

Tom Bethell

DARWIN'S MISTAKE

All change is not progress

HOW DO WE COME to have horses and tigers and things? There are at least a million species in existence today, according to the paleontologist George Gaylord Simpson, and for every one extant, perhaps 100 are extinct. Such profusion! Such variety! How did it come about? The old answer was that they are created by God. But with the increasingly scientific temper of the eighteenth and nineteenth centuries, this explanation began to look insufficient. God was invisible, and so could not be part of any scientific explanation.

So an alternative explanation was proposed by a number of savants, among them Jean Baptiste Lamarck and Erasmus Darwin: the various forms of life did not just appear (as at the tip of a magician's wand), but evolved by a process of gradual transformation. Horses came from something slightly less horselike, tigers from something slightly less tigerlike, and so on back, until finally, if you went back far enough in time, you would come to a primitive blob of life which itself got started (perhaps) by lightning striking the primeval soup.

"Either each species of crocodile has been specially created," said Thomas Henry Huxley, "or it has arisen out of some pre-existing form by the operation of natural causes. Choose your hypothesis; I have chosen mine."

That's all very well, replied more conservative thinkers. If all of this life got here by evolution from more primitive life, then how did evolution occur? No answer was immediately forthcoming. Genesis prevailed. Then Charles Darwin (grandson of Erasmus) furnished what looked like the solution. He proposed the machinery of evolution, and claimed that it existed in nature. Natural selection, he called it.

His idea was accepted with great rapidity.

Once stated it seemed only too obvious. The survival of the fittest—of course! Some types are fitter than others, and given the competition—the "struggle for existence"—the fitter ones will survive to propagate their kind. And so animals, plants, all life in fact, will tend to get better and better. They would have to, with the fitter ones inevitably replacing those that are less fit. Nature itself, then, had evolving machinery built into it. "How extremely stupid not to have thought of that!" Huxley commented, after reading the *Origin of Species*. Huxley had coined the term *agnostic*, and he remained one. Meanwhile, the Genesis version didn't entirely fade away, but it inevitably took on a slightly superfluous air.

The evolution debate

THAT WAS A LITTLE over 100 years ago. By the time of the Darwin Centennial Celebrations at the University of Chicago in 1959, Darwinism was triumphant. At a panel discussion Sir Julian Huxley (grandson of Thomas Henry) affirmed that "the evolution of life is no longer a theory; it is a fact." He added sternly: "We do not intend to get bogged down in semantics and definitions." At about the same time, Sir Gavin de Beer of the British Museum remarked that if a layman sought to "impugn" Darwin's conclusions, it must be the result of "ignorance or effrontery." Garrett Hardin of the California Institute of Technology asserted that anyone who did not honor Darwin "inevitably attracts the speculative psychiatric eye to himself." Sir Julian Huxley saw the need for "true belief."

So that was it, then. The whole matter was settled—as I assumed, and as I imagined most

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people must. Darwin had won. No doubt there were backward folk tucked away in the remoter valleys of Appalachia who still clung to their comforting beliefs, but they, of course, lacked education. Not everyone was enlightened—goodness knows the Scopes trial had proved that, if nothing else. And some of them still wouldn't let up, apparently—they were trying to change the textbooks and get the Bible back into biology. Well, there are always diehards.

So it was only casually, about a year ago, that I picked up a copy of *Darwin Retried*, a

slim volume by one Norman Macbeth, a Harvard-trained lawyer. An odd field for a lawyer, certainly. But an endorsement on the cover by Karl Popper caught my eye. "I regard the book as... a really important contribution to the debate," Popper had written.

The debate? What debate? This interested me. I had studied philosophy, and in my undergraduate days Popper was regarded as one of the top philosophers—especially important for having set forth "rules" for discriminating between genuine and pseudo science. And Pop-

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CLUBS WE DO NOT CARE TO JOIN
The Darwin Club

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per evidently thought there had been a "debate" worth mentioning. In his bibliography Macbeth listed a few articles that had appeared in academic philosophy journals in recent years and evidently were a part of this debate.

That was, as I say, a year ago, and by now I have read these articles and a good many others. In fact, I have spent a good portion of the last year familiarizing myself with this debate. It is surprising that so little word of it has leaked out, because it seems to have been one of the most important academic debates of the 1960s, and as I see it the conclusion is pretty staggering: Darwin's theory, I believe, is on the verge of collapse. In his famous book, *On the Origin of Species by Means of Natural Selection, or The Preservation of Favored Races in the Struggle for Life*, Darwin made a mistake sufficiently serious to undermine his theory. And that mistake has only recently been recognized as such. The machinery of evolution that he supposedly discovered has been challenged, and it is beginning to look as though what he really discovered was nothing more than the Victorian propensity to believe in progress. At one point in his argument, Darwin was misled. I shall try to elucidate here precisely where Darwin went wrong.

