



Designs on Science

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This is an Open Letter to Adam, Tim, Cath and Greg in response to their Discussion in 'Theistic Evolution & Intelligent Design in Dialogue' by Peter S Williams

Dear Adam, Tim, Cath and Greg,

Many thanks for sending me the tape of your helpful exchange of views on ID and for providing this opportunity for a response to your group discussion.

I thought it might be most helpful if I briefly summarised the main claims made about ID as your discussion progressed, and then I would like to make a few comments about each claim. I will not try and address each and every point, otherwise this will become a book rather than a letter... Being a scientist, and for the sake of clarity, I'm going to number the claims that were made during your discussion:

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'.

Claim One: The 'design inference' is not a theological or philosophical argument but is a 'scientific theory'.

The purpose of scientific theories in biology is to explain the relationships between all those

components of the created order which comprise living matter. Biology thereby encompasses a wide range of different types of explanation operating at different levels, ranging from the interactions of organisms with each other and with their environments to the detailed analysis of their molecular components. An essential criterion for all such scientific theories is that they elucidate the properties of matter involved in living processes.

A further important criterion of biological explanations in science is that they be testable – there must be empirical evidence that can count for or against the theory, otherwise it remains vacuous. A successful theory will therefore lead to a research programme which will aim to establish its truth status. At the end of the day a head of lab wants testable ideas to write in her next grant application, or needs to know what experiments to suggest to her PhD students milling around out in the lab.

It should be noted that scientific theories operate at a different level from foundational questions such as "Why are scientific laws the way they are?" Tim therefore muddies the waters by saying, in response to Adam's point about specified complexity, that "ID supporters have suggested a number of candidates, including: the fine-tuning of the laws of nature". Asking why the laws of nature are as they are is a fundamentally different kind of question from trying to pick holes in the evolutionary account. Science uncovers what the laws of the created order are and uses them, but the 'why' question operates at a different kind of level.

We can now begin to understand why the 'design inference' forms no part of current biological theories, because it lacks the two key elements of a successful scientific theory. First, simply saying that something is 'designed' in biology leads to no increase in our understanding of the relationships between the various material components that comprise living matter. This is particularly the case for the types of molecular example that crop up repeatedly in the ID literature (flagella, blood clotting and so on) which were mentioned during the course of your discussion. Second, labelling a biological entity as 'designed' leads to no experimental programme that could be utilised to test the hypothesis, a fact which presumably

explains the lack of scientific publications arising from the notion of a 'design inference'. Simply pointing out presumed difficulties in Darwinian explanations does not in itself count as theory construction – you do not need a 'design inference' to carry out such a critique and in itself it adds nothing to the discussion. All biologists know that there is much more work to do on the theory – and are thankful that this is the case, otherwise some would be out of a job!

The reason why the 'design inference' fails to count as a scientific explanation for anything is therefore quite simple – as an idea it fails to meet the most basic criteria of scientific theorising and practice.

It is not enough in this context to argue, as Tim does during your discussion, 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 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! Each branch of scientific enquiry needs to be pursued using the methods and tools that are relevant for that particular discipline.

In fact, if I might say so, a striking feature of your tea-room discussion was how remote it all was from the life and thinking of the working biologist. For those of us at the molecular end of the biological spectrum, we are really fascinated by the investigation of the molecular properties of living matter – but discussion of cryptography and the like really adds nothing useful to our understanding of such properties.

Claim two: It is possible to define biological entities as 'irreducibly complex' in a meaningful fashion.

I suggested above that the first criterion of a successful scientific theory is that it should

elucidate or explain the properties of matter in a way that leads to new insights into how things work. If the theory merely describes the phenomenon in question using a different set of words, then it fails the test of counting as a useful theory and is vacuous. Unfortunately, the notion of 'irreducible complexity' (IC) or 'specified complexity' as applied to biology suffers from precisely such a fatal weakness.

Once again the reason is simple: all biological phenomena are highly complex. All living matter is composed of thousands or even millions of components, all of which need to work together in a coordinated fashion to produce those properties that we associate with life. This is vividly illustrated by the genomes that are possessed by all living organisms. Even the 'minimalist' genomes of a few thousand genes possessed by some bacteria require an immensely elegant regulation and coordination system. Likewise, all the biological 'sub-systems' that maintain cell growth and division, including all biochemical pathways, are complex without exception. I could easily argue that all of them fall within the ID criteria used to identify an 'irreducibly complex' system, since in each and every case the sub-system only functions properly providing all the components are in place.

