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The first thing I should do is to define what Design is. That would be no easy task as the word is used in so many different ways to mean so many different things. I hope some of the variety of meanings comes clear in this paper. Part of the confusion is that Design can be synonymous with the teleological argument for the existence of God, but often it is more restricted to biological structures. Hence Design means different things to different people. Distinguishing between these meanings is important as confusion reigns when one switches from one to another. To give a rough typology there are four types of design;

1 Design of the universe; - front-loading or teleological (fine tuning)

2. Guidance of natural processes through history; Asa Gray

3. Ahistorical recognition of biological structures as designed; Hooke, Paley,

4. Miraculous appearing action during history or not; Irreducible Complexity - Behe

Most theists, Christians or not, accept the first two. The third is the classical design argument of the 17th to 19th century and the fourth is Intelligent Design.

EARLY IDEAS

The earliest examples of a design argument are to be found in Plato, Socrates and other Greek philosophers. Greek ideas were often taken over and baptised by Christian thinkers and thus Augustine and Aquinas among many others developed this culminating in the several philosophical arguments for God by the Mediaeval scholastics, which are well-known to those who study the philosophy of religion.

THE REFORMATION

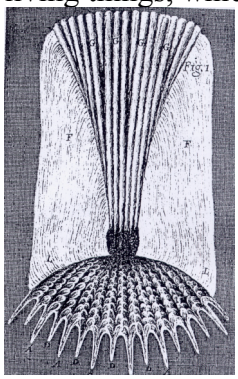
Design arguments came to prominence in the 17th Century evolving from theological arguments of 'nature leading to nature's God' in a culture dominated by mechanistic science. There are roots in Calvin, who wrote in Book One of *The Institutes*; 'Hence, the author of … Hebrews elegantly describes the visible worlds as images of the invisible (Heb. 11. 3), the elegant structure of the world serving as a kind of mirror, in which we may behold God, though otherwise invisible.'[1] And then of 'innumerable proofs, not only those more recondite proofs which astronomy, medicine, and all the natural sciences, are designed to illustrate, but proofs which force themselves on the notice of the most illiterate peasant, who cannot open his eyes without beholding

[1] J. Calvin, *Institutes*, Book 1, Chapter 5, section 1.

them.'[2] Calvin made clear the *general* appeal of his argument including both the scientific and the popular. *Proof* is not rational demonstration but rather the sense of awe and beauty "demonstrating" 'the admirable wisdom of its maker'. The 'recondite' side of Calvin's 'innumerable proofs' was taken up a century later by members of the Royal Society as in the *Physico–theology* of William Derham and many others.

THE LATE SEVENTEENTH CENTURY

With typical English insularity I shall focus on England, with the flowering of Newtonian science and the formation of the Royal society in 1660, popularly called the Scientific Revolution. As Newton and others considered the mechanics of the heavens and the earth, the mundane naturalists like Ray and Hooke considered the structure of living things, which was enhanced by the microscope.



That optical wonder changed the way living things could be observed and thus Robert Hooke in *Micrographia* (1665) compared the perfect design of living things with the blemishes of man's artefacts. Brooke comments, 'Compared with the filigree precision of nature, human artefacts made a very sorry sight: "the more we see of their shape", Hooke observed, "the less appearance will there be of their beauty."'[3] John Ray also waxed lyrical about the 'elegancy and beauty' of natural forms under the microscope and how crude and amateurish human artefacts are in comparison, but I wonder what he would say about nanotechnology. On a larger scale half a century earlier William Harvey was very teleological on the structure of valves in hearts and the whole basis of the circulation of blood. All pointed to God the Designer, and thus the Design of living things confirmed the existence of God and enhanced the teleological argument.

HUME AND BUFFON IN THE 18th CENTURY

A century later the Scottish philosopher David Hume challenged the argument from design. He gave the example of a ship, which seems wonderfully contrived, until broken down into the work of individual carpenters and other craftsmen, whose fine work was not that of a genius, but the accumulation of corrections of trial and error. In other words it was not a great Design but the work of innumerable *bricoleurs*, who did no more than tinker with the work of their predecessors. We almost come back to that in Dawkins and Dennett, who see Natural Selection as the ultimate *bricoleur.*.

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[2] J. Calvin, *Institutes*, Book 1, Chapter 5, section 2.
[3] J. H. Brooke and G. Cantor *Reconstructing Nature*, 1998. Edinburgh: T & T Clark, 217

From Hume we cross the channel to France with Cuvier and Buffon who argued that sloths are a very bad design and, if we speak anthropmorphically, are examples where God's designing abilities are simply not up to scratch or rather slothful, or, in today's terms, reflect *unintelligent* rather than *intelligent* design. Buffon, after describing the clumsy nature of sloths in his *Natural History,* wrote: "All these circumstances announce the misery of the sloths, and recall to our minds those defective monsters, those imperfect sketches of Nature …" And he later wrote: "To regard those bungled sketches as beings equally perfect with others …"[4] After all sloths can travel at 0.1 mph when going flat-out.

WILLIAM PALEY

Almost in defiance of Hume, the development of the Design Argument in the 18th century culminated in William Paley's *Natural Theology* (1802) (to be published in a *World* classics edition in April 2006) and his opening words on finding a watch on a heath are memorable.

Paley (1743-1805) was born near Giggleswick, went to Christ's, Cambridge and occupied the same room that Darwin later had. He was Archdeacon of Carlisle and in 1796 was given the living of Bishop Wearmouth by the ultra-conservative Bishop Shute Barrington of Durham (d1826) who had first become a diocesan bishop in 1769 with 57 years at *see* being an Anglican record! Paley wrote many works and was a fairly orthodox, but not evangelical, Anglican. He wrote on moral philosophy, Christian evidences and most famously on design in *Natural Theology* in 1802. In the absence of any mention of geology in Paley's works, we should not conclude that he had no notion of geological time. By 1800 most educated Britons were aware of, and accepted geological time[5], but most accepted the "direct" (ugh!) creation of living forms. However the implications of both extinction and the succession of life were unknown.

