Review of: J. P. Moreland (ed.) <u>The Creation Hypothesis</u> Downers Grove, Ill: InterVarsity Press

This book is an interesting addition to the anti–evolution literature. (For a nice survey of this literature up until 1992, see Tom McIvor's *Anti–Evolution: A Reader's Guide to Writings Before and After Darwin* Baltimore: Johns Hopkins University Press, 1992.) I shall provide a fairly detailed examination of it here, divided into sections according to the table of contents. Those who don't wish to read the whole review should skip to the bits in which they are most interested. Those who only want a final verdict should skip to my concluding remarks. The discussion of Moreland's introduction is particularly long, because this is where most of the philosophically interesting material is contained; some readers may just want to skip this bit.

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There is a list—at pp.333–5—which provides information about the contributors to the book, including their academic credentials, and their current occupations:

John Ankerberg is a Christian Television show host.
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Phillip E. Johnson is a well–known professor of law at University of California, Berkeley.

Stephen C. Meyer is professor of philosophy at Whitworth College. He has a Ph.D. from Cambridge in history and philosophy of science. He has written a number of journal articles, mostly about the structure of evolutionary arguments and the methodology of historical sciences.

J. P. Moreland is professor of philosophy at Talbot School of Theology, Biola University. He has a Ph.D in philosophy from University of Southern California. He has written many books and journal articles, mostly concerned in some way with philosophy of religion.

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Hugh Ross has a Ph.D in astronomy from the University of Toronto. He has his own 'research institute', and is the author of some well–known books (including *The Fingerprint of God*).

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John Weldon has written many books on religious topics; he is a 'researcher' for the John Ankerberg show.

Kurt P. Wise teaches science at Bryan College, Tennessee. He has a Ph.D in paleontology from Harvard.

Clearly, most of these people have serious academic credentials; and they are qualified to talk about the topics which they discuss. One might expect that this book is better than run–of-the-mill attacks on evolutionary theory; and, at least in some respects, this expectation is justified. Before I discuss the relative merits of the book, I shall give a fairly detailed examination of each of the individual contributions in turn.

Introduction, by J. P. Moreland

Moreland's introduction divides into five parts: (i) some introductory remarks; (ii) a critique of a view which he calls 'scientism'; (iii) a discussion of two well–known arguments for the existence of God, the *kalam* cosmological argument and the argument for design; (iv) some brief remarks about a view which he calls 'naturalism'; and (v) some comments on the material in the rest of the book.

(i) **Introduction**: Moreland considers various views which one might take about the relationship between theology and science (on the assumption that theology is to be taken seriously). The view which he defends he calls 'theistic science': this is the view that theological propositions can and ought to 'enter into the very fabric of science and the utilisation of scientific methodology' (13). In particular, 'theistic science' is premised on the assumption that God designed and created the world for a purpose, and that God has

directly intervened in the course of the development of the world at various times, including times prior to the arrival of human beings. According to Moreland, 'theistic science' constitutes a scientific research program which has an important contribution to make to 'the evolution–creation controversy' (though it is not affiliated with any particular varitey of creationism—young earth creationism, progressive creationism, etc.).

In justifying 'theistic science', Moreland claims that theists ought to 'consult all that they know or have reason to believe in forming and testing hypotheses, explaining things in science and evaluating the plausibility of various scientific hypotheses' (12). I take it that this claim is clearly right: what you have reason to believe depends upon what else you believe (or, perhaps, what else you have reason to believe). However, this claim offers no support at all for the idea that theological propositions can and ought to enter into the very fabric of science and the utilisation of scientific methodology. It is one question how one ought to assess scientific claims; it is quite another how one is to demarcate scientific claims from non–scientific claims. Perhaps Moreland is right to suppose that one could reasonably believe both that Genesis is not consistent with 'theistic evolution' (i.e. the claim that theological propositions are consistent with, but quite independent of, scientific theories of evolution), and that this is a reason for rejecting scientific accounts of evolution. But it does not follow—at least not without further argument—that the replacement views which are accepted are scientific. Since Moreland offers no demarcation principle, it is hard to discuss this matter further (though it is worth noting that the absence of a principle of demarcation affects his critique of 'scientism', to which we now turn).

(ii) **Critique of 'scientism'**: Moreland distinguishes two kinds of 'scientism' which he claims would defeat out of hand the claim that there can be a 'theistic science'. 'Strong scientism' holds that no proposition can be reasonably believed unless it has been formed, successfully tested, and used according to appropriate scientific methodology. 'Weak scientism' holds that science is the most valuable, most serious and most authoritative sector of human learning. (See p.15. When Moreland goes on to claim that, according to 'weak scientism', beliefs are rationally acceptable only insofar as they can be given scientific support, he seems to obliterate any distinction between 'strong scientism' and 'weak scientism'.) Against 'scientism', Moreland urges: (i) that 'strong scientism' is self–refuting (since it is not a proposition which has been formed, successfully tested, and used according to appropriate scientific methodology); (ii) that 'scientism' (in either form) rules out the possibility of stating and defending necessary presuppositions of science; and (iii) that 'scientism' (in either form) is inconsistent with the evident truth that there are true rationally justified beliefs in many non–scientific domains.

Since Moreland hasn't told us what counts as science, it is hard to assess his arguments against 'scientism' (and also hard to know what he takes this position to be). However, it does seem that his case against 'weak scientism' cannot be very strong: after all, it is surely consistent with the idea that science makes philosophical presuppositions that science provides the most valuable, most serious, and most authoritative sector of human

learning, and that there are true rationally justified beliefs in many non–scientific domains. (Moreland claims that, because science rests on philosophical assumptions, philosophy is a stronger candidate to be 'the paradigm of rationality'. But, since no view can be free of assumptions, it seems that what we have here is better seen as an argument for the view that there is no paradigm of rationality! Moreover, there is no inconsistency in the view that science is more valuable, more serious and more authoritative than philosophy, even if interpretations of scientific theories do 'rest' on philosophical assumptions—for those assumptions may be comparatively trivial, or they may be hotly contested in ways in which fundamental scientific claims are not. And it is also not clear that science does *rely* upon philosophical presuppositions; it is a commonplace that scientific theories admit of a variety of realist interpretations from a range of philosophical standpoints.)

I take it that there is a way of understanding 'scientism' on which it turns out to be true, but not inconsistent with 'theistic science'. The idea is that scientific method is simply a continuation of ordinary methods of belief revision: what it is reasonable to believe is the simplest, most powerful, most explanatory theory which coheres with all observations (actual and predicted); and it is only reasonable to revise one's beliefs if one thereby obtains some overall improvement in one's system of beliefs (measured in terms of an appropriate weighting of these desiderata). Of course, this hardly constitutes even the beginnings of an account of scientific method—but, if something along these lines is right, then it seems plausible to think that 'scientism' is not obviously inconsistent with 'theistic science'. (And surely this is a desirable result for Moreland. After all, why is he so keen to call his view 'theistic *science*'?)

Of course, one might want to take a less concessive line here, to preserve a special sense for 'scientific method' as opposed to 'rational method'. So, for instance, one might think that 'theistic science' is bound not to allow certain propositions—e.g. the claim that *Genesis* is the word of God—to confront the tribunal of experience in the way which we require of all genuinely scientific propositions. (Would a proper scientific examination—drawing upon recent work in textual analysis, comparative literature, other historical sciences, and so on—support the claim that *Genesis* is the word of God?) Or one might think that the claim that *Genesis* is the word of God could not obtain—nor merit—the kind of independent concensus which is required for anything which deserves to be called a 'scientific claim'. However, the prospects for these kinds of lines of argument depend upon, among other things, the principle of demarcation which is chosen—so there seems to be little point in pursuing these lines of thought in the present context. (As I said above, Moreland's critique of 'scientism' and his defence of 'theistic science' are useless until he tells us: (i) what he means by 'science' and (ii) how he means us to distinguish between 'science' and 'non–science'. As things stand, his critique is clearly vitiated by slides between thinking of science as a sum of subject matters and thinking of science as the application of a particular kind of methodology.)

(iii) **Two arguments for the existence of God**: Moreland claims that there are two arguments for the existence of God which are 'strongly supported' by recent scientific discoveries' (18): the *kalam* cosmological argument and the cosmic fine–tuning argument

for design. Moreland offers a brief discussion of each, including replies to some objections (the clear implication being that these are the most important objections to these arguments). I shall consider his comments on these arguments in turn:

(1) ***Kalam* <u>cosmological argument</u>**: Moreland doesn't exactly tell us what the *kalam* cosmological argument is supposed to be. What he does say is that it relies upon establishing the following three premises:

1. The universe had a beginning
2. The beginning of the universe was caused.
3. The cause of the beginning of the universe was personal.

I take it that it is quite obvious that it does not follow <u>deductively</u> from these three premises alone that God exists (it could be, for example, that the personal creator of the universe is perfectly evil rather than perfectly good). Moreover, I take it that it is far from clear that the existence of God follows as an inference to the best explanation—i.e. as an <u>inductive</u> inference—from these three premises. However, even if this suffices to show that the *kalam* cosmological argument fails as an argument for the existence of God, these premises would suffice to establish things which non–theists should want to deny. So there is reason to consider the arguments which Moreland offers on behalf of these premises.

On behalf of premise (1), Moreland offers the claim that its truth is established by a philosophical argument from the premise that it is 'impossible to cross or traverse an actual infinite number of events one at a time'. His argument for (1) then proceeds as follows: 'If the universe had no beginning, then the number of events crossed to reach the present moment would be actually infinite. But since one cannot cross an actual infinite, the present moment could never have arrived if the universe were beginningless. Since the present is real, it was only preceded by a finite past, and there was a beginning or first event.' (19)

As Moreland notes (more or less), one important objection to this argument for (1) is that it surreptitiously introduces the idea that a beginningless universe is a universe with a beginning time T which is infinitely far away, and from which the present time must be reached. Even if it is true that 'an actual infinite cannot be traversed one step at a time', it is a mistake to think that a beginningless universe requires the traversal of an actual infinite one step at a time—for the concepts of 'traversal' and 'cross' require a setting out point and a finishing point, but there is no setting out point in the case of a beginingless universe. Moreland claims that this reply is a 'gross misunderstanding' of the argument for (1): the point is that an infinite past would have the same structure as 'counting from negative infinity to zero', something which is clearly impossible.

I think that it is not obvious that it is impossible for there to be physical instantiations of the structure of 'counting from negative infinity to zero'. More strongly, I think that, on the most plausible interpretations of cosmological models in general relativity, it turns out that the physical universe instantiates something like the structure of 'counting from

negative infinity to zero' even though the universe is finite in the past! Cosmological models in general relativity are always based on spatio–temporal manifolds which are *open* in the past, so that time has the structure of an *open* interval in the real numbers. The important conceptual point here is that time can have the crucial feature of the structure of 'counting from negative infinity to zero'—namely, that there is no first moment of time—even if time is finite in the past. (In Big Bang models, the initial singularity is always an *ideal* point which does not belong to the spatio–temporal manifold.) In the present context, the crucial point is that Moreland's claim about the impossibility of a beginningless universe is clearly question–begging: his argument gives no reason at all why the universe could not be a finite but open spatio–temporal manifold (hence, no reason at all why the universe could not be beginningless *even if* time is finite in the past).

(There may be assumptions about the nature of time which are relevant to this debate. If one adopts a 'four–dimensionalist' analysis, according to which there is a four–dimensional spatio-temporal manifold, all of the points of which exist, then it is hard to see why one could not suppose that this manifold is open (and hence why one could not suppose that the universe is both finite in the past and beginningless). However, if one adopts a 'three-dimensionalist', according to which only the present exists, and according to which time 'flows' from the past to the future, then it *may* be that the idea that the universe is both finite in the past and beginningless is more problematic. It seems to me that one could be a 'three-dimensionalist' and nonetheless hold that the universe is both finite in the past and beginningless—but perhaps there is room for disagreement about this matter. It should also be noted that my discussion assumes that time is dense; if time were discrete, then it would not be possible for the past to be finite and yet open. This assumption is certainly contestable—but it is worth noting that all standard physical theories assume that time is continuous.)

