the coming of age of radiometric determinations. Using the decay of uranium to lead in the crust he gave the Earth's age as between 1,640-3,000 million years.

Over the succeeding decades more measurements became available and, most notably, it was realised that there were many different isotopes in the uranium-lead decay series. These opened up better methods of dating the primordial Earth. By 1946 Holmes had been able to buy a state-of-the-art mechanical calculating machine, using which he recalculated 1419 age determinations using lead isotopes of rocks from the Earth's crust. His best estimate of the age of the Earth increased to 3,350 million years. This was his last major contribution to the debate on the age of the Earth: though still shy of the modern accepted value by over a billion years, he had put radiometric dating on a firm scientific footing and moved the ages back by more than an order of magnitude.

The final step in the dating game was in fact taken by Claire Patterson, who realised that the rock samples they were using from the Earth did not contain primordial lead, and that it would be much better to use meteorites to calibrate the

lead system. This he did, and in 1956 calculated a date of $4,550 \pm 70$ million years for the age of the Earth. Subsequent refinements have barely changed that value, and Holmes himself recalculated his crustal samples to show that they were also consistent with this age.

So much for the scientific tale. As is often the case, the human story behind the science is equally, or even more, fascinating. Cherry Lewis describes Holmes' life story sympathetically and well. As a young man Holmes had a difficult time financially. His parents were not well-off, and halfway through his first year of geology Holmes decided that his stipend was insufficient to live on in London.

So he threw himself into 6 months of study for the exams accompanying a job application as an assistant at the British Museum. When that was unsuccessful, he accepted a job with a slightly desperate nine-month expedition to Mozambique for a mineral exploration company. Holmes almost died from fever on the expedition, they did not find the required minerals, and soon afterwards the company went bust.

On his return to Britain, Holmes continued work on trying to date ancient rocks using uranium-lead decay methods, research he had started soon after he interrupted his degree studies. He never did finish his undergraduate degree. Instead he jumped straight to a position as a demonstrator at Imperial College, and he was awarded a DSc based on his published books and papers on the age of the Earth. But a few years later, now married and with a young son, he again felt the financial pinch and was not able to get a better-paid job in academia. So he accepted instead a seemingly prestigious job as Chief Geologist to a small oil company operating in Burma. Alas, this too proved to be a company in a ruinous financial position. Eventually Holmes resigned with a year's arrears in pay, and to add desperation to disaster, his 3-year old son died in Burma of dysentery shortly before they left.

Their return to the UK brought the Holmes to one of their lower points. For 18 months he could not find an academic post. Amongst other things he dabbled in running a shop with one of his wife's cousins, selling knick-knacks from India and the Far East. But in the depressed industrial north east of England of the 1920s, money was scarce and business was not good. Holmes kept looking for an academic job and eventually, in 1924, out of 18 applicants he was appointed as the sole (and therefore head) geologist in the newly-formed Durham science department.

From then on his scientific and academic stature grew rapidly, fuelled in part by his outstanding lecturing style, which led to popularity amongst students and growth of his new geology department. But it was marked, too, by his affair with a petrology lecturer from London, Doris Reynolds, who eventually was appointed to the staff in Durham and shared a desk with Holmes. Some five years later Holmes' wife died of cancer and within the year he had married Doris Reynolds. The Durham authorities took a rather dim view of Holmes' liaison with Reynolds, and even though they were by now married, the Holmes felt pressured into leaving. Arthur Holmes took up a Royal Professorship in Edinburgh, where he remained until his retirement 13 years later.

It is arguable that, important though it was, Holmes' work on dating the Earth was not his greatest contribution to geology. Rather, his textbook on *Principles of Physical Geology*, first written to train RAF cadets going off to the war, remained for four decades a major influence on several generations of geologists. It laid out a way of looking at geology through the quantitative spectacles of the physical sciences which has remained with us, and indeed has grown in importance to the present day.

