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ON THE HISTORY OF THE ARGUMENT FROM DESIGN IN ASTRONOMY[1]

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Abstract: The Argument from Design is possibly the oldest attempt to 'prove' the existence of a deity, or, at least, to persuade people that it is reasonable to believe in one. Although the Argument has often been used in the context of biology, its use in the context of astronomy is arguably earlier. In this paper, its history in astronomical contexts is traced from ancient times to modern discussions of the 'fine tuning' of the Universe.

Keywords: design, deity, Anthropic Principle

1 INTRODUCTION

Simply stated, the Argument from Design is that the natural world shows evidence of having been designed and that, therefore, there must be a designer. The Argument is ancient and seductive, even if it falls short of being a completely convincing proof. Indeed, there are obvious objections to so simple a statement of the Argument as has just been given. Design has been perceived at various times in both the astronomical Universe and in the biosphere. Of course, arguments in the two sciences concerned with those regions are closely related and even, as we shall see, intertwined. Yet they are distinct enough for each to stand or fall alone: a refutation of either one does not necessarily entail the refutation of the other. This is important because Charles Darwin (1809–1882; Figure 1) is often considered to have dealt the Argument a mortal blow with the publication of the *Origin of Species* (Darwin, 1859). The theory of natural selection undoubtedly made much less plausible the argument, advanced by many eighteenth-century writers, that the adaptations of plants and animals were evidence of a powerful intelligence having designed each individual creature. Whether or not it totally invalidated the Argument even within biology is perhaps less obvious. Clearly, however, Darwin's theory left untouched astronomical versions of the Argument, which may well be older than the biological versions, since the former can be found in classical antiquity.

2 THE ARGUMENT IN ANTIQUITY

One of the earliest expressions of the Argument, if only in poetic form, is the opening verse of the nineteenth psalm: "The heavens declare the glory of God and the firmament sheweth his handiwork." That probably precedes even Plato's (c.427–c.347 B.C.E.; Figure 2) reference to the Argument in the tenth book of *The Laws.* The nineteenth psalm is certainly concerned with the heavens and they seem to have been the principal concern of Plato who introduces the subject by making Cleinias, one of the participants in his dialogue, say that it is easy to explain the existence of the gods:

> … just look at the earth and the sun and the stars and the universe in general: look at the wonderful procession of the seasons and its articulation into years and months! (Saunders, 1970: 412).

Plato, in the person of the Athenian Stranger, appears unimpressed by this argument but, nevertheless, goes on to argue strongly against the notion that the Universe could have appeared by chance. There is little or no reference to biological adaptations in these two sources.

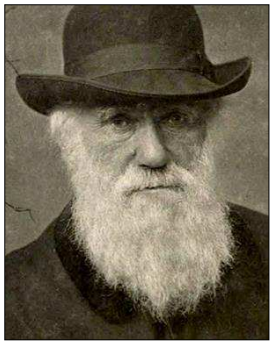
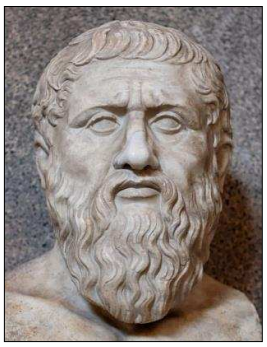

Figure 1 (left): Charles Darwin in 1881 (www,wikiwand.com). Figure 2 (right): A Roman marble bust of Plato after a Greek original from the last quarter of the fourth century (www.wikiwand.com).

Marcus Tullius Cicero (106–43 B.C.E.; Figure 3) took up the Argument in his work, *De Natura Deorum*, introducing it in the same way as Plato had by pointing to the regularity of the seasons. This regularity reflected the apparent motions (which Cicero, of course, assumed to be real) of the Sun, Moon, and the other stars. He likened the Universe first to a house that had been designed, and then to an organism which, he maintained, must itself be divine. He went on to argue that the Sun, Moon, planets and stars, which moved themselves, were also divinities (McGregor, 1972: esp. 123–144). This illustrates the weakness of the Argument from the point of view of Christian theologians. It may persuade people to believe in a divinity, but it is as likely to persuade them to be pantheists or polytheists as