In a long book, Paley considered the structure of living things and how they pointed to a Designer. Paley considered that both the whole organism and the constituent parts, e. g. the arm or eye, pointed to the action of a Designer, just as a watch was designed by a watchmaker. He also considered "cosmological design". He concluded with several chapters on the Deity. His work may be seen as a successor to the *Physico-theology* of the last century. Nowhere does Paley make any reference to geological time, thus his design is timeless and considers no source of origin.

His work had a great appeal, but not for many evangelicals. A review in *The Christian Observer* in 1803 criticised the book for not pointing to the Redeemer. Thomas Gisborne, who has the honour of being the last patient Erasmus Darwin treated before his death, followed this up with *The Testimony of Natural Theology to Christianity* (1817), which both emphasised the need to proclaim the Redeemer, and

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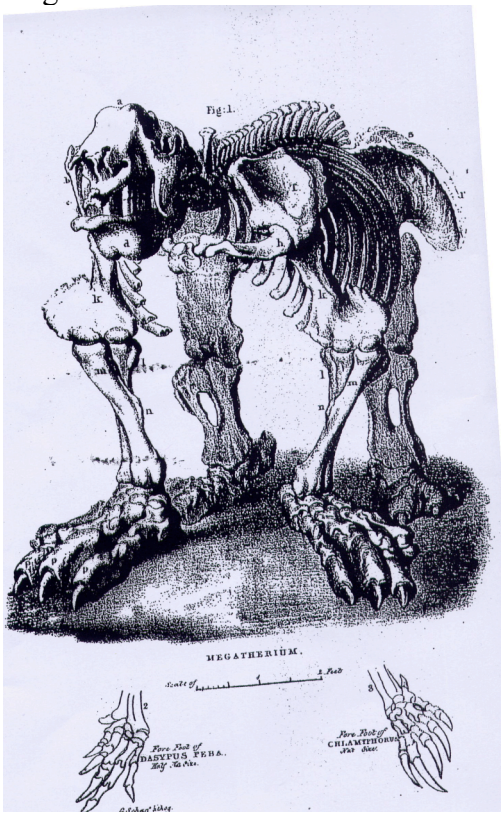
[4] Count de Buffon, *Natural History: General and Particular*, vol. IX, ed. W. Wood (London: 1812), 7, 8.

[5] M. B. Roberts, "The Genesis of John Ray and his successors", *Evangelical Quarterly,* vol. LXXIV, no 2, (2002), p143–64.
M.B.Roberts, "Genesis and Geology unearthed" Churchman , 1998, Vol112, pp225-55
M.B. Roberts Genesis Chapter One and Geological time from Hugo Grotius and Marin Mersenne to William Conybeare and Thomas Chalmers (1620 to 1825).GSL Special Publication (forthcoming c2006/7)
M Rudwick, *Bursting the Limits of Time* Chicago, 2005.

that Paley did not consider suffering. Gisbourne wrote to correct Paley's lack of soteriology. To Gisborne suffering came in at the Fall and thus geology was wrong as well, as there could be no death before the Fall. In this he signalled the start of a spate of Anti- or Scriptural Geologies, which appeared over the next forty years. Some of these are itemised in Mortenson's *The Great Turning Point* (2004).

WILLIAM BUCKLAND[6]

The greatest disciple of Paley on design was William Buckland (1784-1857) the reader of geology and mineralogy at Oxford. Buckland was a fine geologist, who put the age of the earth at "quadrillions", did much work on the Mesozoic, found the first Jurassic mammal at Stonesfield, and introduced the Ice Age to Britain. He was an orthodox Anglican (Roberts 2002, and forthcoming). His *Bridgewater Treatise* on geology and mineralogy published in 1836. In many respects, it was an excellent compendium of geology and palaeontology, but it was also strong on Design, much to Sedgwick's disgust. His *piece de resistance* on Design was on the giant extinct sloth, the *Megatherium.* He gave a summary in his *Bridgewater*, but expounded *Megatherium* at length at the British Association in 1832[7].



To Buckland *Megatherium* was an excellent creature to demonstrate the design of God. Some years earlier, an almost complete skeleton had been brought back from South America. Buckland pointed out that *Megatherium* was related to the sloths and then stressed that the sloths were "a family whose structure is very anomalous, and has been misunderstood by almost every naturalist including Buffon, even the immortal

[6] M. B. Roberts, *Design up to Scratch*, 1999 Perspectives on Science and Christian Faith, 51: 244–53.
[7] There is a manuscript of his lecture, which was never published.

Cuvier himself" (p. 8). Buckland was determined to show that sloths were carefully designed creatures rather than bungled attempts at creation. Buckland apparently had talked himself into a corner. It is impossible to read the lecture without feeling what marvellous theatre Buckland's lectures were. Buckland talked himself out of a corner because of both his scientific skill and of his faith in the Creator: "from first to last, the same hand that has framed, and the same Almighty mind that has designed the smallest and most complicated of existing creatures" (p. 10). Behind the humour and buffoonery is a deadly serious purpose as he sought reasons for Design in every aspect of *Megatherium*'s anatomy, commenting: "I before observed nature is prodigal of contrivance where contrivance is necessary and most rigidly economical when it is unnecessary" (p. 22).