Apart from the question–begging *a priori* defence of (1), Moreland also claims that premise (1) is supported by science, in particular, by the Big Bang theory and the second law of thermodynamics. I have already argued that the first part of this claim is mistaken. For the purposes of the *kalam* cosmological argument, (1) has to be understood to be the claim that there is a first moment at which the universe exists. The Big Bang theory, in all its standard formulations, is actually inconsistent with this claim: for, while the Big Bang theory says that the universe is finite in the past, it also says that the universe is open in the past—the 'initial Big Bang singularity' is no part of the universe. More cautiously, the crucial point is that it is not enough to find arguments from science for the claim that the universe is finite in the past: one needs to find arguments from science for the claim that there is a first moment at which the universe exists. Since Big Bang cosmology does not furnish such arguments, Big Bang cosmology does not support the *kalam* cosmological argument. Moreland's argument from the second law of thermodynamics is also controversial. Moreland claims that if the universe had existed through an actually infinite past, then it would have reached an equilibrium state an infinite number of days ago. Since the universe is not in an equilibrium state now, we can conclude that the universe had not existed through an actually infinite past. Several points should be made in reply: First—as noted above—the crucial point is whether the

universe is open in the past: if the universe is temporally finite but open in the past, then there is no obvious reason why it should have reached an equilibrium state by now. Second, even if we supposed that the universe is infinite in the past, it is not clear that Moreland's claim is correct: in infinite time, one would expect to get some enormously large departures from thermodynamic equilibrium (and anthropic considerations then suggest that we should hardly be surprised to find ourselves in one of these unlikely regions). (Moreland considers, and dismisses, the further reply that the universe is not a thing, and that the laws of thermodynamics only apply to regions of spacetime within the universe. Since I would not wish to press this kind of objection, I shall not discuss these arguments here.)

On behalf of premise (2), Moreland claims that it is justified by the claim that every event has a cause, or perhaps by the claim that everything which comes into existence has a cause. (pp.21/2) He says: "It would seem that this principle [that every event has a cause] is quite reasonable. ... In favour of this principle is, arguably, our entire, uniform experience. We simply find the world to be such that events don't pop into existence without causes." (p.21) Ignoring some hard questions about quantum mechanics, it does seem to be the case that we find causes for all events which are properly included in our spatiotemporal universe. However, this 'uniform experience' does nothing at all towards supporting (2). We can divide events into two kinds: those which overlap the entire initial history of the universe, and those which do not. (So the latter kind of event can be located by a time interval which is properly included in the history of the universe: there are times which are earlier than the occurrence of this kind of event.) In the nature of the case, we have no experience of (the early stages of) events of the former kind; hence, our 'entire, uniform experience' does not support that claim that instances of this kind of events have causes (even if it does support that claim that instances of the other kind of events always have causes). Non-theists can grant that Moreland's causal principle is nearly right—all 'non–initial' events have causes (a claim which is supported by our 'entire, uniform experience)—while nonetheless holding that premise (2) of his *kalam* cosmological argument is entirely without foundation.

Perhaps it is worth noting that non–theists do not need to disagree with Moreland that things don't 'pop into existence' without causes (unless quantum mechanics tells us otherwise). Certainly, talk about things 'popping into existence' suggests the following picture: there is a domain or venue or location in which certain things do not exist and then without cause certain things 'pop into' existence in that domain or venue or location. But that it not—or, at any rate, ought not to be—the way that non–theists think about the origins of the universe. There is no domain or venue or location in which the universe is located. The universe did not 'pop into' existence—caused or uncaused—and there is no space, time, or spacetime which is 'external' to the universe. (Perhaps one might claim that to say that the universe 'popped into existence' is to say no more than that the universe has no cause. But, of course, in that unobjectionable sense, it will also be the case that theists are committed to the claim that God popped into existence—and so it can hardly be that theists are committed to the claim that things do not pop into existence. Since no sensible non–theists hold that the universe 'popped into existence' in any other

objectionable sense, it is plainly time that proponents of *kalam* cosmological arguments stopped foisting this claim on their opponents.)

Moreland also writes: "The question 'What or who made God?' is a pointless category fallacy. ... The question 'What made X?' can only be asked of Xs that are by definition makeable. But God, if he exists at all, is a necessary being, the uncreated creator of all else. This definition is what theists mean by 'God', even if it turns out that no God exists." (22) Perhaps Moreland is right that theists typically suppose that God is a necessary being, 'the uncreated creator of all else'. But, if we are thinking about the origins of our universe, then—as Moreland suggests elsewhere—we shouldn't rule out hypotheses simply by definitional *fiat*. Yet, it seems to be logically possible that our universe was created by a person who is neither necessary nor the uncreated creator of all else. (Here's a possible example. Suppose that, in some other universe, some physicists are playing around with a very powerful particle accelerator. By accident, they create a kind of wormhole in spacetime—a singularity—and that our universe emerges from the 'other end' of the wormhole. In that case, our universe will have a personal cause—but the persons in question will be limited, finite beings. Perhaps as I have stated it, this story is not quite coherent (or consistent with physics)—but I don't see that there is any in principle objection to the idea that some stories of this kind are logically consistent.) The important point here is that, if we are going to treat the hypothesis that the world was made by God as a scientific hypothesis, then we need to give fair and equal treatment to competing hypotheses. As Hume pointed out long ago, there seem to be countless alternative hypotheses which fit the available evidence about as well as the traditional theistic hypothesis.

On behalf of premise (3), Moreland claims that it is justified by the observation that there are two distinct kinds of efficient causation: event–event causation and agent causation. Given that the first event cannot be an instance of event–event causation, it follows that it must be an instance of agent causation—and so, he claims, it follows that the cause of the universe is personal. (p.23) Clearly, this justification is of no use to those who hold that there is no such thing as agent causation, or that the very notion of agent causation is unintelligible. Moreover, I don't see why we should suppose that there can only be one kind of spooky causation above and beyond familiar event–event causation: given that we are going to believe in 'immediate, direct and spontaneous actualisations of causal powers', why shouldn't we suppose that there might be non–personal sources or loci of such powers? Suppose that we set these (important) worries aside. There is still a major difficulty which confronts Moreland's argument. Even if there is a first event in our universe—the region which is spatiotemporally connected to us—it doesn't follow that there is a first contingent event unless we suppose that all contingent events belong to the region which is spatiotemporally connected to us. But why should we suppose this? Naturalists may have a good answer: in their view, there may be no reason to think that there is anything other than our universe (the region which is spatiotemporally connected to us). But, if we are prepared to take seriously the idea that there might be more, then it seems to me that we should be prepared to take seriously the idea that the domain of the contingent may be far more extensive—and, in particular, we should be prepared to take seriously the idea that there is a contingent cause of our universe. But, in

that case, Moreland's 'argument' for the personal nature of the first cause of our universe collapses.

In sum, then: Moreland's sketch of a *kalam* cosmological argument is subject to numerous criticisms. First, the premises which he offers are insufficient to justify the conclusion that God exists. Second, it is clear that reasonable non–theists can reasonably reject each of the premises (and it is also clear that some reasonable non–theists will reasonably reject all of them). Third, the first two points stand even if there is good reason to think that science tells us that the world is finite in the past; i.e. it is not the case that Big Bang cosmology provides any support for *kalam* cosmological arguments. These observations are important because *kalam* cosmological arguments belong to one of the two kinds of arguments in the book for the claim that there is scientific evidence of an intelligent designer. Given what I have said, it seems perfectly clear that *kalam* cosmological arguments do not give non–theists the slightest reason to think that there is a personal first cause.

(2) **Cosmic fine–tuning argument for design**: Moreland provides a brief discussion of design arguments in which he emphasises the following points: (1) there are many different kinds of design which can be appealed to in arguments for design (p.24); (2) design arguments gain much of their strength from the details of the cases of alleged design; (3) (roughly) the case for a cumulative argument for design is greatly strengthened by the variety of cases of design; (4) different cases of design may indicate different aspects of God's nature; and (5) arguments for design can take different forms: arguments from analogy; inferences to the best explanation; and Bayesian arguments (pp.25–8). Much of this discussion is unproblematic; I shall focus instead on some of the more contestable claims which Moreland makes.

Moreland provides the following sketch of a design argument: "There will always be ordered entities and laws that will be brute, unexplainable givens for science. Now our experience teaches us that, regularly, order .. originated and introduced into the world as the direct result of intelligent persons who act intentionally. Thus, the ultimate ordered entities and laws that exist in the universe must either be taken as brute, unexplainable realities .. or explained with the resources we use every day to explain other examples of order—as the result of an intelligent mind. There is no good reason to leave these examples of order as brute, unexplained realities, and there is good precedent to explain them as the result of a mind." (24) I accept that there are always going to be brute, unexplain<u>ed</u> entities in any theory. (Perhaps there are never brute, unexplain<u>able</u> entities, because there can never be a completed theory: for any theory, there is another which explains the unexplained entities in the former. In the interests of brevity, I shall set aside this possibility here.) However—following Hume—I insist that this applies just as much to theistic theories as to any others. We have already seen that Moreland insists that we are not allowed to ask 'Who made God?'; and perhaps one might think that we can rule out any other brute and unexplained (and, indeed, unexplainable) givens in theistic theory by similar *fiat*. But that is not so. Consider, for example, the creative choices of God— e.g. the choice to make certain animals this way rather than that. Assuming that there is no unique best possible world, God had genuine choices for which reason could provide

no justification. Suppose that the choice whether to make certain animals this way rather than that is one of these choices. Then it seems fairly clear that, on Moreland's view, there is no possibility of explaining why God chose one way rather than the other: God's choice is, in this insistence, a brute and unexplainable given. Since pretty much any theory is going to have brute and unexplained givens, the important question is whether there is any advantage in trading kinds of brute and unexplained givens by moving from naturalism to supernaturalism. And that plainly depends upon whether there are independent reasons for preferring naturalism to supernaturalism. (Perhaps Moreland might object that, on his view, there will be fewer and less objectionable brute and unexplained givens. However, that seems quite contentious. At the very least, we need to be told more about how to assess and count givens.)

There is a related argument which ought to be discussed here. The argument for design attempts to explain the apparent design in the world in terms of the orderly mind of the Designer. But the orderly mind of the Designer is just another instance of apparent design, so the question natually arises: what explains the apparent design in it? If we are told that it is brute and unexplainable, then we should conclude that there is no advantage (in this respect) to be gained by postulating a Designer. If we are told that it is self–explanatory, then we should protest that we have no idea what this means but that, if Designers can be self–explanatory, then it is hard to see why universes should not be so as well. And if we say that there is an explanation in terms of something else, then we seem to have given up a crucial part of the theistic picture. So there is at least *prima facie* reason to think that it is just a mistake to think that the apparent design in the world can be explained without remainder in terms of intelligent design. (This argument is due, in its essentials, to David Hume. It is much more deserving of attention than the bad anthropic argument discussed below.)

In connection with the Bayesian version of the design argument, Moreland notes that the contributors to the book contend that "[T]he likelihood that the type of [apparent] design we find in the world would occur if God did not exist .. is quite low. ... [W]hen one actually examines the scientific evidence for the real design of the world, it becomes much less plausible to believe that the design in this world is the result of chance or some other factor apart from God." We shall have more to say about this contention later; for now, I just want to draw attention to the fact that it is not clear that non–theists are committed to the claim that the apparent design in the world is the result of chance or some other factor apart from God. Non–theists may hold that there is no explanation of the apparent design in the world—no explanation of the laws and boundary conditions for the universe—without accepting the suggestion that they consequently hold that the apparent design in the world is the result of chance. The point here is that, according to this kind of non–theist, the apparent design in the world is not the result of anything; hence, in particular, it is not the result of chance (or any other factor apart from God). It may be true that there are many other possible sets of laws and boundary conditions which would not yield universes in which there is life—but without the assumption that these other possible sets of laws and boundary conditions are equiprobable, one cannot obtain the conclusion that our universe is improbable. And, in the absence of some domain or venue or location within which the universe is to appear, it is hard to see how

one can make sense of the idea that possible sets of laws and boundary conditions are equiprobable or that our universe is 'the result of chance'. (Perhaps one might say that, *a priori*, no universe is more likely than any other—and hence that, *a priori*, a universe without life is more likely than one with life. Even if this suggestion is not defeated by cardinality considerations—there may well be just as many possible universes which contain life as there are possible universes which do not—it just seems wrong to think that, *a priori*, no universe is more likely than any other.) I shall have more to say about these kinds of considerations later.