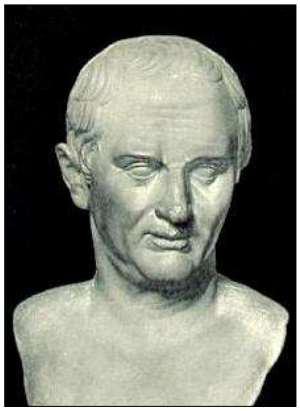

Figure 3: A photograph published in an unidentified book dated 1900 of a marble bust of Cicero at the age of about 60. This bust is presumed to now be in Madrid's Museum of Archaeology (en.wikipedia.org).

to believe in the Christian God. Similar objections to the Argument have been made by both Kant (1781) and Bertrand Russell (1946). As we shall see, Cicero's discussion was to have considerable influence on David Hume.

Of course, the contrary view was also advanced in antiquity, particularly by the Greek atomists, Leucippus and Democritus. Their ideas were communicated to the Roman world through the writings of Epicurus and the famous poem of Lucretius, *De Rerum Natura*. For a thorough discussion of the Greek atomists, including the original texts of the surviving fragments of their work, see Kirk and Raven (1957: Chapter XVII).

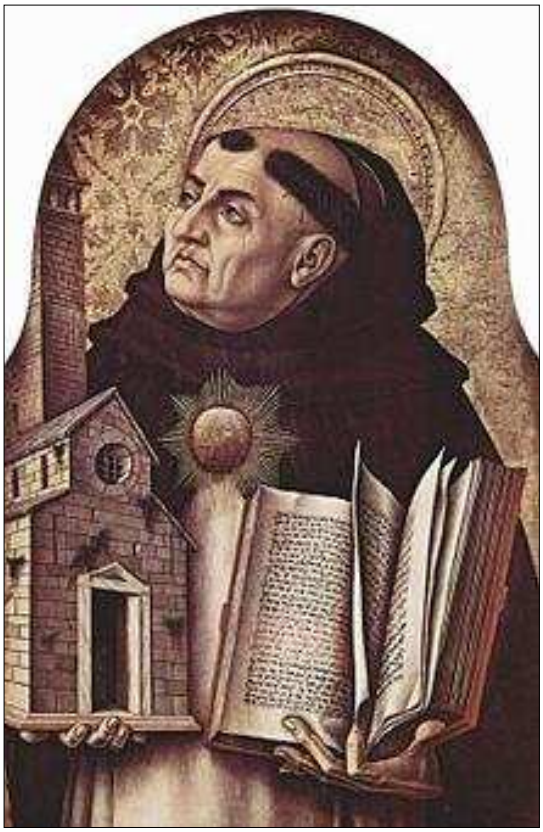

Figure 4: Saint Thomas Aquinas on a 15th century altarpiece by Carlo Crivelli in Ascoli Piceno. Italy (en.wikipedia.org).

3 A MEDIEVAL VERSION

In the Christian era St Thomas Aquinas (1225–1274; Figure 4) gave us the classical form of the Argument in the last of his five ways of 'proving' the existence of God. His is a very general argument and contains no specific reference either to astronomical phenomena or to biological adaptation. While it obviously does not exclude either, the emphasis seems to be on inanimate objects, presumably the planets. As translated in Burrill (1967: 55), Aquinas wrote:

> The fifth way is taken from the governance of the world. We see that things which lack knowledge, such as natural bodies, act for an end, and this is evident from their acting always, or nearly always, in the same way, so as to obtain the best result. Hence it is plain that they achieve their end, not fortuitously but designedly. Now whatever lacks knowledge cannot move towards an end, unless it be directed by some being endowed with knowledge and intelligence; as the arrow is directed by the archer. Therefore some intelligent being exists by whom all natural things are directed to their end; and this being we call God.

4 THE EARLY MODERN PERIOD

In the English-speaking world, John Ray (1627–1705; Figure 5), an older contemporary of Isaac Newton (1642–1727) and, like him, a fellow of Trinity College, Cambridge, was one of the earliest to elaborate the Argument in his book *The Wisdom of God Manifested in the Works of Creation* (Ray, 1691). Although his primary interest was in botany, his book was wide-ranging and included a discussion of the astronomical versions of the Argument. He wrote (*op. cit.*: 63):

> First, for the Celestial or Heavenly bodies, the Equability and Constancy of their Motions, the Certainty of their Periods and Revolutions, the Conveniency of their Order and Situations, argue for them to be ordain'd and govern'd by Wisdom and Understanding; yea, by so much Wisdom as Man cannot easily fathom or comprehend: For we see by how much the hypotheses of astronomers are more simple and conformable to reason, by so much do they give a better Account of the Heavenly Motions.