From the nose, Buckland worked through the teeth, on to the fore legs, and finally to the rear legs. On each he gave both ribald humour and detail, pointing out that "we have here marks of intention and design" (p. 36). On the meter-long feet, he could not resist humour in describing the size of the heel bone as "The bone on which rests the animal is as big as the head of Professor Babbage" (p. 38). Having finished with the anatomical description, he next explained the function of *Megatherium*. His buffoonery came to the fore. It "has been suggested by Professor Sedgwick who thinks we have found old Scratch himself … That he could scratch and did scratch is quite evident and that without scratching he would have died is a fact I will endeavour to show you. If he did scratch, then arises the question, what did he scratch?" (pp. 40–1). And so over the next pages, Buckland gave a lively interpretation of *reverse engineering* applied to Old Scratch. His *reverse engineering* or *artefact hermeneutics* was also painstaking and rigorous, and is as fine an example as anything Dennett may give us. Buckland concluded with a flourish:

> *"Gentlemen his teeth indicated a peculiarity of structure; they were not calculated to eat leaves or grass; they were not calculated to eat flesh; he was an eater of vegetables. What then remained for him but roots? He has a spade, and he has a hoe and a shovel in those three claws in his right hand ... He is the Prince of Sappers and miners—I speak in the presence of Mr. Brunel the Prince of Diggers ..."* (p. 50).

Old Scratch was *designed* to gather potatoes and other roots at a depth of eighteen inches. Finally after midnight, Buckland concluded: "Gentlemen, as time is advancing, I must put an end to the present discussion, and I hope you will accept any apology for having detained you so long" (p. 70).

Buckland had chosen an animal which leading anatomists like Buffon and Cuvier regarded as having a poor and *bungled* design to show, by the careful and rigorous anatomical description and then the application of *reverse engineering*, to be perfectly designed or adapted for its environment. It is almost as if Buckland used his faith in God as a Designer to provide the starting-point for his search for design. Here, for Buckland, design was not so much a scientific theory, but rather a metaphysical or theological outlook, which gave confidence or grounds for applying reverse engineering procedures. In his Bridgewater Treatise, Buckland applied similar techniques for other extinct creatures, but design for inanimate geology was more problematical.

As a progressive creationist, Buckland considered all living creatures to be directly created by God and thus designed by God. Therefore he did not raise issues due to descent or whether the detailed lifestyle of a creature may be due to adaptation rather than design. The key issue here is that design for Paley and Buckland was the design of *all* aspects of a living creature. That is in marked contrast to Intelligent

Design, which focuses only on a few features like the *flagellum* or blood-clotting. This lays it open to the charge "godofthegaps" in contrast to both Buckland and Paley to whom ALL was designed.

Yet we need to ask whether Design to Buckland and Paley was a scientific argument. In their Gifford Lectures, John Brooke and Geoffrey Cantor discuss *Natural Theology as Rhetoric* and expound several examples from the eighteenth and nineteenth centuries including Buckland on *Megatherium*. They point out: "It is important to re-emphasize that natural theologians did not deploy such evidence (from Design) to 'prove' (in the strong deductive sense) the existence and attributes of God." The design argument was an *inductive* argument and its conclusion was deemed a "moral" truth. They cite Campbell, a contemporary writer: "In moral reasoning we ascend from possibility … to probability … to the summit of moral certainty." With shades of Phillip Johnson they suggest that "the persuasiveness of arguments suggest a close similarity between natural theology and the proceedings of the courtroom … Persuasion becomes the name of the game."[8]

Considered in this light, the design argument becomes a rhetorical argument with a persuasive advocate. The rhetoric gives design both its strength and fatal flaw. Buckland gave a superb scientific account of its peculiar anatomy which would have impressed the lately departed "immortal Cuvier," but throughout the lecture was the implicit message: "the adaptation of Old Scratch is so wonderful and demonstrates the skill of the Designer, who is none but the Father of our Lord Jesus Christ." Buckland began with the *possibility* that sloths were not as poor a design as Buffon and Cuvier insisted. As he described Old Scratch so favourably, he moved to *probability* and then to the *moral certainty* of his theistic conclusion. This worked well as Buckland was able to give an explanation of every part of its anatomy, but he could not have done so if he had chosen or found vestigial organs.

As well as this kind of detailed design, Buckland also argued that minerals were distributed by the designing nature of a provident God, especially for England. So that British coal is the result of Design! And His purpose to make it 'the most powerful and the richest nation on earth'! (Perhaps this is why George Bush likes Intelligent Design.)

RESERVATIONS ABOUT DESIGN

Despite the fact that Paley's *Natural Theology* was a set book at Cambridge, the Revd Adam Sedgwick, Professor of Geology, and others stood outside the Paley/Buckland school of Design. Part may be due to his evangelicalism, and possibly his poor grasp of biology and palaeontology. (He was a mathematician and structural geologist first and foremost). Sedgwick wrote to W Coneybeare in 1836 about his doubts of Buckland's *Bridgewater Treatise*, which he thought excellent on palaeontology and 'not good' on Natural Theology. He considered that the Design argument ought to be general and *indirect* rather than particular and *direct.* This is particularly in the case of 'apparent ill', i.e. suffering, which created such a problem for Darwin 25 years on. Both Coneybeare and Sedgwick were close friends of Buckland, and later that year Sedgwick became godfather to the latest little Buckland. Here Sedgwick was rejecting the detailed design arguments of Paley and preferred to look at the overall picture, almost anticipating later Victorian ideas of design as "wholesale rather than retail".

