

Correspondence

Dear Sir,

Some months ago I read Michael Behe's book *Darwin's Black Box* which I considered to be a well-written book which needs to be taken seriously. Consequently, I was rather surprised at the content of Michael Roberts' review of the book in the October issue of *Science and Christian Belief*. I feel that the review dismissively misrepresents both Behe's arguments and his position. In contrast with Roberts' well-written article in the same issue on Darwin and Design, his review is inaccurate on several counts:

1. Roberts seems to be keen to associate Behe's position with young earth creationism which is entirely inaccurate in view of Behe's assertion in his book that he believes in common descent of species. I am puzzled as to the information the reviewer has in mind in asserting that 'Behe claims to accept the geological timescale, though most of his advisors are "young earthers" '. Writers from both theistic evolutionist and young earth creationist backgrounds have an unhelpful tendency to treat other scientists of a Christian conviction as belonging to one camp or other, when there is in reality a large number who hold a wide spectrum of views (and uncertainties) on questions relating to the origin of the universe and of life.
2. While Behe's argument does indeed apply to the origin of life, it is not limited to that sphere. Almost half the systems that he discusses, such as blood clotting and the immune system, involve advanced multicellular life. However Roberts describes the aims of the book as 'focussing on the lack of success scientists have had in explaining the origin of life'. His focus is on the fundamental biochemical processes of life rather than the origin of life.
3. In his discussion of complexity, Roberts states that 'mechanical contrivances are irreducibly complex, but living things are not, as organic molecules are reducible to component atoms of carbon etc.'. This indicates a lack of appreciation of the underlying issues. Clearly, mechanical contrivances, such as motor cars, are also reducible to their constituent atoms. Behe is not arguing about reductionism, but rather that the appearance of certain biochemical processes cannot be explained by a series of simpler precursor mechanisms. He argues that such processes are strongly suggestive of design – he does not argue for design of individual species. One might object that further research is needed to test whether viable precursor mechanisms might be postulated in future. However it is clear that control systems in any modern technology are primitive in comparison with those operational in any living organisms and that these defy attempts to date to explain their origins.

Although I would consider the above arguments to be inaccurate, Roberts' description of Behe's thesis as 'basically the God-of-the-gaps argument covered in amino acids' does require careful consideration and raises issues which are crucial to the debate about origins. Behe's basic argument is that it is difficult, if not impossible, to explain the origin of many biochemical processes that we observe in nature, by gradual transitions from simple to complex mechanisms, the immune system and control of chemical transport in cells are claimed to constitute integrated complex systems which seem to defy attempts to propose simpler viable precursor mechanisms and dubs such examples as 'irreducibly complex'. He backs up his claim by pointing to the almost total absence in the scientific literature of proposed mechanisms for the formation of these systems at the molecular level. Behe then goes further to claim that such irreducible complexity points to the role of design. There have been many attempts to argue in this vein in the past; the distinguishing aspects of Behe's thesis is that it is expressed at the molecular level at which proposed mechanisms can be tested more stringently for viability.

How are we to respond to such claims? Clearly, Behe's argument is based on the apparent existence of 'gaps' in current theories of origins. Recognition of such gaps, which initially appear to be insignificant to the majority of scientists, has often been instrumental in major progress in science, as in the development of quantum physics during the early years of this century. Gaps in theories relating to current phenomena, once they are conclusively established, require one of two responses: either revision of current theory or, occasionally, the introduction of a new theory. However, problems relating to origins involve past events where direct evidence and the opportunities to test theories are necessarily limited. Further, it is difficult to avoid metaphysical issues and presuppositions. Responses to major gaps in our understanding of origins generally belong to one of three categories:

1. An *a priori* assumption that current theories will eventually be extended or new theories be developed to account fully for all aspects of origins. The action of an external agent is implicitly excluded.
2. An *a priori* assumption that scientific mechanisms will never be able to account for origins, which are attributed to God's direct (and usually instantaneous) intervention. Secondary causes are either excluded or viewed with suspicion.
3. An openness to both scientific mechanisms and God's intervention, either instantaneous or over prolonged periods, which are not considered to be mutually exclusive. God is viewed as the primary cause and the role of secondary scientific mechanisms is judged on the basis of the available scientific evidence, subject to continual re-evaluation.

