The Diversity of Evolution

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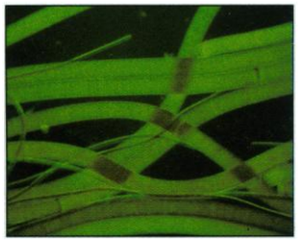
Evolution is the mechanism producing the diversity of life. Yet it is also much more. Although the processes of evolution may be lumped together as "natural selection," this catch-all phrase hides an enormous variety of actions, interactions, and events that are still being discovered and appreciated. Furthermore, the intellectual concepts arising from our understanding of evolution have enriched and changed many other fields of study. Dobzhansky's famous dictum that "nothing in biology makes sense except in the light of evolution" is even more true today than it was half a century ago. The concepts and principles of evolution are so ingrained and fundamental in many fields, not just in the life sciences, that their acceptance seems almost subliminal in many cases. In turn, research in evolution and life's diversity has increasingly involved interdisciplinary studies, using approaches grounded in organic chemistry, genetics, developmental biology, ecology, paleontology, and the earth sciences. These are now yielding new understandings of (and surprises about) the history, process, and results of evolution at both finer and grander scales. And the new era of genomics promises to reveal much about the interrelationships of organisms.



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This special issue on evolution highlights and samples this richness at many levels: from the record of the diversity of life itself to thoughts on the role of evolution in our lives, from small bacteria to the largest land animals; from the origin of life perhaps 4 billion years ago to evolution that is occurring today at a pace that can be studied in the laboratory; from major radiations of life such as the origins of animals and the rise of the dinosaurs to the evolutionary responses of organisms to external changes in climate or to extinctions, as well as the coevolution of interacting species.

Paradoxically, the breadth of evolution's contribution to research and our daily lives remains grossly unappreciated—and sometimes deliberately denied—in the public realm. Evolutionary methods and concepts have been brought to bear on key questions in contemporary medicine, such as AIDS research and the biology of malaria, and are an important element in the current controversies surrounding genetically modified foods. Many of these issues are barely touched on here, but our sample of evolutionary research underscores evolution's integral role in science as well as its sheer excitement.

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BROOKS HANSON
GILBERT CHIN
ANDREW SUGDEN
ELIZABETH CULOTTA

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