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[8] This is based very closely on J. Brooke, & G. Cantor, *Reconstructing Nature* (Edinburgh: T & T Clark, 1998), 181–2

Too little research has been done on the fortunes of Design before 1859, but there was not a sudden collapse after Darwin. The collapse predated *The Origin.* I will give some tentative observations and conclusions before giving one of the chief objections – time. One of the great values of Design was that it encouraged naturalists to think of the function of aspects of plants and animals and attempt some kind of *reverse engineering.* That helped in scientific work, even when Paley was almost forgotten – as in the case of Darwin's biological work. However not all biological features were amenable to *reverse engineering* as numbers of features seemed to have no function e.g. the human appendix and coccyx and the canine dew-claw. If one considers the dewclaw, it has no function in its position as the claw cannot be used, but it is simply a redundant fifth digit corresponding to our thumb. (There is no visible fifth digit on the back paw.) Here no amount of *reverse engineering* gives any explanation and thus *ad hoc* arguments were put forward, which Darwin later criticised. It was argued that the dewclaw and coccyx were there for symmetry or because it was part of the vertebrate skeletal *plan*, but the question remained "Why?"

These questions which directly related to Design cannot be separated from other questions like the "fixity of species" which was becoming increasingly doubtful during the early 19th century, or biogeography which Darwin brought up in relation to two sets of almost identical volcanic islands, Cape Verde and Galapagos, which had flora and fauna related to the nearest continent.

As any good Englishman knows, there is nothing of importance across the Channel, and so we can ignore any foreign science! Clearly we cannot, but so often our historical understanding of science especially biology and geology is so Anglo-centric (or Scotocentric for Hutton) that it becomes worthless. Out of sheer laziness we ignore the continental savants. Hence it is easier to focus on Paley rather than consider what Continental savants were saying. Two, in particular, deserve mention in relation to biological questions, which impinge on Design. The first is Cuvier, the French Protestant anatomist, who fathered comparative anatomy and reckoned he could reconstruct an animal from a drawing of a tooth. Cuvier put all animals into types and emphasised the basic plan of vertebrates, along with homologous structures. This he saw as an expression of God's creativity and some kind of overall design. We have already seen how Buckland looked to Cuvier. The second is Oken, who developed some of the German idealist philosophy as applied to biological forms which led to *Naturphilosophie*, giving a transcendental view of the Plan or design of living forms. Does this qualify as Design? The palaeontologist Richard Owen fused this with his Anglican faith. (Note he was a great friend of Samuel Wilberforce.) Despite his opposition to Darwin, often personal, Owen was closer to Darwin than to Paley. Agassiz also developed ideas from both Cuvier and Oken, which he applied to fossil fish in the 1830s. In 1859 the main alternatives were not Darwin or Paley but Darwin and the transcendental idealism of Oken, Owen and Agassiz. Owen's was almost evolutionary, but strong on the divine. When in the 1860s, Owen came to accept evolution, it was purpose-driven, teleological and thus full of Design.

All of this was part of the whole scientific background of the time, and of great influence to those who could read several languages like Darwin himself. Paley was fading from view before 1859. But now to consider geological time.

THE PROBLEM OF GEOLOGICAL TIME FOR DESIGN.

In his *Natural Theology* William Paley discussed the design of biological structures without reference to deep time. As the geological column was elucidated, by 1820 a Progressive Creation over millions of years was seen as the most reasonable explanation, and inevitable from the fossil record, though Uniformitarians like Lyell rejected progressivism. This meant that there had been innumerable creative acts during the vastness of geological time. Thus the French geologist Alcide d'Orbigny' (1850s) 'recognised 27 successive fossil faunas in one part of the geological column (part of the Jurassic at Arromanches in Normandy) each of which he believed became entirely extinct as the next was created …'[9] This was used to justify his concept of a *Geological Stage,* which is still accepted though shorn of its creationist roots. If d'Orbigny were correct and that part of the Jurassic was 10 million years, then at the same rate of creation there would some have been some 1500 creations since the beginning of the Cambrian.[10]

The crucial work on elucidating the succession of life was carried out by Cuvier and Brogniart (developing William Smith's work) in the Paris Basin in about 1808[11]. Before that, it was known that fossil species had gone extinct (Blumenbach 1790s), but no historical order of their appearance or disappearance was known. Cuvier and Brogniart's work in the upper Mesozoic and Tertiary strata around Paris was decisive. They showed that the bizarre big lizards (dinosaurs) in the chalk were much older that the mammals in the Gypsum formation above it. Thus a sequence of life forms, which changed over time, was slowly revealed. One could no longer look at the design of life forms ahistorically as did Paley. The last to do so was Buckland in his *tour de force* on *Megatherium* in 1832. By 1850 the succession of life from the base of the Cambrian was well-known and very similar to today's understanding.

Cuvier, vertebrates and geological time.1808-1812

Animals	1810 terminology	today's terminology
Living mammals		Holocene
Mix of extant and extinct mammals	Diluvium	Pleistocene
Large extinct mammals *Palaeotherium*	Tertiary strata Gypsum formation Paris Basin	Eocene etc
Big lizards – extinct	In Chalk and below	Cretaceous

This raised severe questions. Why did God create/design a succession of forms differing only slightly from previous forms? Why was extinction allowed? (Extinction was only accepted in the 1790s, so probably Paley knew nothing about it.) Assuming evolution has not occurred, then the Designer returned at regular intervals to modify a previous creation as a motor manufacturer gives an annual revamp to their models. In England such questions were put aside for a time after the formation of the Geological

[9] John Thackray *The Age of the Earth* 8
[10] This is a crude calculation based on some 27 creations every 10 m.y.; i.e.27x55 creations since the beginning of the Cambrian, i.e. a mere 1485 creations.
[11] Rudwick

Society of London in 1807 as the most important task was stratigraphy; that is elucidating the historical succession of strata, rather than providing any interpretative framework, thus avoiding the problem of design over time. From 1800 to 1850 geologists worked out the Geological Column from the Cambrian to the Post–glacial and the fossils embedded in them, without acceptance of evolution. This demonstrated the succession of life, which is derivative from *the principle of superposition (Steno)* rather than based on any hypothesis on the origin of life. Thus by 1850 (and even in 1780) the accepted general order was the same as what we have today, though there was a marked absence of human fossils. However this avoided the question of change over time, which would not go away.

