tor gene can confer transgenic tobacco resistance to a number, but by no means all, of its herbivorous insects; and Arabidopsis mutants now include forms that are not etiolated when grown in darkness, others that have long hypocotyls when germinated in the light, and still others that no longer bend towards blue light. This book is a useful, if ephemeral, guide to some exciting and interesting work in progress.

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UNVEILING THE DECEPTION


Tim Berra, a professor of zoology at Ohio State University, describes his mission as threefold: to explain evolution to the “open minded reader who does not understand the technical issues of evolution but would like to,” especially the reader “genuinely confused by the claims of creationists, who try to present fundamentalist Christian beliefs as science”; to provide “ammunition to the high school biology teacher or school board member who finds himself or herself under attack by creationists”; and to provide a “useful supplemental text for introductory college level classes” in the natural or social sciences. Quite an ambitious agenda, though certainly worth the effort.

The book packs much information and many ideas into its 144 pages of text. The dominant content is scientific—compact discussions of population genetics and of the fossil record, lessons learned from cases such as drug resistance in bacteria or sickle-cell anemia, a history of the cosmos and of life on earth, and an extended presentation of current views of human evolution. The science is liberally mixed with comments on the political strategy of the creationists, on scientific method and philosophy, on the state of science education, and on the relationship between science and religion. There are capsule considerations of the Scopes trial as well as of the more recent Arkansas and Louisiana creationism cases; there is a goodly sprinkling of photographs and sketches of fossils, skulls, and reconstructions of extinct organisms. One brief appendix summarizes fundamental genetic mechanisms. A second appendix, oddly, outlines Darwin’s life from birth to death in a five-page chart. A modest glossary is included, and a partly annotated bibliography that lists a number of creationist publications along with material on evolution ranging from the (sophisticated) cartoon book Darwin for Beginners (1982, Pantheon, New York) to recent articles in Science and Nature.

Berra’s writing is enthusiastic and appropriately direct (or “blunt” as some of his colleagues have described his approach). For example, he characterizes the creationists’ strategy as founded “in deception, misrepresentation and obfuscation designed to dupe the public into thinking that there is a genuine scientific controversy about the validity of evolution. No such controversy exists.” And he is unafraid of issues such as the connections between “creation science” and right-wing politics, or the limits of religious thinking, familiar matters that often are underplayed for fear of alienating potential allies or of seeming unscientific or naive.

How well does all of this work? I’m not sure, principally because of a question about the audience. The book is intended for so many different types of readers that it risks satisfying none of them. Scientific experts—teachers included—will criticize the emphasis given to particular views, the sometimes hazy boundaries between speculation and firmly established concepts, and the treatment of divers details. Those who have had to confront the creationists head-on may be disappointed by sections, such as the one on the origins of life, where subtler discussions might have conveyed better the strengths of science.
and the limits of what present-day scientists expect to establish. Lay readers may find some of the book hard going, especially the section on human evolution, where the material is presented with much peripheral detail. Inconsistency in the levels of scientific presentation plus the extensive and occasionally careless use of technical language, especially in the illustrations, diminish the accessibility of segments of the scientific material including, unfortunately, the set of thumbnail refutations of 16 thoughtfully chosen specific claims of the creationists.

Still, as its title implies, the central aim of Evolution and the Myth of Creationism is to make clear that creationism is not science and should not be allowed to masquerade as such. The book does achieve this goal. It succeeds also in conveying the sense that scientists now have a pretty good idea of much of the history of life. At the same time, it portrays the sciences as self-critical disciplines that do change their minds and draw strength from so doing. I suspect that one cannot realistically expect much more from a brief book.

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A Sampler of Molecular Evolution


The importance of molecular genetics to the study of evolution is best seen from a historical perspective. Charles Darwin recognized that hereditary variation is essential to the theory of evolution by natural selection and noted that although the many laws regulating variation were "dimly seen, ... the number and diversity of inheritable deviations of structure ... is endless." The rediscovery of Gregor Mendel's experiments in 1900 eventually led to the neoDarwinian synthesis between 1920 and 1930, but, remarkably, the nature and extent of hereditary variation remained dimly seen until very recently. With astonishing suddenness, molecular genetics has illuminated the great store of genetic variation recorded in the genomes of extant (and, through the polymerase chain reaction, extinct) species; there appears to be no question regarding genetic variation which cannot, in theory, be answered. This collection leaves one with a sense that a period of extraordinary scientific discovery has begun.

Molecular Evolution contains 31 papers presented at the UCLA Colloquium on Molecular Evolution held at Lake Tahoe, California, in March 1989. The collection is remarkable for its diversity of subjects, ranging from empirical studies concerned with gene and genomic evolution, phylogenetics, intraspecific variation, and population structure, to recent technological developments such as the use of yeast artificial chromosomes to amplify large DNA sequences (J. W. Ajioka et al.) and the now pervasive polymerase chain reaction to amplify DNA even from antique specimens (P. K. Rogan and J. J. Salvo), to studies in applied statistics concerned with the analysis of DNA sequence data (B. S. Weir et al.). The unifying theme is molecular evolution, but the chapters are more focused than the title implies, because the primary topic of virtually every chapter is DNA; this is really a book concerned with evolution manifest at the level of the genotype.

The chapters are uniformly short, averaging just under ten pages of single-spaced typescript facsimile. Most are reviews of the authors' recent work, but some present previously unpublished data and analysis in context of the review. The diversity of topics, combined with the short but usually rich presentations, remind one of eating chocolates from a Whitman's Sampler: one bites into each paper with anticipation, each provides a distinct flavor, and if you don’t like that particular flavor, the next one may be a delight. Moreover, nearly the whole product line is represented; one gets a taste of the complete spectrum of current research in molecular evolution. Of course, there is a trade-off here; one may be left wanting more of a particular flavor, but the complete literature citations provide a guide to interesting cognate readings. The book’s utility is also enhanced by a comprehensive index and by the logical organization of the chapters.

In the lead paper, J. Klein et al. review the major histocompatibility complex (Mhc) in vertebrates and provide convincing evidence that multiple alleles of Mhc genes, characteristically seen in vertebrate species, are ancient polymorphisms. This is apparent when phylogenies for the histocompatibility genes are compared with organismal phylogenies: alleles occurring in distantly related species are often more closely related than alleles segregating within the same species. Implicit in this observation is that selection operates to maintain histocompatibility polymorphisms. This inference, like many inferences about gene and genome evolution, is based on comparison within a phylogenetic context. Thus phylogenetics plays a pivotal role in molecular evolution studies.

J. D. Palmer et al. argue from a phylogenetic premise that the tufA gene was transferred from the chloroplast to the nuclear genome during the early evolution of terrestrial plants. Also using a phylogenetic argument, but in a study of a more recent evolutionary event, M. R. Bates et al. use restriction fragment length polymorphisms to show that aggressively pathogenic strains of Dutch elm disease fungus are a monophyletic group. This implies that aggressive pathogenicity arose only once, although it occurs in both Europe and North America.

K. Ritland and M. Clegg use maximum likelihood statistics to determine the sequence divergence that is optimal for estimating phylogenies. In a related paper, L. A. Sadler and C. F. Brunk present a new phylogeny for 16 species in the Tetrahymena pyriformis (protist) group, based on a short nucleotide sequence that includes parts of two histone genes and an intergenic spacer region. The T. pyriformis group is fascinating because the more than 30 constituent species are morphologically indistinguishable but highly divergent at the molecular level. The histone phylogeny is similar to two earlier phylogenies based on protein electrophoretic data and rRNA sequence data. The authors conclude that the histone se-