Moreland provides some brief discussion of objections to arguments for design. In particular, he considers the bad anthropic argument from the premise that, if the world had been one in which intelligent life could not have arisen then we should not be here to discuss the matter, to the conclusion that we should not be surprised that there is apparent design in the world (and should not think that this apparent design is in any need of explanation). I agree that this is a bad argument. (Moreland seems to think that one can find this kind of argument in Hume. I'm not sure that this is right; in any case, I would want to insist that there are many much better arguments in Hume's *Dialogues Concerning Natural Religion*.) I also think that very few non–theists have seriously tried to mount this argument; i.e., I think that Moreland is here attacking a strawman.

Moreland also considers 'the multiple worlds ensemble' objection to arguments for design. The idea is that the appearance of design will be adequately accounted for if there are numerous domains in which relevant factors vary randomly: while many of these domains will show no appearance of design, some will—and we should not be surprised that we inhabitant one of the domains which does show appearance of design. (Moreland claims that it is part of this view that there are infinitely many worlds, and that every physically possible universe exists. I do not think that either of these claims need be part of 'the multiple worlds' view. Certainly, you don't need either of these claims to get an adequate response to arguments for design.) Against 'the multiple worlds ensemble' objection, Moreland urges: (i) that the view appears to be contrived and made up largely to avoid theistic conclusions; (ii) that one can hardly suppose that there are 'intellectual difficulties' with the notion of a Designer if one supposes that there are 'bizarre entities' such as alternative parallel worlds; and (iii) that there is little or no evidence for these parallel universes while there is additional evidence for the existence of God. (p.30) Against these objections, it should be noted: (a) that some cosmological models require an ensemble of worlds (i.e. it may be that physics provides us with reason to believe in an ensemble of worlds); (b) that it seems to be a matter of taste whether one supposes that a Designer is less bizarre than an ensemble of worlds; and (c) that it is highly controversial that, on balance, there is more evidence that there is a Designer than there is evidence that there is an ensemble of worlds. (Remember, in particular, that while considerations about evil may rule out the existence of God, they cannot rule out the existence of an ensemble of worlds.) It seems to me that Moreland misunderstands the point of the 'multiple worlds ensemble' objection to arguments for design. Typically, the point of the objection is not to try to establish that there is an ensemble of worlds; rather, the point is to suggest that there is no more reason to believe that there is a Designer than there is to believe that there is an ensemble of worlds. If it is true that there is no more reason to

believe that there is a Designer than there is to believe that there is an ensemble of worlds, then it must be the case that arguments for design fail. Whether one should believe that there is no explanation of the appearance of design in the world—or whether one should be agnostic about the reason for the appearance of design in the world—is then a further question which we shall not take up here. (Perhaps it is worth noting that one need not agree with Moreland's claim that the worlds of the ensemble are 'bizarre entities' which create at least as many 'intellectual difficulties' as does the postulation of God. After all, the worlds of the ensemble are supposed to be just like the world which we inhabit—governed by the same kinds of laws, and subject to similar boundary conditions—and we *know* that our world is not logically inconsistent; so we have good reason to think that there will be no logical difficulties involved in the worlds of the ensemble. On the other hand—as is also well known—there are all kinds of logical puzzles involved in the attributes which are typically supposed to be possessed by God: omniscience, omnipotence, omnibenevolence; eternity, and so on. Consequently, there seems to be plenty of room for the view that God is far more bizarre or 'intellectually difficult' than the worlds of the ensemble.)

Another objection to design argument which Moreland briefly considers is appeal to the general theory of macroevolution. This objection says that evolutionary theory shows that we have no need of the hypothesis of an intelligent designer. Although we shall have reason to return to this argument when it is discussed in later chapters in the book, it is worth noting that there are many non–theists who will not accept it. While it may be true that evolutionary theory shows that design arguments based on biological data fail—and even this much is controversial—it seems clearly mistaken to think that evolutionary theory shows that design arguments based on cosmological data fail. (Only those like Smolin, who think that the domain of explanation of evolutionary theory is much wider than is commonly supposed, can have good reason to reject this claim.) At any rate, it seems to me that non–theists ought not to put very much emphasis on this objection. (Moreland briefly notes three responses to the criticism from evolutionary theory, the first of which is the one just given. The other response which he favours is to criticise evolutionary theory, and to provide a creationist alternative to it. The response which he does not like is to accept that evolutionary theory provides some kind of explanation of biological design, but to insist that this explanation of how God designed the world does not remove the need for a Designer. Moreland claims that this response is inconsistent with the early chapters of *Genesis* and with the empirical facts of science. It seems to me to be incredible to think that a literal interpretation of the early chapters of *Genesis* might be taken to provide a serious contraint on reasonable theorising about the appearance of biological design; however, the charge of conflict with the empirical facts of science is a serious one which at least merits considered rebuttal.)

A final objection which Moreland considers to arguments for design is the suggestion that inefficiencies in the apparent design of the world suggest that the world is not the product of intelligent design (or, at least, that the world is not the product of an omniscient and omnipotent God). In reply to this objection, Moreland makes four points: (i) given our limited knowledge of the complexity of living organisms, we might deny that there are any such inefficiencies; (ii) the concept of 'efficiency' might be the wrong

one to apply when assessing God's design; (iii) God is not subject to limitation of resources, so it is unclear why we should expect God to be efficient; and (iv) this objection makes it clear that the model of God as Designer does have empirically testable consequences (and hence that the model is scientific). The second and third of Moreland's points seems questionable: given that God is supposed to be perfect—omniscient, omnipotent, and so on—there is reason to think that God will make the best of all possible worlds (or, if that is logically impossible, at least that God will make a *very very* good world). But isn't there reason to think that there will be no such inefficiencies in a *very very* good world? Moreover, the first and the fourth points seem to tell against each other: if you are allowed to protect the claim that there are inefficiencies by appeal to our limited knowledge, then it seem doubtful that the claim that the model of God as Designer really does have testable consequences. At the very least, there is room for suspicion that, no matter what apparent inefficiencies might be pointed to by non–theists, Moreland's theists will reply that it is only our limited knowledge which makes it seem that there are inefficiencies. And, in that case, it seems that there is no empirical test of the model of God as Designer here. (There is much more to say about this kind of objection. Note, in particular, that it can be connected to the problem of evil. Does the apparent evidence of design really support the claim that the world was designed by an all-wise, all–powerful and perfectly good being? Aren't the amounts and kinds of evils which we find in the world at least prima facie evidence that, if there is an all–wise and all–powerful designer, then that designer is much less than perfectly good? And so on. It would take us too far afield to try to give proper consideration to these issues here.)

In sum: Moreland's brief discussion of arguments for design provides no reason at all to think that non–theists should find these arguments compelling. First, the data cannot be strong enough to decide between all kinds of supernatural hypotheses (including hypotheses on which there is almost no intelligence involved). Second, and relatedly, the data cannot be strong enough to establish the attributes which are traditionally ascribed to God (omnsicience, omnipotence, omnibenevolence, etc.). Third, there are alternative non–supernatural hypotheses—e.g. the hypothesis of the ensemble of worlds—which seem to explain the data equally well and which seem to be no worse than the hypothesis of traditional theism; consequently, it seems that there is no good reason to believe the hypothesis of traditional theism. Fourth, it is quite unclear whether there is any reason to think that those things which science takes to be brute unexplained realities are anything other than brute unexplained realities. In particular, it seems that there are bound to be brute unexplained realities on any theory, including the theories of 'theistic science'. (Moreover, it is unclear whether there is any good reason to say that our universe is 'the result of chance'.) Since the 'philosophical' case against design arguments is very strong, there is no reason to think that 'scientific' assessment of apparent evidence of design will provide any support for the claim that God (or any other supernatural agent) exists.

(iv) **Remarks about 'naturalism**:

Moreland claims that his discussion of *kalam* and design arguments establishes that '[b]efore we even begin to investigate the scientific details of the universe in which we

live, we already have reason to reject philosophical naturalism (the view that the space–time material universe is all there is)'. (33) I take it that the above discussion shows that this is clearly not so: the *kalam* and design arguments fail, so they do not provide reasons to reject anything. (Perhaps it is worth noting that many non–theists will not be inclined to accept philosophical naturalism, at least as it is characterised by Moreland. Many non–theists hold that there are all kinds of abstract entities—numbers, propositions, universals, etc.—which are no part of 'the spacetime material universe'. It would be better to characterise philosophical naturalism in terms of what is says there are not. According to philosophical naturalism, there are no supernatural entities: no ghosts, no spooks, no gods, no Cartesian souls, etc.) Moreland goes on to claim that we also have reason to reject methodological naturalism: his reasons for this are given in Chapter 1 (which we shall soon discuss). It is worth noting here that if philosophical naturalism can be sustained, then methodological naturalism follows immediately: there is no point in abandoning a naturalistic viewpoint if there are no supernatural entities! So Moreland's discussion of *kalam* and design arguments is clearly important: given that those arguments do fail, then I take it that the onus is on him to find other arguments which ought to persuade non–theists to give up their philosophical and methodological natualism.

Moreland notes: 'A major theme of this book is that certain scientific factors—such as the origin and fine–tuning of the universe, the origin of life and information systems, the origin of major taxonomic groups, and the origin of human language and linguistic abilities—help to confirm the *kalam* cosmological argument and the design argument for God's existence.' (33) He then goes on to say that he has 'looked at some background issues that are involved in assessing this claim'. I have spent a lot of time examining Moreland's 'look' at the background issues because what he says is crucial to the rest of the book. If—as I have suggested—there is not the slightest reason to think that there are 'scientific factors' which lend credence to *kalam* and design arguments, then the material in the rest of the book cannot play the role for which it is intended. While it may well be that this material points to difficulties and unclarities in current science, there is no reason (yet) to think that it provides any reason at all to move towards 'theistic science'.

Theistic Science and Methodological Naturalism, by J.P. Moreland

Moreland's discussion has three main parts. First, there is a characterisation and critique of a view which Moreland calls 'methodological naturalism'. Second, there is a characterisation of a view which Moreland calls 'theistic science'. And third there is a discussion of some criticisms which might be made of the view which Moreland calls 'theistic science'. I shall consider each of these parts in turn.

(i) Methodological naturalism: Much of Moreland's critique of 'methodological naturalism' focusses on a view which is defended by the Christian scholars Paul de Vries and Howard J. van Till. According to Moreland, de Vries and van Till are committed to the following claims: (i) the goal of natural science is to explain contingent phenomena in terms of other contingent natural phenomena (46); (ii) natural science has nothing to say about the existence of God, because the domain of the supernatural simply lies outside

the scope of natural science (46); (iii) it is a matter of conceptual necessity that natural science has the features mentioned in (i) and (ii) (43). Moreland has a range of objections to (i)–(iii). For example, against (i), he notes that many scientific explanations advert to ostensibly non–contingent entities (in particular, numbers and mathematical structures). Against (ii), he urges that this kind of claim relies upon discredited demarcation arguments which seek to draw boundaries between the scientific and the non–scientific. (These arguments are taken up by Meyer in the subsequent chapter.) And against (iii), he urges that many less–than–fully realist interpretations of science would be ruled out *a priori* if it were true. (Moreland has much more to say; but there is no need to repeat it.)

I doubt that there is much which needs to be said here. Moreland is surely right to think that, if you believe that there is a supernatural domain which has influences on and is influenced by those natural entities which belong to our spatiotemporal universe, then it is just a mistake to insist the the behaviour of those natural entities can be satisfactorily explained without reference to the supernatural. (Why restrict the word 'science' to those explanations of the behaviour of natural entities which do not advert to the supernatural?) However, it seems to me that it is just wrong to think that contemporary science is based on a dogma—'methodological naturalism'—which rules out appeal to supernatural entities *a priori*. Rather, the truth is that contemporary science is merely committed to the principle that supernatural entities need to pay their way—and that the history and success of science provides no reason at all to think that supernatural entities can pay their way. On the one hand, the history of science is, in part, a history of liberation from explanations involving supernatural entities—one domain after another has been shown to be able to do without them. On the other hand, the extraordinary success of the scientific enterprise—all done without any recourse to the supernatural—suggests that science can get along just fine without it. The commitment to 'methodological naturalism' which one finds in natural science is an *a posteriori* commitment, based on the apparent absence of any need to appeal to supernatural entities.