The first two responses ('Naturalism of the Gaps' and 'God of the Gaps' respectively) are most vividly displayed in discussions regarding the origin of life, where there are no truly satisfactory scientific theories. I suspect that most practising Christian scientists would belong to the third category but display a spectrum of views and emphases. Some appear to rule out direct intervention

prior to the emergence of man while accepting the possibility of present day miracles. From the evidence presented in his book, I would consider Behe to belong firmly in this third category. He accepts common descent but expresses considerable doubt about the ability of current theories to explain the origin of certain biochemical processes. I find his arguments compelling, although it should be borne in mind that biochemistry is a comparatively young discipline and it may well take some years to establish conclusively whether mechanisms can be postulated to account for the origins of these processes. I share Michael Roberts' lack of qualification to examine the biochemistry in detail and would greatly appreciate discussion of his thesis by readers of Science and Christian Belief who are practising biochemists or molecular biologists. From my non-specialist viewpoint, it seems to me that theoretical problems which Behe poses to Darwinism are real and can neither be dismissed nor ignored by the scientific community.

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Darwin's Black Box Reconsidered

Dear Sir,

I thank Dr Macdonald for his response to my review of *Darwin's Black Box*. He has brought out many important points. But, first I think his suggestions of inaccuracies are due to my brevity.

1. Behe does claim to accept the geological timescale and the common descent of species and I made the former clear. The point I was making was both to report Cronin's comments and draw attention to Behe's advisers. Neither in themselves refute Behe's arguments, but it does set alarm bells ringing.
2. Behe does refer to several biochemical systems but I put the focus on the unexplained nature of the origin of life largely for reasons of brevity. I see Behe's aim in discussing all these unexplained biochemical processes as emphasising these are 'irreducibly complex' and will remain beyond scientific explanation.
3. There is a difference between mechanical and biochemical systems. A mechanical contrivance cannot be reduced to its atoms; the spring of a mouse-trap has to be a spring, even if it is a nano-spring, etc. However as Behe's argument is not about Reductionism, this is not important and I agree that it is probably a red herring.

It is essential to consider the soundness of Behe's arguments both scientifically and theologically, as his work (and that of other Intelligent Designers) has made a considerable impact on both sides of the Atlantic, and was Christianity Today's Book of the Year. Behe is facing both ways; first he accepts the common descent of species, and this change most likely involves some change in

biochemistry as well as morphology etc. But, secondly Behe argues for the process of Intelligent Design (I.D.) to explain unexplained biochemical processes. Thus, for example, a proto-Bombardier evolved but required the direct action of I.D. to give it its characteristics and also animals evolved to be blind but required the action of I.D. to provide the biochemistry associated with rhodopsin to make them see.

Since the evolution of a new species requires, by definition, a process of reproductive isolation of a new interbreeding population, it is difficult to imagine that this would not involve, in some cases, the evolution of biochemical processes.

Macdonald stresses biochemistry is a young science and that it may take years to establish mechanisms for various processes. Let's take one example: lysozyme is found in the phlegm of most mammals and has mild anti-bacterial properties. Alexander Fleming discovered it in 1923 – 75 years ago. A decade later Howard Florey followed it up and put a young biochemist – my father – on the job to extract it from cat's phlegm using techniques best described as the Delia Smith school of biochemistry. On purification lysozyme joined the list of antibiotic failures¹ and my father ended up hating cats. At that time no-one knew how it worked or its structure beyond it being a protein. In 1937 – a mere 61 years ago – E.P. Abraham and Sir Robert Robinson reported that the crystals were dodecahedral 'and the molecular weight appears to be of the order of 18,000'². As their near-colleague Peter Medawar later put it, they had performed 'The Art of the Soluble'. Only in 1965 was the chemical structure reported in *Nature*. Later the active site of the enzyme was identified and is now discussed in 1st year undergraduate text-books.

