



Part 1 - Intelligent Designs on Science: A Surreply to Denis Alexander's Critique

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I am gratified that my paper 'Theistic Evolution & Intelligent Design in Dialogue'[1] has initiated a real life dialogue between these two fallible human attempts to understand origins. In 'Designs on Science,'[2] Cambridge University biologist Professor Denis Alexander takes issue with four claims that he finds, explicitly or implicitly, in my aforementioned paper. He summarizes these claims as follows:

1. The 'design inference' is not a theological or philosophical argument but is a 'scientific theory'
2. It is possible to define biological entities as 'irreducibly complex' in a meaningful fashion
3. The 'burden of proof' lies upon the evolutionary biologist to show how complex biological systems come into being
4. Proponents of ID do not perceive the world as a two-tier system of the 'natural' and the 'designed'[3]

Since Alexander disagrees with these claims, it appears that he must endorse something like the following propositions:

1. Intelligent design theory is not science
2. It is not possible to define biological entities as 'irreducibly complex' in a meaningful fashion
3. The 'burden of proof' does not lie upon the evolutionary biologist to show how complex biological systems came into being
4. Proponents of ID perceive the world as a two-tier system of the 'natural' and the 'designed'

These claims happen to be presented in order of descending relevance and importance to

intelligent design theory *per se*. The first claim must be rejected by all ID theorists, since all ID theorists by definition advocate intelligent design as a scientific theory. This is the only essential ID claim attacked by Alexander in 'Designs on Science'. The second claim must only be rejected by design theorists who wish to advocate a design inference from irreducible complexity. Of course, many design theorists embrace irreducible complexity; but one need not embrace irreducible complexity in order to be a design theorist. The third claim must only be rejected by design theorists who wish to place the burden of proof upon the evolutionary explanation rather than the design explanation in their arguments. Again, many design theorists argue that the presumption of truth is on their side; but intelligent design theory doesn't depend upon a presumption of truth. The fourth claim is only indirectly about ID, since this is a claim that must be rejected by those (like myself) who wish to interpret ID within the theological framework of monotheism. While a majority of design theorists identify the source of design with the God of a particular theistic religious tradition (Jewish, Christian, Muslim), intelligent design theory *per se* does not endorse such a specification. Design theorists as such may be perfectly happy to perceive the world in terms of a 'two-tier system' if they are Atheists, Agnostics, Platonists, Stoics, etc. As William A. Dembski comments: 'The ID movement is a big tent and all are welcome. Even agnostics and atheists are not in principle excluded... I've seen intelligent design embraced by Jews, Muslims, Hindus, Buddhists, agnostics and even atheists.'[4] Of course, if theism is true (as I believe) and if theism is incompatible with intelligent design theory (as Alexander believes), then ID and theism pose each to the other a serious external conceptual problem.

Since I am an ID theorist who rejects all four of Alexander's claims, I will critically examine Alexander's arguments regarding each claim in turn. In the course of this discussion I will also draw upon other writings by Alexander, especially his magnum opus on science and religion: *Rebuilding the Matrix* (Lion, 2001). There are, however, a number of preliminary issues I want to address before turning to Alexander's specific points of disagreement with ID.

Prolegomena

According to Garrett J. DeWeese and J.P. Moreland: 'The central aspect of ID theory is the idea that the designedness of some things which are designed can be identified as such in scientifically acceptable ways.'^[5] In its broad sense: 'Intelligent Design is simply the science of design detection - how to recognize patterns arranged by an intelligent cause for a purpose.'^[6] We should distinguish, then, between intelligent design as a general approach to design detection (marrying empirical evidence with design detection criteria) and 'intelligent design theory' as a specific application of ID to the question of origins. Unfortunately, popular usage blurs this distinction, using 'intelligent design theory' and 'ID' interchangeably for both aspects. As William A. Dembski writes:

Intelligent design studies the effects of intelligence in the world. Many special sciences already fall under intelligent design, including archaeology, cryptography, forensics, and SETI (the Search for Extraterrestrial Intelligence). Intelligent design is thus already part of science. Moreover, it employs well-defined methods for detecting intelligence. These methods together with their application constitute the theory of intelligent design [this is ID in the broad sense]. The question, therefore, is not whether intelligent design constitutes a genuine scientific theory but whether, as a scientific theory, it properly applies to biology [this is ID in the narrow sense]. Indeed, the only place where intelligent design is controversial is biology (even physicists are now comfortable talking about the design of the universe).^[7]

Alexander's response to ID in the narrow sense bears out Dembski's analysis.

In terms of applying ID to origins, intelligent design theory (which, following convention, I will still shorten to 'ID') *essentially* consists of the following two claims (the first claim is essential to ID in the broad sense while the second is not):

ID Claim 1) There exist one or more reliable tests for detecting intelligent design

ID Claim 2) The cosmos exhibits empirical data that passes one or more tests for reliably detecting intelligent design

Design theorists have defended several methods

of design detection, including specified complexity,^[8] irreducible complexity^[9] and Bayesian probability approaches.^[10] Design theorists have proposed that intelligent design can be inferred from several facets of nature, including: cosmic fine-tuning,^[11] the fine-tuning of our local cosmic habitat,^[12] the origin of life,^[13] irreducibly complex bio-molecular machines^[14] and the Cambrian Explosion.^[15]

One can see that *if* both of the above ID claims are correct, *then* we must draw the conclusion that:

Therefore) The cosmos exhibits empirical data that passes one or more reliable tests for intelligent design

The soundness of this logically valid argument is what we might call the 'core claim' of intelligent design theory. ID theorists additionally claim that:

ID Claim 3) Inferring intelligent design from empirical evidence using reliable tests can be regarded as a *scientific* enterprise (rather than a philosophical or theological enterprise).

The conjunction of the claim to scientific legitimacy with the above 'core claim' constitutes what DeWeese and Moreland call the 'central aspect' of intelligent design theory. As David DeWolf, John West, Casey Luskin and Jonathan Witt state: 'ID only claims that there is empirical evidence that key features of the universe... are the products of an intelligent cause.'^[16] ID is philosophically minimalist, being neither 'creationism'^[17] nor natural theology.^[18] As Marcus Ross and Paul Nelson observe, ID is compatible with: 'all those teleological views that allow for the empirical detection of real design.'^[19]

Better to be unscientific and true than scientific but false

The third ID claim invites debate about how best to classify the core claim of intelligent design theory. However, this debate should not be confused with the debate about whether the core claim of ID is sound. The question of whether or not intelligent design theory is science is not the same question as whether or not the core claim of ID is sound, since arguments and theories may

be the latter (may be true) without being the former (without being scientific), and vice versa. Anyone arguing that arguments cannot be true unless they are scientific would be advancing a self-contradictory position.

Whether or not ID may legitimately be regarded as science is an important question. Nevertheless, it is not the most crucial question. Rather, the most crucial question is whether the core claim of ID, represented in the above syllogism, is not merely logically valid (which it is), but sound (i.e. whether both premises are true). As Francis J. Beckwith argues:

whether ID fits some a priori definition of 'science' or 'pseudo-science' is a red herring, for such definitions tell us nothing about whether a theory and/or explanation, such as ID, provides us with real knowledge of the order and nature of things.[20]

In Stephen C. Meyer's judgement: 'the question whether a theory is scientific is really a red herring. What we want to know is not whether a theory is scientific but whether a theory is true or false, well confirmed or not, worthy of our belief or not.[21]

Alexander's Minimal Commitment to ID's Core Claim

It seems clear from his writings that Alexander accepts a minimal version of the core ID argument, based wholly upon the 'anthropic' fine-tuning of the universe combined with an implicit use of specified complexity as a design detection criterion (the utility of specified complexity as a design detection criteria is, implicitly and even explicitly, common ground amongst ID proponents and scholars without the ID movement from both theistic and naturalistic perspectives[22]). At least implicitly speaking, Alexander accepts both premises of the core claim of intelligent design theory. Where Alexander parts company from ID is over the claims that anything besides the fine-tuning of the universe merits a design inference and that intelligent design theory (as distinguished from ID in its broad sense) is science. Nevertheless, it is important to note the existence of common ground between Alexander, ID in its broad sense, and the core claim of ID in its narrow sense.

