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## Evolution or Creation? A Path through the Jungle

### Introduction

In the previous chapter we have argued that a central aspect of effective Christian education is the integrating of three key stories:

- the great biblical Story of the ages,
- the story of our culture,
- our own life story.

In other words, we must help our children to find their place in a biblically and personally meaningful world.

Today, our culture tells a very different story. Central to that story - and indeed central to the mythological hold of science on Western thought - is an account of origins. It is the story of evolutionary naturalism that is told by the science of school and media.<sup>1</sup> Whatever our school context (state or independent), part of our calling as Christian teachers of science is to subvert and undermine the idolatry of evolution by incorporating into our teaching a much richer view of reality. Firstly, and crucially, that requires an affirmation of creation.

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## Part I: Does It Matter?

### The Amazing Scope of the Gospel

Historically the Christian churches have responded to the challenge of secularism by withdrawing into the private realm and focusing on personal life and values. This is the fundamental reason why, in Britain especially, many Christians regard the creation/evolution debate as a sideline that has no real significance for the gospel of Christ. They would claim that we are simply arguing about *how* God created. Surely, they add, whether God used natural processes of evolution, or creative acts, makes no difference to our lives today. What does it really matter?

Furthermore, many churches are deeply divided on the issue. They will contain Christians who believe in evolution and others who believe in acts of creation. The former generally accept the objectivity of modern science, and so are convinced that we must accept those theories - such as evolution - that most scientists regard as well-established. The latter generally assume that science is not neutral, but that it is

crucially influenced by the secular beliefs and values held by the majority of scientists. This is a major difference of opinion, but, given the dominant conviction that the issues have no practical relevance, almost all churches will avoid anything which might stir up the controversy. The evolution/creation debate will be kept out of the main church programme and off the agenda at all major conferences. Not surprisingly this means that Christians and churches tend to give no serious attention to the Biblical teaching on creation - *and that really does matter*.

The inevitable outcome of the focus on matters of individual Christian life and morality, is that the Gospel is severed from life as a whole. Without creation, the God of the Gospel shrinks: His Lordship reduced to authority over personal morality and piety; the scope of His purposes restricted to individual human beings.

The reality is that creation affects everything. The Bible teaches that God's plan embraces the whole universe and that it does so *for us* in Christ:

God gave his Son for us all. So with Jesus, God will surely give us all things.  
(Romans 8:32)

All things are yours: Paul, Apollos and Peter; the world, life, death, the present, and the future - all these things are yours. And you belong to Christ, and Christ belongs to God.  
(1 Corinthians 3:21-23)

Christ is more important than anything in this world or in the next world. God put everything under his power. And God made him the head over everything for the church. The church is Christ's body. The church is filled with Christ, and Christ fills everything in every way.  
(Ephesians 1:21-23)

Christ ranks higher than all the things that have been made. Through his power all things were made - things in heaven and on earth, things seen and unseen, all powers, authorities, lords, and rulers. All things were made through Christ and for Christ ... All of God lives in Christ fully (even when Christ was on earth). And in him you have a full and true life.  
(Colossians 1:15-16; 2:9-10)

The New Testament speaks of Christ as Redeemer in the same breath as it speaks of Him as the Creator and Sustainer of the universe (eg Colossians 1:15-2:15; Hebrews 1:1-3). Only if we ignore that biblical perspective can the Gospel come to mean just our individual salvation. When we do limit the Gospel in this way, there is a very serious outcome: almost all Christians today have very great difficulty understanding what they are meant to do in most areas of their everyday life. Those so-called 'secular' areas of life (including all school subjects except RE) cease to have any real relation to the Christianity of Sunday and mid-week church meetings.

These changes have already been occurring for several generations. The result today is that religion is excluded from all the public areas of life. Restricted to individual, private expression, Christianity withers. We simply no longer know what it means to be a Christian *people* or *community*; nor what it means to have a Christian manner of life, a Christian *culture*. No wonder society tolerates our presence: we don't do anything; we don't affect anything; we don't disturb anything. The Scripture certainly does not apply to us:

Everyone who wants to live the way God wants, in Christ Jesus, will be hurt [persecuted].  
(2 Timothy 3:12)

Creation is not just to do with one topic in the science syllabus, or with some science programmes on the television. It is about whether or not the world is designed. Does the universe exist for purposes which centrally involve us all? Or is it just a dumb stage for dramas of individual salvation? Or is it ultimately a world of chance, in which anything goes, and nothing matters?

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## Part II: Secular Science or Secular Religion?

### 1 Science, Nature and Reason

For almost all the leading spokesmen for secular science today - think of Peter Atkins, David Attenborough, John Barrow, Richard Dawkins, Daniel Dennett, Stephen Gould, Stephen Hawking, Steve Jones, and Lewis Wolpert – science is identified with *naturalism*.<sup>2</sup> Naturalism is the assumption that the universe - the entire realm of nature - is a closed system of material causes and effects, which cannot be influenced by anything from beyond or outside. The universe is held to be ultimate and self-sustaining, with no need to appeal to any God in order to explain it.

Given this 'ultimate commitment' (i.e. religious faith) there can be no alternative to evolution as the explanation of how things came to be. Furthermore, naturalism is itself identified with *rationalism*, i.e. with the belief that

- it is possible to obtain, by human reason alone, a knowledge of all that exists;
- everything can be explained, i.e. all knowledge can be arranged within a single system of explanation.

Thus naturalism is not regarded as a distinct and controversial doctrine. On the contrary, it is simply assumed to be part of the definition of reason. Therefore anyone who questions evolution is seen to be questioning reason itself. This obviously places evolution beyond challenge. The American law professor, Phillip Johnson, records his experience:

When a few years ago I began pressing in university circles the question whether evolutionary naturalism is true, I was met mainly with blank incomprehension. Ask a group of intellectuals whether neo-Darwinism is really true, I learned, and you can hear the sound of minds snapping shut all around the room. When I did get a reply, it usually was that 'evolution' is the best naturalistic theory and that naturalism is the philosophical basis of science and thus equivalent to rationality. Hence naturalism is 'the way we think today'. To ask modernists whether science is true is like asking them whether rationality is rational or truth is truthful. Science is, by modernist definition, our only truly objective way of knowing anything.<sup>3</sup>

Those spokesmen for science who dominate the media do indeed promote an evolutionary naturalism:

[Science proclaims] the truth of our mortality, the truth of the absence of a benevolent intercessor, the truth of the absence of soul and the truth of the ultimate insignificance of all human activity<sup>4</sup> ... It cannot be said too loudly or too often that the concept of purpose is a human invention and that seeking purpose in the cosmos is a childish fantasy. The invention of the concept of cosmic purpose by theologians is, apart from the brutality towards individuals that they have inspired, their most serious crime against humanity, for it has directed sharp minds away from real problems ... Humanity should accept that science has eliminated the justification for believing in cosmic purpose, and that any survival of purpose is inspired solely by sentiment.

(British physical chemist, Peter Atkins)<sup>5</sup>

the eye, the bird and the bat have come together by a ... complex, but totally undesigned process ... [that] **Charles Darwin called NATURAL SELECTION. It is a remarkable process which our civilization is only just grown-up enough to understand** ... we can now see human purpose for what it really is. It is a product of our brains that has evolved by natural selection. Originally there was no purpose in the universe ... Then along came one species that was given, by natural selection ... a powerful and flexible on-board computer. This computer is our brain and the nature and potential of our brain is the difference between us and every other living thing. It is our sense of purpose ... **a purpose that we are now finally able to comprehend. It has like us, at last GROWN UP IN THE UNIVERSE.**

(British zoologist, Richard Dawkins)<sup>6</sup>

It is this faith of secular scientists and its implications that we explore in the remainder of Part II.

## 2 Evolution: Continuity as the Ground of Rationality

Given a commitment to naturalism, a commitment to some kind of evolutionary process is inescapable. For these scholars the connection with rationalism is equally non-negotiable. We noted this connection above (section 3), but didn't explain it. We must do that now.

The faith in reason that defines rationalism is based on a key assumption. This is the assumption that the universe is ordered according to the same rational principles that govern our own thinking. The universe is understandable and we are able to understand it. Obviously, if this were not so, there could be no science.

The lawful order of the universe as revealed by science is very remarkable. The universe might just as well be chaotic and constantly changing, so where does the amazing orderliness come from? That orderliness gives the universe a *unity* that is difficult to account for in solely naturalistic terms. If there is no God outside the universe, no divine plan, then the unity - the order and design - must arise wholly from within the universe itself. But how? The dominant pagan solution has been to claim that the universe is a unity through being a *continuity* - hydrogen to humans, dust to stars, particles to people. In the final analysis, the universe really is *one thing*.

This dogma of continuity entered Western history 2000 years ago as a continuity in space - the image of a *Great Chain of Being* that is always present and complete.<sup>7</sup> In

medieval times the Chain ran from God down through the orders of angels to humans, from humans to animals and plants, and finally down to the lowest forms of matter. In the course of history the chain was secularised (God and angels disappeared) and turned upside down (to run from matter upwards to humans). Finally it became a branching continuity in time in which each link causes (gives rise to) the next - the familiar evolutionary tree. But through all these changes it has remained the same dogma of faith in reason and nature.

Its religious character cannot be admitted in rationalistic science, so it is disguised by referring to it as 'the principle (or law) of continuity':

I cannot avoid believing the possibility of this [inorganic origin of life] will be proved some day in accordance with the law of continuity. (Charles Darwin)<sup>8</sup>

Our faith in the idea of evolution depends on our reluctance to accept the antagonistic doctrine of special creation, because this view is foreign to our belief in the continuity of law and order. (Louis More, American physicist)<sup>9</sup>

In any endeavour to trace the evolution of a highly specialised organ, a difficulty often arises in the application of what may be called the principle of continuity. It is repugnant to reason to suppose that eye or ear appeared suddenly in evolutionary history. Their evolution *must* have been a continuous process...

(Richard Pumphrey, Professor of Zoology, University of Liverpool)<sup>10</sup>

A British biophysicist and Nobel Prize winner rejects one theory of the origin of the genetic code because, 'it violates the principle of continuity'. (Francis Crick)<sup>11</sup>

*This 'principle of continuity' is not comparable to other scientific principles. It is in no sense a product of scientific investigation; it is a non-negotiable presupposition, or axiom of evolutionary science, a dogma of the evolutionist faith.*

The link of naturalism with rationalism is quite clear in some of these statements. The claim that evolutionary continuity is essential to intelligible science – that without it there is no meaning to the facts – is constantly and fervently repeated:

Evolution theories have been accepted not because observers have witnessed evolution, but because countless facts of biology make sense on the assumption that evolution has happened and is happening, and these facts make no sense otherwise.

(Edmund Sinnott, L C Dunn and Theodosius Dobzhansky, American geneticists)<sup>12</sup>

It is no longer possible to give a complete or even a coherent account of living things without the story of evolution. (Evelyn Klinckmann, American biologist)<sup>13</sup>

Without that idea [evolution] one is left in chaos: there is no scientific meaning to the facts. (Elizabeth Perrott *et al.*, biologists)<sup>14</sup>

With modifications to include new findings, they [hypotheses about the evolution of the universe, earth and life] have become the central organizing theories that make the universe as a whole intelligible, lend coherence to all of science, and provide fruitful direction to modern research. (National Academy of Sciences, USA)<sup>15</sup>

These are statements of religious faith and too much is at stake for the possibility of

doubt to be allowed to surface over evolution. Thus in discussions about evolution we must recognise that it is not primarily the evidence that is being allowed to speak, but the commitment to evolutionary naturalism. In this situation no amount of evidence can be guaranteed to convince those who, on philosophical grounds, are persuaded that any non-evolutionary position or ostensible fact can be dismissed. Doctrinaire commitments ignore the evidence - or never 'see' it.<sup>16</sup>

In addition to the faith in the evolutionary continuity of the world and life, the dominant *Darwinian* theory of evolution affirms that it is also a world dominated by pure chance. Of course in a Christian worldview even 'chance' processes - processes whose outcomes are random or unpredictable to us - are under God's sovereign control.<sup>17</sup> In contrast, the key emphasis in the secular perspective is on chance as *purposelessness*, as *undirected, unplanned change*. It is held that everything is possible, all may be actualised somewhere, sometime.<sup>18</sup> The world we see around us is simply that one, out of the infinity of possibilities, that happens to have arisen - unplanned and unintended - on this planet at this time:

The modern order was not guaranteed by basic laws (natural selection, mechanical superiority in anatomical design), or even by lower-level generalities of ecology or evolutionary theory. The modern order is largely a product of contingency ... Replay the tape a million times from a Burgess [Shale fossils] beginning, and I doubt that anything like *Homo sapiens* would ever evolve again ... we are an improbable and fragile entity ... not the predictable end result of a global tendency. We are a thing, an item of history, not the embodiment of general principles ... *Homo sapiens* is an entity, not a tendency.