I read 'The Dating Game' on how the great age of the Earth came to be known while sitting in one of the youngest spots

on Earth – a spreading centre on Iceland where new crust is currently being generated through a process of extension and volcanism. Cherry Lewis' description of the twists and turns by which the oldest known rocks in the world came to have their now accepted great age made for a fascinating read, as did the winding tale of one man's part in this.

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Steven Dick, (Ed.)

Many Worlds: The New Universe, Extraterrestrial Life & the Theological Implications

Philadelphia: Templeton Foundation Press, 2000. 210 pp. hb. £17.50
ISBN 1-890151-37-8

This collection of essays grew out of a conference sponsored by the Templeton Foundation held in the Bahamas in November of 1998. The distinguished list of participants included Christian de Duve, Paul Davies, Bernd-Olaf Koppers, Christopher McKay, Martin Rees, Lee Smolin, Arthur Peacocke, John Leslie, Freeman Dyson, Jill Tarter, Ernan McMullin, George Coyne, and Steven Dick. The thirteen essays are organized around three broad themes: 'Origin and Evolution of Life'; 'Humanity's Place in Cosmic Evolution', and 'Extraterrestrial Life and Our World View.' Since a detailed response to all thirteen essays would require a book-length analysis impossible in a brief review of this sort, attention here will be focused on the essays presented in part III, with particular reference to issues of worldview and theology.

The essays in Part I that address the biogenesis or origins-of-life problem display the broad range of opinion on this issue. Christian de Duve is quite optimistic about the emergence of life as almost 'obligatory' given the right chemical and physical conditions; Davies notes

that others such as Stephen Jay Gould and Jacques Monod tend to see life and intelligence as freak accidents in the cosmos. Davies' essay is quite incisive in pointing to the near impossibility of accounting for the information content of DNA sequences on the basis of the deterministic laws of physics and chemistry. The essays in this first part were written before the publication in 2000 of the important work of Peter Ward and Donald Brownlee, *Rare Earth: Why Complex Life is Uncommon in the Universe*, in which persuasive arguments are presented for the view that while microbial life may be common in the universe, it is rather unlikely that *sentient* life is common. Ward and Brownlee present a broad range of new data that challenge the optimistic conclusions of the so-called 'Drake Equation' purporting to estimate the frequency of life in the universe.

In Part Two, 'Humanity's Place in Cosmic Evolution,' the essays by Rees, Smolin, Peacocke, and Leslie explore evolutionary and 'multiverse' scenarios. The discussions of multiverse hypotheses presented by Rees and Smolin are highly provocative and intrinsically interesting, but at the same time represent speculative hypotheses that are 'underdetermined by available data.'

Part Three, 'Extraterrestrial Life and Our World View,' raises many issues of profound theological significance. Dyson's essay, unlike the others, deals not with issues raised by SETI, the search for extraterrestrial intelligence, but with neurological realities such as autism seen as a model of radically different ways of experiencing reality. In her essay, 'SETI and the Religions of the Universe,' Jill Tarter suggests that the reception of signals from extraterrestrials is likely to imply that such advanced civilizations have either never had religions or will have outgrown them. She thinks that it is unlikely that the existence of old technologies can be reconciled with organized religions. This is to make bold extrapolations, of course, based on our

limited human experience with religions on earth. Ernan McMullin's essay, 'Life and Intelligence far From Earth,' is one of the most theologically incisive contributions in this volume. At one point, however, he seems to assume that any divine 'intervention' associated with the origins of life would be 'miraculous.' This seems to overlook the classical Christian theological categories of *immanence* and *extraordinary providence*, through which God can act in the world. George Coyne seems to think that invoking a designing God to explain the cosmic 'fine tuning' would be arbitrary, but it is not clear to this reviewer why this should be considered 'arbitrary,' rather than 'economical,' there being other independent lines of argument (e.g., from religious experience) to support the theistic hypothesis. Steven Dick proposes a 'cosmotheology' to accommodate new discoveries – a 'natural God of cosmic evolution' – which turns out to be a version of ancient pantheism. He seems to assume that traditional Christian theism is 'anthropocentric' and hence parochial in an expanded universe, whereas classical Christian theism has been theocentric in its essential orientation. With the Creator at the centre of reality, it is for the Creator to decide the issue of how many sentient beings might inhabit the universe; multiple intelligences and multiverses, are, in principle, no threat to such a theocentric perspective.