In *Rebuilding the Matrix* Alexander observes that the search for extraterrestrial intelligence: 'is based on the assumption that a single message from space will reveal the existence of intelligent life elsewhere in the universe.'[23] He quotes Norman L. Geisler with approval: 'even if the object of pursuit is the reception of only one message, nevertheless, the basis of knowing that it was produced by intelligence is the regular conjunction of intelligent beings with this kind of complex information.'[24] Although Alexander does not make it explicit, the 'kind of complex information' Geisler is talking about is complex *specified* information.[25] Alexander argues for design on the basis of the fine-tuning of cosmic constants in the big bang:

we have argued that the universe has some very unusual properties that render conscious life possible – and that those properties are not unusual because we observe them but because the physical constants that make them unusual could, presumably, have been otherwise.[26]

Alexander's teleological argument is based upon the existence of 'unusual properties', i.e. an unlikely or *complex* set of physical properties, that are *specified* as the set of properties 'that render conscious life possible'. While Alexander doesn't use the *terminology* of specified complexity, his argument nevertheless *uses* specified complexity by appealing to the combination of complexity ('unusual properties') with a specification ('render conscious life possible'). Alexander's reliance upon specified complexity is emphasised by the fact that he quotes design-theorist and philosopher William Lane Craig in defence of the argument from fine-tuning: 'we should be surprised that we do observe basic features of the universe which individually or collectively are excessively improbable [complexity] and are necessary conditions of our own existence [specification].'[27] Craig explicitly advances the anthropic argument in terms of a design inference from specified complexity.[28]

Alexander paints two scenarios to push home the point that one cannot sidestep this argument by noting that we would not exist to be surprised by finetuning if that tuning were not as fine as it is. The first story involves a kidnapped accountant told that unless he wins the national lottery for ten

consecutive weeks he will be killed, who is surprised to survive (at odds of around 1 in 1060), but who is told that: 'he should not be surprised that such an unlikely event happened for, had it not, he would not have been alive to observe it.'[29] Clearly, the accountant is right to be surprised, and to suspect that there must be an explanation for his survival. The second story concerns a gambler who will be killed unless he gets ten coins-flips in a row to show heads: 'the fact of the gambler still being alive does not explain why he got ten heads in a row... What requires explanation is not that the gambler is alive and therefore observing something but rather that he is not dead.'[30] Indeed, what requires explanation, in both stories, is the occurrence of unlikely (i.e. complex) events that are also specified. Likewise, in the case of the anthropic argument, what requires explanation is that: 'our finely tuned universe is not just any old "something", but contains within it a planet full of people who postulate theories about cosmology and the meaning of the universe...'[31] Alexander rightly argues that an explanation of fine tuning, indeed *an explanation in terms of design*, is required not simply because the fine-tuning represents an *unlikely* (complex) set of constants, but because the particular constants that happen to exist are *specified* as necessary pre-conditions for the existence of complex life:

The data pointing to a series of remarkably finely tuned constants [complexity] which have promoted the emergence of conscious life [specification] sit more comfortably with the idea of a God with plans and purposes for the universe than they do with the atheistic presupposition that 'it just happened'.[32]

Alexander deploys specified complexity as an argument for the conclusion that the data of cosmic fine-tuning demands an explanation rather than an evasion. He also uses specified complexity as a basis for inferring that the best explanation of cosmic fine-tuning is intelligent design; for the *reason* that the specified complexity of cosmic fine-tuning 'sits more comfortably with the idea of a God with plans and purposes for the universe than they do with the atheistic presupposition that "it just happened"'[33] is surely: 'the regular conjunction of intelligent beings with this kind of complex information.'[34]

I am happy to be able to share common ground with Alexander concerning specified complexity as a design detection criterion and its applicability to the fine-tuning of the cosmos. Nevertheless, in an excellent inaugural lecture for *Christians in Science* delivered at Southampton University, Alexander made it clear that he has: 'no problem with the language of design so long as its kept to the big picture [to] design which makes science possible [and which is seen in] the anthropic structure of the universe.'[35] This is as far as Alexander goes with the application of ID (in the minimal sense) to nature. He rejects the proposition that his design inference from the finetuning of the cosmos can be legitimately described as a scientific inference (perhaps because he infers specifically divine design rather than merely inferring intelligent design). He rejects the proposition that any aspect of creation besides cosmic fine tuning warrants a design inference by the same criteria of specified complexity; and he rejects the proposition that 'irreducible complexity' constitutes a reliable design detection criteria because he rejects the proposition that anything biological can be non-vacuously described as irreducibly complex.

However, just as Phillip E. Johnson has asked Darwinists 'What should we do if empirical evidence and materialist philosophy are going in different directions?'[36], so I would ask Alexander: 'What if empirical evidence which triggers a design inference, according to the criteria that he applies to 'the big picture' of fine-tuning, were shown to exist within any of the *details* of that picture?' Which should we then deny: a) the empirical evidence, b) our shared design-detection criteria, c) the logical validity of the core ID argument, or d) objections to invoking the language of design within science? A positive assessment of the core claim of ID provides one with a powerful reason to reject objections to invoking the language of design within science. Suppose that the core claim of ID was sound, but we nevertheless wanted to say that ID was not science. Would we not then have a powerful case for diverting resources from university science departments to university departments of philosophy in order to further our understanding of origins? But surely this implausible consequence is a *reductio ad absurdum* of the position that the core claim of ID could be true without our counting intelligent design theory as science.[37]

That is, the core claim of ID seems to entail (although not in a strict logical sense) the remaining element of the 'central aspect' of ID.[38] As Norman L. Geisler warns:

Even if one... insists, for whatever reason, to exclude all but natural causes from the word science, that does not invalidate supernatural causes or their study. They simply move to another area of intellectual endeavour, be it 'philosophy' or whatever. Science is simply impoverished in its own search for truth.[39]

Foundation's End

Alexander doesn't consider his design inference from cosmic fine tuning to be a scientific argument (he presumably considers it a philosophical argument) because he believes that: 'scientific theories operate at a different level from foundational questions such as "Why are scientific laws the way they are?"'[40] But just how 'foundational' a question is this? Not as foundational as: 'Why are there any scientific laws in the first place?' Yet it is due to the assumption that 'Why are scientific laws the way they are?' is a *foundational* question that Alexander thinks it is illegitimate to place a design inference from the laws of nature in the same (supposedly 'scientific') category as purported design inferences from other data (e.g. the origin of life).

'Science uncovers what the laws of the created order are and uses them', says Alexander, perhaps with the implication that science uses only such laws in its explanations: 'but the "why" question operates at a different kind of level.'[41] However, whether or not science operates at a different level from the question of why the laws of nature are fine tuned, and whether or not science only explains by discovering and using the laws of the created order, depends upon one's definition of science. If ID can be classed as science, then science does not necessarily explain by discovering and using the laws of the created order. Indeed, J.P. Moreland points out that: 'scientists do not always engage in explaining by reference to natural law... scientists sometimes explain something by appealing to a brute given that is not itself a scientific law and is not capable of being subsumed under more general law.'[42] Nor does science necessarily operate at a different level from the question of why the laws of

nature are finely tuned. A design theorist can agree with Alexander that science operates at a different level to foundational metaphysical and theological explanations of reality, whilst simultaneously raising the bar on just how far scientific theorising can take us. For the ID theorist, science can explain why the laws of nature are fine tuned as they are, but it nevertheless cannot explain why laws of nature should exist in the first place. As William A. Dembski explains:

We need here to draw a clear distinction between creation and design. Creation is always about the source of being of the world. Design is about arrangements of... materials that point to an intelligence. Creation and design are therefore quite different. One can have creation without design and design without creation... It is logically possible that God created a world that provides no evidence of his handiwork. By contrast, it is logically possible that the world is full of signs of intelligence but was not created. This was the ancient Stoic view, in which the world was eternal and uncreated, and yet a rational principle pervaded the world and produced marks of intelligence in it... Creation asks for an ultimate resting place of explanation – the source of being of the world. Design, by contrast, inquires not into the ultimate source of matter and energy but into the cause of their present arrangements, particularly those entities, large and small, that exhibit signs of intelligence... Design arguments can tell us that certain patterns exhibited in nature reliably point us to a designing intelligence. But there's no inferential chain that leads [directly] from such finite design-conducting patterns in nature to the infinite, personal, transcendent Creator God of Christianity.[43]

Claim One: Intelligent design theory is not science

'The scientific frame of mind should not *legislate* what kind of explanations there can be. Rather, it should *look* for the best explanation possible.'

– Norman L. Geisler[44]

Before considering the specifics of Alexander's attack on the scientific status of intelligent design theory it is worth noting that his general strategy - proposing necessary criteria for specifically *scientific* explanations and then judging a proposed explanation negatively with respect to

those criteria - is deeply controversial. Paul K. Moser and David Yandell warn that anyone proposing demarcation criteria for science is entering the arena not of science but of philosophy: 'Sweeping metaprinciples about the nature of legitimate inquiry... are not the fruits of the empirical sciences; they rather issue from philosophy...'[45] According to philosopher of science Del Ratzsch: 'there is no universally accepted *formal* definition of science, and proposed definitions almost invariably run into nasty difficulties sooner or later. That makes reliance upon a definition of science a bit "iffy".'[46] As historian and philosopher of science Bruce L. Gordon explains:

There is no consensus among philosophers of science as to what constitutes a proper scientific explanation or what criteria a theory must possess in order to be truly scientific. *Despite extensive attempts, criteria that indisputably demarcate science from non-science or pseudo-science have never been offered.* The failure of these efforts gives us a strong reason to suspect that no such criteria exist.[47]

Samir Okasha writes that: 'whether or not we accept Popper's negative assessment of Freud and Marx, his assumption that science has an "essential nature" is questionable.'[48] Martin Eger declares: 'Demarcation arguments have collapsed. Philosophers of science don't hold them anymore. They may still enjoy acceptance in the popular world, but that's a different world.'[49] Stephen C. Meyer observes that:

most contemporary philosophers of science regard the question 'What methods distinguish science from non-science?' as both intractable and uninteresting... philosophers of science have increasingly realized that the real issue is not whether a theory is scientific but whether it is true or warranted by the evidence.[50]

Hence, as Francis J. Beckwith writes:

one can raise the question of whether there are any... demarcation theories that are noncircular and at the same time may work legitimately to exclude ID. To my knowledge there are none. The overwhelming consensus in philosophy of science is that demarcation criteria are doomed to failure...[51]

With these warnings in mind, we can begin to

consider Alexander's demarcation criteria.