Thus, like Plato, Cicero and Aquinas, with whose works he would, of course, have been familiar, Ray saw design primarily in the regularity of the motions of the heavenly bodies, but he introduced a new element. He was clearly also familiar with the astronomical science of his day and recognized that the Copernican system (or perhaps we should say at this point, the

Newtonian system) was simpler than the Ptolemaic, and he saw that simplicity as further evidence for design. Ray's book was extremely popular and ran to several editions, some of which were published posthumously. It was the inspiration for many writers throughout the eighteenth and early nineteenth centuries, who argued that the adaptations of plants and animals to their environments was evidence of Divine Providence (see e.g., Turner, 1833). Some writers carried the Argument to implausible extremes. Bertrand Russell (1872–1970) asserts (without citation) that some even argued that it was providential that rabbits had white tails that provided good marks for sportsmen (Russell, 1943: 81)! Darwin's theory was a good antidote to such nonsense.

A much younger contemporary of Ray, Joseph Addison (1672–1719), published a famous poem "The spacious firmament on high", which paraphrased the nineteenth psalm and was a summary of a long essay on the Argument from Design (Addison, 1712). Unlike Ray, he appears less familiar with Newtonian physics, or, at least, he chose to ignore it. In the third verse of his poem, he resorted to pre-Copernican imagery:

> What though in solemn silence all
> Move round the dark terrestrial ball?
> What though no real voice or sound
> Amid the radiant orbs be found?
> In reason's ear they all rejoice,
> And utter forth a glorious voice,
> Forever singing as they shine,
> "The hand that made us is Divine!"

The year after Addison's poem appeared, Isaac Newton (Figure 6) published the second edition of the *Principia*, which contained the famous *General Scholium.* Newton had been stung by criticisms of the first edition of his great work to the effect that it presented a godless Universe. One purpose of the *General Scholium* was to refute those criticisms. Unlike Plato, Cicero, and Ray, Newton did not rely simply on the regularity of motions; that followed, after all, from the inverse-square law of gravity and the three laws of motion, once the system had been set in motion. Instead, Newton pointed to the fact that all the planets and all their satellites then known revolved around the Sun in the same sense and in almost the same plane. He wrote:

> This most beautiful System of the Sun, Planets, and Comets, could only proceed from the counsel and dominion of an intelligent and powerful being. And if the fixed Stars are centres of other like systems, these being formed by the like wise counsel, must all be subject to the Dominion of One; especially since the light of the fixed Stars is of the same nature with the light of the Sun, and from every system light passes into all the other systems. And lest the system of the fixed Stars should, by their gravity, fall on each other mutually, he hath placed those Systems at immense distances from one another. (Newton, 1713: 1–2).

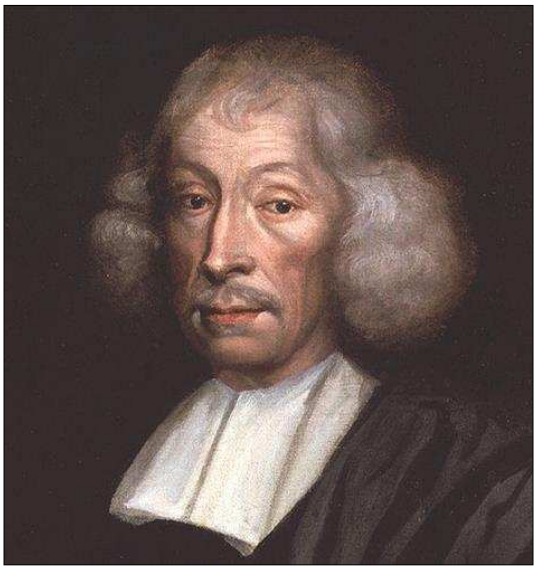

Figure 5: A painting of John Ray (by an unknown artist) now in the National Portrait Gallery, London (en.wikipedia.org).