In this context it is rather surprising to find Behe arguing in *Darwin's Black Box* that the plasma membrane of a cell does not fulfil his criteria of IC, whereas other components of the cell do [1]. Behe is basing this assessment on the fact that the lipid bilayer that comprises the plasma membrane can be generated artificially by mixing the right lipids under the right conditions. But Behe knows as well as I do that each of those cellular lipids is the consequence of complex multi-component biochemical pathways. And of course the plasma membrane itself *in situ* is an incredibly complex entity, with hundreds of proteins floating in the bilayer regulating cell-cell interactions and the cell's interior milieu. As it happens, I have been working on biochemical problems related to the plasma membrane for much of the past 38 years of my research career, so I am not unaware of the complexities of these structures.

The notion of IC in biology is therefore evacuated of any useful meaning once one realises that all biological phenomena without exception can be

press-ganged into the necessary criteria. Every cell and every sub-system within every cell can only exist provided that all the other components are in place – this is a basic property of all living systems. ID proponents wish to utilise the concept of IC as a scientific theory to explain the origins of certain biological sub-systems in contrast to others which have come into being by the Darwinian mechanisms of mutation and natural selection. But at this juncture ID becomes hoist by its own petard: IC can readily be argued for every known biological phenomenon, so the notion is vacuous as an explanation for anything. Once you agree (as several leading ID proponents do) that natural selection can explain some biological systems, but not others, then you have already agreed that complex systems can develop through Darwinian processes, so the IC argument vapourises.

What we have in ID is the ‘fallacy of large numbers’: 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 functional system are remotely small, thereby generating impressively large looking odds against such an event happening. But no evolutionary biologist believes that such systems come into being all at once as intact functioning systems. The whole point of evolutionary explanations is that they depend on systems coming into being incrementally, and there are plenty of examples already known of how that works in evolution. But the fact that at present we do not know, by any means, all the incremental evolutionary steps involved in all biological systems, should be a motivation for hard work in the lab, not for armchair theorising. Certainly that level of scientific ignorance provides no basis for philosophical or theological speculation.

As our biological understanding of organisms at a molecular level continues to grow at a fast pace, not least with the sequencing of genomes of multiple species, so many of the IC examples proposed by ID theorists continue to be elucidated in greater molecular detail. The ID ‘mousetrap’ analogy suggests that a system can only function properly if it comes into being all at once as a complete system. This is quite fallacious. For example Cath mentions the subset of proteins that form the base of the bacterial flagellum that are utilised for a quite different function in the Type III secretory system used by

certain gram-negative bacteria. Cath thinks that because it is not clear which evolved into which, therefore such findings are not relevant to the critique of ID. But I think this misses the point. The whole point of the mousetrap analogy 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 functions. So the example of the Type III secretory system shows that the assumption behind the mousetrap analogy is fallacious.

In this context it is indeed the case that the suggestion made by an ID proponent is falsifiable, but 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. For example, the theory that the planets exert baleful effects on human destinies is, in principle, falsifiable, but that does not in itself make the theory scientific. Theories are accepted by scientists as being scientific when they have the potential to count as better explanations than other theories (a potential open to further experimental testing). This is why a theory which may have been counted as scientific in the 17th century may no longer be counted as a valid theory today – it was long ago tested, found wanting, and then discarded.

Cath may also not realise that bacterial evolution falls below what has been called the ‘Darwinian horizon’. Strict Darwinian explanations require the linear transfer of genetic information from parent to progeny, but this is not the case in the bacterial world in which there is plenty of evidence for additional lateral gene transfer between species. By this means ‘useful tricks’ can be passed around between bacteria, thereby speeding up their own competitiveness during the process of natural selection, but by the same token making it more difficult to be sure about evolutionary pathways.

Biological systems evolve by bringing together sub-systems that are already in use with quite different functions. In this context 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. It is well known that eyes have evolved more than 20 times in independent lineages during the course of evolution and in this context Cath might be interested to read Simon Conway Morris's interesting book on convergence in evolution entitled *Life's Solution – Inevitable Humans in a Lonely Universe* (2003, CUP).