Many Worlds is a fascinating collection of essays that are bold in their speculations and provocative in the fundamental theological and philosophical issues they raise. Notwithstanding the fact that the speculations often outrun the capacity of the available empirical data to adjudicate, the inherent importance of the issues being raised commends this volume to any reader with a serious interest in current cosmology, astronomy, and the search for extraterrestrial intelligence.

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John F. Haught
God After Darwin: A Theology of Evolution

Oxford: Westview Press, 2000. 221 pp, hb, £19.50, ISBN 0-8133-6723-9

Haught is a theologian who seeks to show that evolution 'provides a most fertile setting for mature reflection on the idea of God.' (cover). After developing his theology of evolution in the first six chapters, he then considers, in its light, the supposed meaninglessness of the universe (ch 7), ethics (ch 8), ecology (ch 9), and divine action (ch 10). Haught accepts modern Darwinism (14, 106), but his rejection of the materialist ideology (14, 32) is very evident in the later chapters.

Haught insists that all scientists have a metaphysics and identifies three dominant perspectives. The first, a 'metaphysics of the past' (86), is common to most materialist readings of evolution. From this perspective all events, including the evolution of life and mind, were implicit in the original cosmic conditions and needed only contingency, law, time and space to come to realisation. The second, a Greek metaphysics of the eternal present (84, 92, 94), common to much traditional theology, holds that a hierarchy of levels of being is held up from above. Haught argues that these two views rule out genuine novelty, and render evolution pointless (186). The third, promoted by Haught, is a 'metaphysics of the future' (88) that locates the divine source of being in the future as the goal of a world still in the making. Haught argues that only this allows for real novelty.

It is an exhilarating vision that is widely applauded, but is it viable? A

major problem is an empirical one. Haught rejects materialism, arguing that the evolution of novelty demands a beckoning God. Yet he proposes that any such 'interaction' will be empirically undetectable and that the naturalistic accounts of evolution will be complete in their own terms (74-75, 99, 104). But even if it is agreed that the laws, constants and initial conditions of the universe have to be very tightly constrained for life and mind ever to be sustainably present, that does not mean, or prove, that life and mind will, or even can, emerge in such a universe. At the very least, it remains an open question whether organisms could arise without intelligent intervention. Despite the regular hype, the research continues to indicate that mutation and natural selection, or the various more recent suggestions from, e.g., complexity and chaos theory, are hopelessly inadequate to the task. Furthermore, Haught is unwise to conclude so firmly that his 'theory' would not itself carry empirically detectable consequences (cf 183).

Haught appears to regard the idea of God intervening in nature with revulsion. Yet however one might wish to gloss the word, the Scriptures portray a God who constantly 'intervenes', even to the extent of entering his creation as a creature. Naturalistic evolution must be demonstrated, not simply assumed because it comports so comfortably with a preferred metaphysic, especially when that metaphysic is so clearly alien to Scripture.

That last comment brings us to the heart of the matter, that of authority. Is Scripture our authority, or, if not, what is? Haught assures us that the idea of an originally and instantaneously completed creation is 'theologically unthinkable' (37). He insists that a perfect creation ruined by sin (141), death as judgment (162), a primordial couple, Adam and Eve, rebelling against God in the Garden of Eden and passing down the consequences of that disobedience to their descendants (137), are all myths

that cannot be reconciled with evolutionary science and so must be rejected. Yet he constantly describes aspects of his perspective as 'biblical' as if that matters (108, 147-50) and other things (which he rejects) as 'unbiblical' as if that too is important (107). Yet he is arbitrarily selective in his use of Scripture and radically reinterprets (33) those selections in the light of his metaphysics. To take two specific examples, 'original sin' becomes 'our estrangement from the enlivening new creation yet to come' (140) and John 3:16 means that 'the very substance of divine life is poured out into the creation, and that the world is now and forever open to an infinitely replenishing future.' (111). God does not coercively control; hence he is not responsible for all the imperfections and evil of a universe that is still in the process of making itself (38). But entirely absent from Haught's 'gospel' is any concept of that righteousness, justice and judgement of God that is also fundamental to Scripture and without which the nature of God's love cannot be grasped. The authority for Haught's 'reinterpretation' is his own fertile imagination. His new gospel is yet another postmodern story that can carry no objective authority for anyone else.