As we have seen, Ray's book inspired many writers during the eighteenth and early nineteenth centuries to elaborate the biological version of the Argument from Design. The eighteenth century, however, was dominated by the figure of David Hume (1711–1776; Figure 7). In his posthumously published *Dialogues Concerning Natural Religion*, Hume (1779) concentrated mainly on the analogy between the Universe, on the one hand, and a machine or a house (*cf.* Cicero), on the other. The matter of biological adaptation is raised, but not dwelt upon to any

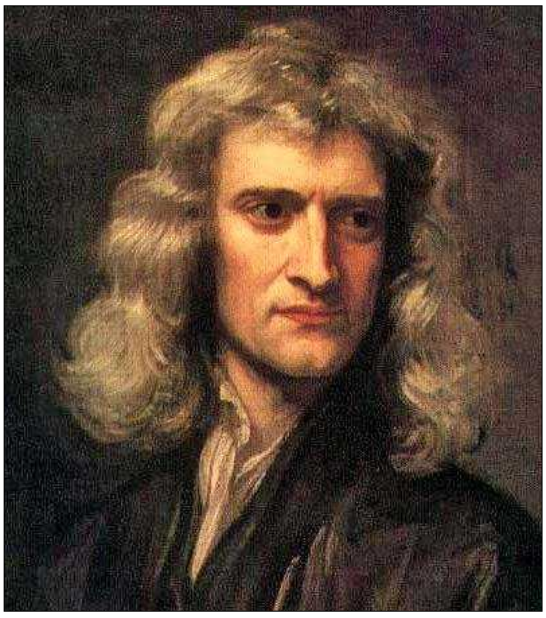

Figure 6: A copy of a painting of Isaac Newton by Sir Godfrey Kneller (en.wikipedia,org).

Figure 7: Painting of David Hume (en.wikipedia.org).

Figure 8: An 1842 posthumous painting of Simon Laplace by Madame Feytaud in the Académie des Sciences, Paris (en.wikiquote.org).

great extent. Hume, indeed, presents both the Argument and the objections to it very forcefully. If the *Dialogues* had been the only one of his writings to survive, we should be hard put to decide which side of the controversy he favoured! Although in many ways Hume echoes Cicero's arguments, there are some surprisingly modern ideas in the *Dialogues.* For example, the famous sentence "Many worlds might have been botched and bungled ere this system was struck out." anticipates by about three centuries modern scientific arguments for "many worlds"! Again, at one point, one of the speakers, following Cicero, likens the Universe to an organism rather than a machine, anticipating, perhaps, some versions of the many-worlds hypothesis which speak of 'baby universes' and a kind of natural selection among universes. Hume would have taken such ideas in his stride.

The eighteenth century ended with the publication of Laplace's *Exposition du Système du Monde* (Laplace, 1796). Sometimes known as 'the French Newton', Pierre Simon Laplace (1749–1827; Figure 8) was anxious to show that he could do what Newton himself had been unable to do, namely, to explain the properties of the Solar System without recourse to Divine intervention. This, rather than an uncompromising statement of atheism, is probably the significance of the remark that Laplace is supposed to have made in reply to Napoleon's question about the role of God in the formation of the Solar System: "*Je n'ai pas besoin de cette hypothèse-la*."[2] Laplace may well have thought that he had dealt a blow to the astronomical argument from design as mortal as that which Darwin is commonly believed to have dealt to the biological argument some half a century later. That was not the opinion of many of his contemporaries, however, as has been shown by R.L. Numbers (1977). Numbers was primarily concerned with the reception of Laplace's hypothesis in the United States, but the reaction of British scholars was similar, as we shall see.