(American evolutionary biologist, Stephen Gould)<sup>19</sup>

The commitment to chance evolution, of course, fuels the 'peculiarly uncritical optimism'<sup>20</sup> that surrounds the search for extraterrestrial life.

### 3 Science As Religion

One of the fascinating things about the last 20 years is that many scientists have come to realise that religious and philosophical commitments *do* influence science. Even in scientific journals, we can now find scientists accusing one another, not of misreading, or misinterpreting the facts, but of coming to them with the wrong philosophy. This has been particularly the case in the realm of evolution. Evolution as such is too foundational to secular religion to be questioned, but the *nature* of the evolutionary process is hotly debated:

... we should consider alternate philosophies of change to enlarge our realm of constraining prejudices. In the Soviet Union, for example, scientists are trained with a very different philosophy of change ... [Niles] Eldredge and I were fascinated to learn that many Russian paleontologists support a model similar to our punctuated equilibria ... I make a simple plea for pluralism in guiding philosophies, and for the recognition that such philosophies, however hidden and unarticulated, constrain all our thought. The dialectical laws express an ideology quite openly; our Western preference for gradualism does the same thing more subtly ... Gradualism, the idea that all change must be smooth, slow and steady, was never read from the rocks. It represented a common cultural bias, in part a response of nineteenth-century liberalism to a world in revolution.

(Stephen Gould)<sup>21</sup>

The 'nature or nurture' debate was never merely scientific, but had strong political overtones. The Lamarckian doctrine, of directly inherited environmental effects, persisted in Russia until the 1960s, and, under Lysenko's leadership, dominated Soviet genetics in the 1930s and 40s. The reasons were that Lamarckian inheritance offered a shortcut to the perfectibility of man, his crops and domestic animals, that matched the Marxist programme. In the West, on the other hand, the doctrine of Darwin and Mendel, the primacy of the genes and the infinitely gradual pace of change, suited capitalist society ... So it is with the sociobiology debate, in my view: the left are ranged on the side of cultural evolution, rapid change and the possibility of betterment; and the right are on the side of the genes, and our heritage from the distant past.

(British Museum palaeontologist, Colin Patterson)<sup>22</sup>

Professor R. McNeill Alexander reviewing a book by Niles Eldredge,<sup>23</sup> neatly summarised it as follows:

... the flavour is that of a debate between political parties. The government, the Ultra-Darwinist Party, is led by Maynard Smith, with Richard Dawkins as his most vocal colleague. In opposition, the Naturalists are led by Gould, supported by (among others) Eldredge. The book is a sustained attack on Ultra-Darwinist dogma.<sup>24</sup>

It is little wonder that philosophers come to the following conclusion:

It is as a *religion of science* that Darwinism chiefly held, and holds, men's minds. The derivation of life, of man, of man's deepest hopes and highest achievements, from the external and indirect determination of small chance errors, appears as the very keystone of the naturalistic universe. And the defence of natural selection appears, therefore, as the defence of the integrity, the independence, the dignity of science itself ... neo-Darwinism is not only a scientific theory, and a comprehensive, seemingly self-confirming theory, but a theory deeply embedded in a metaphysical faith: in the faith that science can and must explain all the phenomena of nature in terms of one hypothesis, and that an hypothesis of maximum simplicity, of maximum impersonality and objectivity ... man seems at home in a simply rational world.

(Marjorie Grene, American philosopher)<sup>25</sup>

Marxism and evolutionism [are] the two great secular faiths of our day ... They are, not accidentally but by their very nature, dominant creeds, explicit faiths by which people live and to which they try to convert others. They tend to alter the world ... Evolution, then, is the creation myth of our age. By telling us our origins it shapes our views of what we are. It influences not just our thought, but our feelings and actions too, in a way which goes far beyond its official function as a biological theory ... today, a surprising number of the elements which used to belong to traditional religion have regrouped themselves under the heading of science, mainly around the concept of evolution.

(Mary Midgley, British philosopher)<sup>26</sup>

The supposed rationality of evolution is actually irrational. In claiming that everything is possible, that only chance accounts for the here and now, evolution, of course, fails to provide a real explanation for anything. It actually *explains* nothing at all.

By the same token evolution provides no basis for the choices of life. If there is no Truth to be heeded, no Way to follow, then no choice can be justified over another.

The universe we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil and no good, nothing but blind, pitiless indifference ... DNA neither knows nor cares. DNA just is. And we dance to its music.  
(Richard Dawkins)<sup>27</sup>

It is up to us to do our own thing, or else to accept a consensus.<sup>28</sup> However that consensus carries no moral authority and our agreement is an arbitrary act of will. Particular choices, though, may well be imposed by whoever has the totalitarian power to do so.

#### 4 What About Theistic Evolution?

This chapter is engaging with secular evolution. Theistic evolutionists may well feel that much of the argument does not affect their position. It is impossible, within a reasonable compass, to address them at every point, but some observations may be helpful.

First, for Christians this is a debate primarily about the Bible, about biblical interpretation (hermeneutics), about the interpretation of Genesis and of the passages that refer or allude to it, and about the role of creation in the overall pattern of revelation.<sup>29</sup> Whilst recognising the present diversity of interpretation amongst biblical Christians, we conclude that the weight of exegetical evidence is in favour of a creationist position.<sup>30</sup>

The only source of belief in absolute creation,<sup>31</sup> in the whole of world literature, is the Bible and sources (e.g. the Koran) which are dependent on it. This fact poses a two-part question. On the one hand, is it possible for anyone outside the biblical tradition to do other than adopt an essentially evolutionary view of origins? On the other hand, given the biblical revelation, could any Christian have come up with an evolutionary view of the world *in the absence of the powerful pagan undercurrent that makes pantheism and evolutionism seem so plausible?*<sup>32</sup> In the absence of Genesis, it is reasonable to conclude that none of the traditional creationist positions, that have dominated the history of Christian thought, would ever have been formulated.

Second, theistic evolutionists usually do not question the secular scientific enterprise. In practice it appears to be taken for granted that secular science is essentially objective and neutral (with regard to personal philosophy or religion) and so must deal in solely naturalistic explanations (section 1 above). In other words it is believed that all scientists must adopt *methodological naturalism*, explaining as much as possible of created reality without reference to God, or to ideologies, moral convictions, or religious or theological commitments. Scientists must assume that naturalistic explanations will always be possible, and so work to make proposals as to how even the resistant facts will be overcome in due course - given more work, luck, ingenuity and research grants. Thus Christians in science must work for evolutionary explanations. This is now such a commonly heard and seductive argument that it is addressed briefly in section 5 below.

Third, theistic evolutionists persistently fail to recognise that many secularists cannot

recognise distinctions among theists. These secularists will reject as religious fundamentalists any scholars who believe in a Creator who plays an active role in natural affairs, *even when that role is just sustaining the process of evolution, or even just setting up the universe in such a way that it self-assembles from a 'Big Bang' beginning.* For them the difference between theistic evolutionists and special creationists is one only of degree. Their enemy is anyone who seeks to introduce concepts of design or purpose into their explanations of the existence and nature of the world. Both kinds of theist are perceived as dangerous: a threat to liberal democracy in general, and to the funding of scientific research in particular.<sup>33</sup>

## 5 Must Christians be 'Methodological Naturalists'?<sup>34</sup>

*Methodological naturalism* (or being 'provisionally atheistic'<sup>35</sup>) - hereafter MN - has been described above. In summary, it is argued that the very definition, or nature of science forbids Christians from bringing their faith-knowledge to bear on their scientific work. A typical claim is this from the philosopher, Michael Ruse:

The Creationists believe that the world started miraculously. But miracles lie outside of science, which by definition deals only with the natural, the repeatable, that which is governed by law.<sup>36</sup>

What is surprising is that many prominent Christian scholars have rallied to the defence of naturalistic, secular science.<sup>37</sup> This is so unexpected, because their argument is effectively that Christians should not only be *in* the world, but also as the world.<sup>38</sup> There are some very serious problems with this claim.

In the first place, the very idea of *methodological* positions needs to be scrutinised. When a scholar says that he or she is a methodological *X*, the implication is that they do not necessarily believe that *X* is true. Therefore they need not take personal responsibility for *X*, nor be expected to defend it. It is hard to see how that can be justified as an acceptable stance for Christian scholars. But if we only adopt methods that we believe are based on truth, then we cannot assume naturalism. From a Christian perspective, naturalism is enormously deficient.<sup>39</sup>

The whole of science proceeds on the assumption (or faith) that reality has a rationally ordered structure that is knowable, and that the human mind has the power to understand things correctly. Scientists take it for granted that a *reason* can be found for why things are as they are. This is not all. The scientific enterprise further assumes human mind and consciousness, the possibility and efficacy of personal inter-communication, human freedom to choose (what is, e.g., in accordance with evidence or theory), the importance of collaboration, and (therefore) the necessity of moral principles such as honesty and integrity in scientific work. Naturalism, in short, faces a standard, but very strong criticism in regard to its virtual total inability to account for all these things. Naturalism is also at a loss to explain some of the key concepts of modern science itself, concepts such as chance, contingency, law and cause.<sup>40</sup> On what grounds, therefore, can it possibly be regarded as satisfactory, even methodologically? Since theism does account satisfactorily for these foundational assumptions of science,<sup>41</sup> there is every reason for Christians to be, at the very least, methodological *theists*.

A second problem is the simple fact that if we do science *as if* naturalism (or atheism) is true (MN), then we end up with the very same science as those who believe naturalism *is* the sober truth. Christians who follow this strategy are inevitably reinforcing the enemy's position. They are helping to ensure that other Christians - and other scholars - accept the dominance of secular naturalism in the academic world and never consider or offer any serious challenge or critique:

The real power of naturalism consists of its presence in the minds of its natural adversaries. (Phillip Johnson)<sup>42</sup>

Third, the adoption of MN, is actually very serious for the health of science. It leaves evolution as the only game in town. *Given MN, there is no way that evolution can be questioned, or any alternative seriously considered.* Indeed, evolutionary naturalism has been placed beyond criticism; it has become a fossilised dogma. It is now widely regarded as the only possible explanatory system.<sup>43</sup> It is self-evidently true, given the antitheistic assumptions on which the whole scientific enterprise is now based. In other words, if creationism did not exist, it would have to be invented. Without such a radical alternative, there is no way in which evolution can be critically - scientifically - assessed. (See Part III below.) We do not believe that Johnson was overstating it when he concluded that, 'Theists who accept a naturalistic understanding of knowledge fatally undercut their own intellectual position.'<sup>44</sup>

Fourth, the monopoly claim for naturalism is undergirded by the Enlightenment assumption that science is uniquely objective and neutral. This vision (today broadly based in the work of Popper<sup>45</sup>) would appear to dominate the thinking of virtually all the leading players in the science/religion debate. The obvious problem with this assumption is that the last 40 years of work in the history and philosophy of science has rendered the assumption untenable.<sup>46</sup>

Fifth, it is assumed by Christian critics that creationists accept the machine-like universe of Enlightenment thought and a God-of-the-gaps theology, i.e. that creationists believe that

- the universe is a vast machine that was created by God, but now runs automatically;
- the universe is almost entirely self-sufficient, but God sometimes has to intervene to alter or adjust it.

Most creationists are perfectly well aware that these beliefs are light years away from a biblical worldview and reject them.<sup>47</sup> It really should be obvious that creationists can reject a machine-like world, and a God-of-the-gaps theology, without endorsing MN or accepting evolution. Indeed, most creationists reject all four.

Sixth, it is commonly claimed that to say that God has done this or that (e.g. created life, or created human beings) is to introduce a *science stopper*. To ascribe anything to the direct action of God is to cut off all further enquiry. This seems such simple commonsense that it is very persuasive. However, it is based on sheer ignorance of

all the different ways in which Christian faith can enter into science and of how fruitful these have been in the history of science.<sup>48</sup> The assertion is also contradicted by the actual practice of secularists (see next paragraph). In general, the direct action of God may cut off one type of explanation, but others will remain and may even be enhanced. For example, to say that God created the different kinds of animal and plant certainly cuts off explanation in terms of evolutionary descent. However, it leaves wide open further scientific investigation of the patterns of relationship between these kinds. We have been so 'indoctrinated' into the belief that these patterns can only be explained historically in terms of the happenstances of evolutionary descent, that we don't look for explanations in other terms. It is now quite clear that fruitful ecological and developmental (embryological) explanations are possible which are independent of assumptions about (a supposed) evolutionary history.<sup>49</sup> On the other hand, of course, naturalism can be just as much a science stopper as theism is claimed to be. Indeed naturalism has been a science stopper. For example, the evolutionary assumption that certain organs or features are vestigial has hindered the (fruitful) research into their functions.<sup>50</sup> Similarly, it can be strongly suspected that a major reason why we still have no theory of (embryological) development in biology is the dominant reductionism of evolutionary naturalism (*ie*, 'the gene, the whole gene and nothing but the gene').