A fine early example of a study on the succession of life is in John Phillips' *Treatise of Geology* of 1838. After giving '[t]he order of development of life', he wrote, 'Is the present creation of life a continuation of the previous ones; … ? I answer, Yes; but not as the offspring is a continuation of its parent.' His meaning is clear – there *has* been a succession of similar species, each separately created and only differing slightly from its predecessor, but no descent. By doing this, Phillips allowed the direct creation of each species and thus retained the Argument from Design almost intact. This meant that any possibility of evolution could be side–stepped.

Phillips was a lifelong opponent of evolution, but Darwin made a fascinating use of Phillips's ideas, while toying with evolution in his *B notebook* of 1837-8.[12] This was before he read Malthus and thus predates Natural Selection. Darwin agreed with Phillips' historical order of fossils, but not his successive creations. In *B notebook* we see Darwin the GEOLOGIST arguing historically and abductively for evolution. Crucial is his earlier statement 'Absolute knowledge that species die & others replace them' but 'two hypotheses [individual creation and common descent] fresh creation mere assumption, it explains nothing further, points gained if any facts are connected' (B 104) Here Darwin appears to dismiss the view of Phillips cited earlier. Later he asked, 'Has the creator since the Cambrian formations gone on creating animals with same general structure. – miserable limited view' (B 216) and argued 'My theory will make me deny the creation of any new quadruped since days of Didelphus[13] in Stone[s]field' (B 219)

Miller in *Finding Darwin's God*[14] mischievously considers design in relation to elephants with 22 species in the last 6 million years and many more going back to the Eocene. If all were "formed" at about the same time in c8000 BC, then the only reasonable explanation is some kind of intelligent intervention, which designed each to be different, rather like cars made by Chrysler or GM over several decades.
If geological timescale be correct, then these different fossil elephants appeared consecutively and despite "gaps" form a graded sequence. They indicate only "annual model upgrade". Assuming that this is a fairly complete sequence, the Intelligent Designer seemed to have adopted the same sequence of modifications as would be expected by evolution. This is exactly the point Darwin made in his 1844 draft;

I must premise that, according to the view ordinarily received, the myriads of organisms, which have during past and present times peopled this world, have been created by so many distinct acts of creation. ... That all the organisms of this world

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[12] Darwin, C.D., *B notebook*, (P.H.Barrett, P.J.Gautry, S. Herbert, D.Kohn & S.Smith, *Charles Darwin's Notebooks, 1836 – 1844*, !987, Cambridge:Cambridge Univ Press.
[13] A Jurassic marsupial first described by Buckland in 1824.
[14] K. Miller, *Finding Darwin's God*, 1999, New York: Harper Collins95–9

have been produced on a scheme is certain from their general affinities; and if this scheme can be shown to be the same with that which would result from allied organic beings descending from common stocks, it becomes highly improbable that they have been separately created by individual acts of the will of a Creator. For as well might it be said that, although the planets move in courses conformably to the law of gravity, yet we ought to attribute the course of each planet to the individual act of the will of the Creator.[15]

DARWIN'S PROBLEMS WITH DESIGN

In *The Origin of Species*, Darwin picked up the problems of appealing to the Design argument and showed how this was swept under the carpet by appeals to the Divine Plan. He wrote: "In works on natural history rudimentary organs are generally said to have been created 'for the sake of symmetry,' or in order 'to complete the scheme of nature,' but this seems to me no explanation, merely a restatement of fact." The fact is that God is the Creator. At the end of *The Origin of Species*, Darwin wrote: "It is so easy to hide our ignorance under such expressions as the 'plan of creation,' 'unity of design,' etc., and to think that we give an explanation when we only restate a fact." To argue rhetorically, surely any Design argument is a restatement of fact?

Throughout the *Origin of Species* Darwin referred to 'the ordinary view of creation' and cited its weaknesses to make his ideas plausible. The rhetorical value of 'the ordinary view of creation' is discussed below, but its power was its lack of definition. Readers today will think of A Six Day Creation and that may have been Darwin's intention, though Six-Day Creationism had virtually disappeared by 1855.[16] The 'ordinary view of creation' was, in fact, Progressive Creation, which was emphatic on geological time and the succession of life but frankly confused over the fixity of species, or how "vestigial organs" were designed. Darwin easily pointed out contradictions with devastating effect.

This he did in asking whether 'species have been created at one or more points of the earth's surface' (352) He pointed out that geologists will find no difficulty for migration as, for example, when Britain was joined to the European mainland some millennia ago. And then he asked, 'But if the same species can be produced at two separate points, why do we not find a single mammal common to Europe and Australia or South America?' The implications he spelt out in detail comparing the Cape Verde Islands fauna with the Galapagos. The one flora and fauna was similar to Africa and the other South America, yet their climates and landscape were almost identical. His conclusion was that 'this grand fact can receive no sort of explanation on the ordinary view of independent creation'. (398) He took this up again in the last chapter on naturalists 'admit variation as a *vera causa* in one case, they arbitrarily reject it in another' And then asked, with Miltonic undertones, 'But do they really believe that at innumerable periods of the earth's history certain elemental atoms have been commanded suddenly to flash into living tissues?' (482) Dembski sees this as a concern that 'the distinction of design and non-design cannot be reliably drawn'[17] but this was not Darwin's point, as his concern was drawing the line between species and varieties, unless Dembski sees 'species' as separately designed and not 'varieties'. (Ultimately

[15] C Darwin *The Essay of 1844,* Works of Charles Darwin, vol. 10, p133/4
[16] In Britain the only examples I can think of are Gosse and B.W.Newton. In the USA there were Moses Stuart, Dabney and a few others.
[17] W. Dembski, *Intelligent Design*,1999, Downers Grove: Inter Varsity Press 126

Intelligent Design demands that one believes that atoms can flash into living tissue.) Were Darwin alive today I am sure he would direct his withering criticism to Dembski's argument from SETI and Behe's partial acceptance of common descent AND his biochemical mousetraps.