Despite my rejection of his overall thesis, I still found much in this book that was stimulating and challenging: his critique of the Greek dualism that still dominates much Christian thought (65) the importance to morality of the conviction that it has 'the backing of the universe' (132, ch 8), his emphasis on the importance of our experience of inwardness to reflection on cosmology as well as psychology (94, ch 10). But, sadly, it is only some of the bath water that is worth keeping.

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N.H. Gregersen, W.B. Drees, U. Görman (Eds.)

The Human Person in Science and Theology

Edinburgh: T&T Clark, 2000. xii +218pp. pb. £14.95. ISBN 0-567-08692-5

There is probably no more contentious a subject matter today than the seminal question as to what constitutes and makes each of us a 'person'. There is clear theological confusion – a recent doctoral candidate of mine found over 130 different definitions of the word. There is equally clear medical confusion as to when a 'person' begins and ends. Whilst we may make a wry smile to such an impasse, the problem remains: doctors of both body and soul are in a conundrum concerning their basic subject matter, the human 'person'.

It is, therefore, immensely significant that this subject is tackled in a book which marks the genesis of a new series launched in partnership between T&T Clark and the William B. Eerdmans Publishing Company, *Issues in Science and Theology*. The content of the book is the product of the 1998 European Conference on Science and Theology, held in Durham by the European Society for the Study of Science and Theology (ESSSAT). The subject matter of the conference was 'The Person: Perspectives from Science and Theology'. As such, the book draws from a diverse range of disciplines: from Systematics, through Psychology, to Philosophy and Paediatrics.

The various authors' aim is to offer an alternative paradigm by which to address the issue of personhood. As Gregersen helpfully points out in his contribution which seeks to map the various issues, the authors avoid both *physicalist reductionism and computational functionalism*. Rather, they pursue a method which they describe as a *bio-cultural* paradigm, that is, one which strongly emphasises 'the covalence of nature and nurture in the formation and development of human personhood' (6). Conse-

quently, contributions come from both the theological and psychological communities. This is a very helpful dialogue. In Part I the authors outline possibilities of a bio-cultural paradigm of personhood. Theologians of the calibre of Michael Welker lay out a possible model of personhood. In so doing, the book will enable its reader to grapple with the issues of where we are coming from, what the present issues are as well as offer clear trajectories for the future.

In part II the discussion moves to the more particular discussion on supervenience as a possible view of the relations between brain, mind and culture. As Dennis Biefeldt reminds us 'the term 'supervenience' has been popping up in the science-theology discussion in regard to the question of the relation of levels [between different physical and biological entities], and the associated question of the possibility of divine agency' (118). The discussions that follow reveal well the complex nature of the debate and will reward careful reading in a debate that is not over by any means.

This book does not offer a watertight definition to what is one of our most complex and far-reaching debates. Such a goal is beyond the scope of this book. What it will do, however, is show that the different disciplines have much to learn from each other as well as richly resource the theologian, scientist and psychologist in what is rapidly becoming one of the most problematic issues in the 21st century.

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Stuart Burgess

Hallmarks of Design: Evidences of design in the natural world

Epsom: Day One, 2000. 200pp. pb. £6.99.
ISBN 1-903087-01-5

The author is an engineer and examines various aspects of the natural world from

that point of view. He writes about the human knee-joint, bird flight and the balanced ecosystem, showing what remarkable combinations of features they exhibit. It is good to be asked to stop and marvel at these things. Those who do not share his anti-evolutionary standpoint would do well to help us more often to be astonished at the almost infinite 'ingenuity' of the created order.