Finally, it must be noted that, at least in regard to origins, the secularist claim of methodological naturalism is actually a charade. Many biologists and philosophers who profess methodological naturalism, actually use theological arguments for evolution, *ie* treat a theory of creation as testable and argue that the evidence refutes that theory and confirms evolution.<sup>51</sup> Darwin's *Origin* was the account of a long, sustained programme of testing a theory of creation. Darwin concluded that it was inadequate and proposed an alternative evolutionary theory. This mode of argument has been followed to this day. Evolutionists use two main kinds of theological argument:

- argument from imperfection - that certain instances of organic design are inconsistent with God's perfection and wisdom;
- argument from homology - that certain patterns of similarity are inconsistent with God's freedom as a creator.

In other words, the argument is about what God would or would not have done (as compared with what natural processes would or would not achieve). The argument is not just generally theological; it assumes a quite specific theology, *ie* what these critics take to be orthodox Christian theology. Clearly, for the arguments to stand, the theological inferences must be shown to be correct, and then the evidence bearing on the truth of those inferences must be scrutinised. We will engage in that exercise in Part IV. Here we are concerned with the *prima facie* inconsistency of these arguments with methodological naturalism. A cynical (and common) reading of the inconsistency would be the pragmatism of 'any stick will do to beat a dog', but the theology is too integral to the arguments for evolution for that to be convincing (quite apart from being a morally questionable practice). Another conclusion suggests itself:

Among the elements of ... 'the modern world picture' - that is, the received scientific world picture - there exist profoundly inconsistent epistemological commitments. Put more simply, if what we want is the truth about how the world and its creatures came to be, then we may not be able to tell that story in fully naturalistic terms. Because the truth - to modern eyes ungainly, even ugly - may be otherwise.<sup>52</sup>

Taking this matter still further, we can observe that it is evolutionism that bears all the hallmarks of a fundamentalist religion. With their commitment to naturalism, secular evolutionists are forced to explain everything in terms of physical continuity and, hence, are forced to invoke enormously long time spans. In contrast the journals and magazines<sup>53</sup> that are the vehicles of mainstream creationism present a refreshing picture of scientific analysis and debate. There is hardly any position that has not been contested by other creationists. It could hardly be otherwise. Even if interpreted in the most literalistic fashion, Genesis still does not answer most of the key scientific questions. What are the created kinds of animal and plant? What processes of variation are possible? What are the limits to variation? How many of the rock strata are attributable to Noah's flood? Was there an Ice Age (or Ice Ages) and how do these fit into the picture? Similarly, what about plate tectonics and continental drift? How is the present distribution of animals and plants to be explained? These and a host of other questions require the hard work of detailed scientific research and analysis. Contrary to stereotypes, *there are no preset answers for creationists*.

The American philosopher Alvin Plantinga concludes his critique of methodological naturalism with a statement that says it all:

'Methodological naturalism ... though widely accepted and indeed exalted, has little to be said for it; when examined coolly in the light of day, the arguments for it seem weak indeed. We should therefore reject it, taken in its full generality.'<sup>54</sup>

## Part III: How Can Theories of Origins be Tested?

In Part III we are considering whether it is possible to put theories of origins to critical test. Section 1 will tackle the definition of the key terms *creation* and *evolution* as they will be used in the remainder of this book. In sections 2 and 3, we will consider what it means to test theories of origins. The ground will then be clear for a case-study in Part IV.

### 1 Evolution and Creation: Working Definitions

The popular distinction of science from philosophy - e.g., of evolution from *evolutionism* - is highly misleading. As we have already noted (Part II), the reality is that all life and thought occurs - and can only occur - within the context of faith, a context of ultimate commitments. In every realm of science, the facts are understood in the terms of a theory, against the frame of reference of a paradigm (research programme), within a philosophical view of reality and from a religious stance.<sup>55</sup> Creation and evolution are fundamentally philosophical perspectives on reality.

For the purposes of the SCT papers, we define *creation* as the belief that there are irreducibly distinct 'kinds' of living organisms which came into being separately and without antecedents. Such a belief is always located within a wider system of beliefs, or worldview. For CST that wider system is that of Christian theism. The relevant items of Christian belief are:

- God is absolutely distinct from the creation that He has brought into being.
- He created because He freely willed to do so, i.e. the creation is contingent upon His decision: *that* it exists and that it exists as *what* it is, is because God so intended.
- All of history is the fulfilling of His plans and purposes.

In summary, the fundamental affirmation of all creationists is that all the kinds of created thing have been designed for a purpose.

Three items of clarification will remove some possible misconceptions.

*First*, for Christian creationists, the affirmation of creation is demanded by the biblical revelation and it is that revelation that is centre stage in the whole debate (see Part II, Section 4 above). It is on the basis of a long tradition of biblical exegesis that creationists conclude that, in all essentials, the created kinds have always been as they are now. Hence they assume that if processes of variation occur to allow adaptation to changing conditions, then these will operate within clear limits which are never transgressed.

*Second*, present classifications of animals and plants are partly shaped by evolutionary assumptions, so creationists can give no exact equation of created kinds with a particular taxonomic grouping. However, with that proviso, it seems that for animals, created kinds generally correspond to *families* in current schemes of classification (eg the horse, dog and cat families are the horse, dog and cat kinds). In plant classifications it appears that what are now known as the *genera* are usually the created kinds (eg the rose [*Rosa*], buttercup [*Ranunculus*], and cabbage [*Brassica*] genera are the rose, buttercup and cabbage kinds). Historically creationist scientists have been in general agreement on this for more than 200 years.<sup>56</sup>

*Third*, affirming creation does not entail denying that there may be many and complex (multidimensional) relationships between organisms. What is denied is solely that these relationships involve, or need to be grounded in, genealogical continuity.

By *evolution* we mean the belief that there has been a continuous development in time from hydrogen to humans, dust to stars, particles to people. Although some have sought to incorporate this idea within Christian theism, its original and natural provenance is naturalism, *ie* within a worldview that affirms:

- There is no God outside of, or independent of, the total system of things.

- The laws and processes operating in the past have always been essentially the same as those operating at the present time and nothing else is needed to explain origins.<sup>57</sup>

Naturalism grounds the unity of the natural world in evolutionary continuity. That complete continuity from particles to people, dust to stars is the basic philosophical statement and *sine qua non* of evolution.

*Theistic evolutionists* believe that God created animals, plants and human beings by means of such a process. Thus they would concur with the affirmation (above) that all the kinds of living thing exist because of God's plan and intention. Thus far they, too, might claim to be creationists, but, to avoid confusion, we will not follow that usage in this discussion. *Naturalistic evolutionists* believe that evolution is an entirely naturalistic process involving no plans, purposes, or direction whatsoever.

Both creation and evolution are religious perspectives on reality. Both can and have been enshrined in scientific theories. In the next section we will consider how those theories can be tested.

## 2 Is Testing Possible?<sup>58</sup>

Within the scientific community there is almost universal acceptance of Karl Popper's assertion that for any theory to count as science, it must be open to critical testing. In particular it must be possible to indicate the observations or experimental results which would refute it. Karl Popper's defence of scientific rationality and objectivity was deeply flawed,<sup>59</sup> but almost no one would dispute that scientific theories must be open to discriminatory testing.

Major theory differences in science always root back to differing philosophical and religious (ultimate) commitments. In consequence, any systematic programme of evaluation must subject those commitments to (philosophical and religious) critique as well. This is essential not simply for evaluation, but also for communication. Differences at this deeper level concern different ways of seeing the world. If the wider critique is not undertaken then no meeting of minds is likely to occur *and no claim to universal scientific objectivity can be justified*. But once the deep commitments are recognised and brought to judgment, an evaluation at the level of scientific paradigm and theory also becomes possible. In the absence of that double critique, all talk of evolution being a well-established scientific theory ought to be disowned – exposed for the fraud that it is.

Specific origins theories, such as Darwinism, are actually *paradigms* or, as I prefer, *conceptual frameworks for research* (hereafter CF), *ie* within the philosophical and religious context of *evolutionism*, Darwinism provides the key concepts which a scientist may utilize to explain the existence of a particular type of organism, or a given feature of the living world. *It tells the scientist what story to tell and how to tell it.*

The Darwinist explains the phenomena of the living world by telling a story which utilizes the key concepts *variation, heredity, adaptation, fitness, environment* and *natural selection*. For example, he or she might explain the evolution of a species

with a particular distinguishing trait as follows:

"An ancestral population of this particular species existed which had various *inherited* traits which *adapted* it for what was then its normal *environment*. A change in the *environment* destroyed the effectiveness of one of those *adaptations*. But there were other, rarer, *inherited variations* of that trait present. These *variations* differed in their *fitness* - their capacity to help the organisms possessing them to survive and reproduce. In other words, one of those *variations adapted* the organism to the changed *environment* better than the others. Through a process of differential survival and reproduction, the population changed until that *fittest variation* became the predominant and, finally, the only trait present. *Nature* (the *environment*) *selected* those organisms best *fitted* for survival and brought about an *evolutionary* change."

In technical language, these CF concepts are *non-instantiative*, *ie* they do not refer directly to things we can observe and measure (the *instances*). For example, we cannot go and observe an 'environment'. It is not the space in which an organism lives, or its physical surroundings. Used in biological explanations it refers to all those extrinsic factors (both external and internal<sup>60</sup>) which significantly influence an organism's vital functions. In order to utilize the concept of environment in empirical science, we must discover, concretely and exactly, what the environment is for a particular organism. Some aspects of the environment (*eg* adequate light levels for green plants) are (nowadays) readily noted, but it may take considerable research before we can specify for a particular organism what its 'environment' really is.

CFs provide the interpretative context for the production of theories. If any of those theories should be refuted by the relevant data, then the CF tells us how to construct a new theory. Specific theories can come and go without affecting faith in the interpretative framework (CF). Indeed, in the normal course of events the CF itself will not even be questioned. Since CFs organize theories *they can only be tested by (alternative) theories*. Theory testing is essentially a contrastive activity.<sup>61</sup> A critical test occurs when theories organized by a competing CF are *judged* to give *better* interpretations of the data than those generated within the received CF. Of course the italicised words illustrate the difficulties of this kind of testing. Competing CFs embody different philosophical commitments. Only if those commitments are (or become) acceptable, will scholars be prepared to concede that a new CF provides a better framework for scientific explanations. Thus, given a prior religious commitment to naturalism and rationalism, alternative philosophies to evolution will not be considered, and nor, for many, will alternative CFs to Darwinism even be conceivable.<sup>62</sup>

Regardless of the situation as regards critical testing between CFs, any CF which purports to be genuinely scientific must function as a framework for theories which have empirical purchase on the world. Now when a scientist considers the empirical credentials of theories he or she normally (and naturally) expects *predictive power*, *ie* that the theory will predict empirical matters (new data) that are independent of any already confirmed data that the theory was introduced to explain, and that were not built into the theory from the beginning.

There is, however, a major snag concerning prediction. Predictive power is often lacking in biological theories and that for two very good reasons. The first has to do with the nature of biological systems, and the second with the nature of historical

explanations.

In the first place, organisms are 'complex adaptive systems' that operate 'on the edge of chaos'.<sup>63</sup> One of the major findings of the new sciences of complexity and chaos is that with such systems prediction is impossible. We can predict with any confidence only a few generations into the future (or back into the past). An enormous increase in available data produces a relatively very small increase in reliable prediction.<sup>64</sup>

A second reason for poor predictability concerns the nature of historical explanations. For events in the past, for the investigation of origins, there is only one source of real evidence, namely *historical* evidence. Historical evidence means *the eyewitness accounts of those who are known to be reliable witnesses*. In the absence of eyewitness reports, all the evidence for theories of origins is limited. The explanations are inevitably based on critically incomplete data and are typically weak explanations.

Fossils are commonly described as 'historical' (or 'direct', 'objective') evidence, but this is a mistake. Put simply, *fossils do not bear labels; there is no fossil 'record'*. Fossils are incomplete remains that have to be interpreted. They must be interpreted on the basis of their similarities to living organisms. The significance of these similarities, or *homologies*, is therefore the crucial issue.