WHAT WAS IT, THEN, that Darwin discovered? What was this mechanism of natural selection? Here it comes as a slight shock to learn that Darwin really didn't "discover" anything at all, certainly not in the same way that Kepler, for example, discovered the laws of planetary motion. The *Origin of Species* was not a demonstration but an argument—"one long argument," Darwin himself said at the end of the book—and natural selection was an idea, not a discovery. It was an idea that occurred to him in London in the late 1830s which he then pondered in the Home Counties over the next twenty years. As we now know, several other thinkers came up with the same or a very similar idea at about the same time. The most famous of these was Alfred Russel Wallace, but there were several others.

The British philosopher Herbert Spencer was one who came within a hair's breadth of the idea of natural selection, in an essay called "The Theory of Population" published in the *Westminster Review* seven years before the *Origin of Species* came out. In this article Spencer used the phrase "the survival of the fittest" for the first time. Darwin then appropriated the phrase in the fifth edition of the *Origin of Species*, considering it an admirable summation of his argument. This argument was in fact an analogy, as follows:

While in his country retreat Darwin spent a

good deal of time with pigeon fanciers and animal breeders. He even bred pigeons himself. Of particular relevance to him was that breeders bred for certain characteristics (length of feather, length of wool, coloring), and that the offspring of the selected mates often tended to have the desired characteristic more abundantly, or more noticeably, than its parents. Thus, it could perhaps be said, a small amount of "evolution" had occurred between one generation and the next.

By analogy, then, the same process occurred in nature, Darwin thought. As he wrote in the *Origin of Species*: "How fleeting are the wishes of man! how short his time! and consequently how poor will his productions be, compared with those accumulated by nature during whole geological periods. Can we wonder, then, that nature's productions should be far 'truer' in character than man's productions?"

Just as the breeders selected those individuals best suited to the breeders' needs to be the parents of the next generation, so, Darwin argued, nature selected those organisms that were best fitted to survive the struggle for existence. In that way evolution would inevitably occur. And so there it was: a sort of improving machine inevitably at work in nature, "daily and hourly scrutinizing," Darwin wrote, "silently and insensibly working . . . at the improvement of each organic being." In this way, Darwin thought, one type of organism could be transformed into another—for instance, he suggested, bears into whales. So that was how we came to have horses and tigers and things—by natural selection.

The great tautology

FOR QUITE SOME TIME Darwin's mechanism was not seriously examined, until the renowned geneticist T. H. Morgan, winner of the Nobel Prize for his work in mapping the chromosomes of fruit flies, suggested that the whole thing looked suspiciously like a tautology. "For, it may appear little more than a truism," he wrote, "to state that the individuals that are the best adapted to survive have a better chance of surviving than those not so well adapted to survive."

The philosophical debate of the past ten to fifteen years has focused on precisely this point. The survival of the fittest? Any way of identifying the fittest other than by looking at the survivors? The preservation of "favored" races? Any way of identifying them other than by looking at the preserved ones? If not, then Darwin's theory is reduced from the status of scientific theory to that of tautology.

Philosophers have ranged on both sides of this critical question: are there criteria of fitness

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that are independent of survival? In one corner we have Darwin himself, who assumed that the answer was yes, and his supporters, prominent among them David Hull of the University of Wisconsin. In the other corner are those who say no, among whom may be listed A. G. N. Flew, A. R. Manser, and A. D. Barker. In a nutshell here is how the debate has gone:

Darwin, as I say, just assumed that there really were independent criteria of fitness. For instance, it seemed obvious to him that extra speed would be useful for a wolf in an environment where prey was scarce, and only those wolves first on the scene of a kill would get enough to eat and, therefore, survive. David Hull has supported this line of reasoning, giving the analogous example of a creature that was better able than its mates to withstand desiccation in an arid environment.

The riposte has been as follows: a mutation that enables a wolf to run faster than the pack only enables the wolf to survive better if it does, in fact, survive better. But such a mutation could also result in the wolf outrunning the pack a couple of times and getting first crack at the food, and then abruptly dropping dead of a heart attack, because the extra power in its legs placed an extra strain on its heart. Fitness must be identified with survival, because it is the overall animal that survives, or does not survive, not individual parts of it.