Early in the nineteenth century William Paley's (1743–1805; Figure 9) famous book, *Natural Theology or Evidences for the Existence and Attributes of the Deity*, appeared (Paley 1802). Despite its opening illustration of the watch found on the heath—the part that everyone quotes and, I suspect, the only part most people have read—which clearly suggests a mechanical analogy, the book is mainly concerned with biological adaptations. There is one, relatively short, chapter on astronomy. Paley writes that he does not consider astronomy to be the best science to illustrate design and thus to lead to belief in a Creator, but that, given the existence of a Deity, astronomy shows us the most magnificent works of the Creator. His astronomical arguments are very weak, however,

and would not convince any modern astronomer. For example, he argues that the law of gravitation could have been different, or that the Sun need not have been in the centre of the Solar System. The central body could have been dark and opaque and one of the planets might have been the source of heat and light. With our understanding of modern physics, we would rule these ideas out of consideration.[3] Paley seems to have believed that God was free to make quite arbitrary choices of this kind. Einstein's famous question about whether God was free to create the Universe however he wished or was constrained by logical necessity seems never to have crossed his mind.

Somewhat later in the century we encounter the *Bridgewater Treatises* which again are mainly concerned with biological adaptation, still from a pre-Darwinian point of view. The famous Victorian polymath and Master of Trinity College, Cambridge, William Whewell (1794–1841; Figure 10), was assigned to write the treatise on *Astronomy and General Physics, Considered with Reference to Natural Theology*, but even quite a large portion of this is devoted to biological matters. To Whewell (1833) it was evidence of design that plants and animals had annual and diurnal cycles in their behavior and that the periods of these cycles coincided so closely with the astronomical year and day. It was also a cause of amazement to him that the sap in trees could rise against gravity, indicating a fine balance between the properties of sap and capillary action and the strength of gravity at the Earth's surface. He argued that the Earth could have had different periods of revolution and rotation so the cycles of living things would no longer have matched, or that the Earth could have been more or less massive, so that the force of gravity would have had a different strength and the sap would have been unable to rise in the tree to the proper height. He does not seem to have thought of the possibility that biological cycles developed to match the astronomical periods, and he dismisses the notion that the coincidence of the properties of sap was an inevitable consequence of the actual value of the force of gravity on this planet. He also sees design in the constancy of the Earth's climate – he was writing not only before Darwin, but before the recognition of ice ages in the distant past. Reading Whewell's treatise brings home the great revolution in thinking that Darwin produced. Whewell's perception of God seems to have been of an omnipotent Creator of a giant jig-saw puzzle, who painstakingly and lovingly carved out each individual piece so that they would all fit together. In this respect, he resembles his eighteenth-century predecessors. Our post-Darwinian thinking is more like the way in which jig-saw puzzles are actually made: the picture is cut into tiny pieces that inevitably fit together because they were cut from the original picture.

Figure 9: An undated woodcut of William Paley (Wikimedia Commons).

Whewell also discusses Laplace's hypothesis of the origin of the Solar System, which, he believed, his contemporaries among astronomers were by no means united in accepting. He argues that it does not rule out the possibility of intelligence and design in the formation of the Universe. He writes:

> If we grant, for a moment, the hypothesis, it by no means proves that the solar system was

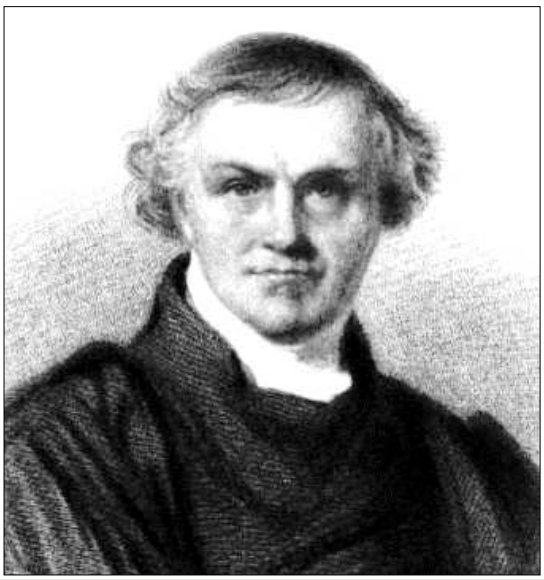

Figure 10: An engraving of William Whewell (after Whewell, 1881: Frontispiece).

> formed without the intervention of intelligence and design. It only transfers our view of the skill exercised, and the means employed, to another part of the work. For how came the sun and its atmosphere to have such materials, such motions, such a constitution, that these consequences followed from their primordial condition? (Whewell, 1833: 145).