Thus theories in origins science typically provide *postdictive* explanations. They are not predictive, but rather provide explanations *ex post facto*, 'after the event'. This situation helpfully serves to emphasise a common misconception. *Prediction and explanation are different things*. Prediction may be possible (on the basis of experience) without any explanation of that predictive success being available. Conversely, as with complex adaptive systems, an explanation may be available, but prediction be very loose, or even impossible. However, the crucial question is obviously, 'How - in the absence of prediction - do we recognise which explanation is better? How do we distinguish between a genuinely scientific explanation and one which is merely *ad hoc* or fanciful?'

### 3 What Makes a Theory (CF) Genuinely Scientific?

If we consider again the key concepts of Darwinism - *variation, heredity, adaptation, fitness, environment* and *natural selection* - we can observe that none of them are peculiar to evolutionary (origins) biology. *Variation* and *heredity* are core concepts of genetics; *adaptation* and *fitness* (in the original sense) are core concepts of functional morphology; *environment* and *natural selection* (plus *variation, adaptation* and *fitness*) are core concepts of ecology. This suggests a two-step programme of evaluation. *First*, in those other biological disciplines are these CF concepts translated into instantiative concepts, *ie* are they utilised in theories that have concrete applications in the real world of organisms? *Second*, do these uses justify/undergird their usage in evolutionary/origins explanations? To clarify this point we must look again at the story explanations of origins science.

Several scholars have argued that the historical (or 'narrative') explanations of

origins science are unique, *ie* that evolutionary events are not instances of a kind, but singular occurrences between which singular relations hold and which will not recur. Similarly, the form or structure of an organism is regarded as a unique product of the happenstances of evolutionary descent. Hence in neither case is there any material for generalisations or laws, and what we have are typically weak explanations. But this argument is based on a confusion. Every event or sequence of events has *both* unique *and* recurring aspects. Every organism has *both* individual *and* general (universal) features. An organism's location in space and time is certainly unique, as are particular sequences of events and particular combinations (patterns) of initial conditions. But every historical event also has non-historical features, otherwise no story could be told and there would be no explanation.

There is no story without meaning; even tragedies have a plot. Narration is impossible unless some laws – or law-like generalisations – can be assumed (however disguised their use may be). Human stories cannot be told without some constants of character and personality. The development of aircraft is constrained by constants of mechanics, thermodynamics and aerodynamics. Similarly, evolutionary explanations must contain some general features. These features must be identified and a case for (or against) their existence must then be made.

Every attempt to tell an origins CF story (as in section 2 above) actually reveals – when applied to the relevant phenomena – that the historical (evolutionary) process can be described in terms of a number of law-like principles. If the Darwinian story is to account for the state of the living world as we know it, then support for those principles must be sought in the appropriate areas of biology. Many stories may appear to explain the observed phenomena, but actually be telling us more about the ingenuity of their authors than about the actual history of the world. If support for the principles is not forthcoming then the CF cannot, at least at the present time, be regarded as providing genuine scientific explanations. We will summarise a pertinent case study in Part IV.

## Part IV: Testing Evolution: The Case of Homology<sup>65</sup>

### 1 Introduction: Sources of Evidence for Evolution

We have chosen to focus on homology, because this concept plays such a key role in theories of evolution. We have already noted (Part III, Section 2) that for events in the past, for theories of origins, there is only one source of real evidence, namely *historical* evidence. Although fossils are commonly described as 'historical' evidence, this is not the case. Fossils have to be interpreted on the basis of their similarities to living organisms. The significance of those similarities, or *homologies*, is therefore the crucial issue. Indeed, it is homology that must provide the critical evidence for evolution if there is to be any.

In the absence of historical evidence, there are only two kinds of evidence relevant to theories of origins:

- evidence from *hereditary variation*;

- evidence from *homology*.

Textbooks often give long lists of 'evidences for evolution', but all of these are actually variants of the two given here.

### **Evidence from Hereditary Variation**

This approach marshals the evidence from the fields of genetics (including domestication and animal and plant breeding) and biogeography (the geographical distribution of plants and animals). In terms of evolution, the patterns of variation should trace lines of descent with no evidence of any limits or constraints on the processes of variation (for, after all, it is 'amoeba to human' evolution that has to be explained).

The data provide abundant evidence of the wealth of variation that exists, but, in terms of origins, it is all relatively insignificant. Colin Patterson's admission in regard to biogeography, accurately sums up the position:

... all such examples illustrate change and divergence on a relatively trivial level.<sup>66</sup>

In all examined groups the patterns of variation are *mosaic* or *modular*, rather than linear or branching. For each kind of organism there appears to be an original, limited pool of hereditary variation which is endlessly permuted (produced in different combinations) in past and present members of that kind. It is as if, to follow Douglas Dewar's analogy,<sup>67</sup> we have 50 hands of 13 playing cards, all different, each with one card of each denomination (ace to king), but with some hands with one or two blank cards for cards of low denomination. These 50 hands could represent the distribution of characters in 50 subgroups of a large group of organisms. It is these patterns of distribution which vitiate every attempt to draw up evolutionary trees.<sup>68</sup>

Related to the above is the fact that there is a high degree of mixture of design features both within and – more significantly – between groups at all levels. For example, the compound eyes of crustacea and insects show detailed similarities, but so profound are the differences between these organisms that evolutionists have usually concluded that the eyes have arisen independently in the two groups.<sup>69</sup> This 'convergence' or 'parallelism' (in evolutionist parlance) puts another question mark over the construction of evolutionary trees.

The evidence from variation is clearly indecisive, *ie* it will carry force only to those who are already persuaded, on other grounds, that evolution must be such trivial variation indefinitely extended. The main 'other ground' will usually be a prior commitment to naturalistic explanations. But, at the level of data, it is homology that is endlessly paraded before the sceptics.

### **Evidence from Homologies**

The evidence from animal and plant similarities has always been central and has long been regarded as the most appealing and persuasive:

[The facts of taxonomy, morphology and embryology] seem to me to proclaim so plainly, that the innumerable species, genera and families ... are all descended ... from common parents ... that I should without hesitation adopt this view, even if it were unsupported by other facts or arguments. (Charles Darwin)<sup>70</sup>

As noted above (Part II, Section 5) the arguments here are peculiarly theological. They are presented as tests of a theory of creation, tests that refute that theory. The geneticist, Theodosius Dobzhansky, went so far as to describe the creationist position as 'implicitly blasphemous' because 'it actually accuses the Creator of arranging things so that they suggest evolution merely to mislead honest students of His works.'<sup>71</sup> Clearly, the evidence of homologies must be scrutinised very carefully indeed.

## 2 Homology: Defining the Beast

### Definitions

The immediate problem we face is the matter of definition: what, exactly, is homology? Definitions we use in everyday life are usually varieties of *genus and species*, *ie* we define something by first stating the broad kind of thing it is (the *genus*) and then specifying how it differs from other instances of that kind (which *species* of the genus). For example, a chair can be defined as a *seat* (the genus - something for sitting on) *for one person which is movable and has four legs and a back* (the *species*, distinguishing it from stools, forms, thrones, armchairs, settees, sedans *etc.*). In the sciences we commonly define things as specific instances of principles of structure, or specific instances of a law that describes function.

However the evolutionary definition of homology is quite different:

A similarity between structures (or molecules) in different organisms attributable to their inheritance from a common ancestry.

(American biologists, William Beck, Karel Liem and George Gaylord Simpson)<sup>72</sup>

This is a *story definition*, *ie* it defines by specifying the role of the concept in the stories of evolutionary descent.

Story definitions are very common in origins science, but there are two obvious problems with this kind of definition and the associated explanations:

- The definitions are viciously circular, *ie* the criterion of homology is taken to be common origin, but the only criterion of common origin – the only way it can be recognised – is by homology.
- Story explanations do not have the structure of scientific explanations. On the face of it there is no appeal to any principles of structure, nor to any laws that describe process or function. Indeed, if the appeal is to chance events, then there is no explanation offered at all.

### Stories: Thickening the Plot

We can illustrate the problem through consideration of the most famous example of

homology. All land vertebrates (amphibia, reptiles, birds and mammals) are characterised by the 'pentadactyl' limb, *ie* their limbs are constructed according to a constant pattern of one upper limb bone, two lower limb bones, a region of many small bones (wrist/ankle) and then finally a set of digits, typically five. If we ask why this is so, we are told a story:

"All land vertebrates have descended from an original ancestor that *happened* to evolve this type of limb which *happened* to be perpetuated because it *happened* to give the animal an adaptive advantage in the environment which *happened* to have developed and in which it *happened* to find itself."<sup>73</sup>

In all the popular literature – and indeed in most of the technical literature – this is all we get. Somehow it is assumed that the story is a sufficient explanation, that it is – on its own – totally persuasive. In reality, there are many who do not find the homology argument at all convincing. There is far more to story explanations than is here implied and further analysis is very necessary.

Story-telling is impossible unless there are some generalities, either laws, or at least law-like generalisations. Thus every attempt to account for homologies reveals that the evolutionary process can be described in terms of a number of general principles. The appropriate areas of (non-origins) biology will be scrutinised for support for these principles. If that support is not forthcoming then the CF cannot, at least at the present time, be regarded as belonging to empirical science.

What we have here is another illustration of the point made in Part IV of Chapter 1. Homology is the observed correlation of characters. From that correlation alone we cannot conclude a common cause, let alone a particular kind of common cause. The correlation is not a self-evident indicator of common ancestry. There may be separate causes or another kind of common cause. The correlations are evidence for a common cause only in the context of a background theory (CF) which has appropriate empirical support.<sup>74</sup>

### 3 Principles of Evolution

If the evolutionary explanation of homologies is true, then the evolution of the pentadactyl limb (and of homologous characters in general) will have conformed to at least four principles:

- Evolution is a *specialising* process.
- Evolution is a *conservative* process.
- Evolution is a *stochastic* process.
- Evolution is an *inefficient* process.

**Evolution is a specialising process.** From a supposed ancestor with unspecialised limbs, evolution has produced organisms showing numerous variations, both simple and complex, on the basic pentadactyl theme.

The simplest cannot help becoming more complicated; and if we look to the first origin there must be progress ... Every successive animal is branching upwards different types of organization ... (Charles Darwin)<sup>75</sup>

We have to account for this long-term increase in complexity.

**Evolution is a conservative process.** What the general pattern of homologies clearly demonstrates is that there are large numbers of organisms differing considerably in the details of their structure, but constructed on the same fundamental plan (eg of insect or vertebrate).

It is generally acknowledged that all organic beings have been formed on two great laws - Unity of Type and the Conditions of Existence. By unity of type is meant that fundamental agreement in structure which we see in organic beings of the same class, and which is quite independent of their habits of life. On my theory, unity of type is explained by unity of descent. (Charles Darwin)<sup>76</sup>

Evolution tends to be a conservative process. By this we mean that rather than new structures developing, the processes of evolution tend toward remodeling of existing ones.

(American biologists, John Moore and I.D. Olsen)<sup>77</sup>

We have to explain the long-term persistence of these fundamental plans.

**Evolution is a stochastic process.** The general pattern of homologies reveals a process in which each event appears to limit the number of possible succeeding events. Each group supposedly begins with small unspecialised forms with great evolutionary potential. As the forms specialise in each line of descent, so the possibilities for future evolution become progressively restricted. Indeed, the existing specialised forms will generally be evolutionary dead-ends.

... five principles of evolution to which nearly all biologists would subscribe ... [No 3] New species do not evolve from the most advanced and specialised forms already living, but from relatively simple, unspecialised forms. The mammals, for example, did not evolve from the large, specialised dinosaurs, but from a group of rather small and unspecialized reptiles. (American zoologists, Claude Villee *et al*)<sup>78</sup>

[Frogs and mammals] may have had the same time course of evolutionary diversification from generalised ancestors to specialised descendants.

(American biologist, Douglas Futuyma)<sup>79</sup>

We have to account for this stochastic pattern of evolution.

**Evolution is an inefficient process.** The argument from homology is based on a distinction between *ancestral* characters and *adaptive* characters. It is assumed that the structural plan common to all the diverse members of a group *cannot* be adaptive for a particular mode of life. Maybe it was adaptive in the original ancestor, but now it is there simply by inheritance. It is only the specific modifications imposed on that plan during evolution which are adaptive now.