These discoveries took place over fifty years. Gaps of knowledge were reduced as aspects were 'explained in terms of those natural laws' and thus, according to Behe, removed from the possible domain of the Intelligent Designer. One can be quite sure that all workers were looking for a total explanation, even if only part was soluble at that time. A historical perspective is extremely important as we can then see the progressive closing of unexplained gaps. Lysozyme is just one example of many. When one considers two hundred years of a developing science, one becomes exceedingly aware of diminishing gaps.

The expression 'The Art of the Soluble' comes from Medawar's scathing review of Arthur Koestler's book *The Act of Creation*. Koestler had stressed how scientists had failed to explain fundamental questions and seemed to avoid them. Medawar responded: 'Like other amateurs, Koestler finds it difficult to understand why scientists seem so often to shirk the study of really fundamental or challenging problems. . . . He wonders why "the genetics of behaviour" should still be "uncharted behaviour" and asks whether this may not be because the framework of neo-Darwinism is too rickety to support an enquiry. The real

1 Macfarlane, G., *Howard Florey, the making of a great scientist*, Oxford University Press, 1979.

2 Abraham, E.P. and Robinson, R. Crystallisation of Lysozyme, *Nature*, July 23rd, 1997. p. 24.

reason is so much simpler: the problem is very, very difficult. Goodness knows how it is to be got at. . . . No scientist is admired for failing in the attempt to solve problems beyond his competence. . . . If politics is the art of the possible, research is surely the art of the soluble.’³

This passage says it all. At a given stage in history scientists can solve only certain problems and the skill is to identify soluble ones and leave the rest for later. As Medawar stressed in 1963 (when I was studying for ‘A’ Level), the ‘genetics of behaviour’ was simply insoluble. But thirty-five years later the genetics of behaviour is on the agenda with a vengeance. As Medawar noted, this seeking of solvable problems is not a cop-out, but reflects a hard-headed realism on the part of scientists in tackling the hardest and most important problems they think they can tackle (and obtain funding for). The rest remain as gaps to be tackled later.

Design, then and now

It is fashionable to dismiss 19th Century exponents of Design from Paley to Buckland, as does Behe in a long section from p. 210 to 219. Behe’s refutation relies on ridicule rather than engagement. Paley and his successors are worthy of far more respect, especially when considered in their historical context. Though Paley was no practising scientist the ‘mixed bag’ dismissed by Behe reflects a wide understanding of contemporary anatomy. Behe mocks Paley’s use of compensation to explain certain aspects of anatomy, but in fact his (or, rather, everyone else’s!) principle of Compensation resurfaces in Cuvier’s *Recherches sur les ossements fossiles de quadrupedes* (p. 81ff) and in Buckland’s lecture on *Megatherium* and his *Bridgewater Treatise*.⁴ Further, Paley and Buckland were convinced that God had designed everything down to the last detail, which is a reasonable inference from their particular creationist belief. Paley wrote as an informed theologian, but Buckland was a geologist of the first rank. Further the state of science at that time prevented them from looking at small scale structures. Paley wrote before Dalton’s atomic theory and in the 1830s many chemists thought the atomic weight of Carbon was 6.

Whether Design with Paley and Buckland was strictly a scientific theory is a moot point, but it did encourage Buckland and others to search for biological mechanisms with great detail and fuelled their scientific research, as they looked not only for divine purpose and meaning, but also function, as ‘the same hand that had formed, and the same Almighty mind that had designed the smallest and most complicated of existing creatures’ (*Megatherium* p. 10). They simply practised reverse engineering or artefact hermeneutics, so well described in Daniel Dennett’s book *Darwin’s Dangerous Idea – Evolution and the Meanings of*

3 Medawar, P. *Pluto’s Republic*, Oxford University Press, 1984, p 253–4.

4 Cuvier, G. *Recherches sur les ossements fossiles de quadrupedes*, Discours preliminaire, Flammarion, Paris, 1992 (first edition 1812), p. 81ff; *A lecture by the Revd Dr Buckland on the fossil remains of the Megatherium*, 23 June 1832, quoted by permission of Mrs D.K. Harman.