Of course, given that the commitment is *a posteriori*, it would be inconsistent to appeal to a principle of 'methodological naturalism' to rule out 'theistic science' on *a priori* grounds. However, I doubt that many of those who ridicule the notion of 'theistic science' really think that it can be ruled out on *a priori* grounds. Rather, what they think is that the history and success of science provides very good reasons for holding that the prior probability that we might need a 'theistic science' is extraordinarily low. ('Theistic science' belongs with astrology and phrenology and scientology and ...; endeavours which have been discredited by the history and success of non–supernatural science.) Given that Moreland and his co–contributors disagree, their task is to show that we do need 'theistic science'—and, indeed, this is what they try to do in the second part of the book. If their enterprise were to bear fruit, then I have no doubt that we would all hear about it. (Part of the point here is that it seems very doubtful that there is any kind of 'conspiracy' against 'theistic science'. All that creationists need to do is to provide decent reasons for taking 'theistic science' seriously. To date, there is, I think, no doubt that they have failed to do this. More about this in my concluding remarks.)

(ii) 'Theistic science': Exactly what 'theistic science' is supposed to turn out to be is not exactly clear. Moreland characterises it in terms of a commitment to the following two principles: (1) God created and designed the world for a purpose and has directly intervened in the course of its development at various times; (2) the commitment expressed in (1) can appropriately enter into the very fabric of the practice of science and the utilisation of scientific methodology (41/2). I take it that what he has in mind is that God and God's creative acts can feature amongst the entities which are adverted to in good scientific explanations of contingent natural phenomena. (What this has to do with 'the very fabric of the practice of science' and 'the utilisation of scientific methodology' is, at best, rather unclear.)

These claims for 'theistic science' are quite strong—and seem to go far beyond anything that is really argued for in the rest of the book. Moreland makes it fairly clear that, by 'God', he means the God of *Genesis*, etc.—and that he means to be taken to be suggesting that the *Bible* can be taken to be a literal account of the origins, history and governance of the world. But, of course, if this is what 'theistic science' is to be then these claims are subject to the same strictures as any other scientific claims. Does the evidence—from comparative literature, history, etc.—really bear out the claim that the *Bible* is the word of God? Does philosophical examination really bear out the claim that the notion of an omnipotent, omniscient, eternal, etc. creator of the world is so much as coherent or logically consistent? Does philosophical investigation really bear out the claim that there are satisfactory answers to the problems of evil, divine foreknowledge, divine freedom, the doctrines of the Trinity and the Incarnation, and so on? Does the alleged evidence from cosmology and biology really suppport the claim that the universe and living species were designed and created by an omnipotent, omniscient, eternal, etc. being?

Perhaps unsurprisingly, when the book turns to look at the evidence from cosmology and biology, the claims which are alleged to be supported by the evidence are far more modest: e.g., that there is evidence of design by some kind of intelligence; and that there is evidence of creation by some kind of supernatural entity. If 'theistic science'—or perhaps better 'deistic science'—were the view that supernatural creators and designers can feature amongst the entities which are adverted to in good scientific explanations of contingent natural phenomena, then there might be some reason to think that there is argument for it contained in the rest of the book. As things stand, its hard to resist the conclusion that 'theistic science' remains entirely without serious support.

(iii) Objections to the very idea of 'theistic science': Moreland considers three objections to 'theistic science': (i) that 'theistic science' relies upon a disastrous 'God–in–the–gaps' strategy; (ii) that the supernatural entities involved in 'theistic science' are unobservable in principle; and (iii) that 'theistic science' is not a fruitful research programme. Moreland has fairly lengthy replies to each of these objections, the details of which I will pass over. It seems to me to be clear that there is no *a priori* reason to think that 'deistic science' is ruled out: it might be, for example, that there is an inference from the available evidence to the existence of intelligent design. If that is right, then objections (i)–(iii) seem to be beside the point. The crucial question will be whether there

actually is a decent inference from the available evidence to the existence of intelligent design.

In sum, then: I am inclined to grant the main substance of Moreland's arguments. 'Deistic science' is not ruled out on *a priori* grounds (and, in particular, it is not ruled out by 'methodological naturalism'). However—as I have argued above—it is important to see that it does not follow from this concession that there is reason to take 'deistic science' seriously. For what matters is the strength of the case which can be made for 'deistic science'. So far as I can see, that case remains extremely weak.

The Methodological Equivalence of Design and Descent, by Stephen C. Meyer

The main thrust of Meyer's argument is fairly straightforward. Following Larry Lauden, he claims that the problem of providing criteria which demarcate the scientific from the non–scientific have proven intractable. Consequently, attempts to use demarcation arguments against the hypothesis of intelligent design also fail. When we examine the demarcation arguments which have actually been used to support that claim that creationist theories are not scientific, we find either: (i) that they must classify evolutionary theories and design theories in the same way (hence 'the methodological equivalence of design and descent'); or (ii) that the arguments are grossly question–begging (because they build in the requirement that scientific theories must not advert to supernatural entities).

I'm not sure that there is much to argue with here. The important claim which non–theists want to make is that there are no supernatural entities; whether the postulation of supernatural entities can be scientific seems rather unimportant by comparison. Having said this, I'm not sure that the case against demarcation arguments can be quite as strong as Meyer supposes. After all, there are some intellectual activities which do not count as 'science' in any ordinary sense of that term—e.g. literary criticism, studying the history of the AFL, and so on. So there is a boundary between the scientific and the non–scientific, even if we are not sure how to say where it is. Still, there doesn't seem to be any reason to think that, if we could figure out how to say where this boundary lies, it is bound to be the case that creationist theories would lie on the non–science side. (Note, by the way, that there is also a distinction between good science and bad science. Conceding the point about demarcation arguments does not mean that one cannot insist that creationist theories are bad science. If there are no supernatural entities, then it seems plausible to think that good scientific theories will not refer to them!)

One important point to note is that the introduction—by Moreland—seems to rely on the assumption that there is a strict demarcation between science and non–science, because it relies on the assumption that there is a strict demarcation between science and philosophy (and theology). If Meyer is right that demarcation principles are doomed, then I do not see how one could hope to hang on to the claim that there is a strict demarcation between science and philosophy. Consequently, it seems to me that Meyer's arguments undermines much of the attack on 'scientism' which Moreland mounts there. (Surely this is to be expected. If there is no way to distinguish science from non–science—if all

intellectual enquiry is scientific—then there can hardly be anything wrong with the view that all intellectual enquiry is scientific! Moreover, given my earlier criticisms of Moreland's arguments, this may be no bad thing from the standpoint of the authors of the book.)

There are various claims and points of detail in Meyer's chapter which I would dispute. However, I shall mention just one before I pass on. At p.97, Meyer claims that 'theism itself constrains design inferences'—i.e. that there will be constraints on the possibility of appeal to supernatural intervention in the affairs of the world which arise 'from theological considerations'. It seems to me that this judgement relies on the assumption that, if there is an intelligent designer, then that designer will be the familiar God of traditional Western theology. But, once we are allowing in design hypotheses, we have to let them all in—and, when we do that, we can't presuppose that the victorious hypothesis will be our favourite one. Perhaps the world is the product of intelligent design by some other kind of being—and, if so, who's to say what kind of constraints their activity is subject to? (I shall reurn to this issue in my concluding remarks.)

On the Very Possibility of Intelligent Design, by William A. Dembski

The main burden of Dembski's article is to establish that it is logically possible that there be compelling evidence of intelligent and transcendent design. Towards the end of the article, Dembski briefly addresses the questions: (i) whether there is any compelling evidence of intelligent and transcendent design; (ii) why so many intelligent and reasonable people think that there is no (or insufficient) evidence of intelligent and transcendent design; and (iii) why it might be reasonable to think that the evidence of intelligent and transcendent design is bound to be subtle.

As Dembski points out, many non–theists have been unsure what it would take to convince them that there is an intelligent and transcendent designer (of the universe, or of some of the ostensibly 'natural' objects which belong to the universe). If there were large–scale disruptions to the normal course of events, it might be more reasonable to think that we had all taken leave of our senses—LSD in the water supply, perhaps?—or that we had become the dupes of technologically advanced extraterrestrials, than to suppose that these disruptions were miracles worked by a flamboyant intelligent and transcendent designer. Similar considerations apply to the idea that an intelligent and transcendent designer might encode a signature into various kinds of entities in the world: suppose that the stars in the sky were arranged to spell out the message 'MADE BY GOD'; or that there was a part of the DNA code, or a part of the structure of various crystals, which spelled out this message; and so on.

Dembski suggests that the discovery of a certain kind of oracle in the universe—one which can solve problems whose solution requires computational resources which we know exceed the resources available in the natural universe but for which we can then easily check that the solutions are correct—would be clear evidence of an intelligent and transcendent designer. Suppose, for example, that a pulsar were discovered to be transmitting a message in Morse code which codes a message in English. Suppose,

further, that this message specifies that, every hour, on the hour, we are to put a message in English inside a particular box. When we do this, we find that the pulsar transmits, in English, answers to these questions, which arive at ten minutes past the hour. By giving the pulsar mathematically intractable problems—i.e. problems whose solution requires computational resources which we know exceed the resouces available in the natural universe—whose solutions we can easily check to be correct once we have them, we could, says Dembski, establish that there must be a transcendent intelligence which is solving the problems.

In this case, it would not be plausible to think that we had all taken leave of our senses; and the nature of the case seems to rule out monkey business on the part of technologically advanced extraterrestrials (since they couldn't have the resources to solve mathematically intractable problems). Perhaps one might think that, in these circumstances, one would need to revise one's estimates of the number of elementary particles in the universe, or the minimum speed with which bits can be switched, or the age of the universe—since these are the numbers which are used in determining which mathematical problems are computationally intractable. (In particular, if there is no finite bound on the number of elementary particles in the universe, and if there are signals which can be transmitted faster than light, then it may be that we should not rule out the possibility that we are the dupes of technologically advanced aliens.) Or perhaps one might think that, in these circumstances, one would need to consider the possibility that there are unfamiliar kinds of computers—e.g. quantum computers or continuous computers—which can solve problems which are computationally intractable for digital computers. (Perhaps it is worth bearing in mind that a world with a finite number of elementary particles can still be infinite in phase space. The constraint imposed by the number of elementary particles applies, at best, to digital computers.) I am not sure how much weight to place on these considerations; I mention them just because it is not utterly obvious that Dembski's case is completely watertight.

Suppose that we grant that there is nothing in our universe which could carry out the computations. (And suppose that we ignore the at least logical possibility that there might be a spacetime wormhole—or some route through another spatio–temporal dimension—connecting the pulsar to some other spatiotemporal domain where there are the resources to carry out the computations. This would be another way in which advanced alien technology might intrude.) What should we conclude? It does seem that, in the envisioned circumstances, we ought to come to the conclusion that there is a transcendent intelligence—i.e. that there is an intelligent entity which exists in some domain which is external to our spacetime. Note, however, how weak this conclusion is when compared to the claim that theists typically wish to defend. All we have is that there is an intelligent entity which is responsible for some aspects of the design of the pulsar. We do not have that this intelligent entity—or any other intelligent entity—is responsible for the creation or design of the universe or any other of its denizens. (Perhaps our transcendent intelligence does no more than to 'tweak' the naturally emitted signals from the pulsar.) As Hume would have insisted, there are ever so many hypotheses which one can dream up about the domain in which our transcendent being exists, and about the relationships between this being and our world. For all that has been said, the transcendent being may

be contingent, of middling moral virtue, and very far from omniscient or omnipotent. Moreover, there may be many such beings, and entities like our universe may be naturally occuring objects in their realm. Even if the pulsar tells us that it is transmitting messages from the sole creator and designer of the universe, it is not clear that one would be rationally obliged to believe this (though I guess that it would be rationally permissible to do so). Again, I'm not sure how much weight to put on the considerations raised in this paragraph; I mention them because it is clear that one would want to be cautious in drawing conclusions in the envisaged circumstances.

