

Evolution and Intelligent Design

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As a 50-year teacher of biology I am saddened and perplexed by continuing conflicts over evolution and the possible role of a supernatural creator or intelligent design force in explaining life. My *sadness* is because these conflicts, which foster ill will, are neither necessary nor useful. Evolution is an ordinary everyday process, directly verifiable, and highly predictable in its directions whenever the environment can be specified. We humans evolve our domestic animals and plants “artificially” by preserving the features we desire, generation by generation, in the same way that the complexities of the non-human environment are continually preserving some attributes of living creatures and causing others to disappear.

Even the self-named creation research scientists have come to acknowledge that evolution occurs across the short term. They call it "micro-evolution," thereby relegating their questions about evolution to changes and events requiring too much time, or occurring too long ago, to be observed directly. The "theory" of evolution, then, is not whether evolution exists, but whether it can explain every last thing about life. This question will necessarily remain theoretical for a very long time. But there is no usefulness in fostering conflict about it, because whether or not supernatural forces are involved, biologists will continue their investigations of life in exactly the same fashion. There is no reason to do otherwise, regardless of one's personal beliefs. If we were continually terminating lines of research, taking the stance that we had reached a level at which creation accounts for whatever we observe, so we could analyze no further, we would never know if our belief was correct. We would always be potentially selling ourselves short, as investigators, and as users of biological knowledge.

Aside from the indefinite question of complexity *per se*, the main targets of creationists' skepticism about evolution have been (1) species formation (or multiplication), (2) questions about "origins," and (3) the significance of much-heralded “gaps” in the fossil record.

(1) In my own research, beginning more than 50 years ago, I studied many similar species that (a) live and breed in the same places at the same times and (b) do not interbreed in nature. This combination of facts demonstrated that I was indeed studying different species, destined to remain separate forever. Many such similar species (and some not nearly so similar to one another) can nevertheless be caused to interbreed in the laboratory, yielding novel hybrids. Hybrids between species

typically have some traits like one parent, some like the other parent, and some intermediate. Some species I studied could also be hybridized further, or backcrossed with one or both parent species. Such breeding experiments are now widespread. Hybridization experiments between species show that the differences between species are exactly the same kinds of differences one finds when cross-mating genetically different individuals within species. These differences are owing to numerous small genetic changes, accumulating across long periods from gene mutations and tending to consolidate when populations become separated. Such consolidated differences often lower breeding success among the resulting genetically different forms.

There is a clear reason why different species sometimes remain interfertile, though not (any longer) cross-mating in nature. As Darwin pointed out, gradual or step-by-step changes toward intersterility cannot be favored by natural selection. Instead selection automatically favors the opposite. Successful reproduction by mated individuals is the only way the genes that in various ways underlie all our traits can remain in the evolving stream of life. Sterility between species thus comes about as an incidental and erratic effect of the divergence of previously separated populations. Prevalence of such sterility increases not through selection but because members of divergent populations that happen to come back together sometimes reproduce poorly when they interbreed. Matings between such populations (rather than within populations) is therefore disfavored by selection, and eventually terminates. This failure of individuals in different populations to mate is what most often seals off the possibility of subsequent field (as opposed to laboratory) hybridization.

All of the above is strong evidence that species form gradually through accumulations of the same small changes that are the substance of the micro-evolutionary process. We observe such changes accumulating whenever ordinary sexually reproducing populations accidentally become geographically isolated, just as they also accumulate when we deliberately generate different breeds or strains of domestic animals or plants by breeding populations separately for different purposes. Even the rarer rapid or “instant” speciation processes are understandable as a part of micro-evolution. Examples are accidents during cell division that multiply the number of chromosomes (polyploidy). Such accidents either succeed because the polyploid individual can make offspring on its own (thus requiring no polyploid sexual partner), or because multiple polyploid individuals are produced in the same locality at the same time and are able to mate with one another.

Thus, both species differences and how they arise are entirely compatible with micro-evolution. We know enough about species and how they form to falsify the hypothesis that creation is either indicated or required.

(2) With regard to the origin of life – or, for that matter, the origin of the physical universe – we will probably always have doubts because it is difficult to reconstruct with confidence the precise details of ancient and possibly one-time events. But the obvious reason has nothing to do with alternative explanations; it involves accessibility of the involved cause-effect events because of loss of information across time. Again, biologists and physicists will continue to explore all possibilities, and there is no reason to discourage or vilify them for doing so just because you wish to retain your faith, or your own personal approach to such ancient events.

(3) As for gaps in the fossil record, they exist because fossils are destroyed by the physical and biological forces of nature, or because the remains of animals and plants were destroyed before fossils could be formed. These are events that all of us can see happening around us virtually every day. It's difficult to reconstruct what happened to produce gaps in the fossil record because we know so little about local events that happened long ago.

Nevertheless, any missing information about the history of organisms seems important to us. The longer it remains missing the more important it may seem. But surely anyone would predict such gaps, as well as their seemingly erratic nature.

Ironically, a perfect fossil record, enabling us to trace all similarities of all organisms across all time, might be the best evidence for the involvement of a supernatural or intelligent force. It does not seem possible that an overall perfect fossil record could otherwise have been formed (and saved), the latter meaning the preservation of at least one member of every species where we could find it.

Gaps are identified as such – even so named – because they involve greater differences than do other compared forms that are sufficiently similar as not to be seen as having a “gap” between them. If an intermediate is found that lies exactly between two distinct forms already known, the one larger gap automatically becomes two smaller gaps. But that's because of how we humans classify such things. Gaps are things to fill, so we name them and emphasize them because we want to focus on them and find out about them.

My *perplexity* on this whole issue comes from wondering why there should be a continuing conflict. Perhaps because many people are not aware of facts and findings like those I have just mentioned. But others continue to claim that such facts and findings either do not exist or are irrelevant. Why? Perhaps to generate an “adversary” to use as a rallying force for a religious or other belief group, as when scientific findings seem to infringe accepted ideas based on faith. Perhaps to advertise still other perceived interests and keep them in the news. But all such reasons are political, and cannot be used to deny the results of honest and verifiable scientific investigations.

On a practical everyday basis, it never made a whit of difference to me, as a biology teacher, what proportion of my students had what kinds of beliefs or inclinations regarding supernatural forces. All I required was that students honestly and open-mindedly explore the nature of life and its probable background, as best they could. I trust that all persons interested in life, including human life and its history, would desire nothing less from the scholars and teachers of the world. Until something turns up that has not yet come to light, the honest and verifiable investigations of good science will continue to march us toward a better understanding and greater usefulness of life, the most marvelous and complicated phenomenon in the natural universe as we know it.

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