Darwin also had problems on the morality of a God who design creatures like the ichneumon fly and this formed much of his correspondence with Asa Gray in the 60s[18].

DESIGN POST-DARWIN

In many accounts of the Christian response to Darwin it is perceived that one of the objections to his ideas was over Design. Often this is presented as if Christians were still following Paley's ideas of Design, and hence Darwin killed Design. I think I have laid that to rest. It may be for popular apologetics but not for the scientifically informed. In his excellent review of the *Origin,* (and I mean excellent), Samuel Wilberforce did not even mention the implications of natural selection for Design, even though he had many reasons to challenge Darwin. This is especially significant, as he would have learnt a Paleyan Design from three years of geology lectures from Buckland in the 1820s. I would suggest that this was modified because of the influence of Richard Owen and his archetypes, which would see more an overall Divine Plan than detailed Divine Design. In his criticism of Darwin, the evangelical geologist Adam Sedgwick, made no reference to design, which also was hardly surprising.

Other Evangelicals were more concerned about the effects on Design. John Pratt, Archdeacon of Calcutta, a competent mathematician and author of a paper on Himalayan isostasy, took Darwin into account in his later editions of *Scripture and Science not at Variance* (1856-71). He argued (p294) for a very general view of design (lower case), but considered as Darwin reckoned 'all plants and animals as having been progressively developed by accidental changes from previous forms' this was opposed to any kind of design, except this would be better termed "creation". Yet this is no defence of Paley against Darwin, but rather an upholding of what Darwin termed 'the ordinary view of creation'.

In 1860s the Church of England was rocked by the publication of *Essays and Reviews* by seven Anglican authors. Baden Powell challenged the evidential Christianity of Paley and successors and miracles and welcomed Darwin's new book. There were many orthodox responses including the evangelical T. R. Birks in the *Bible and Modern thought.* In an appendix *The Evidential School of Theology*, he gave a spirited defence of Paley and his evangelical successors but scarcely mentioned Design.

From these four orthodox Anglicans we see that Paley's Design had almost slipped below the horizon, and had been replaced by a general view of Design and that all was created through the creative power of God. The majority accepted some kind of Progressive Creation, but increasing numbers accepted some kind of evolution, beginning in 1858 when Darwin published his joint paper with Wallace.

Asa Gray, American botanist and friend of Darwin, was a devout Christian and largely accepted Darwin's descent with modification but had doubts over the chanciness of Darwin's evolutionary mechanisms and preferred to consider the general

[18] M. B. Roberts, "Darwin's Doubts about Design" *Science and Christian Belief* , 1997 vol 9 (2) p 113-27.

guidance of God. This resulted in a long correspondence between them and in published works[19]. He considered evolution to have been guided by God.

After Darwin the detailed appeal to Design went out of vogue, though the liberal Anglican Frederick Temple could write in 1884, 'The fact is that the doctrine of Evolution does not affect the substance of Paley's argument at all.'[20] Clearly Temple's 'substance' excludes the detailed design argument of a Paley or a Dembski. I am tempted to say that Temple did not understand Paley's argument!

Yet Darwin retained some of 'the ordinary view of creation' for the initial Creation and the creation of life, virtually as *libertarian acts of God*. This enabled many Christians to accept his ideas, though often rejecting Natural Selection. Some added the creation of consciousness and of man as two more, whether they were Christian or not, for example, A. R. Wallace, the Scottish theologian James Orr and the American G. F. Wright.

Orr was a conservative Scottish Presbyterian whose Kerr Lectures for 1890-1 are significant. He discussed evolution in his lecture on *The theistic postulate of the Christian view.* He said, 'On the general hypothesis of evolution,…, I have nothing to say, except that, within certain limits, it seems to me extremely probable, and supported by a large body of evidence'. What comes next has a most contemporary ring, 'On this subject two views may be held. The first is, that evolution results from development from within [front-loading], in which case, obviously, the argument from design stands precisely where it did, except that the sphere of its application is enormously extended. The second view is, that evolution has resulted from fortuitous variations …'[21] Clearly Orr rejects pure chance. His discussion of evolution is highly informed and he almost held a form of Punctuated Equilibrium as 'The type persists through the ages practically unchanged. At other periods … there seems to be a breaking down of this fixity. The history of life is marked by a great inrush of new forms. …it in no way conflicts with design.'

But Orr wishes to go beyond Design; 'The chief criticism … upon the design argument, …, is that it is too narrow. It confines the argument to final causes - … it is not the marks of purpose alone which necessitate this inference (of God) but everything which bespeaks of order, plan, arrangement, harmony, beauty, rationality in the connection and system of things.' We are now back to Calvin, 'the elegant structure of the world serving as a kind of a mirror, in which we may behold God, though otherwise invisible.' and to Polkinghornes' 'inbuilt potentiality of creation'. Orr's criticism that Design as understood in the early 19th Century is too narrow ought to be recognised. They also give the lie to the claim that Darwin killed Design in the wider sense.

The American preacher, Henry Ward Beecher, summed it up as he moved the focus from individual examples of design, e.g. the eye, to the design of the vast universe. He expressed it pithily, 'Design by wholesale is grander than design by retail.'