Suppose we grant that Dembski's case of the incredible talking pulsar establishes that it is *logically* possible that there be good evidence for the existence of a personal, transcendent creator and designer (with the kinds of attributes which are traditionally ascribed to God in Western theology). Does this concession have any important consequences for the debate between theists and non–theists? In particular, does it have any important consequences for 'methodological naturalism'? If 'methodological naturalism' involves the claim that it is *a priori* that there are no supernatural entities, then, indeed, 'methodological naturalism' would be refuted by Dembski's case (given the concessions which we have made). However, it seems to me to be wrong to think that science rules out the supernatural on *a priori* grounds. Consider the case of astrology. Setting aside some difficult metaphysical issues, it seems plausible that it is *logically* possible that there be good evidence for astrology—e.g. it is *logically* possible that astrologers (and only astrologers) make perfectly correct detailed predictions about the future on the basis of their astrological theories. Nonetheless, science quite correctly refuses to countenance astrology as a serious possibility, not because there is *a priori* reason to rule it out, but because: (i) there is no evidence that detailed astrological predications ever fare better than chance; and (ii) it is utterly implausible to think that mechanisms to explain astrological predictions could find any place in current scientific accounts of the world. If the prior probability, that mechanisms to explain astrological predictions could fit into current scientific accounts of the world, were not so low, then there might be reason to invest more effort looking for evidence; but, given current science—which, of course, is based on centuries of partly *a posteriori* endeavour—it is reasonable to think that it would just be a waste of time and effort to throw much in the way of resources in this direction. (More about this line of thought in a minute.)

As I mentioned earlier, Dembski concludes his article with a brief examination of three issues: (i) whether there is any compelling evidence of intelligent and transcendent design; (ii) why so many intelligent and reasonable people think that there is no (or insufficient) evidence of intelligent and transcendent design; and (iii) why it might be reasonable to think that the evidence of intelligent and transcendent design is bound to be subtle. On the first issue, Dembski claims that there is compelling evidence in the cosmos and in living systems, but that this is the burden of subsequent chapters of the book. (We shall return to these matters later.) On the second issue, Dembski claims that it is 'methodological naturalism' which excludes design from rational discourse on *a priori* grounds. And, on the third issue—following Pascal—he claims that it is reasonable to think that the evidence for design should not be obvious (if it is the case that the world is

designed by the God of traditional Western theology). I shall consider the second and third points in reverse order.

Now, Dembski may be right that there are grounds for thinking that the evidence for design should not be obvious, if the universe were designed by Pascal's God. (And, similarly, he may be right that it is logically possible that there should be a superintelligent verifiable oracle to which only a limited number of people have access. It does seem logically possible that I might have a magic penny which does what his incredible talking pulsar does.) However, it seems to me that these grounds have the potential to raise difficulties for the claim that there can be a 'theistic science' (of the kind which Moreland promotes in his introduction). Whatever else is characteristic of science, it seems to be crucial that science is *publicly accessible*—anyone who is smart enough and who is prepared to work hard enough can have access to the results of science (without the aid of priestly or scholastic interpretters, for example). If the evidence for design is sufficiently unobvious—or if it is only accessible to those with magic pennies—then it is likely that it will fail the public accessibility requirement. (I am assuming that Dembski is thinking—as Pascal did—that the evidence for design might be unobvious in ways which no amount of mere intelligence can penetrate: only the pure of heart or the true believers are able to see the evidence. I can't see any reason why, on traditional theistic hypotheses, the evidence of design should be apparent only to the very intelligent and intellectually industrious.)

Even setting these considerations aside—and turning back to the second of the issues which Dembski raises, and to some remarks which I made earlier—it seems to me pretty implausible to think that there is anything which rules out design hypotheses from science on *a priori* grounds—and hence, in particular, that there is nothing which deserves to be called 'methodological naturalism' which does this ruling out. Rather—as in the case of astrology which I discussed above—the crucial points are: (i) that there is no evidence that design hypotheses have anything to contribute to science; and (ii) that there is no room for any mechanisms for intelligent design in current scientific accounts of the world. As in the case of astrology, it remains open that there could be reason to revise these opinions; but there is no good reason to squander limited resources in looking for such reasons. (As in the case of astrology, there are plenty of people who are prepared to invest their own resources in such projects. If they come up with any useful results, it is bound to be the case that the rest of us will be informed.) Note, in particular, that it is no use arguing that the approach which I have just outlined 'seriously limits our options' (cf. 133). Of course, if our world is the product of intelligent design, then this approach is not on the right track. But, equally, if you can read the future in the stars or in sheeps entrails, then this approach is not on the right track. Since we are subject to limitations of resources, we are obliged to take certain kinds of punts. (I shall return to these issues in my concluding remarks.)

Astronomical Evidences for a Personal, Transcendent God, by Hugh Ross

Ross considers the scientific evidence from astronomy and cosmology which is supposed to support the *kalam* and design arguments. I shall provide a brief summary of each part

of this discussion, and then I shall provide some critical comments. Since I have no particular expertise in matters astronomical and cosmological, I shall not take issue with Ross's claims about what the evidence is; instead, my questions will be about what this evidence is supposed to show.

(i) Evidence for a beginning: Ross provides a brief history of scientific cosmology, beginning with Kant's Newtonian vision of the cosmos. He notes three difficulties for the Newtonian conception of a static infinite universe: (i) the work of Stefan and Boltzmann showed that Olber's paradox—the question of why the night sky is dark, given that, in the Newtonian universe, any line can be extended until it eventually meets a star which is radiating light towards the earth—cannot be resolved by appeal to an intervening absorptive medium; (ii) the work of Zollner, Seeliger and Neumann showed that the gravitational potential at any point in the Newtonian universe is infinite; and (iii) the famous Michelson–Morley experiment seemed to show that there is no aether (hence, no absolute space and time, as demanded by the Newtonian model). Ross then notes that Einstein provided a general relativistic model of the universe which can overcome these difficulties, and which provided the basis for all subsequent scientific cosmology. Ross's account of Einstein's model is rather sketchy: the main point is that, although Einstein's initial model—like the model discovered at around the same time by de Sitter—was stationary, the most natural cosmological models based on the general theory of relativity are expanding—hence, non–stationary—models. (Einstein introduced a 'cosmological constant'—conceptually tied to a cosmological repulsive force—in order to derive his stationary model. Without the cosmological constant—and subject to other natural constraints—general relativistic models are bound to be non–stationary.) In the late 1920s, Hubble and others found empirical evidence that the universe is, indeed, expanding—thus confirming one of the predictions of Einstein's theory.

As Ross notes, if the universe is expanding, then the question naturally arises whether the expansion can be traced all the way back to a beginning point. This idea was first seriously persued by Lemaitre—who, in the late 1920s, entertained the possiblity of a 'primeval atom—and was developed by Gamow—who, in the 1940s, developed many of the details of the hot Big Bang theory. (We shall return to this history later.) However, there are competing scenarios which were also taken seriously by cosmologists, and the main aim of Ross's discussion is to show that these alternatives can be ruled out. The two main competing alternatives are: (i) *steady state universes* (in which there is continuous creation of matter); and (ii) *oscillating universes* (in which the universe goes through infinitely many alternating phases of expansion and contraction from Big Bang to Big Crunch). On these alternatives, the universe is infinite in the past—and, if that were so, then there would be no beginning. Ross claims—I think correctly—that there is quite good reason to think that our universe does not oscillate infinitely, and that it is not a steady state universe. Moreover, as Ross also claims, there is quite a bit of evidence which supports the claim that ours is a hot Big Bang universe. In particular, the discovery of the cosmic microwave background radiation in 1965 and the COBE discoveries of the early 1990s seem to provide strong empirical support for hot Big Bang models. (Ross also claims that the Hawking–Penrose singularity theorems provide support for hot Big Bang models. I'm pretty sure that this is not right. Those theorems do show that

singularities are generic in general relativistic models—but I don't think that there are any theorems which show that *initial* singularities are generic in general relativistic models. Thus, the case for 'a beginning for time' is nowhere near as strong as Ross suggests on p.152. Nonetheless, the case is strong.)

Ross assumes—pretty much without argument—that evidence for 'a beginning for time' is evidence for a transcendent creator. After a bizarre section—pp.152/3—in which he claims to show that Christianity is uniquely supported by this cosmological data, and in which he exhibits 'biblical statements of cosmological significance', Ross goes on to consider some possible objections to this 'argument' from hot Big Bang cosmology. He considers five possible replies: (i) that quantum–tunelling provides a model for things to come into existence from nothing; (ii) that an ensemble of universes may have arisen back before the Planck time (when quantum gravitational effects allowed that anything is possible); (iii) that when we correct our models to take account of quantum effects in the very early stages of the universe, it will turn out that there is no initial singularity (cf. Hawking's 'no boundary condition' boundary condition); (iv) that people created the universe (through some weird kind of reverse creation or obserer–dependence of quantum events); and (v) that the Omega Point is God, and it is the ultimate explanation of all that comes before (cf. the bizarre theories of Frank Tipler). There is little that seems sensible in these suggestions, and Ross has a fairly easy task demolishing them. (There is one significant point. We know that general relativity and quantum mechanics are inconsistent, and that we shall need a successor theory. We don't know what our cosmological models will look like when we have this successor theory. It is not ruled out, yet, that there will be no initial singularity in those models. So there is some reason to be cautious about claiming that science now commits us to an initial singularity. Beyond this, it seems wisest to be silent: we don't yet have these theories, so we don't know what they will say.)

Leaving aside the point about quantum cosmology, the crucial point to make is that there is a huge gap between the premise that science tells us that there is an initial singularity and the conclusion that science tells us that there is a transcendent creator. Since I made most of the relevant points in my discussion of Moreland's introduction, I shall only briefly recapitulate them here. In all standard general relativistic models, the spatiotemporal manifold is open—i.e. there is no first moment of time. (The initial singularity is an ideal point; it does not belong to the spatiotemporal manifold, and nor do any other boundary points.) Consequently, there is no important *topological* difference between Big Bang models and models in which time is infinite in the past: in both cases, there is no first moment of time. Thus, that the world is a hot Big Bang world provides no extra reason to think that it was created by a transcendent being: there is no less reason to think that the world was created by a transcendent creator in the case in which the world is infinite in the past. If time were discrete, the case would be different—but there is no evidence that time is discrete (and it is certainly supposed to be continuous in all standard hot Big Bang models). So, in short, Ross's claims about evidence for a beginning are just completely mistaken: *kalam* cosmological arguments get no support from current cosmological models.

(ii) Evidence for design: Ross provides a fairly standard presentation of fine–tuning arguments for design. He notes 25 aspects of the universe which seem to need to be fine–tuned for life (some to extraordinary degrees of accuracy), and 32 features of the galaxy, sun, earth and moon which seem to need to be fine–tuned for life (some again to quite extraordinary degrees of accuracy). On the basis of this data, Ross argues that it is perfectly clear that life on earth is the result of intelligent design, and that the universe has been designed for life. The only objection which he considers is the suggestion that, despite the odds, the improbable might have happened—and he has little trouble pointing out that this is a fairly poor objection.

However, there *are* other objections which one might make to this argument (as Moreland points out in his discussion of this kind of argument in his introduction). Ross doesn't consider the possibility of an ensemble of universes; or the possibility that the appearance of design at any time can be explained in terms of the appearance of design at even earlier times; or the possibility that it is just a mistake to apply the language of objective chances to the universe as a whole. Moreover, he also fails to note that there is a big stretch from the claim that there is an intelligent designer to the claim that the universe was designed by the God of the Bible (cf. his conclusion that 'the more astronomers learn .. the more they accumulate evidence for the existence of .. the God of the Bible' (171)). Even if one were to accept that there is evidence of intelligent design, it is hard to see how this could possibly amount to more than commitment to some nebulous kind of deism (cf. Hume's well–known analysis of design argument in his *Dialogues Concerning Natural Religion*.). Since I have already said quite a bit about these matters in my discussion of Moreland' introduction, I shall say no more about them here.