It is commonly thought at the present day (by those who do not merely ignore such

considerations) that most of the particular features of any animal are adaptive to its particular mode of life, but its general plan which it shares perhaps with an enormous number of other forms cannot be adaptive to a particular mode of life, and therefore must be due to its ancestry. (British zoologist, Arthur Cain)<sup>80</sup>

As noted above (Part II, Section 5) the argument is commonly presented in theological form. It is argued that a creator free to do as he pleases will not use a common plan (*ie* homologies) because such a plan suggests limitations or constraints foreign to divinity – an unintelligent repetition of structures even where they are not really appropriate. It is assumed that intelligence and purpose would be more 'creative'. Rather such plans must reflect the happenstances of evolutionary descent:

From a purely practical point of view, it is incomprehensible that a turtle should swim, a horse run, a person write, and a bird or bat fly with structures built of the same bones. An engineer could design better limbs in each case. But if it is accepted that all of these skeletons inherited their structures from a common ancestor and became modified only as they adapted to different ways of life, the similarity of their structures makes sense.

(American geneticist, Francisco Ayala)<sup>81</sup>

Many, of course, take the argument further and argue that, by their very nature, evolutionary processes can only produce relative perfection. In any evolutionary series there should be numerous imperfect 'attempts' leading up to the present or final (if extinct) relatively perfect form.

... if organisms have a history, then ancestral stages should leave *remnants* behind. Remnants of the past that don't make sense in present terms - the useless, the odd, the peculiar, the incongruous - are the signs of history. They supply proof that the world was not made in its present form. (American zoologist, Stephen Gould)<sup>82</sup>

If the evolutionary explanation of homology is true, then support for these four principles should be forthcoming from the relevant scientific disciplines. The embarrassing fact (for evolutionists) is that it can be cogently argued that evidence for these principles is completely lacking. On the other hand, it can be argued that evidence for a creationist explanation of homologies is abundant and persuasive.

## 4 Principles of Evolution? Weighing the Evidence

### Is there Evidence for Specialising Processes?

For a principle of evolutionary specialisation to be acceptable, we should expect there to be support from genetics. For example, is there evidence that genetic systems proffer for selection (some) mutants that are more complex, more organised, than the forms currently existing? Surprisingly, or perhaps not surprisingly, this question is hardly addressed in the literature: it is simply taken for granted that such mutants arise. The famous British medical scientist and Nobel laureate, Sir Peter Medawar, was at least facing the issue when he stated that,

'the real weakness of modern evolutionary theory' is 'its lack of a complete theory of

variation, of the origin of *candidature* for evolution'.

Then he could only express the hope that,

'It may ... turn out to be of the nature of nucleic acids and the chromosomal apparatus that they tend spontaneously to proffer genetical variants - genetical solutions of the problem of remaining alive - which are more elaborate than the immediate occasion calls for ...'<sup>83</sup>

More than 30 years on the hope remains unfulfilled. This first principle lacks support from genetical science.

### **Is there Evidence for Conserving Processes?**

For this principle to be acceptable, we should expect support from genetics and ecology. For example, can we find support for the notion that natural selection allows the conservation of the basic structural plans when they are, supposedly, no longer adaptive for most organisms? On the face of it this notion can be supported only at the cost of admitting a major contradiction into Darwinism. At the same time that natural selection is supposedly conserving the basic plans, it is permitting and perpetuating diverse variations in almost every detail of those plans. It is also producing numerous amazing and intricate adaptations, sometimes involving several different organisms. There are even cases where evolutionists are forced to believe that an overall plan *has* been reconstructed, *eg* that the pentadactyl limb pattern has been radically reconstructed in *ichthyosaur*<sup>84</sup> paddles, and that the whole arthropod body plan has been completely changed in parasitic crustacea such as *Sacculina*.<sup>85</sup> Persuasive support for this homology principle is therefore difficult to imagine, let alone find.

### **Is there Evidence for the Stochastic Principle?**

For this principle we again look for support from genetics and ecology. *First*, is there greater potential for variation in the less specialized forms of phyla and classes? Within a phylum, members of the most 'primitive' or 'generalised' class taxon show no more potential for variation than the members of the most specialised class. The same result is confirmed for orders within a class and for families within orders. It is only within a family or genus that some evidence has been obtained for genetic impoverishment (e.g. amongst African antelope species and for the cheetah in the cat family). Evolutionists can readily explain away this absence of evidence, *eg* by arguing that existing 'primitive' forms have undergone just as much evolution as their specialised descendants and are therefore not representative of the real 'generalised' ancestors. Nevertheless we are left with an absence of positive evidence.

Another finding that goes against the expectations of evolutionists, is that, for any given organism, mutants appear to belong to a relatively restricted set of possibilities, and this set is probably the same for all members of the group in question.<sup>86</sup>

*Second*, we would expect evidence from systematics and ecology of the existence of some generalised organisms. However, although we can distinguish more specialised from less specialised, unspecialised organisms are nowhere to be found.

We can certainly identify a lack of specialisation if we consider only one or a few features. For example, the insectivores (moles, shrews, hedgehogs etc.) are regarded as 'primitive' or 'generalised' mammals on the basis of their small size and certain dental and skeletal features. These features are preferred simply because fossils are less likely to provide evidence of other kinds of feature. But when many kinds of feature are considered, all living insectivores prove to be highly specialised. This is true of every other group that has been similarly investigated. The same also applies to extinct (fossil) organisms. 'Common ancestors' or 'missing links' are usually first identified on the basis of a few 'key' (*sic*) features. Further studies invariably show that the forms are too specialised to be common ancestors, and that in some respects they are more specialised than their alleged descendants. The trouble, of course, is that the discovery event attracts much publicity, whereas the process of reinterpretation goes unreported in the popular media. The impression of accumulating evidence for evolution is as powerful as it is false.

### **What is the Evidence for Biological Imperfection?**

It is here that the theological nature of the homology argument becomes especially clear. '... imperfection,' notes Stephen Gould, 'carries the day for evolution':

... you cannot demonstrate evolution with perfection because perfection need not have a history. After all, perfection of organic design had long been the favorite argument of creationists ... When history perfects, it covers its own tracks.<sup>87</sup>

In support of this principle we obviously expect abundant evidence that organisms have features which are imperfect, *ie* less than optimal for their function. But Gould's comments have introduced issues of logic which play a major role in discussions of the inefficiency principle. This is so important that we shall consider these issues in some detail.

## **5 Homology and Logic**

Imperfection is what evolutionists need to demonstrate, but this agenda raises acute logical problems. The assumption of imperfection can be no part of research methodology, because *it is logically impossible to demonstrate imperfection*. There are no positive criteria by which imperfection (non-adaptation) can be recognised and demonstrated.<sup>88</sup> The only way we can demonstrate imperfection is by ruling out every conceivable function. Yet there is an infinitude of conceivable functions. There may not be one prime function: structure may be an optimal compromise between two or more partially incompatible specifications. Also, structure and/or function may change, or adjust, or even cease, during a specific stage of development, or in response to environmental changes which affect the organism as a whole. And so on.

On the other hand, the opposite principle, the assumption of optimal design, is,

rightly, one of the most basic principles of scientific research, because there can be positive and cumulative evidence for the adaptation of a given feature.<sup>89</sup> Thus the only justifiable working hypothesis is, as put by the British zoologist, Arthur Cain, that,

... if we personally cannot see any adaptive or functional significance of some feature, this is far more likely to be due to our own abysmal ignorance than to the feature being truly non-adaptive, selectively neutral or functionless.<sup>90</sup>

The alternative is methodologically unsound:

If it is taken dogmatically that many characters must be non-adaptive, then of course there will be no motive to investigate them, and they will continue to be quoted as non-adaptive whether they are or not.<sup>91</sup>

In a survey of the argument from vestigial organs, the zoologist, Steven Scadding, comes to the same conclusion:

Such an argument, from ignorance, or from negative results, is not valid scientifically, and has no place in observational science ... Since it is not possible to unambiguously identify useless structures, and since the structure of the arguments is not scientifically valid, I conclude that 'vestigial organs' provide no special evidence for the theory of evolution.<sup>92</sup>

Cain and others take the argument further, seeing a logical contradiction within Darwinian theory itself. Research continually extends our knowledge of the amazing and intricate adaptations of organisms. Evolutionists stand in awe at the phenomenal creative power of natural selection. How then can they also say that it allows fundamental structural patterns to persist for hundreds of millions of years when they are non-adaptive? Cain's response is that this cannot be. Turning the argument on its head, he argues from such long-term persistence that the structures must be optimal:

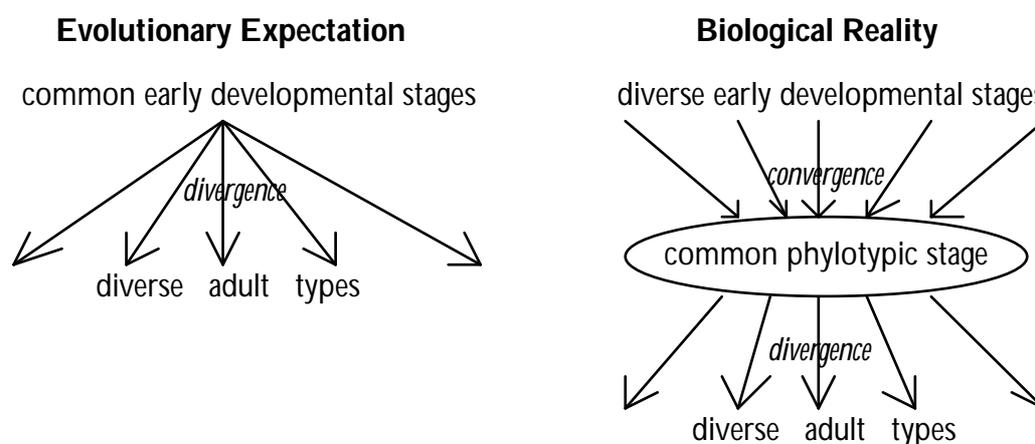
... everything that is known of the power of natural selection and the nature of evolution strongly suggests that there has been ample time for the complete reconstruction of the older groups to make them better adapted to their mode of life if this had been necessary; their remarkable constancy of plan combined with plasticity in pretty well every detail of that plan over hundreds of millions of years almost forces us to the conclusion that they are as they are because that is what, in competition with all the other great groups, they need to be.<sup>93</sup>

Indeed we can take the argument even further. Many will remember the 'argument from embryology' for evolution, in which the supposed parallelisms in development between the embryos of different vertebrate groups (fishes, amphibia, reptiles, birds and mammals) have been paraded in almost every biology textbook. It has long been known that the diagrams were significantly falsified,<sup>94</sup> but we can leave that aside. The major point to be made is that the published series of diagrams begin – arbitrarily it would seem – with a relatively late stage in development. That stage – now called the *phylotypic stage*<sup>95</sup> – already shows the full layout of the basic vertebrate body plan.<sup>96</sup> The reason for this practice is quite simple: if we start at the

logical place - the fertilised egg - the argument loses its force (Figure 2.1).

The remarkable uniformity of the phylotypic stage is attained from an astonishing diversity of structures and by an astonishing diversity of developmental processes. It is very difficult to homologue the different patterns of early development and it may well prove to be impossible. The overall pattern is not the traditional evolutionary expectation of divergence from similar beginnings, but rather of convergence to a uniform phylotypic stage from diverse beginnings followed by divergence again to the different adult types.

**Figure 2.1 Homology and the Vertebrate Body Plan**



If we apply Cain's argument then the logical conclusion is that the phylotypic stage must be the only tolerable intermediate stage.

Since evolutionary texts make much of certain common features (eg the embryonic aortic arches – the so-called 'gill arches') we can fittingly conclude this section with another comment from Arthur Cain:

... we know so little about the actual mechanics of development that this may be one more argument from ignorance ... the developmental features of classes, subphyla or phyla are more likely to be those best suited for producing a given basic plan.<sup>97</sup>

The American anatomist, Hans Elias presents a similar argument with regard to the liver. He found that all vertebrates possess a fully developed liver which shows a remarkable uniformity of structure. However, this uniform adult structure is produced by an astonishing diversity of developmental processes. Completely contrary to evolutionary expectation, we do not have diverse adult livers diverging from a common beginning. We have the exact opposite: a uniform adult liver structure arising from diverse beginnings (Figure 2.2).

