

just seen, Berwick is not above simply deleting the crucial qualifications when they would tend to expose his gameplan. Then he borrows a refinement from Stephen Jay Gould that I recently analyzed:

In the first stage, you create the strawperson, and "refute" it (everybody knows that trick). Second (this is the stroke of genius), you yourself draw attention to the evidence that you have taken the first step—the evidence that your opponents don't in fact hold the views you have attributed to them—but interpret these citations as their grudging concessions to your attack!<sup>1</sup>

In closing section of his review, called "Yes, But . . ." Berwick acknowledges all the complications that Dawkins himself insists upon, but interprets Dawkins as thereby "backing off" his "original alpinist assumptions." But Berwick never succeeded in pinning "fundamentalist alpinism" on Dawkins in the first place!

Berwick also repeats Gould's oft-heard but fatally ambiguous claim that if we run the evolutionary tape again, "we aren't going to get the same 'perfection' we see now." Well, what about a *merely similar* "perfection"? It is trivial to claim that the replay wouldn't be *exactly* the same, and neither Gould nor Berwick has offered any reason to believe that there wouldn't be major similarities, again and again and again. This phenomenon is called convergent evolution, and in spite of what you may have heard from members of the Gould/Lewontin sect about the importance of "massive contingency," convergent evolution is an uncontroversial textbook fact of contemporary evolutionary theory, exemplified in hundreds or thousands of well-studied cases.

Berwick also relies heavily on an old rhetorical trick of Lewontin's, the scientific snow job: he provides a generous helping of elementary instruction (on Mendel's peas, on DNA replication, on Kimura's neutral theory, etc.), presented as if it were an embarrassment to Dawkins's position. What are we to suppose—that Dawkins somehow forgot all this in his "fundamentalist" ecstasy? As I asked some years ago, in exposing Lewontin's strategy,

Lewontin reminds us of genetic hitchhiking and random genetic drift. . . . To whom is Lewontin addressing these remarks? He may suppose if he wishes that a philosopher has never heard of genetic hitchhiking or random genetic drift, but surely the biologists he is supposedly criticizing are not in need of this textbook review. He says as much. So they must disagree about the implications of these recognized facts.<sup>2</sup>

Is there anything new in Berwick's piece? Yes, there is a novel argument which equals in desperation anything I have encountered in the creationist literature. Berwick quotes Darwin as saying that variation "extends continuously [Berwick's emphasis] in all direc-

<sup>1</sup> Daniel Dennett, "Confusion over Evolution: An Exchange," *The New York Review of Books*, January 14, 1993, pp. 43-44.

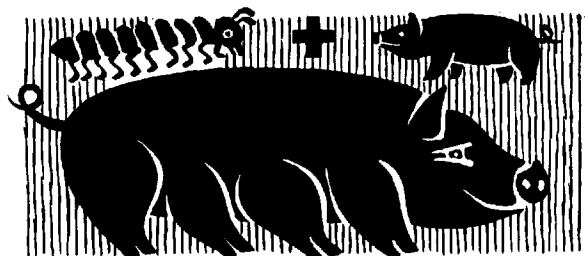
<sup>2</sup> Dennett, "Intentional Systems in Cognitive Ethology: The 'Panglossian Paradigm' Defended," in *Behavioral and Brain Sciences* 6 (1983): 387.

tions" and then notes that if we take this literally (and he does mean literally—dead literally), the space of possible animals is infinite, "bigger than the merely countable infinity of possible genes. . . . But that means the space of possible organisms may not be computable—that is, a computer program might not be able to calculate it. . . . There may be no algorithm to characterize epigenesis." His illustration of this literal reading of Darwin is captivating: "For every inch-long worm, there can be one half as long, another half again as long, and so on, with gradations as fine as we wish." Right. If matter is infinitely divisible—you know, not composed of atoms—then worms, too, may be infinitely divisible, in which case, there may be—may be—no algorithm to characterize epigenesis! Berwick sees that a trivial implication of the digital nature of the genome is that there are (less than) a countable infinity of possible genomes. Since the process that turns genomes into organisms is cell division, a

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beautifully recursive process, it is hard to see how the set of possible worms generated from the set of possible worm genomes could be non-computable, but maybe that's a logical possibility. A possible real worm continuum to go along with the real number continuum? Cling to it, those of you who still hate the idea of evolution as an algorithmic process. It may be the only straw floating.

Although Berwick and Orr have criticized Dawkins and me for making natural selection so central to our views of evolutionary theory, when Orr turns to Michael Behe's book and faces the task of responding to all of Behe's challenges, he helps himself at every turning to hypotheses about natural selection. Why? Because although natural selection may not be the answer to all the questions of life, it is surely the answer to all Behe's ignominious questions about the intricate economies and efficiencies of the sub-cellular world. How did they arise? By natural selection, which is, as Orr shows, a much more potent collection of cranes—and ratchets—than Behe has imagined in his search for a job that needs skyhooks. If Behe hadn't existed, I would have been tempted to invent him—the quintessential skyhook-seeker, hoping to demonstrate that there are some phenomena in nature that cannot be arrived at by mindless, mechanistic (that is, algorithmic) processes. He demonstrates no such thing, but his challenges, like those of many before him, help to show how important the cranes are in getting up to the heights that no simple hill-climbing process can scale. ■



## A Scientific Snow Job

Daniel Dennett

It seems that the *Boston Review* has decided to become an outlet for position papers by members of the Gould/Lewontin sect of evolutionary thinkers. First there was H. Allen Orr's attack on my book, *Darwin's Dangerous Idea*, and now there is Robert Berwick's attack on Dawkins's book. All this is getting old, as one says: The ideas are all second-hand, and even the tactics are borrowed.

Berwick's review is an extended exercise of two rhetorical tricks he has learned from his mentors—and one strange novelty. He leads with that old chestnut: creating a strawperson by quoting out of context:

But Dawkins believes, further, that "all questions about life have the same answer—natural selection."

In fact, Berwick's opening is doubly worse than just quoting out of context, since this is a *misquotation*—and of somebody other than Dawkins! In a jocular passage in his book about the false profundity of the idea of a Bauplan—"these tuba notes from the depths of the Rhine," as Sir Peter Medawar sarcastically put it"—Dawkins goes on to say: "I prefer the Anglo-Saxon simplicity of my colleague Dr Henry Bennet-Clark, with whom I have discussed these matters: 'All questions about life have the same answer (though it may not always be a helpful one): natural selection.'"

Berwick strains hard to create the misimpression of Dawkins as a "fundamentalist," an "alpinist" committed to simple hill-climbing, ignoring all the passages in which Dawkins elaborates, clarifies, acknowledges complexities. And as we have