Alexander's Informal Criteria

Alexander complains that:

It is not enough in this context to argue... that the 'design inference' can be justified as a scientific theory on the grounds that 'design inferences' are made in 'archaeology, cryptography and forensic science'. These are all examples where we already know that purposive human behaviours are involved, so we are not surprised at finding evidence for such behaviour. But these kinds of analogies are, I would suggest, simply irrelevant for understanding biological entities. The SETI example is likewise bogus – for analogies to work there must be at least some connection between the two entities being compared.

But it is not [at] all obvious to me why the SETI programme should have anything to do with understanding the origins of the flagellum. This is comparing apples and oranges![52]

These comments appear in Alexander's paper before he formally argues against the scientific status of ID on the basis of two necessary conditions of scientific theory making not mentioned here. As such, I will consider these remarks as Alexander's *informal* attempt to establish the same conclusion concerning the scientific status of ID.

A Priori and A Posteriori Evidence

Alexander grants that design inferences are legitimate scientific explanations as long as a) 'we already know that purposive human behaviours are involved'[53] and b) we are therefore 'not surprised at finding evidence for such behaviour.'[54] But of course, the archaeologist or forensic scientist does *not* know *a priori* that purposive human behaviours are involved in the explanation of their latest set of data (e.g. a flint, a corpse). They may well know that purposive human behaviour is a *possible* explanation of their latest find, inasmuch as they may know that humans existed at the time from which their latest find originates; but they may not and certainly need not know this. All the archaeologist or forensic scientist assumes (or at least all they actually need to assume) is that intelligent design is a *possible* explanation for the things they see. These scientists infer design from empirical

evidence *a posteriori*.

If an archaeologist infers intelligent design as the best explanation of a flint they will probably chalk that design up to purposive human behaviour. It is logically possible that the flint was chipped into an arrow head by a visiting alien, but in the absence of evidence for this explanation Occam's razor favours the terrestrial explanation because we have independent evidence for the existence of terrestrial designers. However, it is easy enough to imagine scenario's wherein it would clearly be legitimate to infer design quite apart from any prior or independent knowledge about the existence of any particular candidate designer/s. Suppose an archaeologist discovered an object that justified a design inference on account of its specified complexity – for example, a statue like those on Easter Island - but which was dated (by carbon dating, etc.) to a time long before hominids are currently thought to have existed on earth, or which is found lying in the sands of Mars when the first manned expedition arrives.[55] According to Alexander's informal criteria, the archaeologist in such a situation would have to conclude that since they *are* 'surprised' to see such evidence of design, and since they do not already know that intelligent agents existed at the time or place their find originated (indeed, since the prior evidence indicated that intelligent agents did not exist at this time or place), the obvious conclusion that the find is the result of intelligent design is *thereby* rendered non-scientific! This seems to me a *reductio* of Alexander's criteria; in which case design inferences cannot be excluded from science when we don't 'already know that purposive human behaviours are involved'[56] and we are therefore 'surprised at finding evidence for such behaviour.'[57]

Analogy or Identity?

Alexander treats the design inference from the details of nature as an argument by analogy with design inferences within sciences such as archaeology and SETI. He objects that this analogy is 'irrelevant' and 'bogus' for forming our scientific understanding of biological entities, because the analogy is non-existent (or at least, too weak to work):

for analogies to work there must be at least some connection between the two entities being compared. But it is not [at] all obvious to me why

the SETI programme should have anything to do with understanding the origins of the flagellum. This is comparing apples and oranges.[58]

Let me attempt to explain what the SETI programme has to do with understanding origins (of the flagellum etc.). The design inference is not an argument by analogy of the sort described by Alexander. 'SETI', writes Alexander: 'is based on the assumption that a single message from space will reveal the existence of intelligent life elsewhere in the universe.'[59] As Geisler explains: 'even if the object of pursuit is the reception of only one message... the basis of knowing that it was produced by intelligence is the regular conjunction of intelligent beings with this kind of complex information.'[60] If some detail of the natural world, such as the fine tuning of the solar system, RNA, or a bio-molecular machine exhibits *exactly the same* property of complex specified information, then a standard inferential argument warrants positing exactly the same kind of cause: intelligent design. Even if the object of pursuit is a one-of-a-kind structure or event, 'the basis of knowing that it was produced by intelligence' is not an argument by analogy with SETI, but: 'the regular conjunction of intelligent beings with this kind of complex information.'[61] Alexander cannot exclude intelligent design theory from science on the basis that its core claim lacks a sufficiently close analogical relationship with design inferences he admits are scientific, because intelligent design depends upon an inferential argument from *identical effects*: 'intelligence is a generic quality, one that leaves a signature that can be identified by techniques already heavily employed in such fields as cryptography, anthropology, forensics and computer science.'[62] ID claims that since specified complexity exhibited by situations where its cause is known on other grounds is always the product of intelligent design, discovering the *identical* property of specified complexity in situations where its cause is not known on other grounds is therefore best explained by an identical type of cause: intelligent design. As Norman L. Geisler explains: 'Archaeology posits an intelligent cause for pottery. Anthropologists do the same for ancient tools. Likewise, when [ID theorists] see the same kind of specified complexity in a simple one-cell animal, such as the first living thing is supposed to be, they too posit an intelligent cause for it.'[63] Alexander's

informal attempts to exclude intelligent design theory from science are inadequate to the task. What of his formal attempt?

Alexander's Formal Criteria of Scientific Theory Making

According to Alexander:

the 'design inference' fails to count as a scientific explanation for anything... it fails to meet the most basic criteria of scientific theorising and practice.[64]

To substantiate this claim, Alexander advances two necessary conditions of scientific theory making:

Alexander's First Rule of Science: Methodological Naturalism

Alexander's first necessary condition of 'biological explanations in science'[65] amounts to an endorsement on his part of hard-line 'methodological naturalism':

An essential criterion for all such scientific theories is that they elucidate the properties of matter...[66]

Alexander also states that biological explanations 'relate to physical components in the actual world around us.'[67] In *Rebuilding the Matrix* he states that (within science): 'Questions about physical phenomena require physical answers.'[68] Of course, ID is concerned to elucidate the properties of matter and to pursuing physical explanations relating to physical components in the world around us. The problem is, this isn't all that ID attempts to do, whereas Alexander makes such activity 'essential' to scientific theory making.

Alexander does not deploy the *terminology* of 'methodological naturalism'; no doubt because he wishes to avoid any impression that science is *metaphysically* naturalistic, or implies a 'two-tier' worldview. However, as the established terminology in the philosophy of science 'methodological naturalism' carries none of 11 the associations that Alexander wishes to distance from himself. Indeed, the phrase 'methodological naturalism' was apparently coined by theistic evolutionist Paul de Vries in a 1983 conference paper subsequently published as 'Naturalism in

the Natural Sciences,' *Christian Scholar's Review*, 15 (1986), 388-396. De Vries distinguished between 'methodological naturalism', as a disciplinary method that is *neutral* concerning God's existence and 'metaphysical naturalism', which 'denies the existence of a transcendent God.' Hence De Vries states that the goal of the natural sciences is: 'to place events in the explanatory context of physical principles, laws, fields... the natural sciences are committed to the systematic analysis of matter and energy within the context of methodological naturalism.'[69] Methodological naturalism (MN) has thus been defined as the idea that: 'scientific method requires that one explain data by appealing to natural laws and natural processes.'[70] However, the very *raison d'être* of MN is to imply nothing about the ontological or metaphysical status of those 'properties of matter' and 'physical components in the actual world around us' mentioned by Alexander. Hence theistic evolutionist Nancy Murphy, a philosopher at Fuller Seminary, asserts: 'Science qua science seeks naturalistic explanations for all natural processes... Anyone who attributes the characteristic of living things to creative intelligence has by definition stepped into the arena of either metaphysics or theology.'[71]

However, as Del Ratzsch comments: 'appeal to definition cannot be the whole story.'[72] Despite its popularity among scientists, MN is a highly problematic and widely disputed philosophical rule. As DeWeese and Moreland report: 'The inadequacy of methodological naturalism [is] widely acknowledged by philosophers of science, even among those who are atheists...'[73] For example, philosopher of science Larry Laudan: 'rejects methodological naturalism as a demarcation criterion for science.'[74] According to Laudan:

If we would stand up and be counted on the side of reason, we ought to drop terms like 'pseudoscience' and 'unscientific' from our vocabulary; they are just hollow phrases which do only emotive work for us.[75]

Elsewhere Laudan writes: 'There is no demarcation line between science and nonscience, or between science and pseudoscience, which would win assent from a majority of philosophers.'[76] Hence Darwinist

Michael Ruse acknowledges:

It would indeed be very odd were I and others to simply characterize 'science' as something which, by definition, is based on (methodological) naturalistic philosophy and hence excludes God [or, therefore, intelligent design].[77]

Noted philosopher Willard Quine was a similarly pragmatic naturalist: 'If I saw indirect explanatory benefit in positing sensibilia, possibilia, spirits, a Creator, I would joyfully accord them scientific status too, on a par with such avowedly scientific posits as quarks and black holes.'[78] Likewise philosopher of science Philip Kitcher: 'Even postulating an unobserved Creator need be no more unscientific than postulating unobservable particles. What matters is the character of the proposals.'[79] Hence Moser and Yandell conclude: 'We find no basis in the empirical sciences for the kind of standard needed by methodological naturalists. The prospects for methodological naturalism... seem bleak now.'[80]

The History of Science vs. Begging the Question

'To redefine science so as to eliminate the possibility of an intelligent cause is contrary to the very commencement and character of modern science itself.'