This attitude is consistent with that of American scholars at the time, as is shown in the work by Numbers, already cited. It is of interest that, contrary to what many scientists suppose, the contradiction between Laplace's hypothesis and any literal interpretation of the early chapters of *Genesis* seems not to have been of concern to most theologians, even in the early nineteenth century. Although Whewell was discussing the origin of the Solar System, rather than that of the Universe as a whole, he comes close to imagining something like the Big Bang, with light being the first created thing. His reaction is rather similar to that of Pope Pius XII over a century later, almost claiming that science had proved the existence of God.

5 THE TWENTIETH CENTURY

Although neither Paley's nor Whewell's arguments carry much conviction to us, there is an interesting parallel between them and modern reasoning along the lines of the so-called "Anthropic Principle". Paley and Whewell argued from coincidences between astronomical and biological phenomena that seemed to them evidence for design. Anthropic reasoning also points to coincidences, in particular to the precise values of the four major forces currently recognized as ruling the material Universe. Some of us find it very difficult to avoid the conclusion that the Universe was created with the deliberate intention of making possible the kind of life forms that are capable of evolving into morally self-aware beings such as ourselves, but not necessarily limited to those we find on this planet. Are we making the same mistake as Newton, Paley and Whewell made? Will some perfectly natural explanation be found for these coincidences? From my reading of the history of science, I cannot rule that possibility out. Indeed, many, but not all, cosmologists believe that they have already found the natural explanation in the hypothesis that this 'Universe' is but one of many and that we are bound to find ourselves in a Universe in which we can exist. The 'multiverse', as it is sometimes termed, is, however, still a hypothetical entity and, even if we eventually find convincing evidence for it, that would not disprove that the entire system was deliberately created. In Whewell's words (quoted above): "It only transfers our view of the skill exercised, and the means employed, to another part of the work."

Meanwhile, there seem to me to be three differences between our modern arguments and those of our predecessors. First, the coincidences we talk of are found in inanimate matter, were necessary for the appearance of life as we know it, and must have been fixed long before any form of life could have appeared in this Universe. As Freeman Dyson (1979: 250) has put it: "… in some sense the universe must have known that we were coming." Second, the coincidences have very tight limits. That was not so for the kinds of coincidences that Paley and Whewell were discussing. We could easily imagine a planet about half as massive again as the Earth, revolving around a star, perhaps a little hotter than our Sun, with a period of, say, eighteen of our months. Such a planet might well be life-supporting. The life forms on it would be different from ours but, provided they were based on DNA, would probably be recognizable as kindred beings. In our modern understanding, the ratios of the four forces need to be only a very little different to make the evolution of life as we know it (i.e. based on DNA) impossible. As Leslie (1989: 3–6) has emphasized, we require a vast number of other universes if we are to explain this one as simply a product of chance. Third, the importance of these coincidences has impressed itself on many people who would like to be able to explain them away. We may compare this with the situation in modern biology where design arguments have re-appeared in the guise of 'Intelligent Design'. The chief protagonists of this movement, Michael Behe and William Dembski, are both men of strong religious faith who very much want to find evidence for design in living creatures.

I began by describing the argument from design as seductive and many of you may have, quite correctly, assumed that I am myself attracted to it. My understanding is that most modern theologians are wary of it. Perhaps they are wise to be so.

6 NOTES

1. This is a modified version of a paper presented at a conference on *Theology and the Philosophy of Science: Analytic, Scholastic, and Historical Perspectives*, at Concordia University of Edmonton, 14–15 October 2016.
2. I have tried to find if Laplace ever did make that remark. We know that there was a meeting between Napoleon and Laplace at which the role of God in the creation of the Solar System was discussed, because the British astronomer, Sir William Herschel (1738–1822), was present and kept a diary, but the famous reply is not recorded there (Lubbock, 1933: 312). I rather like the suggestion at which the late Stephen Jay Gould hinted: that the reply was the one Laplace

wished he had made when he got home! (Gould, 1995: 25).

3. I assume that when Paley wrote that the law of gravitation might have been different, he was imagining some form different from the inverse-square law. Of course, we can conceive of the *strength* of the force of gravity being different, as will become clear in the discussion of anthropic reasoning in the next section.

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