Nevertheless he jumps too quickly to the conclusion that these features are cases of 'irreducible mechanisms', a concept that is similar to the 'intelligent design' (ID) arguments. These arguments, like the arguments for biological evolution, are purely scientific. They have no clear biblical support, because the biblical passages about evidence of God's handiwork in nature seem to be much more general and speak of what is 'evident' to everyone and was so long before the rise of such sophisticated technical points. It is evident in what can be scientifically explained (like the seasons and the rising of the sun) as much as in what at present we cannot explain. That is presumably why the majority of ordinary folk believe in some sort of a Deity. Weak arguments can do more harm than good, by reducing such evidence to a matter of technical scientific debate.

He defines evolution in philosophical terms, accepting the opinions of a few anti-Christian writers as reliable. As a result some of his arguments do not convince. He sees God's creation in the similarities between animals (such as the pentadactyl limb), because, like us, God can be expected to re-use a good design again and again. Then in the next chapter he argues for God because of the great variety of forms. Not a convincing book, and he does not seem to be familiar with many of the arguments on the other side. Nevertheless it raises some splendid engineering features of the created order – however God may have chosen to create them.

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Ernest Lucas

Can we believe Genesis today?

Leicester: IVP, 2001. 192 pp. pb. £6.99.
ISBN 1-85111-658-2

This book will be of interest to anyone who is concerned about the relationship between science and the Bible. Although written for the general reader, the book deals with its subject-matter in a scholarly and thought-provoking way, and I believe that even the most highly qualified professional (either scientist or theologian) would find it helpful.

The first three chapters (one third of the book) are devoted to 'dispersing the fog that surrounds science in many people's minds'. The author, who was a research biochemist before turning to theology, argues that science cannot explain everything, but also suggests that science can help to correct some wrong understandings of the Bible. He discusses scientific concepts such as observation, experiment, theories, models and laws and then explores the nature of religious understanding, with particular reference to biblical Christianity.

The next three chapters (another one-third of the book) are mainly concerned with the interpretation of the first chapter of Genesis. Many people (including some whose aim is to attack Christian belief) assume that the only valid approach to interpretation of this part of the Bible is a literal, anti-evolutionary one. This approach is examined in some detail, with discussion of issues such as the age of the Earth, radioactive dating, fossils, flood geology, evolution, etc. Although the author is critical of biblical literalism, he acknowledges that the theory of evolution does raise difficult questions which are 'not easily resolved, either scientifically or theologically'. Some brief comments on concordist interpretations – many of which are as anti-evolutionary as the literal interpretations – are followed by the central thesis of the book, which is that the understanding of Genesis 1 calls for what the

author calls a literary-cultural approach. (I believe that the majority of his fellow-members of Christians in Science will agree with him on this point.)

It should be pointed out that the book was published originally by Scripture Union in 1989, with the title *Genesis Today*. A review of it by Reg Luhman appeared in *S&CB* 4(2). This second edition contains a valuable discussion, in chapter 6, of contributions to the science/faith debate which have been made during the last five years or so by proponents of 'theistic science' and 'intelligent design'. While advocating that these contributions should be debated seriously, Ernest Lucas expresses his concern that they are going back towards a discredited 'God-of-the-gaps' position.

The final one-third of the book applies the literary-cultural approach to the interpretation of Genesis chapters 2 to 11, and then sums up the argument. A chapter is devoted to what are called 'puzzles in Genesis 2-5', such as the location of Eden, the dating of Adam and Eve, Cain's wife, death (physical and spiritual) and the ages of the patriarchs. Another chapter deals with 'events in Genesis 6-11', including the sons of God, the Nephilim, Noah's flood and the Tower of Babel. The penultimate chapter contains short essays on God, the world, evil, human nature and salvation, which give concise answers to theological questions that arose in earlier chapters, and the final chapter applies the arguments of the book to a number of contact points between science and Christianity.

Reg Luhman's review in 1992 concluded that *Genesis Today* was 'an excellent little book'. My view of the enlarged second edition is exactly the same.

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