Life, and looked for the function of biological features. In his famous and ribald lecture on *Megatherium*, which contained some sideswipes at Babbage, Buckland sought and succeeded in finding reasons for its peculiar anatomy, showing that it had 'a hoe and a shovel in those three claws in his right hand . . . he is a canal digger' (p. 50), vividly describing its three foot long front paws. Buckland chose *Megatherium* because Buffon thought 'the sloths, as the most imperfectly constructed among all the members of the animal kingdom' 'had been misunderstood by . . . the immortal Cuvier himself' (p. 8). *Megatherium* appears as clumsy as a mechanical digger, but Buckland demonstrated the functions of its weird anatomy. Whereas Buckland's faith in Design enabled him to find scientific explanation, which Buffon and Cuvier overlooked, Behe and others use Intelligent Design to explain why they cannot give scientific explanations for certain things. Behe does not understand Paley and his successors and his comments are more patronising and inaccurate than Dawkins! Darwin took over this approach but turned it on its head and acknowledged disused designs, i.e. vestigial organs which are explained by 'continuity of descent'.

Unlike Paley and Buckland, Behe believes some biological structures are designed and some are not. 'If a biological structure can be explained in terms of those natural laws then we cannot conclude that it was designed' (p. 203). Poor *Megatherium*! He was not designed after all! He was not even a clumsy design as Buffon and Cuvier believed. He was no Design at all! Thus Behe believes that if an 'explanation' exists then that structure is not designed and thus God is removed from the scene. This is a fallacy which Asa Gray condemned so strongly in the 1860s, whereby many hold that if something can be given a scientific explanation then God didn't do it. That is not Theism which holds that God is involved in all of His Creation.

A trivial example happened to me while working as a field geologist in the Namib Desert in South Africa. In 1970 I was the third geologist to work in a remote area of late Precambrian strata, and the previous two geologists contradicted each other. A series of problems had confounded me, but one morning I stopped for drink and contemplated the view (a rugged mountainous desert) and in a revelatory moment I did not see a burning bush, but the whole geological structure became clear and explainable in naturalistic terms. I thought 'Well, that's how you did it, God!' Perhaps not suitable for a theological tome, but it does enshrine the essence of Theism for a scientist. Surely Behe would have to say, 'Well, God. I've explained it, therefore you didn't do it.'

It is essential to see what Behe and other exponents of Intelligent Design are actually saying. They adopt reverse engineering and where this explains a feature, then that feature is NOT designed. Design is reserved only for those features which cannot be explained. Our two advocates of reverse engineering, Buckland and Dennett, would concur, for very different reasons, that ultimately a reason for any structure will be found.

Scientific explanation does not give God a notice of redundancy, though this long has been a popular understanding as Asa Gray moaned in the 1860s. This

is a very deep-seated and persistent misunderstanding. Pastorally speaking it is one any Christian teacher must refute. It must be a starting point of faith in the Creator that he created everything, and scientific explanation is not necessary to believe that. Surely that is Theism.

Theism

Perhaps one of the finest statements of a Theistic understanding of creation is in the poem *God's Grandeur* by Gerard Manley Hopkins, written while at St Beuno's monastery, near St Asaph. Perhaps he wrote this after a heavy shower, when the Vale of Clwyd is especially beautiful, with the atmosphere crystal clear and whatever the season the colours at their best, whether the browns of winter or the greens of summer. Everything stands out in great sharpness, from the patchwork quilt of field and hedgerow to the heather of the Denbigh Moors and beyond that the hills and mountains of Snowdonia. The whole landscape is more beautiful than normal, if that were possible, and:

*The World is charged with the grandeur of God.
It will flame out, like shining from shook foil;
It gathers to a greatness, like the ooze of oil
Crushed. Why do men then now not reckon his rod?*

To Hopkins the whole vale proclaims the reality of God the Creator. Hopkins is almost echoing one of the nature psalms:

'The heavens are telling the glory of God;
and the firmament proclaims his handiwork'.
(Psalm 19 verses 1-2 or else Psalm 104.)