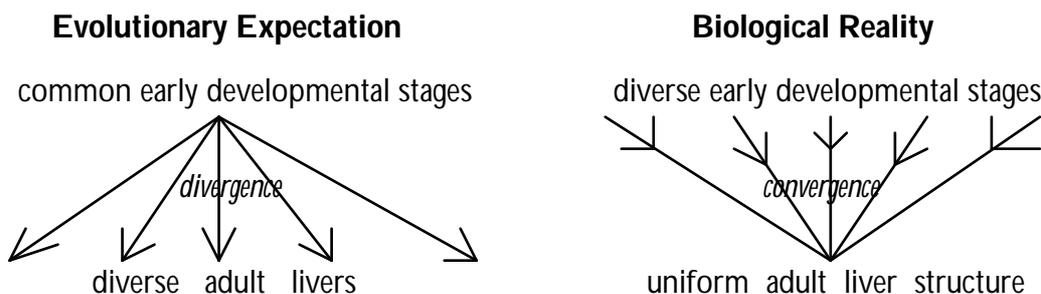
Elias drew the following conclusion:

... it follows that the muralium [a system of walls of cells] is not only the best but also

the worst possible, i.e. the only tolerable structure which a liver must have to assure survival.<sup>98</sup>

... if there is uniformity of functional structure arising from diversified beginnings one must suspect that the organ, as far as its histological structure is concerned, is close to perfection.<sup>99</sup>

**Figure 2.2 Homology and the Vertebrate Liver**



One other point here is to note that there is a serious conflict between the homology arguments of the molecular biologists and those of the comparative anatomists. The anatomists argue that the fundamental structural patterns are 'ancestral', whereas the detailed expressions of those patterns are 'adaptive' and not necessarily indicative of common ancestry. In contrast the molecular biologists have concluded that it is the fundamental patterns (eg amino acid sequences in proteins, with their three-dimensional configuration) which are adaptive, *ie* that cannot be replaced without major disruption of biological function. However, the specific differences between the molecules in different species are held to explore the possible expressions of the primary adaptation, *ie* they all result in functional molecules. However, it is tacitly assumed that these specific differences are not adaptive (*ie* not related to habit and environment), but are random productions within a limited functional range. These radically differing interpretations could both be right in their own spheres, but, intuitively, that does not seem likely. At the very least the differences should encourage critical interrogation.

These abstract arguments are quite fascinating, but would carry little weight if that was all we had. Fortunately, that is not the case. The principle of optimal design is such a central principle because it has been so incredibly fruitful. Every researcher seeking evidence of optimality in biological structure and function – even in the common features of major groups – has found it. The literature on it is now enormous.<sup>100</sup> The TV nature programmes wouldn't have their enormous appeal if it wasn't for the optimality of adaptation that they so wonderfully document.

Two final and crucial points:

- Once optimal design is accepted homology ceases to provide evidence for evolution (as opposed to creation). We have already noted Gould's comment on this (in section 4 above). Arthur Cain makes the same point:

As functional significance is found for characters, they are abandoned as of doubtful value for phylogenetic speculation, and only the unanalysed residue is left ... As soon as a reason is found, the possibility of independent acquisition ... will be realized.<sup>101</sup>

- The second point is by far the most telling. Optimal design cannot be reconciled with any theory of evolution yet proposed for one very simple reason. *The patterns of homology demonstrate that in every instance the optimal 'solution' was there from the beginning and was never the end point of a lengthy process.* Consider the liver. If all known vertebrates have the same optimal liver structure, then the clear implication is that the original vertebrate ancestor had it. But how did that original ancestor hit on the optimal solution at the very beginning? A solution moreover that is optimal not just for it, but for all the great diversity of its descendants in all the vast variety of environments that they now inhabit. Very remarkable indeed! The same conclusion follows for the vertebrate body plan and for every other homologous structure. It follows, for example, for the basic structure and function of the cell. Microorganisms already show all the basic cellular structures – and the whole range of biochemistry – that is exploited by all their animal and plant 'descendants'<sup>102</sup>. And similarly for DNA and the genetic code.

Isn't homology really an argument for creation?

## 6 Homology and Development<sup>103</sup>

What organises life and creates its patterns is development (embryology). Biology is fundamentally about generation and reproduction. Before we can understand homology - before we can know if it carries any evolutionary implications - we must understand development. Before homology can be regarded as evidence for evolution, the developmental grounding for its principles must be explained.

This being so it is amazing to discover that one of the biggest gaps in modern biology is that there is still no credible theory of development. Indeed, we are nowhere near formulating one. We can *describe* the development of a chicken from an egg in enormous detail, but we cannot *explain* that development in any detail at all. We still have no idea how it happens. All the wonderful advances in understanding DNA, and how its genetic code translates into proteins, still leaves us with little more than a bag of complicated chemicals (structural proteins, enzymes, hormones, regulatory proteins *etc.*). How those chemicals then interact and cooperate to form an adult organism is unknown - a truly enormous theoretical gap. Put another way, we do not understand why one 'bag' produces a kitten, but another produces a chick. Indeed, we do not even know whether the genes are determinative at all, i.e. whether the fundamental reason a mouse egg develops into a mouse is *because* it has mouse DNA.<sup>104</sup>

Now pause and consider the logical problem. *If there is no scientific theory of development* (of egg to chicken - which we can at least observe and so confirm that it happens), *how can there be a scientific theory of evolution* (of development from 'amoeba' to chicken - which no one has observed and so no one can confirm has happened)?<sup>105</sup>

Current thinking assumes genetic (chemical) determinism, *ie* that all the features of organisms and their whole structure and behaviour is determined by the genes, and thus by DNA. 'DNA is god and RNA is his prophet!' But despite the overwhelming hype, there is no persuasive evidence for this supposition. The famous American geneticist, Richard Lewontin explains:

... genes can *make* nothing ... Isolating the gene as the 'master molecule' is another unconscious ideological commitment, one that places brains above brawn, mental work as superior to mere physical work, information as higher than action.

Nor are genes self-replicating. They cannot make themselves any more than they can make a protein. Genes are made by a complex machinery of proteins that uses the genes as models for more genes ... if anything in the world can be said to be self-replicating, it is not the gene, but the entire organism as a complex system.<sup>106</sup>

There has long been abundant evidence that there is more to heredity than genes (DNA), and that the whole cell system is the hereditary system. One particular approach has been discussed in Chapter 1 (Part III, Section 4).

## 7 Conclusion: Weighed and Found Wanting

This discussion of homology has had to be brief. But hopefully enough analysis has been given to indicate

- a more fruitful approach to the discussion of origins;
- the enormous problems that face evolutionary explanations.

Postulating a common cause of homologies in terms of common ancestry has never been plausible against the background of a Christian philosophy that, for us, successfully accounts for more of life than any alternative, especially given that naturalistic alternatives fail miserably. We can now add that common ancestry is also no longer plausible (if ever it was) in the light of all that is known about the world of living things.

## Part V: An Overview of Some Other Key Topics Genetics, Time and Fossils<sup>107</sup>

### Ringing the Changes: Mutation

What about mutation? Current evolutionary thinking still regards gene mutation<sup>108</sup> as the ultimate source of all *variation*. But we must also consider *viability*.

- **Variation:** Mutation is extremely limited, never transgressing the boundaries of the kind. Mutations do not increase the pool of variation, do not increase complexity, do not raise the level of organisation. Only quite limited kinds of mutation actually occur.<sup>109</sup>
- **Viability:** Some mutations do appear to be neutral, *ie* lack any discernible effect

on the phenotype.<sup>110</sup> But as far as we know all mutations with discernible outcome affect viability to some extent. However marginally, they harm the organism. Evolution by mutation is extinction on an instalment plan. It is possible to extend the instalments, but there is no evidence to suggest that it is possible to alter the trend to extinction. A lingering death is still terminal.

## Evolution in Action?

Peppered moths, cichlid fishes, *etc.*, are wonderful examples of ecological survival, or of diversification involving endless permutation within a pre-existing pool of genetic variation. Sometimes these ecological processes are called *micro-evolution*, but that is a specious name that should be avoided. That these processes have any relevance to evolution is what remains to be demonstrated.

## Plenty of Time for Evolution?

Time is irrelevant, because it is not an agent:

- Time cannot complete a process that does not even begin; time is not creative or constructive.
- More time simply expedites the universal tendency for deconstructive, levelling out processes to dominate (entropy law).
- Placing your explanation beyond testing (or beyond ability to test) is hardly a scientific procedure. It can only be a last resort if we have other good grounds for belief in evolution. We, of course, would urge that there are no such grounds.

## Digging up the Past: Fossils

Fossils are not historical evidence (Part III, Section 2 above) - there is no 'record', no 'labels'. Fossils are remains that must be interpreted on the basis of similarity (homology) to living plants and animals.

In terms of evolution, fossils should demonstrate

- that most species are extinct: extinct (fossil) species (the branches and trunk of the evolutionary tree) should outnumber living species (the tips of the twigs) by (according to different biologists) anything from 100:1 to even 100 000:1;
- the presence of many 'missing links';
- that extinct fossil forms differ from living relatives; the older the fossil, in general the greater the difference we would expect.

The known facts do not meet these expectations:

- About 250 000 fossil species have been described, approximately one-tenth the number of described living species. Many fossils are of kinds<sup>111</sup> of animal and plant which are still living in the world today. Of the fossils ninety-five per cent

are of organisms that live in shallow marine environments (e.g. trilobites, corals, fish); 95% of the rest are algae and plants; only 0.25% are vertebrates other than fish and only 1% of these involve more than one bone or part. Yet even in the case of land vertebrates most living kinds are also found as fossils.<sup>112</sup>

- There are no missing links.<sup>113</sup>
- The comparison of fossils with living forms leads to an astonishing conclusion: whatever the supposed age of a fossil, and wherever it or its living relative is found in the world, there has been no evolution.<sup>114</sup> There may be a difference of species, but in terms of the basic body plan, the level of organisation and the degree of complexity, there is no difference. Every 'fossil' is a final edition. (This is a general - and major - problem as already noted in Section 5 of Part IV)

## Conclusion

Origins is truly a vast topic, so this remains but a brief overview. The aim has been to set the issue into its wider cultural and religious context, and in that light to examine afresh the evidence bearing on it. Contemporary discussions tend to be very inadequate. This overview has sought to provide tools of analysis and strategies that can be followed. If it enables others to go further, then it has fulfilled its purpose.

## Notes

<sup>1</sup> However there are some educationalists who recognise that science is not independent of worldview commitments, and that serious unresolved issues surround the teaching of evolution. See Geoffrey Harper, Alternatives to evolutionism, *School Science Review*, **61** (214), 1979, pp 15-27, William Cobern, Point: belief, understanding and the teaching of evolution, *Journal of Research in Science Teaching*, **31** (5), 1994, pp 583-590, Mike Smith, Counterpoint: belief, understanding and the teaching of evolution, *ibid.*, pp 591-597 and David Jackson *et al.*, Hearts and minds in the science classroom: the education of a confirmed evolutionist, *ibid.*, **32** (6), 1995, pp 585-611. Graham Haydon defends the inclusion of religious perspectives, even in science lessons, in Conceptions of the secular in society, polity and schools, *Journal of Philosophy of Education*, **28** (1), 1994, pp 65-75 and *Teaching About Values: A New Approach*, London: Cassell, 1997, Chapter 10, Secular society, secular schools and citizenship, pp 109-117. Michael Leahy's caveat concerning the greater risk of indoctrination in secular subjects such as science is also pertinent (Indoctrination, evangelisation, catechesis and religious education, *British Journal of Religious Education*, **12** (3), 1990, pp 137-144). That Darwinism is taught in an indoctrinatory way has been urged by Geoffrey Harper, Darwinism and indoctrination, *School Science Review*, **59** (207), 1977, pp 258-268.

<sup>2</sup> Also known as *materialism*.

<sup>3</sup> P. Johnson, *Reason in the Balance: The Case against Naturalism in Science, Law and Education*. Downers Grove, Illinois, USA: InterVarsity Press, 1995, p 195.

<sup>4</sup> Of course, for some scientists, science does offer hope, even of future immortality. See, e.g. Frank Tipler, *The Physics of Immortality: Modern Cosmology, God and the Resurrection*

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of the Dead, Garden City, New York: Doubleday, 1994 (Macmillan, 1995), 528 pp. Secularists seem to find it impossible to completely separate themselves from the Christian story. Cf. Mary Midgley, *Science as Salvation: A Modern Myth and its Meaning*. London: Routledge, 1992, 239 pp.

<sup>5</sup> P. Atkins, Will science ever fail? *New Scientist* **135** (1833), 8 August 1992, pp 32-35 (pp 32, 34).

<sup>6</sup> R. Dawkins, *Growing Up in the Universe: A Study Guide to the Royal Institution of Great Britain Christmas Lectures*, London: BBC Education, 1991, 28 pp (pp 11, 27).

<sup>7</sup> 'The result was the conception of the plan and structure of the world which, through the Middle Ages and down to the late eighteenth century, many philosophers, most men of science, and, indeed, most educated men, were to accept without question.' (Arthur Lovejoy, *The Great Chain of Being: A Study of the History of an Idea*. Cambridge, Mass: Harvard UP, 1936, p 59).

