Tipler intends his work to be a "popular book," and indeed it has been featured on at least one popular TV show. However, not too many people whose lives have been enriched by faith in God will even bother about the mathematical proofs for the divine principle. The "ergo est" formulation of God's existence is of interest only to professors, authors of books and papers, and debaters, not to the spiritually awakened souls of the world.

In 1888, when the positive sciences were on the ascendant, Madame Blavatsky published *The Secret Doctrine*, a massive tome replete with ancient writings and quotations from 19th-century scientists, to establish that all the results of the physics and cosmology of her period lay implicit in the occult writings of ancient Egyptians, Hindus, and Buddhists. Tipler's book is on target with our own Zeitgeist. We live in an age when people feel they have had enough of science and rational thought, which have led us to theories that make God irrelevant and ethics a function of situations. Our sciences have dragged us to doubt and atheism; while technology, with all its creature comforts, has engendered pollution, population problems, and the depletion of rain forests. Add to all this a degrading drug culture, crippling crime waves, promiscuous sex, broken families, and low SAT scores to boot: we have had it. It's time to sing, "Give me that old-time religion."

The only snag has been that (at least for the college-educated lot) it is difficult to be convinced *de rerum natura* by soothing songs and eloquent sermons. Most book-readers cannot rid themselves of the suspicion that science tells it like it is, while religion and poetry are only meant to make us feel good. Now, if only science can prove that there is indeed a Santa Claus, some of the deepest emotional problems of the modern world would be considerably alleviated. This calls for a rebirth of the old physics. Books like *The Tao of Physics* and *The Dancing Wu Li Masters*, condemnation of Descartes and belittling of the Enlightenment, holistic medicine and multiculturalism, all have set the stage for such a paradigm shift, unwittingly spawning a resurgence of interest in astrology, telepathy, and psychic revelations.

Tipler has written a masterpiece for the Age of Aquarius, conferring much-craved scientific respectability on what we have always wanted to believe in. His insight that "in the end, reason will sway emotion" (p. 9) may not be entirely correct, for often it is the opposite that occurs.

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Fossils Worth Studying

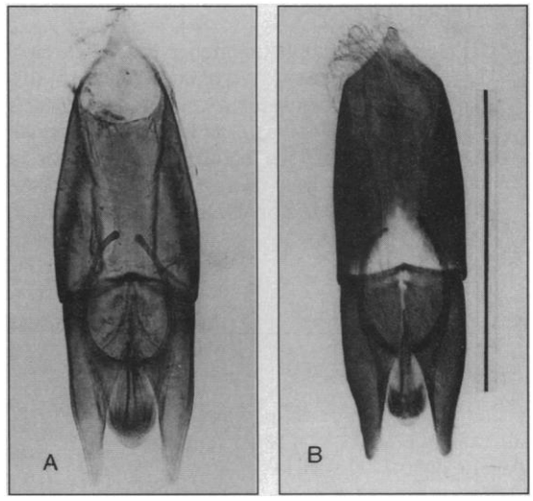
Quaternary Insects and Their Environments. SCOTT A. ELIAS. Smithsonian Institution Press, Washington, DC, 1994. xvi, 284 pp., illus. $40 (overseas orders, $47.95) or £31.25.

At the 1977 meeting of the International Quaternary Association in Birmingham, England, many Quaternary scientists first became aware that fossil insects were a legitimate topic of study. There Russell Coope (the father of Quaternary paleoentomology as we know it) and his students demonstrated the enormous potential of Quaternary beetles and other insects in paleoenvironmental studies. Now there are about 40 scientists studying paleoentomology and over 450 published papers; this research has made important contributions to our understanding of global change. The research has shown that most species of Quaternary fossil beetles and other insects are still extant, that their modern biogeography is an excellent source of paleoclimatic information, and that their wide range of habitats allows detailed paleoecological reconstructions. Until recently, this information was widely scattered in the literature. It is a good time for a synopsis of the field.

Elias's book concentrates on beetles but includes some information on other insect groups and on arachnids. The first few chapters deal with the history of Quaternary insect studies, fossil preservation, sampling, extraction, and general principles of identification. A middle group of chapters summarizes the value of insects in paleoecology, paleoclimatology, zoogeography, and archeology. The last third of the book comprises descriptions of the faunas of individual sites and their chronology and paleoenvironmental significance.