- Norman L. Geisler[81]

In his *Optiks*, Newton wrote that: 'the business of science is to deduce causes from effects, till we come to the very first cause, which certainly is not mechanical.'[82] Newton's first Rule of Reasoning in *Philosophy* (i.e. science), from volume two of the *Principia*, is that: 'We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances. To this purpose the philosophers say that Nature does nothing in vain, and more is in vain when less will serve...'[83] In other words, science is a search for the best (simplest adequate) explanation of material reality *simpliciter*, and that explanation may not be 'mechanical' in nature, but intelligent. As Stephen C. Meyer points out, 'Theoretically there are at least two possible types of causes: mechanistic and intelligent'[84] – and ruling out either type of cause *a priori* when arguing that the other type of cause is the best explanation of a given effect is simply to beg the question. Newton did not beg the question

against intelligent causes, and hence felt free to argue in the *General Scholium* that: 'this most beautiful system of sun, planets, and comets could only proceed from the counsel and dominion of an intelligent and powerful Being.'[85] As Paul Nelson writes:

The founders of western science did not know about DNA, but they certainly knew how to recognise design. Knowledge of intelligent causation (design) was not placed in a separate rank from knowledge of natural causation (physical regularities and chance events), such that knowing that a stone will fall to the ground when thrown counted as genuine scientia, whereas knowing that a letter had an author did not. The very suggestion would have been seen by such early giants of science as Robert Boyle or Isaac Newton as laughable.[86]

In *Rebuilding the Matrix*, Alexander asserts that 'there is nothing that scientists can describe which is not part of the nexus of the secondary causes that comprise God's actions'[87]; which is well and good except for the fact that it begs the question against the true explanation of anything described by scientists being God acting as a primary cause. Alexander states:

The theistic claim is that the created order, complete with its biological diversity, has been brought into being and continues to exist by God's will. The claim says nothing about the mechanisms by which this has occurred in the past or continues to occur in the present. It is the task of biologists (and others) to elucidate such mechanisms.[88]

If 'mechanisms' is defined in a methodologically naturalistic manner that excludes primary actions performed by God (being equivalent to Newton's use of 'mechanical'), then Alexander's statement begs the question against Newton's first rule of natural philosophy and thereby divorces science from the pursuit of truth. As Alexander himself argues:

The traditional Christian theist has a 'voluntaristic' doctrine of God, meaning that, unlike Plato's demiurge, God is free to act in any way he chooses, unrestricted and unfettered... this doctrine provided a powerful support for science in stimulating the early natural philosophers to

investigate what God had actually done in the created order in contradistinction to the rationalistic scholastic philosophers who thought they could derive what God ought to have done from first principles. Therefore when it comes to scientific explanations and models of how things work, the theist need have no hidden theological investment in supporting one model over another... Scientists are meant to be empiricists not dogmatists.[89]

By rejecting methodological naturalism, ID rejects dogmatism and allows scientists to be empiricists.

Defining Science Informally Without Begging the Question

'Science is the search for truth.'

– Linus Pauling

Turning from attempted formal definitions of science to informal definitions, Del Ratzsch takes a dim view of begging the question against supernatural causation:

One such definition is that science is an attempt to get at the truth no holds barred. That is not likely to provide support for attempts to bar particular concepts. The scientific attitude has usually been characterized as a commitment to following the evidence wherever it leads. That does not look like promising ammunition for someone pushing an official policy of refusing to allow science to follow evidence to supernatural design no matter what the evidence turns out to be... [Such an approach] commits science to either having to deliberately ignore major (possibly even observable) features of the material realm or having to refrain from even considering the obvious and only workable explanation, should it turn out that those features clearly resulted from supernatural activity... any imposed policy of naturalism in science has the potential not only of eroding any self-correcting capacity of science but of preventing science from reaching certain truths. Any imposed policy of methodological naturalism will have precisely the same potential consequences.[90]

Applying this problem to the debate about evolution, philosopher Robert C. Koons comments:

If one is absolutely committed to the materialistic model, then of course something like Darwinism must be the true explanation of life. However, this provides no reason whatsoever for those not so committed to limit the scope of scientific

theorizing to models that would be acceptable to the committed materialist.[91]

Alexander's empiricist affirmation that 'The purpose of scientific theories in biology is to explain the relationships between all those components of the created order which comprise living matter',[92] is thus in tension with his dogmatic commitment to the methodologically naturalistic claim that 'An essential criterion for all such 14 scientific theories is that they elucidate the properties of matter...'[93] As Jay Wesley Richards argues: 'Methodological naturalism... contradicts the true spirit of science, which is to seek the truth about the natural world, no holds barred.'[94] I would encourage Alexander to reject the dogmatism represented by methodological naturalism and to consistently embrace the empiricism represented by his assertion (made in a letter to *The Guardian*) that: 'God can bring about his intentions any way he chooses, and all that scientists can do is try to describe how he did it.'[95]

Methodological Naturalism and History: A Dilemma for Alexander

'There is no valid reason supernatural explanations should be excluded from an academic endeavour interested in finding and teaching the truth about our world.'

– Norman L. Geisler[96]

As William P. Alston observes: 'There are Gospel critics who reject, on principle, any reports of divine intervention in the affairs of the world, anything that God is reported to have brought about other than what would have happened had only natural, thisworldly influences been involved.'[97] According to New Testament scholar R.T. France: 'the historical evidence [concerning Jesus] points to conclusions which lie outside the area which some modern scholars will allow to be "historical".'[98] These are the very conclusions that apologists from the time of the apostles (e.g. John, Luke, Paul and Peter) to contemporary Christian scholars (e.g. Craig L. Blomberg, William Lane Craig, Norman L. Geisler, Gary R. Habermas and J.P. Moreland) believe can be legitimately supported by combining standard historiography with relevant evidence.[99] Hence William Lane Craig notes that:

natural theologians who argue inductively must confront the same obstacle as Christian evidentialists do in history, namely, methodological naturalism. It is frequently asserted that the professional scientist or historian is methodologically committed to seeking only natural causes as explanations of their respective data, which procedure rules out inference to God as the best explanation.[100]

For example, according to Albert Schweitzer: 'the exclusion of miracle from our view of history has been universally recognized as a principle of criticism, so that miracle no longer concerns the historian either positively or negatively.'[101] Likewise, D.E.

Nineham asserts:

It is of the essence of the modern historian's method and criteria that they are applicable only to purely human phenomena, and to human phenomena of a normal, that is non-miraculous, non-unique, character. It followed that any picture of Jesus that could consistently approve itself to an historical investigator using these criteria, must a priori be of a purely human figure and it must be bounded by his death.[102]

More recently, the Jesus Seminar has contended that the historical Jesus must *by definition* be a non-supernatural figure.[103] In justifying this stance, the Seminar reference D.F. Strauss (the 19th century German Bible critic) according to whom God does not act directly within the world, but only indirectly through natural, secondary causes. Regarding the resurrection, Strauss stated that the hypothesis that God raised Jesus from the dead: 'is irreconcilable with enlightened ideas of the relation of God to the world.'[104] As the Seminar explain:

Strauss distinguished what he called the 'mythical' (defined by him as anything legendary or supernatural) in the Gospels from the historical... The choice Strauss posed in his assessment of the Gospels was between the supernatural Jesus - the Christ of faith - and the historical Jesus.[105]

The Seminar endorses Strauss's distinction between the historical Jesus and the Christ of faith as: 'the first pillar of scholarly wisdom.'[106] By adopting methodological naturalism as a necessary condition of historical theory making,

the Jesus Seminar guarantee supernatural, miraculous explanations are *by definition* non-historical (although not necessarily non-factual), irrespective of the empirical evidence. On such a definition of history, arguing for the resurrection as the best explanation of the available evidence would be seen as a miracle-of-the-gaps argument. As William Lane Craig comments:

If you begin by presupposing naturalism, then of course what you wind up with is a purely natural Jesus! This reconstructed, naturalistic Jesus is not based on evidence, but on definition. What is amazing is that the Jesus Seminar makes no attempt to defend this naturalism; it is just presupposed. But this presupposition is wholly unjustified.[107]

Since Christian theistic evolutionists are not *deistic* evolutionists, they believe in the historicity of biblical miracles – especially the resurrection – and discount accusations that such a belief is founded upon an argument from ignorance, or a 'gap' argument. For example, theistic evolutionist Keith Ward argues for belief in Jesus' Virgin birth on the basis of the biblical witness in Matthew and Luke, under-girded by the observation that:

it is indeed irrational to deny the possibility of miracles. If there is a God, who creates and holds in being the whole of the natural world at every moment, then it is true that all the laws of physics and chemistry and so on must be held in being by him. We may well hope that he will continue to allow such laws to operate; otherwise we would never quite know what was going to happen next. But there is no reason at all why he might not sometimes do things which are not predictable from the laws of physics or biology alone. God can do what he wants with his own universe...[108]

Alexander likewise takes a pre-commitment to naturalism in history to task:

The atheist who believes that the universe is essentially a closed system in which all matter 'obeys' deterministic laws is unlikely to be very open to the possibility that the material world occasionally behaves in an unexpected way... In contrast, the theist who believes that there is a creator-God who is actively sustaining every aspect of the created order will not be surprised if God occasionally chooses to act in an unusual

way in a particular historical context... Ironically it is therefore the stance of the atheist that is likely to lead to a closed mind when it comes to the question of evidence for claimed miraculous events ("miracles do not occur by definition")... it is the stance of the theist that best exemplifies the general attitude which one hopes characterizes the scientific community as a whole, namely, an openness to the way that world actually is, rather than the attitude more typical of some forms of Greek rationalism, which already knew the answer before the investigation had even begun.[109]