However, we don't have to worry too much about umpiring this dispute, because a look at the biology books shows us that the evolutionary biologists themselves, perhaps in anticipation of this criticism, retreated to a fortified position some time ago, and conceded that "the survival of the fittest" was in truth a tautology. Here is C. H. Waddington, a prominent geneticist, speaking at the aforementioned Darwin Centennial in Chicago:

"Natural selection, which was at first considered as though it were a hypothesis that was in need of experimental or observational confirmation turns out on closer inspection to be a tautology, a statement of an inevitable although previously unrecognized relation. It states that the fittest individuals in a population (defined as those which leave most offspring) will leave most offspring."

The admission that Darwin's theory of natural selection was tautological did not greatly bother the evolutionary theorists, however, because they had already taken the precaution of redefining natural selection to mean something quite different from what Darwin had in mind. Like the philosophical debate of the past decade, this remarkable development went largely unnoticed. In its new form, natural selection meant nothing more than that some organisms have more offspring than others: in the argot, differential reproduction. This indeed was an

empirical fact about the world, not just something true by definition, as was the case with the claim that the fittest survive.

THE BOLD ACT OF redefining selection was made by the British statistician and geneticist R.A. Fisher in a widely heralded book called *The Genetical Theory of Natural Selection*. Moreover, by making certain assumptions about birth and death rates, and combining them with Mendelian genetics, Fisher was able to qualify the resulting rates at which population ratios changed. This was called population genetics, and it brought great happiness to the hearts of many biologists, because the mathematical formulae looked so deliciously scientific and seemed to enhance the status of biology, making it more like physics. But here is what Waddington recently said about *this* development:

"The theory of neo-Darwinism is a theory of the evolution of the population in respect to leaving offspring and not in respect to anything else. . . . Everybody has it in the back of his mind that the animals that leave the largest number of offspring are going to be those best adapted also for eating peculiar vegetation, or something of this sort, but this is not explicit in the theory. . . . There you do come to what is, in effect, a vacuous statement: Natural selection is that some things leave more offspring than others; and, you ask, which leave more offspring than others; and it is those that leave more offspring, and there is nothing more to it than that. *The whole real guts of evolution—which is how do you come to have horses and tigers and things—is outside the mathematical theory* [my italics]."

Here, then, was the problem. Darwin's theory was supposed to have answered this question about horses and tigers. They had gradually developed, bit by bit, as it were, over the eons, through the good offices of an agency called natural selection. But now, in its new incarnation, natural selection was only able to explain how horses and tigers became more (or less) numerous—that is, by "differential reproduction." This failed to solve the question of how they came into existence in the first place.

This was no good at all. As T. H. Morgan had remarked, with great clarity: "Selection, then, has not produced anything new, but only more of certain kinds of individuals. Evolution, however, means producing new things, not more of what already exists."

One more quotation should be enough to convince most people that Darwin's idea of natural selection was quietly abandoned, even by his most ardent supporters, some years ago. The following comment, by the geneticist H. J. Muller, another Nobel Prize winner, appeared

For Further Reading

Since the Darwin Centennial celebrations of 1959, a fairly large literature has emerged dealing with the logical status of evolutionary theory. The following chronological list includes some of the most important books and articles.

Himmelfarb, Gertrude. *Darwin and the Darwinian Revolution*. The Norton Library, 1959.

Scriven, Michael. "Explanation and Prediction in Evolutionary Theory." *Science*, August 28, 1959.

Grene, Marjorie. "The Faith of Darwinism." *Encounter*, November 1959.

Manser, A. R. "The Concept of Evolution." *Philosophy*, January 1965 (perhaps the most important article).

Flew, A. G. N. "A Comment on Manser." *Philosophy*, January 1966.

Connolly, Kevin. "A Comment on Manser and Flew." *Philosophy*, October 1966.

in the Proceedings of the American Philosophical Society in 1949. It represents a direct admission by one of Darwin's greatest admirers that, however we come to have horses and tigers and things, it is not by natural selection. "We have just seen," Muller wrote, "that if selection could be somehow dispensed with, so that all variants survived and multiplied, the higher forms would nevertheless have arisen."

