CONTENTS

Author profiles	4
Preface Stuart Burgess	7
1. The design argument Dominic Statham	11
2. Why engineers need inspiration Stuart Burgess	27
3. Important examples of bioinspired design Stuart Burgess	35
4. A dragonfly-inspired micro air vehicle Stuart Burgess	. 45
5. A knee-inspired robotic joint Stuart Burgess	57
6. A fish-jaw-inspired robotic hand Stuart Burgess	. 69
7. Examples of outstanding design in nature Stuart Burgess and Dominic Statham	81
8. Objections to design Dominic Statham	.107
9. Design and the Designer Dominic Statham	. 121

1

The design argument

Dominic Statham

or what can be known about God is plain to them, because God has shown it to them. For his invisible attributes, namely, his eternal power and divine nature, have been clearly perceived, ever since the creation of the world, in the things that have been made.

Romans 1:19, 20.

Evidence of design in nature is all around us. Whether we consider cosmology, astronomy, physics, chemistry or biology, the message is always the same: our universe and our world must have come into being through a supreme act of creation.

The 'design argument' can be expressed very simply. Where natural processes cannot produce what we observe in nature, the most reasonable explanation is a designer. When an archaeologist, digging in a field, discovers numerous pieces of jewellery, pots and tools, he rightly concludes that this provides evidence of human activity. No one denies this because we all know that such artefacts have to be designed. Similarly, as we shall see, no known natural processes can produce a universe like ours or the kind of complexity found throughout the living world. From what we observe of cause and effect, an intelligent designer provides the best and only explanation.

A universe by design

Many people have been led to believe that Big Bang theory neatly explains the existence and nature of our universe. As many secular cosmologists now admit, however, the chances of a Big Bang producing our universe are effectively zero.¹ For example, according to Oxford University's Professor Peter Penrose, the probability of a universe like ours coming into being by chance with the required state of orderliness (i.e. low entropy) is far, far less than 1 divided by the number of atoms in a trillion, trillion, trillion universes.²

Many characteristics (quantities and ratios) would also have had to be just right (exquisitely 'fine tuned') for the Big Bang to have produced stars, habitable planets and the molecules needed for life. For example, the ratio of the electromagnetic force constant (which determines the force between electrically charged particles) to the gravitational force constant (which determines the force due to gravity) would have had to be just right to 1 part in 10^{40} . (10^{40} is 1 followed by 40 zeros.) Had this been just slightly larger, only small stars could exist; had it been just slightly smaller, there

^{1.} Lennox, J.C., God's Undertaker: Has Science Buried God?, Lion Hudson, UK, pp. 68–70, 2007.

Actually around 1:10^(10^123). Penrose, R., Time-Asymmetry and Quantum Gravity, in Isham, C.J., Penrose, R. and Sciama, D.W. eds., Quantum Gravity 2, Clarendon Press, Oxford, p. 249, 1981.

could be only large stars. In Big Bang theory, both large and small stars are needed to produce planets with life. The large stars produce elements in their thermonuclear furnaces; only the small ones burn long enough to sustain a planet with life.³

The list goes on. The ratio of the expansion force to the gravitational force would have had to be just right to 1 part in 10^{55} . Just slightly more and the universe would have expanded too rapidly and no galaxies could have formed at all. Just slightly less and the whole universe would have collapsed under the force of gravity.⁴ Other examples of fine tuning include the electromagnetic coupling constant (which controls the binding of electrons to protons in atoms), the ratio of electron mass to proton mass, and the energy levels of carbon and oxygen nucleii. Unless these were just right, molecules could not form and life could not exist.⁵ Cambridge University astronomer Professor Fred Hoyle remarked,

A commonsense interpretation of the facts suggests that a super-intellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature. The numbers one calculates from the facts seem to me so overwhelming as to put this conclusion almost beyond question.⁶

Leading atheist cosmologists such as Professor Stephen Hawking step round these problems by postulating the existence of many universes—perhaps even an infinite number—arguing that in such a 'multiverse' everything is bound to happen in at least one. Others, such as Lee Smolin, suggest that the answer lies in the laws of physics having been different in the past.⁷ However, these leaps of imagination, which have no basis in science, simply demonstrate that, when tested against observed natural laws, Big Bang theory doesn't work. Its proponents reaching outside of known science in order to rescue the theory amounts to a tacit admission that the theory has failed. Some supporters of Big Bang theory have admitted that the universe has evidence of intelligent design. For example, Professor Paul Davies commented, "The impression of design is overwhelming."