DESIGN IN THE DOLDRUMS

And so Design went into eclipse from about 1900 to 1980 except for a few works and popular evangelical apologetics and the *Fact and Faith Films* of the 50s and 60s, which

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[19] See footnote 18
[20] F. Temple *The Relations between Science and Religion,* 1884 London:Longmans, p113
[21] J.Orr, *The Christian View of God and the World,* Edinburgh, 1897, p98ff.

presented the wonders of nature, which were clearly designed. It was a rhetorical argument from beauty and awe, rather than from biological mechanisms.

Another reason was that Natural Theology went into eclipse as well due to theology of Karl Barth.

RENAISSANCE OF DESIGN FROM 1980

I first simply list some contemporary aspects of design, which really need a substantative treatment.

THE BLIND WATCHMAKER

This book and the approach of Dawkins et al have shaped much understanding of Paley and of the Christian faith. It is best left to McGrath!

FINE-TUNING

Fine-tuning may be seen as a re-statement of the teleological argument, but I will leave this to others. (see Rodney Holder's *Design in cosmology*)

YOUNG EARTH DESIGN

YEC has always stressed Design, and due to their young earth stance, considers design ahistorically. At an over-simplification much remains with Paley. However there is also much interest in Information Theory.

INTELLIGENT DESIGN

As ID has come to the fore in recent years, I shall give an account of its history and development. I shall not assess any of its ideas and focus on dates and names.

Origins of Intelligent Design

Though Intelligent Design came to the fore in the late 90s following *Darwin's Black Box* published in 1996, its roots go back to the early 80s, especially in two books; *Origin Science, a proposal for the Creation-Evolution controversy* (1987) by Norman Geisler and Kerby Anderson and secondly, Bradley, Olson and Thaxton *The Mystery of Life's Origin* (1984). The two books rejected both a young earth and theistic evolution. The latter three authors, all scientists, argued that the self-organisation of molecules was incapable of producing life, thus pointing to a non-naturalistic origin of life. The common YEC/ID division of science into *Operation* and *Origen* science stems from Geisler and Anderson. This has not been widely accepted, though it is part of the "controversy". In 1981 Bradley and Olson were involved in the *Chicago declaration on Inerrancy*, when they argued that inerrancy allows geological time but not evolution. It is difficult not to conclude that their search for a non-naturalistic explanation of life was predicated by their belief in inerrancy. Much too has been made of Michael Denton's *Evolution; A theory in crisis* (1986), which challenged evolution from a secular standpoint, but he has recently back-tracked. Politically, the most significant event was the lawyer Phillip Johnson's sabbatical visit to England in 1987. He came to question "Darwinism" after visiting the British Museum of Natural History and reading Dawkins' *The Blind Watchmaker*, and also visited Stephen Meyer who was doing a Ph.D. on the philosophy of science at Cambridge at the same time. Four years later Intervarsity Press launched *Darwin on Trial* in 1991, which received both adulation and denigration in equal proportions. The book is a sustained critique on neo-Darwinism, which he considered to be totally dependent on a naturalistic philosophy. He wished to

challenge this by providing a "wedge" between scientific empiricism and naturalism. A common and justified criticism of Johnson is that he is inaccurate in his depiction of Darwinism. This movement grew and soon included the philosophers Plantinga, Moreland and Craig, who introduced the concept of theistic science.

Soon after, in 1992 a conference was held at the Southern Methodist University, with Johnson, Behe, Meyer and Dembski as speakers. After that conferences were held at Biola (1996), which gave rise to the book *Mere Creation*, (Dembski, 1998), Austin (1997), Baylor, Concordia in Wisconsin and Yale (2000) and Calvin (2001). At Concordia and Baylor some of the participants were strong critics of Intelligent Design, including Conway Morris, Schermer, Ruse and Ken Miller. The Concordia conference gave rise to the book *Debating Design*, but only a few of the chapters were given as papers at the conference. In 1996 *Darwin's Black* by Michael Behe was published and also that year the Center for the Renewal of Science was formed as part of the Discovery Institute in Seattle. This has given both political and financial support for the movement, as many proponents of ID are Fellows of the Discovery Institute. The DI began as a radical Republican think-tank and has remained right-wing.

With the financial backing of the DI, fellows are able to spend much time in research of alternatives to Darwinism and have produced a great volume of literature, most published by Christian publishers. Despite their prodigious output, virtually no papers on ID have been published by peer-reviewed science journals.

Since 2000, attempts in the USA to limit the teaching of evolution in schools have argued for "Design" as an alternative rather than Biblical Creation. The influence of ID may be seen in their arguments. This has raised the controversial nature of ID to be on a par with YEC. Since the turn of the century ID has become more controversial. In 2000, Jonathan Wells published *Icons of Evolution*, which criticised several text-book examples of evolution; - the Cambrian Explosion, the peppered moths and Haeckel's embryo diagrams. These are often presented as though they were deliberately fraudulent, e.g. the pinning of Peppered Moths to trees. Just imagine going out at night, watching for a moth to land on a tree and then photograph it with a 1950s flash camera!! ID began to be involved in challenges to educational policy. All previous attempts to downgrade the teaching of evolution had failed, partly because YEC was presented as the alternative. A different tactic evolved with the emphasis on teaching the Design in living forms and ignoring or playing down the tenets of a Young Earth. This had a far wider appeal as those who accepted the vast age of the earth but not evolution could identify with it. Thus a political alliance of YEC and ID was formed, despite the criticism of ID by ICR and AIG. Along with the teaching of Design as an alternative to evolution, it was also proposed that evolution should be taught critically, hence the cry "*teach the controversy*". During 2002-3 there was a long running attempt to introduce the teaching of intelligent design in Ohio and this alliance was nearly successful. In all the discussions and hustings, various proponents were brought in from outside – Ken Miller and Stephen Meyer for example.

