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No one's spotted the divine designer

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The physical world is characterised by behaviours that are highly regular: the fixed motion of the Sun, the flow of rivers to the sea, the transition of liquids to gas on heating. The biological world, by contrast, presents exceptions; each species finds a different way of solving the same problem.

For example, light-detecting organs are observed in many species, but whereas vertebrates employ two liquid-filled spheres, each with a single lens and retina, invertebrates employ thousands of simple light receptors without lens or retina.

In the absence of obvious regularities, the process of constructing models to represent order becomes more difficult. It was the great genius of Charles Darwin to observe in the diversity of the biological world a meta-regularity. Where we are unable to explain the particularities of a single eye, we can predict where we expect to observe eyes. Darwin, to use a physics expression, "coarse-grained" the biological world into units of adaptation or function and explored how these functions related to properties of the environment through natural selection.

In *Debating Design*, the editors - Michael Ruse, a prominent philosopher of evolution, and William Dembski, an advocate of intelligent design (ID) - bring together a number of researchers, philosophers and writers to debate the success and failure of Darwin's theory in 20 polemical chapters, in accounting for fine-grained mechanisms in biology. For those not familiar with the ID approach, it is that "intelligent causes are capable of leaving empirically detectable marks in the natural world" and that "the best explanation for at least some of the appearance of design in nature is that design is actual" (Angus Menuge in chapter three).

It is interesting that nowhere in the book do the supporters of ID tell us anything about the identity of the designer, as if establishing nominal cases of detectable marks of design - synonymous with things we have yet to fully understand - is sufficient in itself. Whereas science proceeds by replacing complex observations with simple models, ID proceeds by replacing complex observations with mysteries.

Some of the most interesting progress in extending evolutionary theory has been in the area of complex-systems research. This is the subject of two chapters in this book, one by Stuart Kauffman, and one by Bruce Weber and David Depew. Complex-systems research is a large body of science based on the mathematics of non-equilibrium dynamical systems. Unlike solar systems - where a single force, gravity, dominates and where the mass of objects tells us most of what we need to know to explain motion - in complex systems there are

many more degrees of freedom, and behaviour follows intuitively from knowledge of component parts and their diverse interaction rules. The canonical, simple example is deterministic chaos, a bewildering spatio-temporal pattern produced by simple rules. Out of complex-systems research have come insights into the fact that most evolving dynamical systems show highly punctuated time series, manifest extensive degeneracy and possess fascinating properties of self-similarity and scaling. Many of these have become the focus of confused ID propaganda.

The core puzzle in ID is so-called irreducible complexity (IC), discussed at length by Michael Behe and defined as "a single system that is necessarily composed of several well-matched, interacting parts that contribute to the basic function, and where removal of any one of the parts causes the system to effectively cease functioning". A favourite example is the flagellum, an ion-powered rotary molecular motor in cell membranes.

Kenneth Miller in "The flagellum unspun" chapter shows how the flagellum can, contrary to IC, be built up from precursor components whose primary function is secretory rather than motility. It is also established that the secretory apparatus is able to function even with components removed.

Irreducible complexity is, as Ruse and Francisco Ayala remind us, an echo of an earlier, similar appeal to improbability raised in 1802 by William Paley in his book *Natural Theology; or, the Evidences of the Existence and Attributes of the Deity* - a statistical surprise perspective fully fleshed out in the multi-author collection of treatises known as the *Bridgewater Treatises on the Power, Wisdom and Goodness of God*.

All these writers, including Behe, find Darwinian gradualism problematic as they are unable to trace a continuous functional series from simple to complex, whereby transformed traits might come into existence through selection. The ID writers are correct that the 19th-century theory of evolution covered in *On the Origin of Species* does not provide a full and predictive theory for all fine-grained complex structures in biology. That is why biology did not stop with Darwin but went through the "modern synthesis" and now the evolutionary theory of development.

In the chapter on "Design without a designer", Ayala describes Darwin's contribution as fomenting a biological Copernican revolution, placing questions of origin within a materialist framework, not necessarily solving all origin questions in biology.

But there remains an area of thought where theists do not pursue pseudo-empirical attacks on evolution and cosmology. These are covered in five chapters under the section heading, "Theistic evolution". In "Darwin, design and divine providence", John Haught points out that the ID flight from Darwin is rooted in "an anxiety that (Darwin's) evolutionary ideas may be incompatible with any coherent notion of God or divine Providence".

Haught suggests that this arises from confounding metaphysics with science.

John Polkinghorne, in another chapter, also dismisses ID and espouses a moderate anthropic principle, whereby certain cosmological constants, which make the existence of complex carbon-based life possible, suggest a role for divine providence.

Keith Ward starts by declaring: "As a theologian, I renounce all rights to make any authoritative statements about natural science" and "I take it that it is an established fact of science that evolution occurs, and that human beings have descended by a process of mutation and adaptation." For Ward, as for Pope John Paul II, it is human consciousness that intimates the divine. What separates these theists from ID practitioners is that, unlike ID, they do not attempt to refute good science with a bogus empiricism but seek a means of coexisting with science.

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