I think it should now be abundantly clear that Darwin made a mistake in proposing his natural-selection theory, and it is fairly easy to detect the mistake. We have seen that what the theory so grievously lacks is a criterion of fitness that is independent of survival. If only there were some way of identifying the fittest beforehand, without always having to wait and see which ones survive, Darwin's theory would be testable rather than tautological.

But as almost everyone now seems to agree, fittest inevitably means "those that survive best." Why, then, did Darwin assume that there were independent criteria? And the answer is, because in the case of artificial selection, from which he worked by analogy, *there really are independent criteria*. Darwin went wrong in thinking that this aspect of his analogy was valid. In our sheep example, remember, long wool was the "desirable" feature—the independent criterion. The lambs of woolly parental sheep may possess this feature even more than their parents, and so be "more evolved"—more in the desired direction.

In nature, on the other hand, the offspring may differ from their parents in any direction whatsoever and be considered "more evolved" than their parents, provided only that they survive and leave offspring themselves. There is, then, no "selection" by nature at all. Nor does nature "act," as it is so often said to do in biology books. One organism may indeed be "fitter" than another from an evolutionary point of view, but the only event that determines this fitness is death (or infertility). This, of course, is not something which helps *create* the organism, but is something that terminates it. It occurs at the end, not the beginning of life.

Onward and upward

DARWIN SEEMS TO HAVE made the mistake of just assuming that there were independent criteria of fitness because he lived in a society in which change was nearly always perceived as being for the good. R. C. Lewontin, Agassiz Professor of Zoology at Harvard, has written on this point: "The bourgeois revolution not only established change as the characteristic element of the cosmos, but added direction and progress as well. A world in which a man

could rise from humble origins must have seemed, to him at least, a good world. Change per se was a moral quality. In this light, Spencer's assertion that change *is* progress is not surprising." One may note also James D. Watson's remark in *The Double Helix* that "cultural traditions play major roles" in the development of science.

Lewontin goes on to point out that "the bourgeois revolution gave way to a period of consolidation, a period in which we find ourselves now." Perhaps that is why only relatively recently has the concept of natural selection come under strong attack.

There is, in a way, a remarkable conclusion to this brief history of natural selection. The idea started out as a way of explaining how one type of animal gradually changed into another, but then it was redefined to be an explanation of how a given type of animal became more numerous. But wasn't natural selection supposed to have a *creative* role? the evolutionary theorists were asked. Darwin had thought so, after all. Now watch how they responded to this:

The geneticist Theodosius Dobzhansky compared natural selection to "a human activity such as performing or composing music." Sir Gavin de Beer described it as a "master of ceremonies." George Gaylord Simpson at one point likened selection to a poet, at another to a builder. Ernst Mayr, Lewontin's predecessor at Harvard, compared selection to a sculptor. Sir Julian Huxley topped them all, however, by comparing natural selection to William Shakespeare.

Life on Earth, initially thought to constitute a sort of prima facie case for a creator, was, as a result of Darwin's idea, envisioned merely as being the outcome of a process and a process that was, according to Dobzhansky, "blind, mechanical, automatic, impersonal," and, according to de Beer, was "wasteful, blind, and blundering." But as soon as these criticisms were leveled at natural selection, the "blind process" itself was compared to a poet, a composer, a sculptor, Shakespeare—to the very notion of creativity that the idea of natural selection had originally replaced. It is clear, I think, that there was something very, very wrong with such an idea.

I have not been surprised to read, therefore, in Lewontin's recent book, *The Genetic Basis of Evolutionary Change* (1974), that in some of the latest evolutionary theories "natural selection plays no role at all." Darwin, I suggest, is in the process of being discarded, but perhaps in deference to the venerable old gentleman, resting comfortably in Westminster Abbey next to Sir Isaac Newton, it is being done as discreetly and gently as possible, with a minimum of publicity. □

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Barker, A. D. "An Approach to the Theory of Natural Selection." *Philosophy*, October 1969.

Ruse, Michael. "Confirmation and Falsification of Theories of Evolution." *Scientia*, vol. 104, 1969.

Young, Robert. "Darwin's Metaphor: Does Nature Select?" *Monist*, July 1971.

Popper, Karl. *Objective Knowledge*. Oxford University Press, 1972.

Ruse, Michael. *The Philosophy of Biology*. Hutchinson, 1973.

Williams, Mary B. "Falsifiable Predictions of Evolutionary Theory." *Philosophy of Science*, vol. 40, 1973.

Hull, David. *Philosophy of the Biological Sciences*. Prentice-Hall, 1974.

HARPER'S MAGAZINE
FEBRUARY 1976