

## The creationist abuse of evo-devo

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To those of us who pursue it on the wing, evolutionary developmental biology provides the liveliest expression of evolutionary processes in action and offers us experimental access to the machinery underlying the evolutionary change of form. Workers in the field may be unpleasantly surprised to find that a recent manifestation of creationism has settled upon evo-devo as something altogether different—a major platform for creationism. Such is the case presented in the writings of Jonathan Wells, author of *Icons of Evolution* (2000), who asserts that “embryology is the Achilles’ heel of Darwinism.”

It is one of those little ironies of life. Creationism rejects the existence of evolution through extraordinary denial of inconvenient scientific data, but creationism itself evolves. In his book *The Tower of Babel* (1999), Robert Pennock has examined the ongoing rapid branching of this conceptual phylogeny. We are all familiar with the strident claims of “young earth” creationists who insist that the world was created 6000 years ago, with dinosaurs tucked aboard Noah’s Ark and all geological features and fossils originating in the Great Flood. These creationists are the strict biblical literalists. They keep uneasy company with “old earth” creationists who view the biblical days as long ages. Between these groups the chief conflict is over the age of the earth. There are also “progressive” creationists, who accept a largely natural view of development of the universe, with divine intervention at critical points. Beyond creationism, there are other kinds of religious accommodation with evolution, notably theistic evolution, which holds that the earth is old and life evolved, but that God guided the course of evolution. Although taking a religious perspective, this last view is strongly rejected by creationists who view it as “collaborating with the enemy.”

Until recently, young earth creationists have dominated the political arena. However, the rise of another species of creationism, “intelligent design,” marks a new phase in creationist activity. So-called intelligent design creationism constitutes a sort of intellectual upper crust of the movement. The prominent adherents to this version of creationism have degrees in science from major universities and in some cases hold academic positions. This group is well organized and

has a focus in the Seattle-based Discovery Institute (see Hughes 2000 for an example of their activities). Intelligent design creationism opposes a naturalistic outlook in scientific investigation and seeks to replace the methodological treatment of natural phenomena as explicable by natural causes with an explicit inclusion of supernatural causes in science. Strange veggies grow in this garden, as for example the acceptance of microevolution but not macroevolution.

Let us return to Wells and his abuse of evo-devo. *Icons of Evolution* presents the dark view of evolutionary biologists held by Wells. He says that we are involved in a conspiracy to consciously lie in what we teach students and present in our writings. Claims of deliberate scientific fraud and “Darwinian censorship” reaches a crescendo as the book progresses. These are strong accusations built on a shaky scaffolding of special pleading and deceptive use of quotations.

Wells attacks what he sees as major developmental icons. He avers that the concept of homology is in dire crisis because a comprehensive definition of homology cannot be based either on sameness of genes or development. Wells notes correctly that there is not a necessary connection between homologous genes and homologous structures, nor must homologous structures arise from similar developmental processes. Wells and Nelson (1997) took a detailed look at this issue in a paper. There I found my own work on direct and indirect development presented as one of the examples of the failure of development to connect with homology. I was surprised to note that what I thought was an exciting research problem of how developmental pathways evolve was being taken as evidence against evolution. Such phenomena do not fit the simplistic straw man predictions of absolute congruence expected by the authors, and thus they concluded “Homology . . . cannot be attributed to similar developmental pathways anymore than it can be attributed to similar genes. So far, the naturalistic mechanisms proposed to explain homology do not fit the evidence.” What logical gymnastics! If it’s unexplained, it must be unexplainable by evolutionary biology. If it’s unexplainable by evolutionary biology, it must require an intelligent designer. Unfortu-

nately, as the influence of the intelligent designer grows in this train of thought, the relationship between phenomena and explanations becomes increasingly arbitrary. Finally one reaches a point where all biological features are “special creations” and other explanations become unnecessary.

A second developmental icon taken on by Wells is the case of Haeckel’s embryos. This is a famous drawing of a developmental series of vertebrates, in which Haeckel adapted von Baer’s earlier work to give it an evolutionary context. In the top row of his drawing are the phylotypic stages of each example species, with more advanced developmental stages in rows below. Richardson et al. (1997) showed that Haeckel falsified the degree of external appearance of these embryos to exaggerate similarity of phylotypic stage. To Wells this means that “scientists have long known that drawings showing similarities between fish and human embryos were faked, yet continue to use them as evidence of evolution.” Despite all the talk of conspiracy and fraud among evolutionary biologists, creationists did not blow this whistle. Richardson and his collaborators are evolutionary biologists, and their work has opened new avenues of study of the question of the vertebrate phylotypic stage. Clearly Haeckel did a dishonest thing with his drawing. Does this mean that the concept of a phylotypic resemblance among vertebrate classes is a lie? The answer is a resounding no, and the great indignation raised by Wells is largely a pious smoke screen. The crucial point is not the superficial external appearance of embryos, but the sharing of major structural elements and their topological relationships. The phylotypic stage includes a dorsal nerve cord, somites, notochord, paired appendage buds, pharyngeal pouches, and sensory placodes. These are the elements that define the vertebrate developmental body plan. Are all vertebrates exactly the same at the phylotypic stage? No, of course not; development evolves, and so do features of the phylotypic stage—a point strongly made by Coyne (2001).

Although Wells’ science consists of a poor and misleading special pleading, it presents a scholarly appearance, and the politics are potent. Wells makes an explicit call for political action, quite correctly pointing out to the reader that tax dollars pay for most of the research done by Darwinists in America. In her review of *Icons of Evolution*, Scott (2001) notes that the book has already generated at least one state legislative bill and a number of law suits by parents to ban textbooks that present the supposed false icons. Members of the public may be attracted to the idea of a more inclusive kind of science that balances materialism with design. They are unlikely to realize that if one includes supernatural causes as an additional explanation of natural phenomena, then all of the results of experimental science become contingent on the unknowable attention of

the intelligent designer and conclusions become arbitrary and untestable.

Wells hides his motivation for this project in his book, but it can be found in his web site (Wells 2001). Wells holds a Ph.D. in biology from Berkeley and is a clergyman in Rev. Sun Myung Moon’s Unification Church. In his web site, he makes his position clear: “Father’s words, my studies, and my prayers convinced me that I should devote my life to destroying Darwinism.”

Wells misuses the science he learned at Berkeley in a deceptive way to advance his single-minded goal. In discussing Darwinism on his web page, he says that his own work with a student showed him that “DNA does not program the development of the embryo.” This statement is supported by a disingenuous distortion of what is known about gene regulation in embryos. Despite some pictures of suitably iconic four-winged *Drosophila*, the discussion of genes and development in *Icons of Evolution* is even more shabby and misleading. All that matters is that the answer comes out right, so that “Darwin’s theory is incompatible not only with the evidence from embryology, but also with the evidence from the fossil record” (Wells 2001).

Although I have focused on Wells’ writing because of the wide distribution of *Icons*, he is hardly alone. There is a whole stable of intelligent design creationist writers associated with the Discovery Institute, and we will see more slick books of bogus science produced to influence the teaching of biology, and even federal funding of research. Evo-devo data have become a part of the creationist rhetorical weaponry, and as evo-devo grows in prominence, the problem will grow in severity. We must not allow this misapplication and distortion of our work to go unobserved and unopposed.

Readers who would like more information on attacks on the teaching of evolution might wish to contact The National Center for Science Education at <http://www.natcensci.org/default.asp>.

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