Information and the Origin of Life, by Walter L. Bradley and Charles B. Thaxton

Bradley and Thaxton focus most of the discussion of this chapter on Oparin's hypothesis about the earliest steps in the evolution of life: the formation of small prebiotic builiding blocks (amino acids, fatty acids, sugars, nucliec acid bases), the subsequent formation of macromolecules and supramolecular structures from these building blocks (polymers of amino acids, membrane vesicles), and then the formation of the first forms of early life (protobionts or protocells). (Some later stages of evolution are discussed in the next chapter.) Bradley and Thaxton argue that Oparin's hypothesis is 'conceptually bankrupt' (193), and that no alternative naturalistic account of the earliest stages in the evolution of life is even remotely plausible. They then go on to argue that 'intelligent design' is a plausible account of the origins of life, and develop an information–theoretic design argument which is intended to support this contention. However, they also insist that this inference to intelligent design is not necessarily an inference to an intelligent designer: their stated aim here is just to establish that intelligent design is a plausible account of the origins of life on earth. I shall give a brief outline of their claims (much of it couched very much in their words).

(i) Oparin's Hypothesis: In 1924, Oparin proposed that the early earth's atmosphere consisted of ammonia, methane, hydrogen, and some water vapour, but no oxygen. He

suggested that, under the influence of lightning and ultraviolet light, such an atmosphere would react chemically to form the amino acids, bases, sugars, lipids and other organic molecules which are the prebiotic building blocks. He also suggested that, over time, this process would lead to a significant concentration of these prebiotic building blocks in lakes, oceans, and Darwin's 'small warm ponds'. Once this concentration was significantly high, polymers would have formed, including macromolecules which could then agglomerate into the first forms of early life. In 1952, Stanley Miller performed a classic experiment which confirmed part of Oparin's hypothesis—when a spark is discharged in a mixture of ammonia, methane, hydrogen and boiling water, it is indeed the case that amino acids are formed. (Of the twenty biological amino acids, all but lysine have been produced in Miller–style experiments.) Other similar experiments have produced all five nucleic bases found in RNA and DNA, and various fatty acids found in cell membranes.

(ii) Problems for Oparin's Hypothesis: Bradley and Thaxton note a multitude of problems for Oparin's hypothesis. There is evidence from atmospheric physics that the early earth's atmosphere did not contain ammonia, methane or hydrogen. Moreover, there is also evidence from atmospheric physics that the early earth's atmosphere did consist of nitrogen, carbon dioxide and water vapour. But Miller–style experiments won't work in this alternative atmosphere. Furthermore, there may be reasons to think that one would require very special conditions in order to allow the prebiotic building blocks to accumulate. (Typically, in these experiments, there is a selective use of energy, and quick removal of prebiotic products from the energy flux, because longer wavelengths of radiation will cause amino acids to break down.) And there are also reasons for thinking that the conditions which are needed in order to synthesise the sugars ribose and deoxyribose—building blocks for RNA and DNA—are quite unlike those conditions which prevailed on the early earth. So, say Bradley and Thaxton, there are reasons to be sceptical that the prebiotic building blocks could have arisen in the way which Oparin suggested.

Moreover, they continue, even if the prebiotic building blocks could be produced in the way which Oparin suggested, there are much graver difficulties which confront the suggestion that these building blocks might be assembled into functional biopolymers by the action of heat (Darwin's 'warm little pond' again). As Bradley and Thaxton acknowledge, it is possible that peptide bonds might form between prebiotic building blocks simply given the availability of energy in the form of heat—but they insist that there is no way that one could get 'the right arrangements' of building blocks, i.e. the proteins with which we are familiar. The problem here is one of informational complexity: the proteins with which we are familiar form an extremely tiny subset of the possible polymers which can be formed from amino acids under random formation of peptide bonds. As Fred Hoyle says, the likelihood that our proteins developed by the random formation of peptide bonds between prebiotic building blocks is about the same as the likelihood of 'the assemblage of a 747 by a tornado whirling through a junkyard'.

Bradley and Thaxton consider some attempted responses to the problem of informational complexity which they have raised. In 1990, Julius Rebek Jr. created a synthetic organic

molecule—AATE—which can replicate itself under certain special conditions. Bradley and Thaxton dismiss Rebek's creation by citing Joyce's claim that AATE reproduces too accurately to have any biological relevance—without the possibility for mutation, there is no possibility for evolution. In 1987, Jeffrey Wicken made two suggestions about responses to the problem of informational complexity, viz: (i) to claim that there is an entropic driving force which is responsible for the polymerisation reactions; and (ii) to claim that intrinsic chemical properties of the molecular building blocks might account for the specified sequences of the molecules in the biopolymers. In reply, Bradley and Thaxton note: (i) that any entropic driving force would have to be inconsequential once a small yield of polymers had been produced (else it would be much easier than it is to get polymerisation to occur in experimental systems); and (ii) that there is no evidence in support of the claim about intrinsic chemical properties. Finally, in 1990, Bernard Kuppers suggested that we need to suppose that there is some kind of natural selection which operates in the realm of inanimate matter. Against this, Bradley and Thaxton object that Kupper's hypothesis lacks both conceptual detail and experimental support.

(iii) Alternatives to Oparin's Hypothesis:

Bradley and Thaxton suppose that their critique of Oparin's hypothesis is pretty much decisive, so they turn to alternative accounts of the origins of life which have been proposed. These include: (i) Cairns–Smith's proposal that life arose on solid substrates with enough complexity to mutate and evolve in a lifelike way (e.g. on crystalline clays); (ii) Corliss's proposal that hydrothermal vents on the sea floor may have supplied the energy and nutrients needed to create and sustain life; (iii) Wachterschauser's and de Duve's proposals of ways in which life might have started as a metabolic process on the surface of a solid (e.g. a pyrite mineral or a thioester); (iv) proposals based on Prigogine's studies of spontaneuous ordering in far–from–equilibrium systems; and (v) Eigen's account of the development of early living systems given various protein molecules and RNA. Bradley and Thaxton contend that either these theories are 'pure speculation', without any empirical support ((i), (iii)); or they lack the ability to solve the problem of informational complexity ((ii), (iii), (iv)); or they are not really relevant to the problem of origins (v).

(iv) Information–Theoretic Design Arguments:

Bradley and Thaxton suppose that their examination shows that the prospects for non–intentional accounts of the origins of life are pretty dim. Moreover, they suggest that there is material here for the construction of a design argument which establishes the existence of an intelligent designer (though perhaps not necessarily a supernatural intelligent designer). The basis of their argument is the claim that certain molecules—DNA and protein—which are fundamental for life are also high in informational content (specified complexity). They suggest that, while it is possible for order with low informational content (e.g. that exhibited in snowflakes and crystals) to arise by non–intentional processes, 'there is no convincing experimental evidence that it is possible for order with high information content to arise by non–intentional processes' (208, with some minor modifications). That is, the only plausible explanation of the appearance on

earth of molecules with high informational content is that these molecules are the product of intelligent design.

(v) Some Critical Comments:

Having outlined the case which Bradley and Thaxton make, I shall now make one or two critical comments. I suppose I should begin by noting that I am not in any sense an expert in the field of evolutionary theory; I shall make my criticisms only under the assumption that Bradley and Thaxton give a reasonably accurate account of the current state of origins research. If they have overlooked or misrepresented important lines of research, it is up to other people to point this out.

The main argument which Bradley and Thaxton give—the one upon which they place the most stress—is a familiar one. In 1947, the French chemist du Nouy sought to cast doubt on evolutionary theory—and, in particular, on Oparin–style hypotheses—by calculating the probability that a protein molecule be assembled purely by chance from the atoms which make it up. He found—of course—that the chance of this happening is incredibly small. Bradley and Thaxton give a similar calculation, but they assume that the fundamental building blocks from which we begin are the amino acids rather than atoms. Consequently, they provide a probability which is much larger than the one given by du Nouy, but still one which is incredibly small.

Now, the obvious response to du Nouy—and, indeed, to Bradley and Thaxton—is that evolutionary theorists need not and do not assume that such incredibly unlikely events have occured. Proteins are not assembled directly from atoms (and, indeed, Oparin did not assume that they are). Rather, atoms are first assembled into amino acids, and other building blocks (something which Bradley and Thaxton do not suppose is ruled out by probability considerations). Given this modest success, evolutionary theorists might well wonder whether the trick can be turned again. Could it be, for example, that there are replicating biopolymers which are less complicated than the familiar proteins, but which can nonetheless act as stepping stones on the way to the formation of the familiar proteins? Perhaps there is some reason why this is ruled out but, if so, Bradley and Thaxton do not give it. What they give are some reasons for doubting *some* proposals along these lines—but that falls a long way short of a demonstration that this general line of thought is incorrect.

Perhaps Bradley and Thaxton might agree. Though they do say that Oparin's hypothesis is 'conceptually bankrupt', they might be prepared to concede that this is an overstatement—the truth is rather, that there are large gaps in any evolutionary theory which runs along these lines. However, it is not at all clear that one should think that the presence of such gaps is a crippling defect in a scientific theory. Of course, if there is a competing theory which has no such gaps, then the competing theory will win. But, if there is no plausible competing theory, then it may be perfectly rational to continue to accept the theory in question, gaps and all. For all that has been said so far, it may be that the most reasonable thing to believe is that there is some way of filling this gap in the theory, but we don't yet know what it is. (Perhaps here it is worth recalling that there are

large gaps in Big Bang cosmology, and, indeed, in many other historical sciences. If it cannot be reasonable to accept a global theory even though you are utterly unsure about some of the details, then it will not be reasonable to accept Big Bang cosmology—and so the crucial *a posteriori* support for the *kalam* cosmological argument will again disappear.)

Of course, Bradley and Thaxton disagree: they think that appeal to intelligent design will yield a better theory. Since no detailed theory of this kind has been presented, it is hard to fully evaluate this proposal. However, it is important to remember that, even if theories which appeal to intelligent design have no difficulty on the point of creation of proteins, they may well face difficulties in other areas which evolutionary theory does not. It's a well–known point that it is much easier to criticise theories than it is to contruct them (at least if theory construction is constrained by the normal requirements of fit with evidence, consistency, explanatory width, etc.). Moreover, it's a commonplace that scientific theories have difficulties which endure for centuries without undermining the worth of those theories. (Think, for example, of Newtonian physics. From the beginning, it was subject to certain conceptual difficulties which were only 'resolved' when Einstein developed his theories of relativity. Nonetheless, we still think that there is a good sense in which the Newtonian theory was on the right track: where we can ignore relativistic and quantum considerations, it gives the correct answers.) So there are various different kinds of considerations which suggest that, even if Bradley and Thaxton are right about the current state of evolutionary theory, we should be cautious about accepting their conclusion that evolutionary theory has reached its use–by date.

Moreover, there may be reasons to be sceptical about their information–theoretic design argument. For one thing, it is not clear to me that they are right to claim that there are no uncontroversial cases in which order with high informational content has arisen by non–intentional processes. Think, for example, about the fossil record in geological strata. Bradley and Thaxton do not context that the fossil record arose by non–intentional processes; and it certainly *seems* to be the case that the fossil record has high informational content. (Perhaps this claim relies on a misunderstanding of what Bradley and Thaxton mean by 'high informational content'. In that case, these remarks should just be ignored.) More importantly, even if they are right that there are no uncontroversial cases in which order with high informational content has arisen by non–intentional processes, it's not at all clear why we should think that this claim supports the conclusion that order with high informational content must be the product of intelligent design. As I noted earlier, the important question here is about the overall merits of competing hypotheses: there may be other reasons why it is wrong to think that proteins are the product of intelligent design, but which will not be apparent until we turn our attention to the details of theories of intelligent design of proteins. (Perhaps its worth thinking here about the official theology of the Catholic Church, i.e. about the best developed version of traditional Western theology. This theology has been worked on by countless extremely intelligent people over a period of nearly 2000 years. Even so, it still contains all manner of unclarities, improbabilities, puzzles, problems and the like, and it is still in the course of development. If *this* theology is to be the basis for our account of the intelligent design of proteins, then we need to think about the adequancy—indeed the

coherence—of its account of the problems of evil, the problems of divine foreknowledge, the problems of divine freedom, the paradoxes of omnipotence and omniscience, the Trinity, the Resurrection, transubstantiation, and a host of other issues. The costs of evolutionary theory—and indeed, the costs of naturalistic science in general—may not look nearly so prohibitive when set against all of this.)