<sup>8</sup> C.R. Darwin, letter to D. Mackintosh (1882). In Francis Darwin (ed), *More Letters of Charles Darwin*, New York: D Appleton, 1903, vol 2, p 171.

<sup>9</sup> L. More, *The Dogma of Evolution*, Princeton University Press, 1925, p 304.

<sup>10</sup> R.J. Pumphrey, Hearing. *Symposia of the Society for Experimental Biology*, **4**, 1950, pp 5-6.

<sup>11</sup> F.H.C. Crick, The origin of the genetic code. *Journal of Molecular Biology*, **38** (3), 1968, p 372.

<sup>12</sup> E.W. Sinnott *et al.*, *Principles of Genetics*. New York: McGraw-Hill, 1958, 5th edn, p 276.

<sup>13</sup> E. Klinckmann, *BSCS Biology Teachers' Handbook*. New York: John Wiley, 1970, 2nd edn, p 14.

<sup>14</sup> E. Perrott *et al.*, *Biology: An Environmental Approach. Teachers' Guide*. London: Murray, 1974, p 51.

<sup>15</sup> National Academy of Sciences, *Science and Creationism: A View from the National Academy of Sciences*. Washington, DC: National Academy Press, January 1984, p 7.

<sup>16</sup> See P.E. Johnson, *Reason in the Balance: The Case Against Naturalism in Science, Law and Education*. Downers Grove, Illinois, USA: IVP, 1995, 245 pp.

<sup>17</sup> See Proverbs 16:33 and compare with Exodus 16:17-18, and 1 Kings 22:17, 34-35.

<sup>18</sup> 'There is a deeply ingrained conviction in the great majority of mankind, to which the appeal of science fiction and fantasy bears witness, that the universe is so constituted that, if an opportunity exists for life to originate, it will be actualized, and if an opportunity exists for hominids to evolve, that too will be actualized.' (William Pollard, The prevalence of Earthlike planets. *American Scientist*, **67** (6), 1979, p 659). Similarly, Joseph Silk (Professor of Astronomy & Physics, University of California, Berkeley) asserts that, 'Anything that can exist must exist' is a common precept in physics. (Kirk and Scotty's lie. *Times Higher Education Supplement*, **1247**, 27 September 1996, p 25).

<sup>19</sup> S.J. Gould, *Wonderful Life: The Burgess Shale and the Nature of History*. Harmondsworth: Penguin, 1991, pp 288-9, 319-20 (first published in 1989).

<sup>20</sup> New Scientist, Editorial: Martians have landed (again). *New Scientist*, **152** (2055), 9 November 1996, p 3. The editorial was commenting on the search for signs of microbial life in lumps of meteorite supposedly from Mars. It referred, rightly, to 'the woefully inconclusive nature of that evidence'.

<sup>21</sup> S.J. Gould, *The Panda's Thumb: More Reflections in Natural History*. Harmondsworth: Penguin, 1983, pp 153-154, 188, (first published in 1980).

<sup>22</sup> C. Patterson, *Evolution*. London: British Museum (Natural History), 1978, pp 177-8.

<sup>23</sup> N. Eldredge, *Reinventing Darwin: The Great Evolutionary Debate*. London: Weidenfeld & Nicolson, 1995, 244 pp. Eldredge is a well-known palaeontologist, curator in the Department of Invertebrates at the American Museum of Natural History in New York.

<sup>24</sup> R. McNeill Alexander, Time to join the grownups, *New Scientist*, **148** (1999), 14 October 1995, p 41. Alexander is Professor of Zoology in the University of Leeds.

<sup>25</sup> M. Grene, *The Knower and the Known*. London: Faber & Faber, 1966, pp 187, 199-200.

<sup>26</sup> M. Midgley, *Evolution as a Religion: Strange Hopes and Stranger Fears*, London: Methuen, 1985, pp 15-16, 30-31.

<sup>27</sup> R. Dawkins, *River out of Eden: A Darwinian View of Life*. London: Weidenfeld & Nicolson, 1995, p 133.

<sup>28</sup> See Chapter 1, Part I, Section 3 on the moral priority of individual choice in modernism.

<sup>29</sup> This is the major problem with Del Ratzsch's otherwise excellent book, *The Battle of Beginnings: Why Neither Side is Winning the Creation-Evolution Debate*, Downers Grove, USA: IVP, 1996, 248 pp. By leaving out almost all consideration of theology and biblical interpretation, he implies that they are not crucial to resolution of the debate. But without them it is doubtful if there would ever have been a debate at all.

<sup>30</sup> See references in Chapter 5, section 8, Theistic evolution?

<sup>31</sup> By *absolute creation*, we mean creation by a God (Creator) who is not part of the Universe. God alone is self-existent. All else is absolutely dependent on him for existence and meaning (see Roy Clouser, *The Myth of Religious Neutrality*. University of Notre Dame Press, 1991, Chapter 2, pp 9-34).

<sup>32</sup> 'Pantheism is congenial to our mind not because it is the final stage in a slow process of enlightenment, but because it is almost as old as we are. It may even be the most primitive of all religions ... It is immemorial in India. The Greeks rose above it only at their peak, in the thought of Plato and Aristotle; their successors relapsed into the great Pantheistic system of the Stoics. Modern Europe escaped it only while she remained predominantly Christian; with Giordano Bruno and Spinoza it returned. With Hegel it became almost the agreed philosophy of highly educated people, while the more popular Pantheism of Wordsworth, Carlyle and Emerson conveyed the same doctrine to those on a slightly lower cultural level. So far from being the final religious refinement, Pantheism is in fact the permanent natural bent of the human mind; the permanent ordinary level below which man sometimes sinks ... but above which his own unaided efforts can never raise him for very long ... It is the attitude into which the human mind automatically falls when left to itself. No wonder we find it congenial. If "religion" means simply what man says about God ... then Pantheism almost *is* religion. And "religion" in that sense has, in the long run, only one really formidable opponent - namely Christianity.' (C.S. Lewis, *Miracles*. Collins, 1974, pp 86-87 [first published in 1947]).

<sup>33</sup> Theistic evolutionists commonly complain about the 'damage' that creationists are doing to the good name, or academic respectability, of Christianity (or Evangelicalism), about young people being 'misled' and 'confused', and about the 'pastoral problems' that this creates. This kind of anecdotal evidence is valueless without some real research, as it is quoted in equal measure from both sides. (From the creationist side see Henry Morris and John Morris, *The Modern Creation Trilogy*, Volume I, *Scripture and Creation*, Green Forest, AR: Master Books, 1996, Chapter 11, Creation Evangelism, pp 163-184). But theistic

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evolutionists must take cognisance of the fact that they are seen by many secularists in exactly the same light as creationists.

<sup>34</sup> For more detailed critique and references see the literature listed in section 8 Methodological naturalism? of Chapter 5 of this book.

<sup>35</sup> Basil Willey, Darwin's place in the history of thought. In *Darwinism and the Study of Society: A Centenary Symposium* (Ed M. Banton), London: Tavistock Publications, 1961, pp 1-16 (p 15).

<sup>36</sup> M. Ruse, *Darwinism Defended: A Guide to the Evolution Controversies*, Reading, Mass: Addison-Wesley, 1982, 356 pp (p 322).

<sup>37</sup> For example, American physicist Howard Van Till bases his defence on a 'doctrine of creation's functional integrity' (H.J. Van Till, Basil, Augustine, and the doctrine of creation's functional integrity. *Science and Christian Belief*, **8** (1), 1996, pp 21-38).

<sup>38</sup> In the light of this discussion, it is interesting to note that the implications are pursued primarily in relation to origins and education. For example, in relation to education, Eric Lane writes that, 'Education for life in the world means education with and by the world.'*(Special Children?* London: Grace Publications Trust, 1996, p 37).

<sup>39</sup> See, e.g., Keith Ward, *God, Chance and Necessity*. Oxford: Oneworld, 1996, 212 pp. Ward is Regius Professor of Divinity, University of Oxford. He accepts evolution, but by divine providence, not by blind chance. His book is a trenchant critique of evolutionary naturalism.

<sup>40</sup> See Tom Settle, The dressage ring and the ballroom: loci of double agency, in Jitse van der Meer (ed), *Facets of Faith and Science*, Vol. 4: *Interpreting God's Action in the World*, Lanham, MD: University Press of America, 1996, Chapter 2, pp 17-40 and Problems naturalism has explaining science, *Pascall Centre Notebook*, 1997, **5**, pp 3-6.

<sup>41</sup> Historically, science has been strongly undergirded and motivated by Christian faith - see Section 2, Religious roots of modern science, in Chapter 5 of this book.

<sup>42</sup> P.E. Johnson, *Reason in the Balance: The Case Against Naturalism in Science, Law and Education*. Downers Grove, Illinois, USA: IVP, 1995, p 101.

<sup>43</sup> A variant of this assertion invokes Ockham's razor - a complicated explanation should not be used when a simple one will do. The argument is then that evolution is the simplest explanation of origins. However, all this really shows is that there are no neutral (worldview-independent) criteria of simplicity (*cf* Elliott Sober, Let's razor Ockham's razor. In *From a Biological Point of View: Essays in Evolutionary Philosophy*. Cambridge: CUP, 1994, Chapter 7, pp 136-157). The creationist may well retort that the simplest explanation is that the world has always been as it is now. It is then very arguable as to whether creation or evolution takes us farther from *that* simplicity.

<sup>44</sup> P.E. Johnson, *ibid*, p 235.

<sup>45</sup> On Popper see Section 4 of Chapter 5 of this book.

<sup>46</sup> See sections 3 and 4 of Chapter 5.

<sup>47</sup> They are also perfectly well aware that scientific advances themselves - especially in the areas of relativity, quantum and chaos theories - have undermined the mechanistic worldview. See Paul Davies and John Gribbin, *The Matter Myth: Towards 21st-Century Science*, London: Viking (Penguin), 1991, 314 pp.

<sup>48</sup> See the literature listed in section 2 of Chapter 5.

<sup>49</sup> See Part III, Section 4 of Chapter 1.

<sup>50</sup> See Jerry Bergman and George Howe, *'Vestigial Organs' are Fully Functional*, Kansas City, MO: Creation Research Society Books, 1990, 97 pp.

<sup>51</sup> See the papers by philosopher Paul A. Nelson: The role of theology in current evolutionary reasoning, *Biology and Philosophy*, **11**, 1996, pp 493-517; A sensible God: the bearing of theology on evolutionary explanation, in Jitse van der Meer (ed), *Facets of Faith and Science*, Vol. 3: *The Role of Beliefs in the Natural Sciences*, Lanham, MD: University Press of America, 1996, Chapter 11, pp 169-197; *Jettison the Arguments, or the Rule? The Place of Darwinian Theological Themata in Evolutionary Reasoning*, 1997, 23 pp (A4 printout) on the internet at:

<http://www.dla.utexas.edu/depts/philosophy/faculty/koons/ntse/papers/Nelson.html>

<sup>52</sup> Nelson, 1997, conclusion.

<sup>53</sup> For example, the *Creation Research Society Quarterly* and *Creation Ex Nihilo Technical Journal* - see Chapter 5, *Science: An Annotated Reading List*, Section 8, for further information.

<sup>54</sup> A Plantinga, Methodological naturalism? In Jitse van der Meer (Ed), *Facets of Faith and Science. Vol 1: Historiography and Modes of Interaction*. Lanham, Maryland: University Press of America, 1996, Chapter 9, pp 177-221 (p 214).

<sup>55</sup> See Figure 1.1 in Chapter 1.

<sup>56</sup> See Arthur Jones, A Creationist Critique of Homology. *Creation Research Society Quarterly*, **19** (3), 1982, pp 156-175, especially, Appendix One: The Created Kinds, pp 165-166.

<sup>57</sup> 'The fundamental assumption of the doctrine of descent presupposes that all those processes which have led during evolution to change in the organic multiplicity in principle also take place today.' (F Mainx, *Foundations of Biology*, Chicago: University of Chicago Press, 1955, p 49). 'The processes of evolution are still in operation and therefore capable of experimental study.' (T.I. Storer *et al.*, *General Zoology*. New York: McGraw-Hill, 1979, 6th edn, p 266).

<sup>58</sup> See Arthur Jones, The dogma of evolution, *Faith and Thought*, **98** (2/3), 1970, pp 25-41 and The nature of evolutionary thought, *Creation Research Society Quarterly*, **8** (1), 1971, pp 44-49.

<sup>59</sup> See Section 4 of Chapter 5.

<sup>60</sup> Internal and even intracellular parasites are part of an organism's environment.