REALTIONSHIP OF ID WITH YEC

One $64,000 question is whether ID is an evolved version of YEC. Intelligent Designers like Dembski emphatically deny this but many, whether Pennock in *The Tower of Babel*, Barbara Forest and Eugenie Scott of NCSE claim that the two are genetically related. To confirm this ID is often called the *New Creationism*, which is most unhelpful. There are notable differences. ID does not explicitly base its ideas on

the Bible and thus makes no use of either Creation or Flood. Neither does it make an appeal to the Judaeo-Christian God. As discussed above they eschew discussion on the age of the earth, though most leading practitioners of ID do accept an old earth. The two leading YEC organisations, ICR and AIG, are highly critical of ID for being neither Biblical nor Young Earth.

So on the surface there seems to be no connection. However in recent educational cases, as in Ohio, Kansas and Dover, Pennsylvania, the tactic is to enforce legally the teaching of "Design" rather than "Creationism", but the proponents are dominantly YEC. This highlights the change by YEC on the teaching of evolution. In the 80s they used the *Two Model Approach* of Creationism and Evolutionism, which was defeated in 1982 in Arkansas and in 1987 when the *Edwards v. Agouillard* case overturned Louisiana's creationist legislation. After several defeats a new tactic was needed. Here Design fitted the bill, especially after Philip Johnson's *Reason in the Balance* (Johnson 1995) dealt with educational issues. Focussing on "design", critical thinking and, later, "teaching the controversy" seemed far more likely to succeed. Thus in these recent cases young earth arguments are ignored, and efforts are directed to a more limited aim. Hence some see ID as a Trojan Horse for YEC.

Superficially it may seem that Intelligent Design - the "New Creationism" resulted from the *Edwards v. Agoullard* judgement and is clearly "descent with modification" from the old creationism, i. e. Young Earth Creationism. My summary of the history of ID flatly contradicts that. But that is not the whole story as there has been the transference of ideas as Barbara Forest and Paul Gross have demonstrated in the replacement of the term "creation" by "design" in the biology text *Pandas and People.* This was part of the plaintiffs presentation at Dover and I cite from the Memorandum Opinion of December 20, 2005;

As Plaintiffs meticulously and effectively presented to the Court, Pandas went through many drafts, several of which were completed prior to and some after the Supreme Court's decision in Edwards, which held that the Constitution forbids teaching creationism as science. By comparing the pre and post Edwards drafts of Pandas [in 1987]*, three astonishing points emerge: (1) the definition for creation science in early drafts is identical to the definition of ID; (2) cognates of the word creation (creationism and creationist), which appeared approximately 150 times were deliberately and systematically replaced with the phrase ID; and (3) the changes occurred shortly after the Supreme Court held that creation science is religious and cannot be taught in public school science classes in Edwards. This word substitution is telling, significant, and reveals that a purposeful change of words was effected without any corresponding change in content, which directly refutes FTE's argument that by merely disregarding the words "creation" and "creationism," FTE expressly rejected creationism in Pandas. In early pre-Edwards drafts of Pandas, the term "creation" was defined as "various forms of life that began abruptly through an intelligent agency with their distinctive features*
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intact – fish with fins and scales, birds with feathers, beaks, and wings, etc," the very same way in which ID is defined in the subsequent published versions. (P-560 at 210; P-1 at 2-13; P-562 at 2-14, P-652 at 2-15; P-6 at 99-100; P-11 at 99-100; P-856.2.). This definition was described by many witnesses for both parties, notably including defense experts Minnich and Fuller, as "special creation" of kinds of animals, an inherently religious and creationist concept. (28:85-86 (Fuller); Minnich Dep. at 34, May 26, 2005; Trial Tr. vol. 1, Miller Test., 141-42, Sept. 26, 2005; 9:10 (Haught); Trial Tr. vol. 33, Bonsell Test., 54-56, Oct. 31,

2005). Professor Behe's assertion that this passage was merely a description of appearances in the fossil record is illogical and defies the weight of the evidence that the passage is a conclusion about how life began based upon an interpretation of the fossil record, which is reinforced by the content of drafts of Pandas. The weight of the evidence clearly demonstrates, as noted, that the systemic change from "creation" to "intelligent design" occurred sometime in 1987, after the Supreme Court's important Edwards decision. This compelling evidence strongly supports Plaintiffs' assertion that ID is creationism re-labeled. Importantly, the objective observer, whether adult or child, would conclude from the fact that Pandas posits a master intellect that the intelligent designer is God.

There is much in favour of this claim but it is only a partial explanation, and it is not correct to state that *ID is solely creationism re-labeled.* For a start, against that, Philip Johnson had no YEC roots and became convinced of ID *sui generis* in Britain in 1987. Several other leaders of ID have no roots in YEC as with Behe, Dembski, Thaxton, Bradley and Pattle Pun and most continue to distance themselves from YEC. But Nancy Pearcey and Paul Nelson are clearly YEC as well as ID.

However the replacement of "creation" by "design", the refusal to come clean over the age of the earth, and the association of YEC and ID makes it difficult for observers to distinguish between the two. I hope that by dealing with the historical order of events, rather than an assessment of ID arguments, has indicated both how ID came about in the last 25 years and its relationship with YEC. ID may not be an evolved version of YEC, but many of its genes have been spliced from YEC.

CONCLUSION

As Design is on-going there is no conclusion, but to grapple with present controversies we need both to understand how Design fared in the past and that Paley was obsolete long before 1859 and how ID came about in the last 25 years. The next stage is to compare the various design arguments of Paley, Orr and ID.

One of my major conclusions is that Design as the specific action of God on living things or to create living things is precluded by geological time. This is because of the succession of life over billions of years indicates slow change rather than active "design" and myriad Divine interventions. However following James Orr, John Calvin, Thomas Aquinas and the Fine Tuners of today that does not contradict Design in the broader sense, as we see both the fine-tuning of the universe and all the beauty and wonder of Creation.

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