In sum: It seems to me that Bradley and Thaxton make quite a good case for the claim that evolutionary science is currently facing some reasonably serious foundational difficulties. However, I don't think that they make much of a case for the claim that these difficulties must be resolved by appeal to intelligent design. In particular, I think that there is no way that such a case could be made without some account of the nature of theories which appeal to intelligent design (so that their virtues and vices can be compared with the virtues and vices of their non–intentional competitors). If, for example, it turned out that theories which appeal to intelligent design are bound to have lots of explanatory gaps, then there would be no clear reason to prefer them to their non–intentional competitors. (What one should think in these circumstances remains an open question. Perhaps one then ought to be agnostic about questions of origins; or perhaps one ought to prefer non–intentional theories on other grounds; or ... We shall return to this issue in the final summing up.)

The Origin of Life's Major Groups, by Kurt P. Wise

Wise discusses, and criticises, one major tenet of macroevolutionary theory, viz. the claim that there is a single tree of life which relates all living things. He examines what he takes to be the major evidence which supports this claim—and the evidence which is in conflict with it—and suggests that a theory of intelligent design can explain the evidence better.

Evidence which is often held to support macroevolutionary theory includes: (i) similarities amongst phylogenies; (ii) embryological recapitulation; (iii) nested hierarchy of form; (iv) suboptimal improvisations; (v) vestigial organs; (vi) macrobiogeography; (vii) fossil order; and (viii) fossil transitions. In each case, Wise allows that there is at least an initial appearance that the evidence supports macroevolutionary theory. But, in each case, he claims, it is also true that the evidence can be explained by a theory of intelligent design—and, moreover, in most cases, there are difficulties for the macroevolutionary explanation which do not arise for the theory of intelligent design. Furthermore, Wise claims, there is some evidence which macroevolutionary theory leaves unexplained, in particular: (ix) the complexity at all levels of the biological world; (x) the integration of all levels of the biological world; and (xi) the aesthetic beauty of the natural world. In his view, a theory of intelligent design can explain all of this evidence.

Rather than discuss each of these cases in turn, I shall just consider Wise's discussion of the first case: **similarities amongst phylogenies**. Wise claims that in evolutionary theory, anologies—similarities which are not due to genetic relationships—should be expected to be very uncommon, whereas on theories of intelligent design they should be expected to be common (as, in fact, they turn out to be). Since, as Goodman pointed out,

any two things are alike in ever so many ways and unlike in ever so many ways, it must be that there are some restrictions on the kinds of features which are allowed to count as analogies. (Any consistent theory has to allow that analogies are common unless there are restrictions on the kinds of analogies allowed.) Since Wise doesn't tell us what these restrictions are, there is no way for me to assess the claims which he is making here. Wise also claims that in evolutionary theory, discordances—discrepancies which arise from calculating according to different criteria of similarity—should be expected to be very uncommon, whereas on theories of intelligent design they should be expected to be common (as, in fact, they turn out to be). This claim also seems to be vitiated by uncertainties about what kinds of similarities and differences are at issue.

Suppose we set this worry aside. (Perhaps it is just my ignorance of biological theory which makes me think that there is even a problem here.) There is another worry about Wise's discussion, which extends to all of the other cases as well. Wise claims that, if an intelligent designer were responsible for the variety of life, then we should expect similarities among organisms. 'If the intelligent Designer has a common purpose—the production of adult organisms—then embryonic forms and molecular structures were designed to produce the adult structures. Similarities in adults would be expected to be tied to similarities in embryology and molecules.' (214) I don't see that there is anything which deserves to be called 'an explanation' here. Wise has told us nothing about the characteristics of the intelligent designer which he is postulating, beyond the fact that it wants to produce adult organisms. Given just this much, I don't see how we can infer anything about likely similarities. Perhaps, if the intelligent designer is subject to various kinds of constraints, we might be able to get some consequences—but since the ultimate theory at which Wise is aiming is one in which there is an omniscient and omnipotent designer, it seems unlikely that there is much in the way of constraints which can be imposed.

Part of the problem here is that Wise simply talks about what could be expected 'on theories of intelligent design'. But there are many different possible theories of intelligent design, and there is no reason to think that they will all yield the same answers on any given question (even for those versions of the theory which are sufficiently precise to yield any answers at all). If we suppose that the designers are creatures much like ourselves—subject to all kinds of finitude—then we may be able to make some kinds of conjectures about what they are likely to do; but if we suppose that the designers are creatures not much like ourselves, and not subject to much in the way of constraints, then we shall surely make very different conjectures about what they are likely to do. Consequently, none of Wise's claims about what theories of intelligent design can be expected to say carry any credence at all. (Note, too, that there is the possibility of sliding between conjectures about what intelligent designers much like ourselves would do and what intelligent designers not much like ourselves would do. This is another reason why Wise needs to consider one detailed theory of design at a time when assessing the comparative merits of evolutionary theories.)

Consider, for example, Wise's claim that 'if life is the result of an intelligence analogous to humankind's, then a nested hierarchy of life forms would be the expected result'. (220)

Why? What on earth could be the justification for this claim (other than the fact that, accoding to Wise, there is a nested hierarchy of form, and so, of course, the correct theory is bound to predict this fact)? What's needed here is the formulation of a theory of an intelligent design for which it is possible to trace out implications about the kinds of outputs expected. Until there is a definite theory to set against evolutionary theory, the kind of project in which Wise is engaged is completely pointless. (That's not to say that Wise may not be right in claiming that there is data which is hard for macroevolutionary theory to accomodate. However, for the reasons given in my discussion of the previous chapter, it's not clear that it would be a major blow to macroevolutionary theory even if this were the case.)

Origin of the Human Language Capacity: In whose Image?, by John W. Oller, Jr. and John L. Omdahl

Oller and Omdahl argue for a number of claims, the most important of which (I think) are the following:
1. There is an anology between human capacity for language use and the genetic code which supports the claim that, if the latter is the result of intelligent design, then so is the former.
2. It is impossible to give an adequate materialist account of the origins of human language.
3. All of our concepts are innate.
4. Apes cannot learn language.
5. There is an abstract eternal realm (evidence for which is found in our freedom to make choices and in our ability to 'think outside the spatiotemporal').

Their overall aim is to vindicate the position which holds that human beings were separately and specially designed and created—that we have abilities and capacities which are not continuous with those of other animals—and that the designer and creator belongs to a realm which transcends the spatiotemporal.

Oller's and Omdahl's discussion of the alleged 'analogy' between human capacity for language use and the genetic code is not terribly clear. I think that what they are claiming is this: For the kinds of reasons given by Bradley and Thaxton, it must be that the genetic code is the result of intelligent design. Consequently, any capacity which is programmed into the human genome is the product of intelligent design. There is good reason to think that the human capacity for language use is programmed into the human genome. So there is good reason to think that the human capacity for language use is the product of intelligent design. The problem with this interpretation of what they say is that it seems not to involve any kind of analogy—the conclusion of the reasoning does not depend upon any alleged similarities between the genetic code and the human capacity for language use.

Here is a different suggestion about what Oller and Omdahl may be thinking: There are some good analogies between the genetic code and human languages. In particular, both the genetic code and human languages can be thought of as storehouses for information. Since it must be the case that the genetic code is the product of intelligent design, there is

good reason to think that human capacity for language use is the product of intelligent design. But, of course, the problem with this interpretation is that the inference is clearly no good: the appropriate analogy is between the genetic code and human languages, not between the genetic code and the human capacity for language use. And Oller and Omdahl note as much: they say 'we want to show that the products of human language capacity [i.e. languages?] are similar in design to the biological texts that form the basis of biological organisms (p.237); and 'both linguistic and biological structures reveal an articulate design' (p.246). (Note, by the way, that there are many important respects in which the genetic code and human languages are quite unlike each other. For example, the genetic code is not a system of representations which depends upon arbitrary conventions; and nor is it the case that the genetic code involves a system of representations which play functional roles in the mental lives of agents. These kinds of disanalogies might well suffice to undermine any argument based on alleged analogies between the genetic code and human languages. Certainly, they seem sufficient to undermine any *analogical* argument to the conclusion that human languages could not have purely naturalistic explanations.)

Since I cannot reconstruct the argument of their paper, I shall suppose that Oller and Omdahl are committed to the first argument which I sketched above. Leaving aside the reliance on the arguments of Bradley and Thaxton, the crucial premise here is the claim that there is good reason to think that the human capacity for language use is programmed into the human genome. Oller and Omdahl rely principally on an appeal to authority in defending this premise. ('[It is a central theme of modern linguistics that] whatever facts we can know can be known only by linking prior knowledge from our innate capacities with an external world' (p.243). '[T]he solution that is almost universally accepted by modern linguists .. is to suppose that the conceptual basis for human understanding and the language capacity itself is essentially innate.' (p.250)) The one argument they give is contained in a quote from Chomsky: 'The rate of vocabulary acquisition is so high at certain stages of life, and the precision and delicacy of the concepts acquired so remarkable, that it seems necessary to conclude that in some manner the conceptual system with which lexical items are connected is already substantially in place.' (255) This is a very slender reed on which to hang their argument. Chomsky does not say (here) that all of our concepts are innate; nor that we need to suppose that they are in order to explain language acquisition in children. It seems very plausible to think that some of our concepts are innate, and that there is some sense in which an ability to learn language is part of our genetic endowment (if only because the possession of large brains is part of our genetic endowment). But it is a big leap from this plausible claim to the much stronger contention that all of our concepts are innate and that pretty much everything about the human capacity for language use is programmed into the human genome. And, in any case, even if it did turn out that the strong claim about innateness is correct, our earlier objections to the arguments of Bradley and Thaxton would still suffice to defeat the argument to the conclusion that human linguistic capabilities must be the products of intelligent design.

Oller and Omdahl make much of the claim that apes cannot acquire human language systems. They claim that, while apes can be taught large vocabularies of symbols, there

are many things which we can do with our vocabularies of symbols which apes cannot do with theirs—e.g. ask questions, recognise structure–dependence, practice linguistic ascent, indefinitely expand vocabulary, achieve much greater than 80% accuracy in using signs, etc. Moreover, they (at least implicitly) claim that this shows that there is a difference in kind between what apes can do and what we can do, and hence that it is implausible to think that there are evolutionary relations between us and the apes. I don't want to contest the data on which they rely; but I do think that the inferences which are supposed to be supported by it are somewhat tenuous. If we (perhaps crudely) think of minds on the models of computers, then the difference between us and the apes might just be a matter of processing capacities (you need more memory and more speed in order to run sophisticated language programmes). That I need to upgrade my computer in order to run updated versions of my favorite software does not show that there is a difference in kind between my earlier and later computers. (It is plausible to think that the apes have hard–wired conceptual capacities of various kinds, just as we do. Whose to know what they could do if they were able to upgrade?) Certainly, if the rest of the evolutionary story is intact, then the claim that the linguistic abilities of apes provides a stumbling block seems to be quite implausible.

There are a couple of places where Oller and Omdahl give what seem to me to be disastrously bad arguments for philosophical conclusions. I shall end this section by mentioning a couple of them.

On p.248, they write: 'Logical analysis shows that any intention to do something is, from the physical point of view, merely a hypothetical possibility, not yet an act. It is just an abstract proposition associating a subject .. with a predicate. ... Before such events are caused by the person who intends to cause them, they are merely abstract propositions about potential states of affairs in the mind of the person who is considering or willing to do them. ... [On the contrary] within a nonmaterialistic realism, mental acts and all representations are accorded real status. ... Intentions, thoughts, and the abstract propositions they they truly manifest are all quite real irrespective of any particular physical event.' This is incredible! According to non–eliminativist materialist views, intentions are real entities, namely, neurophysiological states of those who have them. Mere logical analysis does not show that this kind of reductive materialism is mistaken. So there is no possibility of arguing directly from the reality of intentions, thoughts, etc. to the falsehood of materialism. It is just an elementary howler to think that *this* kind of argument shows that 'a material event is entirely incapable .. of creating, suggesting, or inferring .. any conceptual abstraction'. (249) Of course, it may be that materialism is mistaken—but it would take a quite different kind of argument to show that it is. (Perhaps it is worth noting that, in their summing up, Oller and Omdahl say that they have 'shown logically that the language capacity cannot have originated in any purely materialistic manner' (p.265). This claim refers back to the little gem which I have just been discussing.)