The book contains many interesting details in several biological areas that you won't find anywhere else. Here are some unrelated examples. Many studies show that beetles especially are sensitive indicators of climate. They are able to migrate so rapidly in response to climatic change that they often record climatic fluctuations that the slower-colonizing plants show no hint of. In Britain during the last glaciation, beetles record a short, intense warming, so rapid and brief that thermophilous plants never reached the British Isles. Elias cites studies on such diverse sources of insect fossils as human mummies, coprolites, and agricultural areas that indicate that humans have been plagued (sometimes literally) by fleas, lice, and chiggers for well over 1000 years.

Ideas about insect evolution may need to be revised in light of evidence from the fossil record. Insect fossils reveal that most fossils in the last million years or so are modern species. Few insects have become extinct or have shown any measurable evolution in the last million years or more, thus being a very conservative group. Yet one species of bot fly found in mammoth carcasses is extinct. Related species inhabit modern elephant carcasses, and this species may have become extinct because its host became extinct. Another example involves elm, which is known to have declined suddenly over a large area of Europe during a short interval of Neolithic time; the elm bark beetle, carrier of the Dutch elm disease, appears in those same deposits—a prehistoric pathogen?



"Light microscope photographs of fossil (A) and modern (B) aedeagi of *Helophorus aquaticus*. The fossil specimen is from the Starunia site in the Ukraine. . . . It was originally identified as *Helophorus dzieduszckii* by Lomnicki (1894). . . . Scale bar equals 0.5 mm for both." [From *Quaternary Insects and Their Environments*; photographs courtesy of Robert Angus]

The discussions of research in the later chapters are simply paragraph-length descriptions of what insects were found at different sites in each major region. This approach makes for tedious reading for the non-entomologist, and it is unfortunate that a more comprehensive synthesis was not attempted. It also would have been helpful if results were presented more graphically (rather than by way of lists of species) and more quantitatively. Even in 1977, Coope and students were able to summarize with compelling visual images how beetle faunas of the United Kingdom changed through time. Perhaps the number of sites and the chronology are still so mea-

Vignettes: Matters of Wording

The language we have now has suffered damage wholesale, the faults encountered come not as single spies but in batallions . . . : words misunderstood or misapplied, idioms distorted, prepositions used at random, jargon and imagery blanketing thought, neologisms proliferating without need, grammar and syntax defied to no purpose.

. . . . . .

The National Institute of Mental Health (not yet Wellness) promotes the Search for Alternative Pursuits. First we are told that "alternative is not just a synonym for substitute, since it implies being more satisfactory and not merely a replacement." The distinction is imaginary—why not say Preferable Pursuits and cut the explanation? We are further told: "Exercise your capacity for *alternativing*." Query: Is it pronounced *-tivving* or *-tyving*? It should be pronounced detestable.

. . . . . .

Computer certainly belongs to the good kind [of neologism]—no fancy tricks with Greek, short enough, and plain. Only a slight fault can be found with it: it sounds like a synonym for *calculator*, and the thing itself is not a mathematical machine but a logical one. The result is that many people who think they have "no head for math" keep away from "computer science" because of its name. Some have found by accident that they had good "logical heads" and have become able programmers. The French for *computer* is *ordinateur*, which gives a truer idea of what happens inside.

—*Jacques Barzun*, in *Simple and Direct: A Rhetoric for Writers* (second edition; University of Chicago Press)

ger outside the United Kingdom that that is all that is possible at the present stage of development of this field.

The study of Quaternary fossil beetles is daunting to say the least. Of all species of animals known, three-quarters are insects. One of every four species of all known organisms is a beetle, and the modern beetle fauna of North America alone numbers 30,000 species. And most keys are to whole beetles, whereas the fossils are usually individual body parts. Learning to be a paleoentomologist has been possible only in a tutorial mode, by studying with an expert. Elias's book will not alleviate that necessity, but it will spread the word that fossil insects are extremely valuable as independent and highly sensitive indicators of past habitats, communities, climates, and human activities. Most of the specialists in various groups of beetles and other insects are aging, and they are not being replaced by a younger generation of able taxonomists. If this book sparks the interest of anyone to study these fascinating animals, living or fossil, it will be worth the substantial effort it took to bring this information together.

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Reprints of Books Previously Reviewed

American Lives. Looking Back at the Children of the Great Depression. John A. Clausen. University of California Press, Berkeley, 1995. Paper, $18. *Reviewed* **260**, 1157 (1993).

Genius in the Shadows. A Biography of Leo Szilard, The Man Behind the Bomb. William Lanouette, with Bela Silard. University of Chicago Press, Chicago, 1994. Paper, $18.95. *Reviewed* **261**, 1461 (1993).