As he says of the debate about historical miracles:

it is noticeable that the debate on miracles that Hume generated, and which philosophers like Flew have continued, has tended to get bogged down in circular arguments and question-begging prior commitments to philosophical positions that have excluded the possibility of miracles by means of prior definitions.[110]

How can a scientific attitude of openness to the way the world actually is, rather than knowing the answer before investigation even begins, be endorsed regarding events within recorded history, but not regarding events before recorded history? Yet while Alexander does not side with the Jesus Seminar when it comes to recorded history – i.e. he is happy to appeal to God's actions as the best explanation of evidence in 'salvation history' (e.g. evidence concerning Jesus' resurrection) - he isn't happy to appeal to God's actions as the best explanation of evidence in natural history. But arguing for a historical miracle (like the resurrection) on the basis of evidence from human history whilst simultaneously endorsing a methodological rule against arguing for miracles, no matter what the evidence, from natural history, seems both inconsistent and arbitrary (why not reject methodological naturalism in science but endorse it in history?). William Lane Craig argues:

It is frequently asserted that the professional scientist or historian is methodologically committed to seeking only natural causes as explanations of their respective data, which procedure rules out inference to God as the best explanation. It is puzzling that some methodological naturalists in science... nevertheless want to dismiss

methodological naturalism when it comes to history and to affirm the historicity of the gospel miracles. One cannot, it seems to me, have it both ways.[111]

On what grounds can anyone consistently object to the methodologically naturalistic approach to history taken by D.F. Strauss and his followers whilst simultaneously taking a methodologically naturalistic approach to biological or pre-biological history? As Craig writes:

it has been argued, even by Christian thinkers, that there is a sort of methodological naturalism which must be adopted in science and history. According to methodological naturalism, science and, by implication, history just doesn't deal with supernatural explanations, and so these are left aside... For my part, I see no good reason for methodological naturalism in either science or history.[112]

Another Dilemma for Alexander

Here is another dilemma for Alexander. Would he say that the stone heads on Easter Island (or a similar item hypothetically discovered on Mars) should be explained only by elucidating the properties of matter? If not, then Alexander must say that science cannot say anything illuminating about the cause of the heads. In which case, either nothing illuminating can be said about the cause of the heads, or something illuminating can be said - but by a subject other than science. If, on the other hand, he would say that the heads can be explained by elucidating the properties of matter, then he has to say that they have a material cause. Does the obvious fact that the Easter Island heads are the result of intelligent design (they exhibit specified complexity) therefore count as a 'material' cause which elucidates the properties of matter? If it is, then 'intelligent design' cannot be discounted as a scientifically legitimate explanation according to Alexander's first rule of science. If not, then Alexander's definition of science unfortunately means that science is forever barred from knowing the true cause of the Easter Island heads, or any other example of intelligent design. In which case, science must excommunicate archaeology, cryptography, forensic science, fraud detection, parapsychology, psychology, sociology and SETI. These sciences all appeal to intelligence in the course of

explaining data. But Alexander admits that these are scientific disciplines.

HMN vs. SMN

One can distinguish between hard and soft versions of methodological naturalism.[113] Hard methodological naturalism (HMN) excludes all *intelligent* causation from scientific explanations - thereby exiling from science many fields of study currently considered scientific and ceding epistemological competency from science to philosophy. On the other hand, soft methodological naturalism (SMN) excludes *supernatural* causation from science, but does permit explanation in terms of *intelligence*. SMN has all of the pragmatic advantages and few if any of the problems associated with HMN; but of course, SMN permits ID to count as science just as effectively as the outright rejection of 'methodological naturalism' endorsed by contemporary philosophers of science. As William A. Dembski observes: 'detecting design... does not implicate any particular intelligence.'[114] Michael J. Behe explains:

my argument is limited to design itself; I strongly emphasize that it is not an argument for the existence of a benevolent God, as Paley's was. I hasten to add that I myself do believe in a benevolent God, and I recognize that philosophy and theology may be able to extend the argument. But a scientific argument for design in biology does not reach that far. Thus while I argue for design, the question of the identity of the designer is left open... as regards the identity of the designer, modern ID theory happily echoes Isaac Newton's phrase, hypothesis non fingo.[115]

David DeWolf *et al* likewise affirm:

Empirical science cannot determine whether the intelligent cause detected resides inside or outside of nature. That further determination requires more than empirical science. Far from merely being 'rhetorical,' this claim is central to the definition of intelligent design as a scientific theory... intelligent design does not require a supernatural entity...[116]

(In point of fact, philosophers of science have constructed thought experiments wherein the supernatural can be ruled in by science as the

best explanation of certain data. However, this point applies only to very special circumstances, and not to the mere discovery of specified or irreducible complexity.[117])

SMN is not a necessary condition of 'science', but there are good practical reasons for agreeing to practice science within the bounds of SMN. Accepting SMN allows science to continue as a 'big tent' for people of widely differing worldviews. Rather than theists just doing 'theistic science' and atheists just doing 'science' (HMN definition), we can all co-operate in doing science (SMN definition). SMN allows Agnostics, Atheists, Buddhists, Christians, Deists, Jews, Mormons, Muslims, New Agers, Panentheists, Pantheists, Platonists and Raelians to all do science together - which is a good thing. Furthermore, SMN does not risk subverting the truth-seeking intent of science. SMN does limit the epistemological competency of science so defined, but it limits it less than does HMN. Whether an intelligent cause is supernatural or not (a question which SMN leaves to philosophers), it is still an *intelligent* cause, and hence still true to note it as such within scientific theory making. Hence DeWolf *et al* conclude: 'Intelligent design, properly conceived, does not need to violate methodological naturalism.'[118] (Of course, adopting SMN does not entail adopting intelligent design theory.)

Alexander's Second Rule of Science: Testability

Alexander's second rule of science is that: 'there must be empirical evidence that can count for or against the theory, otherwise it remains vacuous.'[119] He also asserts that: 'The potential to be falsified is a necessary but not sufficient ground for something to count as a scientific theory.'[120] Alexander himself, in *Rebuilding the Matrix*, cautions that testability is not a criterion of science to be embraced naively:

The idea of potential falsifiability by the methods of science provides a tidy and convenient borderline for differentiating science from non-science... This is not to say that the demarcation line between science and non-science is invariably a sharp one - and it is certainly not static... What counts as a scientific theory worthy of serious testing may also be controversial... it is simply not

true that scientists give up their theories that easily after they have set up tests for the theory which have turned out not to support it. In practice the anomalous data are explained away, or reinterpreted or, more often, seen in retrospect not to provide a very good test of the theory.[121]

However, I need not rely upon such caveats, since ID is both testable and falsifiable.[122] In the course of discussing the concept of irreducible complexity, Alexander admits that: 'In this context it is indeed the case that the suggestion made by an ID proponent is falsifiable...'[123] He immediately cautions readers:

before ID proponents jump on this as support for the idea that ID is a scientific theory after all, it is worth remembering that 'one swallow does not make a spring'. The potential to be falsified is a necessary but not sufficient ground for something to count as a scientific theory.[124]

Nevertheless, since Alexander admits that ID can be framed so that it doesn't contravene his second rule of science, it does seem strange that he takes the time not only to mention this criteria, but also to argue that: 'labelling a biological entity as "designed" leads to no experimental programme that could be utilized to test the hypothesis...'[125] There is a self-contradiction in Alexander's argument at this point. For example, Alexander brings up that organ much featured in 19th century natural theology, the eye:

I find it intriguing that ID theorists do not present that highly complex structure, the eye, as an example of irreducible complexity; it was, after all, the example that Darwin felt was most difficult to explain by his theory. But we now know a lot about the evolution of the eye, and about how its components have evolved, so perhaps it is not surprising that ID proponents find it an awkward example for their purposes.[126]

ID proponents do not find the eye 'an awkward example for their purposes.'[127] They have no stake in the suggestion, made on their behalf here by Alexander, that the eye is IC (at least when taken as a whole).[128] Nevertheless, the point should be clear that were anyone to make the claim that the eye is IC when taken as a whole (a claim William Paley can be read as having made) that claim could be falsified. The claim that a given

system is IC is clearly empirically falsifiable.

On the one hand Alexander wants to argue that ID makes 'vacuous'[129] claims that lead to 'no experimental programme that could be utilized to test the hypothesis'[130]; but on the other hand he suggests that ID claims are not only falsifiable in theory, but have been falsified in practice:

IC is only used by ID proponents such as Behe and Dembski for those systems for which we don't yet know a detailed evolutionary pathway, or at least didn't at the time their particular book was written.[131]

Quite aside from any questioning of the accuracy, or significance, of Alexander's implication here (that claims to the effect that certain biological structures are IC have been falsified by the discovery of detailed evolutionary pathways of sufficient statistical plausibility), it should be obvious that this is the implication of what he writes. This being so, Alexander clearly makes the contradictory claims that designating things as IC is *not* experimentally testable, and that designating things as IC *is* experimentally testable. However, he can't have it both ways; and indeed, he explicitly admits that designating things as IC is experimentally testable: 'it is indeed the case that the suggestion made by an ID proponent is falsifiable...'[132] Likewise, Darwinist and ID critic Massimo Pigliucci affirms that: 'the concept of irreducible complexity is, in fact, falsifiable...'[133] Hence Alexander's second rule of science turns out to be a red herring that fails to support his view that ID is not science.