Also on p.248, Oller and Omdahl give a little argument for the conclusion that there can be true counterfactuals: 'I hold my coffee cup in my hand about the tile floor. I don't drop it. If I did drop it .. it would fall. Is the fact that it would fall a real fact? Shall I do

the experiment and see? Of course not. No one doubts that if the experiment were done, it would come out as it always does. The cup would fall to the floor.' Of course! But which materialists have ever thought otherwise? Or, more importantly, why should you think that there is anything in this little story which is incompatible with a sensible materialism? (Perhaps a good think to look at in this connection is J. Bigelow and R. Pargetter (1990) <u>Science and Necessity</u> Cambridge: CUP. They are materialists; and they would agree with Oller and Omdahl that '[w]e know what would have happened if the cup had been dropped, and this proves our access to an abstract eternal realm that must be .. real' (p.265).)

On p.266, they write: 'If any choice is to be regarded as real, we must accept the fact that the rejected alternative is as real as the one selected, though neither was physically determined before the choice was made. Otherwise there could be no real choice between dropping the cup or not.' Perhaps it is true that, if I am to make a genuine choice, then there must be real alternatives. (There seem to be cases in which I act freely even though there are no real alternatives. But that's a different story.) However, no compatibilist is going to grant that I can't have a genuine choice if my actions are (physically) determined. What matters for genuine choice—and for genuine freedom—is that my actions issue from my beliefs, desires, intentions, values, and so on in the right kind of way and in the right kind of circumstances. Or so say compatibilists. Again, there is a big debate here—but it's absurd to think that the dinky little argument which Oller and Omdahl give cuts any ice.

Also on p.266, Oller and Omdahl give this argument: 'Though we are surely not omnsicient, nor omnipresent, nor omnipotent, by the powers released in us through the gift of language, we are undeniably able to entertain such concepts, and in doing so we give as clear a proof as ought to be required that our capacity for language cannot have originated within the narrow confines of any finite duration of experience.' This argument reminds me of the proof of the existence of God which Descartes gives in *Meditation III*: given the content of certain concepts pertaining to God, there is no way that they could have arisen in us. But why not? Perhaps there are some logical ideas which are innate—quantification, negation, comparative, and so forth—but with these and the concepts of knowledge, power and place we can constuct the concepts of omniscience, omnipresence and omnipotence. Thus, it is hard to see how anyone could think that there is something special about the concepts of the divine attributes which shows that *those* concepts could not have originated in us. (The argument at this point continues: 'Suppose I dropped the cup and it fell. This would be a particular event. Yet our conception of that event, like all conceptions whatever, is completely general. The conception would apply equally well to any event similar to the one at hand and thus reaches out to an infinity of possibilities that have never been experienced. If all the eons of the spacetime world could be multiplied clear to infinity, the material world would still fail to account for the abstract conceptions that any human being can easily solve through the gift of language. ... The most peculiar property of [the abstract and nonfinite human language capacity], the one that demands explanation, is that it enables us to step outside the bounds of time and space.' Here, we may be getting into difficult philosophical issues, in particular, Kripkean considerations about rule–following. Granted, it is hard to

understand the potential open-endedness of our concepts. But this is a problem for everyone, not just for materialists.)

Finally, on p.249, Oller and Omdahl write: 'Recall the Sermon on the Mount, where it is argued that lust and unwarranted hatred will be judged in the end as equivalent to acts of sexual immorality and murder, respectively. Therefore the biblical perspective assigns no more weight of reality to the physical, material world than to the realm of merely abstract representations.' What kind of an inference is this? Lust and hatred belong to the physical, material world; they are no mere abstract representations. Even if they were, how could the fact that *some* 'abstract representations' are treated like real acts establish the conclusion that the physical, material world is no weightier than the realm of merely abstract represenations? Do different logical standards apply when inferences are drawn from scripture? (Later on the same page, our authors claim that 'the scientific ideas that follow from the Bible are very different from those of Darwin's philosophy or any other materialistic philosophy', where the evidence for this claim is based on a series of quotes from scripture which seem not to contain a single scientific idea, nor to carry any entailments about scientific ideas.)

Appendix: Rational Inquiry and the Force of Scientific Data—Are New Horizons Emerging?, by John Ankerberg and John Weldon

This appendix is an instance of a familiar feature of anti–evolution literature: a selection of quotes from well–known scientists and intellectuals expressing doubts about various aspects of contemporary evolutionary theory. Ankerberg and Weldon say: 'Virtually all aspects of evolutionary theory have recently encountered major critique by someone. Thus collectively considered, what now remains factually and scientifically established in evolutionary theory as a whole would appear to be marginal. Therefore we think it appropriate to consider new paradigms.' (271) However, it is at least worth noting: (i) that some of the anti-evolution quotes are from creationists or others who have never been well–disposed towards evolutionary theory; (ii) that the quotes are arranged without regard to chronology (and that there is no indication in the main text whether a quote belong to the 1950s or the 1990s, nor—in many cases—whether the person making the quote can plausibly be thought to be an expert on matters evolutionary); (iii) that the quotes are nearly all given without any clues about the contexts in which they are made, nor with any regard to different ways in which they might be interpretted; and (iv) that many of the quotes could only be thought to be damaging to the scientific standing of evolutionary theory if one makes absurd assumptions about the nature of science. (Let me illustrate with just one case. Ankerberg and Weldon start with this quote from E. White's Presidential Address to the Linnean Society, 1966: 'I have often thought how little I should like to prove organic evolution in a court of law.' This may sound damaging to evolutionary theory—and perhaps White worried that it was—but, in fact, there are very few scientific theories which can meet the standards which we demand in a court of law. In law, we require proof beyond all reasonable doubt; but, in science, we require only that our hypotheses be the most probable amongst those which we can devise (in light of all the evidence which is available). In some cases, we may have overwhelming evidence for a particular hypothesis—but there is no reason to think that this is likely to be the

norm (particularly in historical sciences, where our data is bound to be somewhat patchy).)

Rather than trawl through Ankerberg's and Weldon's piece, I shall confine myself to the following point: There is no doubt that one could write a very similar article based on a selection of quotes from well–known scientists and intellectuals expressing doubts about various aspects of contemporary Big Bang cosmology. (Curiously, Ankerberg and Weldon actually provide some material for such an article— see pp.285–6 for quotes from Bird and Hoyle which say very clearly that the Big Bang theory is in bad shape.) If we are allowed to cast our net back to the 1950s, then we will be able to find lots of material which suggests that global cosmology is not and can not be a science. If we restrict our attention to the period after the discovery of the cosmic microwave background radiation (1965), we shall still be able to find plenty of quotes pointing to dissatisfaction with various aspects of Big Bang models. Even if we restrict our attention to the 1990s—after COBE—we can still find plenty of material from physicists casting doubt on the status of Big Bang cosmology. Non–theists who were so inclined could meet the creationist propaganda with anti–Big Bang propaganda of their own. But what would be the point?

Well, there is a point here which is important for us. The scientific case for creation which is purportedly made in the book under review relies upon two kinds of scientific evidence: evidence from living systems (for design) and evidence from the cosmos at large (for origins). (There is also alleged evidence from the cosmos at large for design, but, in the interests of simplicity of exposition, I shall ignore this here.) In order to get evidence from living systems (for design), evolutionary theory needs to be defeated. But in order to get evidence from the cosmos at large (for origins), the Big Bang theory must be upheld. So, in order for the book to make its case, the contributors must be careful to ensure that the strategies and arguments which they use to cast doubt on, or to undermine, or to knockout, evolutionary theory do not also cast doubt on, or undermine, or knockout, Big Bang cosmology. But the point which I have just made is that, to the extent that the strategy which Ankerberg and Weldon employ succeeds against evolutionary theory, it is bound to succeed just as well against Big Bang cosmology. (As I noted above, it is very curious that Ankerberg and Weldon seem to concede that this is so. If their efforts seriously undermine evolutionary theory, then they also seriously undermine Ross's claims about astronomical evidence for origins, and they also seriously undermine the *a posteriori* version of the kalam cosmological argument which Moreland sketches in his introduction.)

Now, of course, I would want to hang on to both evolutionary theory and Big Bang cosmology; hence, I would want to argue that Ankerberg and Weldon do not succeed in their attempt to cast doubt on evolutionary theory. However, it would be a major task to argue this in detail. Perhaps there is someone else out there who would like to take up this task?

Some Concluding Remarks:

I began by saying that, in some respects, this book is better than run–of–the–mill attacks on evolutionary theory. One reason for saying this is that it relies on reasonably sophisticated views about the nature of scientific theory. (Much of Part 1—the articles by Moreland, Meyer and Dembski—is well–argued and well–thought–out.) Another reason for saying this is that, when conclusions are drawn from scientific data, those conclusions are often fairly careful. (For example, Bradley and Thaxton are careful to note that—in effect—their arguments at best support 'deistic science'.) Yet another reason is that in some places—particularly in the article by Wise—it is acknowledged that evolutionary theory is a very successful scientific theory.

However, there are respects in which this book is very much like familiar anti–evolutionary literature. The appendix by Ankerberg and Weldon employs a familar creationist strategy which is pretty much beneath contempt. (In my remarks on that part of the book, I noted the possibility that one could use this strategy to 'discredit' the Big Bang theory. Of course, it would be even easier to use this strategy to 'discredit' Christianity—think of the wealth of resources provided by the memoirs of those who lost their faith, etc! Surely it is time that serious creationists stopped playing this silly game.) Moreover, the articles by Ross, and Oller and Omdahl, are rather poorly argued—the alleged connections between the data which is presented and the conclusions which are drawn are hard to fathom. Finally, the whole work has a tone of 'resentment' which seems to me to be quite unjustified. As I argued earlier, I see no reason at all to think that there is any kind of conspiracy against—any kind of methodology implicit in modern scientific practice which rules out—creationism. There are lots of well–funded research institutes and presses devoted to the task of developing and promoting creationism, and this work is being monitored by mainstream scientists, philosophers of science, and so on. If creationists manage to come up with good reasons to take their views seriously, then I have no doubt that their views will be taken seriously. (Likewise for astrologers, phrenologists, scientologists, and all those other denizens of the margins of science.) To date, howevere—as the current volume makes manifest—no such reasons have been forthcoming.

(Perhaps my remarks in the previous paragraph are a little too concessive. There are good political reasons for separation of church and state: we all know about the problems which sectarian divisions can create in societies. Since there is no prospect that those who are prone to religion will agree on a single religion, there is good reason to keep the state secular. The same point applies—with bells on—to the curriculum in schools and universities. There is no prospect that those who are prone to 'theistic science' will agree on a single 'theistic science'—indeed, plainly, pretty much every religion will have its own 'theistic science'—so there is good reason to keep it out of the schools and universities. Moreover, since it is an important feature of science that it is a public institution which belongs to no sect or creed, there is good reason to keep it separated from religion as well. Of course, the more controversial questions here concern what should be done with evolutionary theory—but I shall not buy into those debates here.)

One feature of the book which I have mentioned at various points is that it does not form a unified and coherent whole: the argument in one part very often pulls against the

argument in another part. This feature is, I think, related to a more fundamental drawback of the book, which is, once again, a common feature of the anti–evolution literature—viz. that it nowhere makes any attempt to give a detailed statement of the theory which is supposed to be in competition with evolutionary theory. Although many of the authors make claims about the ability of 'theistic science' to explain this or that, we are never given any clear statement of this wonderful theory—and so we have no way of even beginning to assess these claims. Even if this could be in part justified by the claim that 'theistic science' is in its infancy—a claim which is in any case in tension with the claim that 'methodological naturalism' is a recent invention which was used to overthrow well–established and long–standing 'theistic science'—it's hard to see how claims about what 'theistic science' can explain can be justified unless someone, somewhere, has a well–worked–out theory of this kind.

This criticism is important, because, before a proper assessment of, say, evolutionary theory can be made, we need to know what the alternatives are. Those alternatives need to be subjected to the same kind of critical scrutiny to which creationists subject evolutionary theory *before* any claims about the possible superiority of creationism can be accepted. As any debater knows, it is much easier to win a debate if aren't required to state and defend your own position, and are free to spend all your time attacking your opponents' position. Since so much anti–evolutionary literature has now appeared, the negative part of the 'theistic science' programme is well–known; it's time for these people to give us their positive views in the same kind of textbook format in which evolutionary theory is often presented, so that these views can be subject to proper criticism.