So, in summarising this section, we have pointed out that the concept of 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. In other words, 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. What the ID proponents do is to simply re-define as IC those systems for which we do not currently understand the evolutionary pathway.

Claim 3: The 'burden of proof' lies upon the evolutionary biologist to show how complex biological systems come into being.

A striking characteristic of the ID literature, which is faithfully reflected in the tea-room discussion, is the idea that the 'burden of proof' lies upon the evolutionary biologist, whereas the ID proponent simply has to point out that certain biological systems are very complex and that there is current scientific ignorance about how they came into being. This is exemplified by Cath's comment that: "What's needed is a detailed, seamless and statistically likely enough evolutionary account of how subsystems undergoing co-evolution could gradually transform into an IC system. No such accounts exist. Proposals offered to date consist of a lot of 'hand waving' vagueness. They simply don't meet the proper burden of proof".

The first observation I suppose one could make is that Cath has clearly never been near a biology lab nor apparently has any concept of how biological research actually works. The word 'proof'

may be popular in mathematical and philosophical circles, but is rarely used by biologists. It isn't by chance that so many engineers, physicists and chemists are enamoured by ID, while most biologists don't get beyond the first page.

However, on a more positive note, biologists certainly are interested in determining the best explanations for how living matter works in all its many forms, and this requires the assessment of a wide variety of different types of data. Much of these data are obtained by functional genomics – investigating the functions of molecules in the context of whole cells or animals, often using various types of genetic engineering to analyse the system. In parallel there is the field of comparative genomics, highly relevant to this discussion. In this case people working in bioinformatics who may never put on a lab coat are sitting in front of their computers comparing and contrasting gene sequences from hundreds of different species. It is when comparative and functional genomics are brought together that one realises how powerful Darwinian explanations are in explaining similarities and differences at the genomic level. Even if we had not a single fossil we would still be forced to a Darwinian explanation as the best explanation for the data observed. To support that statement fully would take a complete text-book – and indeed I would recommend to Cath the reading of the many excellent texts on the subject (actually Richard Dawkins' *Ancestor's Tale* provides a really good account – this is one of those rare books by Dawkins in which he resists the attempt to slam religion, and instead focuses on the science, with excellent results).

Compared with the actual explanations offered by biologists, which relate to physical components in the actual world around us, the 'inference to design' does no explanatory work, as mentioned above, but simply becomes a rather unsatisfactory way of flagging up current areas of scientific ignorance. One might make a similar comment on Behe's distinction between 'obvious' design and 'apparent' design. This distinction adds to the confusion. If a biologist doesn't think that an 'inference to design' counts as a scientific explanation anyway, then clearly starting to make fine distinctions between 'obvious' and 'apparent' is not going to help matters.

Claim 4: Proponents of ID do not perceive the world as a two-tier system of the 'natural' and the 'designed'.

Clearly there is some variation between ID proponents as to how they view theological and philosophical questions, and some are more theologically astute in their writings than others. Nevertheless it should be remembered that the ID movement was really launched by Philip Johnson in a series of books written during the 1990's, and it is quite clear from his books that it is 'philosophical naturalism' which is his main target. No problem there: Christianity is clearly inimical to philosophical naturalism. The problem began, however, by Johnson's bad habit of using the word 'natural', 'naturalistic' and 'naturalism' in ways quite different from the ways in which those words are normally employed in philosophical discourse (in the arts the words are used with quite different meanings again, just to confuse matters).

Go to a dictionary and you will find 'naturalism' defined in its philosophical sense as: "view of the world that excludes the supernatural or spiritual" (Oxford Dictionary).

Go to Philip Johnson and you will find comments such as the following: "It is conceivable that God for some reason did all the creating by apparently *naturalistic* processes, perhaps the better to test our faith, but surely this is not the only possibility. My writings, and those of colleagues like Michael Behe, argue that design is detectably present in biology, that *naturalistic* substitutes like the blind watchmaker mechanism are inadequate and contrary to the evidence, and that theists who believe that God is real should not assume that he never played a detectable role in biological creation" [my ital.] [2]. In the same book chapter Johnson also comments that "theistic evolution can more accurately be described as theistic *naturalism*" [3]. But according to the dictionary understanding of 'naturalism', a term like 'theistic naturalism' is an oxymoron, that is, a contradiction in terms, like calling someone a 'fascist communist'. Christian theism, the kind of theism to which Johnson is referring in this passage, refers to the belief in a creator God who is the origin and sustainer of all that exists. So God cannot possibly create by 'apparently naturalistic processes' for the simple reason that if there is a God who creates, then there are no 'naturalistic

processes' because naturalism is false. Unless you are really post-modern (or very confused) you can't believe in both God and naturalism simultaneously.