ID theorists do not use IC of *any and all* systems for which we do not know of detailed, sufficiently probable evolutionary pathways; but *of course* they only designate as IC systems concerning which we lack knowledge of such a pathway, for the simple reason that any system that could have evolved with sufficient probability via such a pathway provides no evidence of design. This is why the claim that a system is IC is falsifiable. As Dembski points out, to falsify the claim that a system is IC one need only discover a sufficiently detailed and probable indirect evolutionary pathway to its existence:

If it could be shown that biological systems that are wonderfully complex, elegant and integrated –

such as the bacterial flagellum – could have been formed by a gradual Darwinian process (and thus that their specified complexity is an illusion), then intelligent design would be refuted on the general grounds that one does not invoke intelligent causes when undirected natural causes will do. In that case Occam's razor would finish off intelligent design quite nicely.[134]

As philosopher of science and ID critic Bradley Monton concludes: 'ID should not be dismissed on the grounds that it is unscientific.'[135]

Claim Two: It is not possible to define biological entities as 'irreducibly complex' in a meaningful fashion

'Behe ... does have a point concerning irreducible complexity...'

– Massimo Pigliucci[136]

Alexander's assertion (true or false) that the designation of certain biological systems as irreducibly complex has been falsified contradicts not only to his assertion that ID is not falsifiable, but the assertion that it is not possible to define biological entities as IC in a meaningful fashion. If it is not possible to define biological entities as IC in a meaningful fashion, how can anyone present empirical evidence showing that any given biological entity is not IC? If I claim that a biological system is 'snuggly' – a word I have just invented – how could anyone meaningfully claim to show that the system in question is not 'snuggly'? Showing that something is not 'snuggly' assumes that something can be meaningfully defined as being 'snuggly'. Likewise, the claim that something biological is not IC assumes that it is possible to define a biological system as IC in a meaningful fashion. Alexander's assertion that claims about irreducible complexity are falsifiable, contradicts his assertion that it is not possible to define biological entities as IC in a meaningful fashion.

Making Warranted Claims about Irreducible Complexity

I propose that in order to make a warranted claim that a given biological system is irreducibly complex it is necessary and sufficient that we fulfil the following two conditions:

Condition 1) Provide a sufficiently clear and

coherent definition of 'irreducible complexity'

Condition 2) Show that it is more reasonable than not to accept that something in the biological world falls under the definition of IC

Let us tackle these two conditions in turn.

Condition 1) Provide a sufficiently clear and coherent definition of 'irreducible complexity'

The general concept behind 'irreducible complexity' is not new. Paley pointed out that not only is a watch's purpose carried out by the complex sum of its many parts, but that purpose would not be carried out: '*if its different parts had been differently shaped from what they are, or placed after any other manner or in any other order than that in which they are placed...*'[137] As the twentieth century British philosopher A.E. Taylor argued, what makes an inference to design irresistible in the case of a watch is: '*the way in which the various parts ... are co-adapted to produce a unitary result, and a result which cannot be effected until they are all assembled in a definite way.*'[138] Taylor argued that: '*the thorough-going co-adaptation of the parts of organisms to contribute to a unitary result which will only emerge when the organism is mature may be ascribed to "prospective contrivance" with an even higher degree of probability.*'[139]

Charles Darwin may have been drawing upon Paley when he noted in the *Origin* that: '*If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive modifications, my theory would absolutely break down.*'[140] Darwin laid the bet that no such system would be discovered. Richard Dawkins places the same bet today when he acknowledges that Darwin's remark: '*is valid and very wise... his theory is indeed falsifiable... and he puts his finger on one way in which it might be falsified.*'[141] Dawkins asserts that: '*not a single case is known to me of a complex organ that could not have been formed by numerous slight [un-guided] modifications.* I do not believe that such a case will ever be found.'[142] (Like Darwin, Dawkins illegitimately raises the standard of proof required by his bet to a level that all but insures against his ever losing the bet.) Nevertheless, he concedes: '*If it is – it'll have to be a really complex organ, and... you have to be sophisticated about what you mean by "slight"*

– I shall cease to believe in Darwinism.’[143] Like Darwin then, Dawkins has a lot riding on the universal negative proposition that nothing in nature is irreducibly complex.

Evolutionary biologist and philosopher Massimo Pigliucci acknowledges that: ‘irreducible complexity is indeed a hallmark of intelligent design.’[144] As atheist philosopher Daniel Dennett, who called IC systems ‘the You-Couldn’t-Get-Here-From-There Organ or Organism,’[145] admits:

If there are designs that cannot be approached by a gradual, stepwise redesign process in which each step is at least no worse for the gene’s survival chances than its predecessor, then the existence of such a design in nature would seem to require, at some point in its ancestry, a helping hand from a foresightful designer...[146]

Pigliucci likewise accepts that the existence of an IC system in nature would be evidence of intelligent design: ‘irreducible complexity is indeed a valid criterion to distinguish between intelligent and nonintelligent design.’[147] However, like Darwin, Dawkins and Dennett, Pigliucci thinks that: ‘there is no evidence so far of irreducible complexity in living organisms.’[148]

It would therefore seem that scholars of diverse metaphysical persuasions have a sufficiently clear grasp of the notion of an IC system to agree that if an IC system were found in the biological realm it would resist evolutionary explanation, and even that it would provide empirical evidence of intelligent design.

Darwin’s Black Box

Biochemist Michael J. Behe put new life and specificity into the concept of irreducible complexity by improving the explicit definition of irreducible complexity and applying that definition at the bio-molecular level of cellular machinery unknown even in Taylor’s generation.

Behe’s most notable presentation of irreducible complexity is *Darwin’s Black Box: the Biochemical Challenge to Evolution* (1996/2006), where he defined irreducible complexity as follows:

By irreducibly complex I mean a single system composed of several well-matched, interacting parts that contribute to basic function, wherein

the removal of any one of the parts causes the system to effectively cease functioning.[149]

In other words, a single system, one performing a given basic function, is ‘irreducibly complex’ if and only if it consists in a set of several, well-matched, mutually interacting, non-arbitrarily individuated parts such that each part in this set is indispensable to maintaining the system’s basic function.[150] This fulfils the first condition required for the meaningful assertion of IC within biology.

Condition 2) Show that it is more reasonable than not to accept that something in the biological world falls under the definition of IC

A review of Behe’s analysis of, and design inference from, the bacterial flagellum will not only demonstrate that it is more reasonable than not to accept that something in the biological world falls under the definition of IC, but will be a useful backdrop when answering Alexander’s third objection to ID (concerning the proper burden of proof regarding ID claims):

The flagellum includes an acid powered rotary engine, a stator, O-rings, bushings and a drive shaft. The intricate machinery of this molecular motor requires approximately fifty proteins. Yet the absence of any one of these proteins results in the complete loss of motor function.[151]

The flagellum is clearly: ‘a single system composed of several well-matched, interacting parts that contribute to basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning.’[152] One can see from a conceptual analysis that a rotary motor without a propeller, or a drive shaft, or a motor, just won’t function: ‘Because the bacterial flagellum is necessarily composed of at least three parts – a paddle, a rotor, and a motor – it is irreducibly complex.’[153] Furthermore, experiments have confirmed that eliminating any of the many proteins that form the flagellum results either in the non-appearance of the flagellum or the appearance of a non-functioning machine.

IC and Intelligent Design

To define a system as IC is not to argue for design by definition, but to lay the foundation for an argument to design. Behe’s first point is that if a system is IC then it is impossible to evolve that system via a *direct* evolutionary pathway: ‘An

irreducibly complex system cannot be produced directly... by slight, successive modifications of a precursor system, because any precursor to an irreducibly complex system that is missing a part is by definition non-functional.'[154] Behe admits that: 'although irreducible complexity does rule out direct routes, it does not automatically rule out indirect ones.'[155] However, he argues that the more complex the IC system in question is (i.e. the more necessary parts it contains): 'the more unlikely the indirect routes become.'[156]

Behe does *not* move directly from the unlikelihood of an evolutionary explanation of an IC system to the hypothesis of intelligent design. Rather, he notes that:

irreducibly complex systems such as mousetraps and flagella serve both as negative arguments against gradualistic explanations like Darwin's and as positive arguments for design. The negative argument is that such interactive systems resist explanation by the tiny steps that a Darwinian path would be expected to take [because direct routes are impossible and indirect routes unlikely]. The positive argument is that their parts appear arranged to serve a purpose, which is exactly how we detect design.[157]

Hence Behe defends his argument against the charge that it is an argument from ignorance:

there is a structural reason - irreducible complexity - for thinking that Darwinian explanations are unlikely to succeed. Furthermore... irreducible complexity is a hallmark of intelligent design... Truncating my case for intelligent design and then saying I commit the fallacy of argumentum ad ignorantium is not, in my opinion, fair play.[158]

The inference to intelligent design from irreducible complexity is the default explanation intuitively speaking, and it is supported by a standard inference from the fact that whenever we know the causal history of an IC system it turns out to have originated by intelligent design. The lack of Darwinian explanations for IC systems constitutes a failure to rebut the inference from irreducible complexity to intelligent design (bear this point in mind for later). Indeed, irreducible complexity is simply a concrete type of specified complexity (the criteria Alexander implicitly applies to the fine tuning of the cosmos):

The irreducibly complex systems Behe considers require numerous components specifically

adapted to each other and each necessary for function. On any formal complexity-theoretic analysis, they are complex in the sense required by the complexity-specification criterion. Moreover, in virtue of their function, these systems embody patterns independent of the actual living systems. Hence these systems are also specified in the sense required by the complexity-specification criterion.[159]

How the Flagellum Evolved?