<sup>61</sup> Elliott Sober, Contrastive empiricism, in *From a Biological Point of View: Essays in Evolutionary Philosophy*, Cambridge: CUP, 1994, pp 114-135. Cf. Geoffrey Harper, Alternatives to evolutionism, *School Science Review*, **61** (214), 1979, pp 15-27.

<sup>62</sup> Even successful prediction by a theory may not win the day for an alternative CF, though it will normally cause scientists to pay attention!

<sup>63</sup> See, e.g Ian Stewart, *Does God Play Dice? The New Mathematics of Chaos*, London: Penguin, 1997, 2nd edn, 401 pp.

<sup>64</sup> For example in order to double the predication span we may need as much as 100 000 times more data (as, e.g., in weather forecasting).

<sup>65</sup> For further discussion of homology, see Arthur Jones, A creationist critique of homology, *Creation Research Society Quarterly*, **19** (3), 1982, pp 156-175.

<sup>66</sup> C. Patterson, *Evolution*. London: Routledge & Kegan Paul, 1978, 197 pp (p 120).

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- <sup>67</sup> D. Dewar, *Difficulties of the Evolution Theory*. London: Edward Allen, 1931.
- <sup>68</sup> Dewar demonstrates this for birds in *The Transformist Illusion*. Murfreesboro, Tennessee: DeHoff Publications, 1957, pp 246-248, 274-280. For references to similar analyses of other groups (especially mammals and fishes) see my doctoral thesis, Arthur Jones, *Developmental Studies and Speciation in Cichlid Fish*, Birmingham, UK: University of Birmingham, 1972, Diss S2 B72.
- <sup>69</sup> For an old, but still excellent discussion see N.B. Marshall's Aspects of convergent evolution, Chapter 5 in his *Explorations in the Life of Fishes*, Cambridge, Mass.:Harvard University Press, 1971, pp 100-168.
- <sup>70</sup> C.R. Darwin, *The Origin of Species*. London: Senate, 1994, Chapter XIV, p 403 (6th edn, first published in 1872).
- <sup>71</sup> T.G. Dobzhansky, *Evolution, Genetics, and Man*. New York: John Wiley & Sons, 1955, 398 pp (p 228).
- <sup>72</sup> W.S. Beck, K.F. Liem and G.G. Simpson, *Life: An Introduction to Biology*. New York: HarperCollins, 1991, 3rd edn, p G-16.
- <sup>73</sup> 'Evolution is a contingent process: even if evolution on this planet was run through again, the land vertebrates would be very unlikely to reappear and, even if something like them did, their anatomies would have many important differences ... Our hands and feet have the common "pentadactyl" pattern, variations of which are characteristic of all the descendents of *Eusthenopteron* [a fossil lobe-finned fish] but of no other organisms on this planet.' (Jack Cohen, How to design an alien. *New Scientist*, **132** (1800/1801), 21/28 December 1991, pp 18-19).
- <sup>74</sup> See Elliott Sober, The principle of the common cause, in *From a Biological point of View: Essays in Evolutionary Philosophy*, Cambridge: CUP, 1994, Chapter 8, pp 158-174.
- <sup>75</sup> G.R. de Beer, Darwin's Notebooks on transmutation of species Part I First Notebook (July 1837-February 1838). *Bulletin of the British Museum (Natural History) Historical Series*, **2**, 1960, p 43. At the end of *The Origin of Species*, Darwin wrote that, 'And as natural selection works solely by and for the good of each being, all corporeal and mental endowments will tend to progress towards perfection.' (London: Senate, 1994, p 428).
- <sup>76</sup> C.R. Darwin, *The Origin of Species*. London: Senate, 1994, Chapter VI, p 166.
- <sup>77</sup> J.A. Moore and I.D. Olsen (Eds), *Biological Sciences: An Inquiry into Life* (Biological Sciences Curriculum Study Yellow Version). New York: Harcourt, Brace, Jovanovich, 1973, 3rd edn, p 741.
- <sup>78</sup> C.A. Villee, W.F. Walker and F.E. Smith, *General Zoology*. Philadelphia: W B Saunders, 1963, 2nd edn, p 676.
- <sup>79</sup> D.J. Futuyma, *Evolutionary Biology*. Sunderland, Mass: Sinauer Associates, 1979, p 443
- <sup>80</sup> A.J. Cain, The perfection of animals. In J.D. Carthy and C.L. Duddington (eds), *Viewpoints in Biology*, London: Butterworth, 1964, Vol **3**, pp 36-63 (pp 36-37).
- <sup>81</sup> F.J. Ayala, The theory of evolution, *New Encyclopædia Britannica*, Chicago: Encyclopædia Britannica, 1988, 15th edn, Vol. 18, pp 981-1009 (p 987).
- <sup>82</sup> S.J. Gould, *The Panda's Thumb: More Reflections in Natural History*. Harmondsworth: Penguin, 1983, p 27 (first published in the USA in 1980).
- <sup>83</sup> P.B. Medawar, Critical notice: *The Phenomenon of Man* by Pierre Teilhard de Chardin. *Mind*, **70**, 1961, pp 99-106 (p 104).

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<sup>84</sup> Ichthyosaurs are extinct fish-like reptiles.

<sup>85</sup> *Sacculina* is a parasite of crabs. It has a saclike body with no shell, appendages or gut. It is regarded as an arthropod (barnacle) because it has larvae resembling those of crustacea.

<sup>86</sup> See, e.g. Alastair Ewing *et al.*, *The Open University, Science: A Second Level Course, S298 Genetics, Units 9 & 10*, Milton Keynes: Open University Press, 1987, pp 1-30 and 1-33.

<sup>87</sup> S.J. Gould, *The Panda's Thumb*. Harmondsworth: Penguin, 1983 (1980), pp 34, 27.

<sup>88</sup> There is, of course, one kind of 'imperfection' which is universally admitted, namely that of, e.g. wingless flies on windswept islands, or of eyeless animals in deep caves. On this kind of degeneration ('devolution') see the note in Part II, Section 2 of Chapter 1.

<sup>89</sup> This is not, of course, to claim that establishing function is easy. It may require a rich imagination and painstaking research, but it is demonstrably *possible*. See the end of this Section, Paul Nelson's papers cited in Part II, Section 5, and, for an insight into the painstaking research required, Pieter. Dullemeijer, *Concepts and Approaches in Animal Morphology*, Assen, Netherlands: Van Gorcum, 1974. 264 pp.

<sup>90</sup> A.J. Cain, The perfection of animals. In *Viewpoints in Biology* (J.D. Carthy and C.L. Duddington eds). London: Butterworth, 1964, **3**, pp 36-63 (p 37).

<sup>91</sup> A.J. Cain, *ibid*, p 51.

<sup>92</sup> S.R. Scadding, Do 'vestigial organs' provide evidence for evolution? *Evolutionary Theory*, **5**, 1981, pp 173-176 (p 173). Scadding rebutted criticism in, Vestigial organs do not provide evidence for evolution, *Evolutionary Theory*, **6**, 1982, pp 171-173. Scadding is in the Zoology Department of Guelph University, Guelph, Ontario, Canada.

<sup>93</sup> A.J. Cain, *ibid*, p 37.

<sup>94</sup> Documented by Wilbert H. Rusch, Ontogeny recapitulates phylogeny, *Creation Research Society Quarterly*, **6** (1), 1969, pp 27-34. A note in *New Scientist* (Embryonic fraud lives on, **155** (2098), 6 September 1997, p 23) reports on a new exposé by Michael Richardson of St George's Hospital Medical School in London (*Anatomy and Embryology*, **196**, 1997, p 91).

<sup>95</sup> See J.M.W. Slack *et al.*, The zootype and the phylotypic stage, *Nature* **361** (6412), 1993, pp 490-492.

<sup>96</sup> On body plans (Baupläne) see J.M.W. Slack *et al.*, *ibid*, and Chapter 3 Animal architecture and the Bauplan concept, in Richard Brusca and Gary Brusca, *Invertebrates*, Sunderland, Mass: Sinaeur, 1990, pp 43-96.

<sup>97</sup> A.J. Cain, *ibid*, pp 57-58.

<sup>98</sup> H. Elias, Embryonic diversity leading to adult identity: the early embryology of the liver of vertebrates (A preliminary report). *Anatomischer Anzeiger*, **101** (13/15), 1955, pp 153-167 (p 166).

<sup>99</sup> H Elias, Liver morphology. *Biological Reviews*, **30**, 1955, pp 263-310 (p 304).

<sup>100</sup> See, as examples, R. McNeill Alexander, *Optima for Animals*, London: Edward Arnold, 1982, 112 pp, *Animal Mechanics*, Oxford: Blackwell, 1983, 2nd edn, 312 pp.; Stephen Wainwright *et al.*, *Mechanical Design in Organisms*, Princeton, NJ: Princeton University Press, 1982, 423 pp; Peter Hochachka and George Somero, *Biochemical Adaptation*, Princeton, NJ: Princeton University Press, 1984, 538 pp; Knut Schmidt-Nielsen, *Scaling: Why is Animal Size So Important?*, CUP, 1984; N.F. Hadley, *The Adaptive Role of Lipids in Biological Systems*, New York: John Wiley, 1985, 332 pp; Steven Vogel, *Vital*

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*Circuits: On Pumps, Pipes, and the Workings of Circulatory Systems*, Oxford University Press, 1992, 315 pp; Peter Wainwright and Stephen Reilly, *Ecological Morphology: Integrative Organismal Biology*, Chicago University Press, 1994, 367 pp; R. McNeill Alexander. *Bones: The Unity of Form and Function*, London: Weidenfeld & Nicolson, 1994, 224 pp; Michael French, *Invention and Evolution: Design in Nature and Engineering*, CUP, 1995, 2nd edn, 385 pp.

<sup>101</sup> A.J. Cain, *ibid*, p 55.

<sup>102</sup> See Edmund J. Ambrose, *The Nature and Origin of the Biological World*. Chichester: Ellis Horwood, 1982, 190 pp.

<sup>103</sup> See Part III, Section 4 of Chapter 1.

<sup>104</sup> The alternative is that the mouse makes mouse DNA because it is a mouse.

<sup>105</sup> 'In order to know anything about how organisms evolve you first have to know how organisms are put together. Before you can ask how a worm changes you have to know how to build one.' Dutch biologist Armand Leroi, cited by Graham Lawton, Geneticist to explore Dutchmen's extra inches, *Times Higher Education Supplement*, **1266**, 7 February 1997, p 18.

<sup>106</sup> R.C. Lewontin, *The Doctrine of DNA: Biology as Ideology*. London: Penguin, 1993, p 48.

<sup>107</sup> For literature see Section 8 of Chapter 5.

<sup>108</sup> In the DNA molecule, the sequence of four chemical bases contains the information for the production of proteins. By gene mutation we mean change in the DNA base sequence through random events which result in base substitution, addition or deletion.

<sup>109</sup> See Alastair Ewing *et al.*, *The Open University, Science: A Second Level Course, S298 Genetics, Units 9 & 10*, Milton Keynes: Open University Press, 1987, pp 1-30 and 1-33.

<sup>110</sup> Total appearance, including, e.g., chemical constitution and behaviour.

<sup>111</sup> On 'kinds' (a creationist term) see Part III, Section 1 above. If 'kinds' are roughly equivalent to the 'families' of modern classification systems, then about one-quarter of the 4000 known fossil kinds are still represented by living organisms. See David Raup, The role of extinction in evolution, *Proceedings of the National Academy of Sciences of the USA*, **91** (15), 1994, pp 6758-6763 (6759).

<sup>112</sup> The fossil record of land vertebrates is as good as that of echinoderms (e.g. starfishes and sea urchins) which are generally assumed to have one of the best fossil records (Michael Benton, *Vertebrate Palaeontology*, London: Chapman and Hall, 1997, 2nd edn, Section 2.3.4, pp 34-35). Of the land vertebrates, birds are regarded as being the most poorly represented as fossils, yet the data of D.M. Unwin (Aves, Chapter 40 in M.J. Benton (ed), *The Fossil Record 2*, London: Chapman and Hall, 1993, pp 717-737) show that of the 153 families of living bird, species from 134 (88%) are known as fossils (Benton, *ibid* (1997), p 259).

<sup>113</sup> See Duane Gish, *Evolution: The Fossils Still Say No!*, El Cajon, California: Institute for Creation Research, 1995, 391 pp.

<sup>114</sup> See Dr Joachim Scheven's video, *Living Fossils: Confirmation of Creation*. His *Lebendige Vorwelt* ('Living Prehistory') museum in Hagen, Germany (just south of Dortmund) houses the largest known collection of 'living fossil' pairs. Video obtainable from Creation Science Foundation (CSF) - see Chapter 5, Section 8, for details of CSF (UK).

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