In these and many other passages in his books Johnson draws a contrast between what he perceives to be the 'designed aspects' which can be recognised and detected against a backcloth of 'naturalistic explanations'. This contrast is made even more starkly in the writings of ID proponent Michael Behe. For example, Behe says that: "The laws of nature can organize matter – for example, water flow can build up silt sufficiently to dam a portion of a river, forcing it to change course. The most relevant laws are those of biological reproduction, mutation, and natural selection. If a biological structure can be explained in terms of those natural laws, then we cannot conclude that it was designed" [4]. This seems to be a very clear statement expressing the belief that there is a 'two-tier universe', one tier involving 'natural laws' and the other tier involving 'design'. Lest we be in any doubt about the interpretation of this statement, Behe gives the example of a cell as an illustration of what he means: "Some features of the cell appear to be the result of simple natural processes, others probably so. Still other features were almost certainly designed. And with some features, we can be as confident that they were designed as that anything was" [5]. Once again Behe is drawing here a distinction between 'natural processes' which reflect 'natural laws', and entities that are 'designed'. This is very distant from the Biblical view that God creates and sustains all that exists in order to bring about his purposes. In this view, held by the vast majority of the natural philosophers (= scientists) responsible for the emergence of modern science in the 16th and 17th centuries, the 'laws of nature' are simply human ways of summarising God's consistent handiwork in the created order.

To show that ID proponents are at least consistent in their claims on this point, one only has to read Bill Dembski's book 'The Design Revolution'. For example, Dembski comments that "The design theorist is not committed to every biological structure being designed. Naturalistic mechanisms like mutation and selection do operate in natural history to adapt organisms to their environments" [6]. And again: "If specified complexity is exhibited in actual biological

systems, we are justified in attributing such systems to design. That's not to say that every aspect of such systems is designed. (Some aspects may be due to purely natural forces)" [7]. Here, as in the rest of this book, it is clear that Dembski envisages a biological world largely explained by 'naturalistic mechanisms' and 'natural forces', and it is against this backcloth that 'designed systems' may be detected. Indeed, if there is no such backcloth, the rest of his argument would make little sense, since if the identification of designed entities is to be possible, then clearly a non-designed 'naturalistic' backcloth is essential, otherwise the detection of the so-called designed components would be impossible.

Does all this matter? I think it matters a lot, because the impression is given in the ID literature, faithfully reflected in the conversation between Adam, Tim, Cath and Greg, that there is something inherently 'naturalistic' about one particular scientific theory and not about others, and such thinking appears to stem from a very inadequate doctrine of creation. In Biblical creation theology which, as mentioned above, so motivated and inspired the early natural philosophers – and which continues to do so equally for many scientists today – the created order is seen as a seamless web of God's creative activity. So all scientists can do is to describe God's creative activity to the best of their ability. Often their theories will be wrong and will need to be modified or discarded. But within this framework of a robust Biblical theism, there is nothing in the created order without exception that is not created and sustained by God.

It was difficult to avoid the impression, whilst listening to the discussion between Adam, Tim, Cath and Greg, that ID represents yet another species of Red Herring, that famous biological species which keeps Christians so occupied and distracted from other much more important matters.

References.

1. Michael J. Behe, 'Darwin's Black Box', The Free Press, 1996, p. 206.
2. Philip Johnson in P.E.Johnson and D.O.Lamoureux (eds.) 'Darwinism Defeated? The Johnson-Lamoureux Debate on Biological Origins', Regent College Publishing, Vancouver, 1999, p.

52.

3. op. cit. p.50
4. Michael J. Behe, 'Darwin's Black Box', The Free Press, 1996, p. 203.
5. op. cit. p. 208.
6. William A. Dembski, 'The Design Revolution', InterVarsity Press, 2004, p. 63.
7. op. cit. p. 141.