^{3.} Ref. 1, p. 69.

^{4.} In these particular examples, three variables are mutually constrained: the electromagnetic force, the gravitational force and the expansion force.

^{5.} Sarfati, J., The universe is finely tuned for life, creation.com/tuned.

^{6.} Hoyle F., The universe: past and present reflections; in: Engineering and Science, p. 12, November 1981.

Smolin, L. and Unver, R.M., The Singular Universe and the Reality of Time: A Proposal in Natural Philosophy, Cambridge University Press, 2014.

^{8.} Davies, P., The Cosmic Blueprint, Simon and Schuster, p. 203, 1988.



Fig. 3. Piston engine.

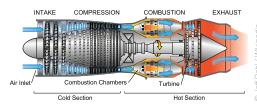


Fig. 4. Gas turbine.



Fig. 5. Thermionic valves.

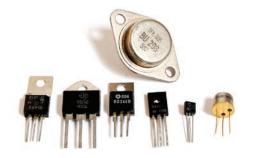


Fig. 6. Transistors.

anything required for survival, and are much more reasonably explained by purposeful design.

Optimal design in nature

As will be demonstrated in the following chapters, the natural world is exceptionally well designed. Indeed, many of the world's top designers will freely admit that they are in awe of nature's solutions. This presents a major problem for Darwinists because, as all engineers know, optimal design is not achieved by taking an existing device and making a series of tiny changes. Instead, radically new concepts are needed. For example, piston engines in aircraft were replaced by gas turbines which have a much higher power to weight ratio; thermionic valves in digital computers were replaced by transistors which are much smaller and more reliable; cables for telephone networks were replaced by microwaves, facilitating mobile phones. There are no 'intermediate forms' between these technologies.

Engineers achieve good design by brainstorming. Unshackled by what has gone before they are free to be radical and to consider any new idea. The Darwinian process cannot do this; once it has adopted a particular concept it is stuck with it. Nor can it look ahead and see what kind of system it will

PALEY AND HUME

William Paley (1743–1805) was one of the first to write a treatise on the design argument. He famously argued that any reasonable person stumbling upon a mechanical watch would conclude that it must have arisen by intelligent design—that there must have been one "who comprehended its construction and designed its use". Similarly, he claimed, observations of the natural world point to a creator as "every indication of contrivance, every manifestation of design, which existed in the watch, exists in the works of nature; with the difference, on the side of nature, of being greater and more, and that in a degree which exceeds all computation."⁴³ Paley's appreciation of the sophistication of the natural world, however, hardly bears comparison with what modern science has revealed to us. If his argument had force then, how much more today?

Watches, of course, are also irreducibly complex. While it is true that some parts could be removed such as the minute hand—and the mechanism still be used to tell the time, there would come a point where the removal of just one more part would cause it to stop. Moreover, it would then be completely useless, having no other function. The same is true of all life forms. For example, without machines to copy DNA and make proteins (and produce the energy molecules needed to drive these machines) a biological cell would not work. Remove just one of these and reproduction ceases. This is

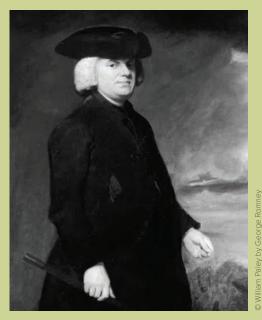


Fig. 10. William Paley (1743-1805).

an intractable problem for evolutionists because any putative 'first cell' would have to be complete from the outset—it simply could not evolve gradually.

Many have been led to believe that the Scottish philosopher David Hume (1711–1776) refuted Paley's argument. This, however, appears to be one the great myths of history. Firstly, Paley's book was published in 1802, twenty-three years *after* Hume's book, which was published posthumously in 1779.

^{43.} Paley, W., Natural Theology: or, Evidences of the Existence and Attributes of the Deity, J. Faulder, London, 12th ed., pp. 17–18, 1809.