Since anything IC cannot be explained in terms of direct evolutionary pathways, any proposed explanation that does not posit intelligent design must be framed in terms of an indirect evolutionary pathway. Alexander, like fellow Christian biologist Dr Kenneth R. Miller, argues for an indirect explanation in the case of the flagellum by pointing to the existence of the type III secretory system (TTSS). The TTSS is coded for by about ten genes, each of which is homologous to genes in the bacterial flagellum. Miller sees the TTSS as a functional evolutionary precursor of the flagellum capable of being selected for on its own functional merits and then augmented to produce the flagellum. As Behe comments:

Miller's argument is that because the flagellum is more complex than we thought, that because it can act both as a protein pump as well as an outboard motor, then it is not irreducible. If the motor gets broken, remaining pieces may still act as a pump. That's like arguing that because, in addition to wheels and a motor, a car has a fuel pump, then it isn't irreducible either. If the tires are flat, the fuel pump can still work. Therefore we can imagine that the car could have been put together in small random steps. Such is the rigor of Darwinian thought.[160]

However, as Dembski points out:

At best the TTSS represents one possible step in the indirect Darwinian evolution of the bacterial flagellum. What's needed is a complete evolutionary path and not merely a possible oasis along the way. To claim otherwise is like saying we can travel by foot from Los Angeles to Tokyo because we've discovered the Hawaiian Islands.[161]

Two final points nail shut the coffin of the TTSS scenario. The first is that: 'The type III system itself is [IC], perhaps with ten IC components.'[162] The second is that the best current molecular evidence: 'points to the TTSS evolving from the

flagellum and not vice versa.’[163] As the eminent Yale biochemist Robert Macnab wrote with reference to the TTSS and the flagellum in the *Annual Review of Microbiology* 2003:

‘nature has found two good uses for this sophisticated type of apparatus. How they evolved is another matter, although it has been proposed that the flagellum is the more ancient device...’[164]

University of Rochester biologist H. Allen Orr (a critic of Behe) acknowledges:

it will do no good to suggest that all the required parts of some biochemical pathway popped up simultaneously by mutation. Although this ‘solution’ yields a functioning system in one fell swoop, it’s so hopelessly unlikely that no Darwinian takes it seriously... we might think that some of the parts of an irreducibly complex system evolved step by step for other purposes and were then recruited wholesale to a new function. But this is also unlikely.[165]

Nevertheless, the current favourite among indirect explanations advanced for IC systems is Orr’s second option of wholesale co-option from other functions, for as Alexander observes: ‘as soon as you have a multi-component system, then of course the chances of it coming into being all at once as a fully functioning system are remotely small...’[166] While the TTSS contains around ten proteins homologous to proteins in the flagellum, the flagellum has another thirty or so proteins, which are unique to it. As Scott Minnich, Professor of Biology at the University of Idaho, and an expert on the flagellum, says:

With a bacterial flagellum, you’re talking about a machine that’s got forty structural parts. Yes, we find ten of them are involved in another molecular machine, but the other thirty are unique. So where are you going to borrow them from? Eventually you’re going to have to account for the function of every single part as if originally having some other purpose. I mean you can only follow the argument so far, until you run into the problem that you’re borrowing from nothing...’[167]

Dembski supposes, purely for the sake of argument, that we discover several molecular systems ‘that jointly took into account all the flagellar proteins’.[168] Those proteins would be ‘similar but, in all likelihood, not identical to the flagellar proteins (strict identity would itself be vastly improbable)’.[169] Such a hypothetical situation, designed to maximize the chances of an indirect explanation by co-option, ‘raises

the question how those several molecular machines can come together so that proteins from one molecular machine adopt proteins from another molecular machine to form an integrated functional system like the flagellum’.[170] As Minnich says: ‘even if you concede that you have all the parts necessary to build one of these machines, that’s only part of the problem. Maybe even more complex is the assembly instructions.’[171] Dr John Bracht, managing editor of the journal *Progress in Complexity, Information and Design*,[172] explains:

biological functionality is turning out to be much more highly specified and precise than we had originally envisioned... biology is really a science of engineering, where the constraints for bio-functionality are extreme – to the point that nearly every molecular interaction is remarkably precise and tightly controlled. Molecular biology is much like a jigsaw puzzle where each piece must be specifically shaped to fit with the other pieces around it...’[173]

Applying these observations to the proposed construction of the flagellum by cooption, Bracht writes:

The problem is that the proteins which are to become the flagellum are coming from systems that are distinctly non-flagellar in nature... and being comodified from their original molecular interactions into an entirely new set of molecular interactions. Old interfaces and binding sites must be removed and new ones must be created. But given the sheer number of flagellar proteins that must co-evolve... the Darwinian explanation is [very unlikely and therefore] really no different from appealing to a miracle.[174]

Dembski observes that: ‘the only evidence we have of successful co-option comes from engineering and confirms that intelligence is indispensable in explaining complex structures like... the bacterial flagellum,’[175] and he concludes:

We can do the probabilistic analysis at the level of individual proteins... Or we can do it at higher levels of organization like functional subsystems [like TTSS]... But all such probabilistic analyses still point up vast improbabilities.[176]

Dembski summarises the argument for design from IC systems:

we can show conclusively that direct Darwinian pathways are causally inadequate to bring them

about and that indirect Darwinian pathways are utterly without empirical support in bringing them about. Conversely, we do know what has the causal power to produce irreducible complexity – intelligent design.[177]

Intelligent design looks like the best explanation for IC systems such as the flagellum, and evolutionists appear to be betting in the face of some long odds: 'Like compulsive gamblers who are constantly hoping that some really big score will cancel their debts, evolutionary biologists live on promissory notes that show no sign of being redeemable...'[178] If biologists can meet the burden of proof by discovering or constructing detailed, testable, indirect Darwinian pathways of sufficiently high probability that account for the emergence of systems like the bacterial flagellum, 'then more power to them',[179] says Dembski (the assertion that a given system is IC is a falsifiable claim): 'But until that happens, evolutionary biologists who claim that natural selection accounts for the emergence of the bacterial flagellum are worthy of no more credence than compulsive gamblers who are forever promising to settle their accounts.'[180]

Alexander's Straw Men

Alexander erects and then attacks a straw man definition of irreducible complexity. He asserts that:

The whole point of the mousetrap analogy [which is not an analogy, but a concrete illustration] is to suggest that complex systems can only function if all the components are in place, and that the separate components of the system have no independent function.[181]

This is a straw man on two counts.

First of all, Alexander reduces irreducible complexity to mere complexity. Behe does *not* suggest that: 'complex systems can only function if all the components are in place'.[182] Rather, Behe defines any system that is *both* complex *and* which can only function if all the components are in place as 'irreducibly complex'. Alexander blows away his straw man of irreducible complexity by observing that: 'all biological phenomena are highly complex.'[183] However, there is a distinction between being 'highly complex' and being 'irreducibly complex'. Dembski contrasts 'irreducible complexity' with 'cumulative complexity':

Irreducible complexity may be contrasted with cumulative complexity. A system can be defined as cumulatively complex if the components of the system can be arranged sequentially so that the successive removal of components never leads to the complete loss of function... it is clear that the Darwinian selection mechanism can readily account for cumulative complexity.[184]

Having first ignored the 'irreducible' component of IC, Alexander proceeds to misrepresent it. Behe does *not* affirm that an irreducibly complex system is one in which, as Alexander writes: 'the separate components of the system have no independent function.'[185] Attributing this assumption to Behe allows Alexander to dispatch Behe's claim that the flagellum is IC simply by pointing to the existence of the Type III secretory system. However, Behe's definition of irreducible complexity simply does not make the assumption Alexander attributes to it (and Behe's argument for design explicitly allows for the fact that the separate components of a system may exhibit independent functionality). As Behe comments: 'there's no reason that individual components of an irreducibly complex system could not be used for separate roles, or multiple separate roles, and I never wrote that they couldn't.'[186]

Alexander's argument for the vacuity of irreducible complexity

Alexander thinks that he 'could easily argue that all [biological systems] fall within the ID criteria used to identify them as an "irreducibly complex" system...'[187] Why does he take this as evidence against ID, rather than as increased evidence for ID? Alexander argues that: 'IC can readily be argued for every known biological phenomenon, so the notion is vacuous as an explanation for anything.'[188] In other words, Alexander proposes a necessary condition for the use of IC in a biologically meaningful fashion: that IC applies to *some but not all* biological systems. He argues that IC fails to satisfy this criteria; not because it fails to apply to any biological systems, but precisely because *it applies to them all*: 'The notion of IC in biology is... evacuated of any useful meaning once one realises that all biological phenomena without exception can be press-ganged into the necessary criteria.'[189] We can formalize Alexander's argument for the vacuity of IC as follows:

1) If a concept applies to all biological systems, it

is evacuated of any useful meaning

2) The concept of irreducible complexity applies to all biological systems

3) Therefore the concept of irreducible complexity is evacuated of any useful meaning

This is a logically valid argument. Unfortunately for Alexander, both premises are false (moreover, Alexander himself is committed to the falsity of both premises).