If he were a Protestant rather than a Jesuit, he may also have been echoing Calvin's Institutes, 'the elegant structure of the world serving us as a kind of mirror, in which we may behold God.' God's grandeur in nature to Hopkins is so great that he cannot understand any who does not believe in the Creator, and so asks the question, 'Why do men then now not reckon his rod?' He meant those who did not recognise (sic) God's rod and sceptre, and see God's hand in ALL creation.

To cruelly represent Behe's dual world of Designed and Undesigned, we must parody Hopkins' poem (as, in Behe's view, haemoglobin is explainable and clotting is not):

*The clotting of blood is charged with the grandeur of God
It will ooze out, like shining from shook foil.
But hemoglobin is not charged with the grandeur of God.
We know not when to reckon his rod.*

Intelligent Design is not Design at all, but rather an insistence that certain unexplained phenomena will remain unexplained because they were formed directly without any secondary causes (or naturalistic means) by an Intelligent

Designer. I am perfectly happy to accept that as a possibility, but a Theistic approach to Creation which recognises that God is the Creator of all, explained and unexplained, will accept it only as a possibility. Behe appears to accept it as an *a priori* assumption. His accounts of the discovery of this is, frankly, plain daft, with 'no bottles have been uncorked, no hands slapped' (p. 233). All this section tells us is that many aspects of life have not been explained by biochemists. Behe then moves on to give a History Lesson with some risible comments on the Huxley-Wilberforce encounter of 1860. Further, this amazing discovery of an intelligent Designer tells us nothing that we did not know before – God is Creator. Darwin's strictures in the penultimate chapter of *The Origin of Species* where he criticises those who talk of 'the plan of the Creator' are relevant here: 'it seems to me that nothing is thus added to our knowledge'.⁵

Macdonald's categorisation of three responses to the gaps in our scientific knowledge needs careful consideration. Some theists, e.g. Peacocke and possibly Van Till opt for 'Naturalism of the Gaps' on theological grounds. I also think it may be the case, but we still end up with the most important question: 'Why is there a universe and us, anyway?' The second 'God of the Gaps' is basically young earth creationism, and needs no further comment. The third alternative seems attractive, but can easily slip into God-of-the-Gaps. I wonder how open Intelligent Designers are to both scientific mechanisms and God's intervention. Behe tends to exclude God's activity when a biological process is explained by secondary causes, as I stress above, and thus leans strongly to God-of-the-Gaps. The emphasis of I.D. on libertarian acts of God is far more of an *a priori* assumption than an openness. Behe does not mention what these could be, but others are specific and suggestions such as the parting of the Red Sea and Noah's Flood go far beyond the biblical evidence and must be considered eisegesis rather than exegesis. The danger of this approach is to multiply interventionist miracles whenever an explanation is not readily at hand. It is hardly scriptural to suggest miracles which are not recorded in the Bible, and it is not reasonable to expect anyone else to accept them. As an Anglican Evangelical, holding firm to Article VI, I am under no obligation to accept either extra-biblical miracles or tendentious biblical ones.

I cannot but think that discussions over Intelligent Design will run and run. To conclude, Behe has a two-tier approach to God's Creation; first that which is scientifically explained and has come about by naturalistic means and is thus not designed; and, secondly, there are some aspects which we will never explain scientifically and thus were designed. Neither Behe or any other Intelligent Designer gives any grounds for deciding which unexplained phenomena were intelligently designed. If this is not God-of-the-Gaps then I don't know what is.

Despite its American accolades, Behe's book ultimately fails to satisfy.

⁵ Darwin, C. *The Origin of Species*, Harmondsworth, Penguin, 1968, p. 399.

Intelligent Design needs to be seen as a cul-de-sac as it is neither design nor, dare I say, very intelligent. Its popularity is that it provides a grain of comfort to those unhappy with Creationism or Ultra-Darwinianism. We have not yet opened Darwin's Black Box but Behe simply wants to keep it padlocked.

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