It simply isn't true that if a term applies to all biological phenomena then it is vacuous.[190] For example, if his criterion of meaning were true, Alexander's observation that 'all biological phenomena are highly complex'[191] would be vacuous and without meaning. Alexander is surely right to think that 'complex' is a term that can be meaningfully applied to the biological world, even if it applies to all biological phenomena. But in that case, Alexander is clearly wrong to advance the premise that a concept applicable to all biological systems is evacuated of meaning. Alternatively, if complexity is a concept that cannot be applied to all biological phenomena, then neither can irreducible complexity be applied to all biological phenomena (since complexity is a necessary, although not sufficient, condition of irreducible complexity) and Alexander's criterion of meaning becomes irrelevant to the debate about IC.

Alexander claims that IC applies to all biological systems on the basis of a straw man definition of IC. With the real definition of IC in hand, we can see that IC does not apply to all biological systems. In fact, we can quote Alexander to show that IC does *not* apply to all biological systems. Recall, for example, Alexander's discussion of how the eye is not a good 'example of irreducible complexity', despite Darwin's own misgivings, because: 'we now know a lot about the evolution of the eye, and about how its components have evolved...' [192] Alexander also writes that: 'if you didn't know anything at all about the evidence for evolution, then you would have to describe virtually everything in a cell as IC.' [193] But of course, 'virtually everything' entails 'not everything'.

In short, once we have disregarded Alexander's straw man of IC, we have a sufficiently clear and coherent definition of 'irreducible complexity'. Since Alexander's argument for the vacuity of IC is unsound, and since it is more reasonable than not

to accept that the flagellum is IC, I conclude that it is possible to define and designate a biological system as IC in a fashion that is both meaningful and warranted. Moreover, I contend that the warranted designation of a biological system as IC justifies a design inference.

This paper is continued in Part 2.

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[113] A proposal I first made in 'Reviewing the Reviewers: Pigliucci *et al* on Darwin's Rotweiller & the public understanding of science'.

[114] William A. Dembski, 'Skepticism's Prospects for Unseating Intelligent Design'.

[115] Michael J. Behe, 'The Modern Intelligent Design Hypothesis', *Philosophia Christi*, Series 2, Volume 3, Number 1, 2001, p. 165.

[116] David DeWolf, John West, Casey Luskin & Jonathan Witt, *Traipsing Into Evolution: Intelligent Design And The Kitzmiller vs. Dover Decision*, (Seattle: Discovery Institute, 2006), p. 31-33.

[117] cf. Bradley Monton, 'Is Intelligent Design Science? Dissecting the Dover Decision'; William A. Dembski, 'On the Very Possibility of Intelligent Design' in J.P. Moreland (ed.), *The Creation Hypothesis*, (Downers Grove: IVP, 1994)

[118] David DeWolf, John West, Casey Luskin & Jonathan Witt, *Traipsing Into Evolution: Intelligent Design And The Kitzmiller vs. Dover Decision*, (Seattle: Discovery Institute, 2006), p. 35.

[119] Alexander, 'Designs on Science', p. 1.

[120] *ibid*, p. 4.

[121] Alexander, *Rebuilding the Matrix*, *op. cit.*, pp. 233 & 235.

[122] cf. William A. Dembski, 'Is Intelligent Design Testable?'.

[123] Alexander, 'Designs on Science', p. 3.

[124] *ibid*, p. 4.

[125] *ibid*, p. 2.

[126] *ibid*, p. 4.

[127] *ibid*.

[128] Darwinists have failed to show that the eye could be evolved *from scratch* through any series

of sufficiently small mutations; let alone to provide evidence that any eye historically followed any such evolutionary pathway. Richard Dawkins argues that different forms of eye present in nature can be arranged into a sequence from less to more complex, and that this sequence shows the theoretical viability of a Darwinian explanation of the eye. However, not only is this sequence of eyes historically hypothetical (showing at best what could rather than what did happen), but its supposedly simple beginning assumes the existence of a cell sensitive to light (linked in the requisite way to an organism's behavioural output). That light sensitive cell, far from being a simple first step up Dawkins' 'Mount Improbable', appears to be an example of an 'irreducibly complex' system. Hence, while the eye is not irreducibly complex as a *whole*, it does appear to depend upon an irreducibly complex *core* system.

[129] Alexander, 'Designs on Science', p. 1.

[130] *ibid*, p. 2.

[131] *ibid*, p. 4.

[132] *ibid*, p. 3.

[133] Massimo Pigliucci, 'When Philosophy Matters', *Skeptical Inquirer*, Volume 30, No 4, July/August 2006, p. 19.

[134] William A. Dembski, *The Design Revolution*, (Downers Grove: IVP, 2004), p. 282.

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[135] Bradley Monton, 'Is Intelligent Design Science? Dissecting the Dover Decision'.

[136] Alexander, 'Designs on Science', p 3.

[137] William Paley, *Natural Theology*.

[138] A.E. Taylor, *Does God Exist?*, (London: Collins/Fonatana Books, 1961), p. 118, my italics.

[139] *ibid*, p. 119, my italics.

[140] Charles Darwin, *Origin of Species*, (1872), 6th edition, (New York University Press, 1988), p. 154, my italics.

[141] Richard Dawkins, 'Universal Darwinism', in Hull and Ruse (eds.), *The Philosophy of Biology*, (Oxford University Press, 1998), p.29.

[142] Richard Dawkins, *The Blind Watchmaker*, (London: Penguin), p. 91, my italics.

[143] *ibid*.

[144] Massimo Pigliucci, 'Design Yes, Intelligent No', *Darwin, Design, And Public Education*, p. 467.

[145] Daniel C. Dennett, *Darwin's Dangerous Idea* (London: Penguin, 1995), p.318.

[146] *ibid*, p. 317, my italics.

[147] *ibid*, p. 471.

[148] *ibid*, p. 467.

[149] Behe, *Darwin's Black Box*, *op. cit.*, p. 39.

- [150] For further tightening of the definition of irreducible complexity cf. William A. Dembski, *No Free Lunch: Why Specified Complexity Cannot be Purchased without Intelligence*, (Rowman & Littlefield, 2001)
- [151] William A. Dembski, 'Reinstating Design Within Science', in Jay Wesley Richards (ed.), *Unapologetic Apologetics* (Downers Grove: IVP, 2001), p.253.
- [152] Michael J. Behe, *Darwin's Black Box*, (Free Press, 2006), p.39.
- [153] Behe, *ibid.*, p.72.
- [154] Behe, *ibid.*, p .
- [155] Michael J. Behe, *Darwin's Black Box*, 10th anniversary edition, (Free Press, 2006), p.258.
- [156] *ibid.*
- [157] *ibid.*, p. 263-264.
- [158] Michael J. Behe, 'Philosophical Objections to Intelligent Design: Response to Critics'.
- [159] William A. Dembski, *Intelligent Design* (Downers Grove: IVP, 1999), p.149.
- [160] Michael J. Behe, 'The Pilgrim's Regress: A Review of The Ancestor's Tale'.
- [161] William A. Dembski, 'The Bacterial Flagellum: Still Spinning Just Fine'.
- [162] Mike Gene, 'Evolving the Bacterial Flagellum through Mutation and Co-option', cf. Minnich, Scott A. & Michael J. Behe, 'Genetic Analysis of Coordinate Flagellar and Type II Regulatory Circuits in Pathogenic Bacteria'.
- [163] Dembski, *op. cit.*, p. 3. cf. Milton H. Saier, Jr., 'Evolution of bacterial type III protein secretion systems', *Trends in Microbiology*, Volume 12, Issue 3, March 2004, p. 113-115.
- [164] Robert Macnab, 'How Bacteria Assemble Flagella', *Annual Review of Microbiology* (2003), 57:77- 100.
- [165] H. Allen Orr, *Boston Review*.
- [166] Alexander, 'Designs on Science', p. 3.
- [167] Scott Minnich, in the video *Unlocking the Mystery of Life*.
- [168] Dembski, *op. cit.*.
- [169] *ibid.*
- [170] *ibid.*
- [171] Minnich, *op. cit.*.
- [172] cf. www.iscid.org/pcid.php
- [173] J. R. Bracht, 'The Bacterial Flagellum: A Response to Ursula Goodenough'.
- [174] *ibid.*
- [175] William A. Dembski, 'Gauging Intelligent Design's Success'.
- [176] Dembski, 'The Bacterial Flagellum: Still Spinning Just Fine', *op. cit.* 58.
- [177] *ibid.*
- [178] William A. Dembski, *The Intelligent Design Revolution*, (Downers Grove: IVP, 2004), pp. 112-113.
- [179] *ibid.*, p. 113.
- [180] *ibid.*, pp. 112-113.
- [181] Alexander, 'Designs on Science', p. 3.
- [182] *ibid.*
- [183] *ibid.*, p. 2.
- [184] William A. Dembski, *No Free Lunch*, (Oxford: Rowman & Littlefield, 2002), p. 248.
- [185] Alexander, 'Designs on Science', p. 3.
- [186] Michael J. Behe, *Darwin's Black Box*, 10th anniversary edition, (London: Free Press, 2006), p. 260.
- [187] Alexander, 'Designs on Science', p. 3.
- [188] *ibid.*
- [189] *ibid.*
- [190] As a general philosophical point, it isn't true that a term that applies to everything material is necessarily vacuous. For example, the description 'exists contingently' applies to everything material and is not vacuous.
- [191] Alexander, 'Designs on Science', p. 2.
- [192] *ibid.*, p. 4.
- [193] *ibid.*