The Path to the Double Helix. The Discovery of DNA. Robert Olby. Dover, New York, 1994. Paper, $13.95. *Reviewed* **187**, 827 (1975).

Powers of Ten. A Book About the Relative Size of Things in the Universe and the Effect of Adding Another Zero. Philip Morrison *et al.* Scientific American Library (Freeman), New York, 1994. Paper, $19.95. *Reviewed* **221**, 1281 (1982).

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Alternatives for Ground Water Cleanup. Committee on Ground Water Cleanup Alternatives, Water Science and Technology Board, Board on Radioactive Waste Management, and the Commission on Geosciences, Environment, and Resources. National Academy Press, Washington, DC, 1994. xviii, 315 pp., illus. $39.95.

Analysis of Longitudinal Data. Peter J. Diggle, Kung-Yee Liang, and Scott L. Zeger. Clarendon (Oxford University Press), New York, 1994. xii, 253 pp., illus. $45. Oxford Statistical Science Series, 13.

Animal Achievement. A Unifying Theory of Zoology. F. D. Por. Balaban Publishers, Rehorot, Israel, 1994. iv, 424 pp., illus. Paper, $49.

Artificial Intelligence and Neural Networks. Steps Toward Principled Integration. Vasant Honavar and Leonard Uhr, Eds. Academic Press, San Diego, CA, 1994. xxxii, 653 pp., illus. $89.95.

Atlas of Prenatal Rat Brain Development. Joseph Altman and Shirley A. Bayer. CRC Press, Boca Raton, FL, 1994. lxx, 589 pp., illus. $125.

Autoimmune Disease Models. A Guidebook. Irun R. Cohen and Ariel Miller, Eds. Academic Press, San Diego, CA, 1994. xviii, 329 pp., illus. $64.95.

Burger's Medicinal Chemistry and Drug Discovery. Vol. 1, Principles and Practice. Manfred E. Wolff, Ed. 5th ed. Wiley, New York, 1995. xiv, 1064 pp., $195.

The Coming Plague. Newly Emerging Diseases in a World Out of Balance. Laurie Garrett. Farrar, Straus and Giroux, New York, 1994. xiv, 750 pp. $25.

Computational Chemistry Using the PC. Donald W. Rogers. 2nd ed. VCH, New York, 1994. xiv, 247 pp., illus. $65.

The Cult of the Big Bang. Was There A Bang?. William C. Mitchell. Cosmic Sense Books, Carson City, NV, 1994. 240 pp., illus. Paper, $11.95 or $C15.95.

The Cytokine Factsbook. Robin E. Callard and Andy J. H. Gearing. Academic Press, San Diego, CA, 1994. viii, 265 pp., illus. Paper, $19.50.

Drosophila melanogaster. Practical Uses in Cell and Molecular Biology. Lawrence S. B. Goldstein and Eric A. Fyrberg, Eds. AP Professional (Academic), Cambridge, MA, 1994. xx, 755 pp., illus. $115; spiralbound, $65. Methods in Cell Biology, vol. 44.

The Evolution of Insect Flight. Andrei K. Brodsky. Oxford University Press, New York, 1994. xiv, 229 pp., illus. $82.50.

Eye Movements in Reading. Jan Ygge and Gunnar Lennerstrand, Eds. Pergamon (Elsevier Science), Tarrytown, NY, 1994. xvi, 374 pp., illus. $125 or £79. Wenner-Gren International Series, vol. 64.

Flow Cytometry. Zbigniew Darzynkiewicz, J. Paul Robinson, and Harry A. Crissman, Eds. 2nd ed. Academic Press, San Diego, CA, 1994. Part A, xxxii, 591 pp., illus., + plates. $110; spiralbound, $59.95. Part B, xxxii, 697 pp., illus., + plates. $110; spiralbound, $59.95. Methods in Cell Biology, vols. 41-42.

The Geography of Innovation. Maryann P. Feldman. Kluwer, Norwell, MA, 1994. xii, 155 pp. $91.50 or £62.50 or Dfl. 160. Economics of Science, Technology and Innovation, vol. 2.

Molecular and Cell Biological Aspects of Gastroenteropancreatic Neuroendocrine Tumor Disease. Bertram Wiedenmann *et al.*, Eds. New York Academy of Sciences, New York, 1994. xii, 535 pp., illus. $145. Annals of the New York Academy of Sciences, vol. 733. Based on a conference, Berlin, Germany, Nov. 1993.

Physics on Course 1995. Physics Courses in Higher Education in the United Kingdom and the Republic of Ireland Commencing in 1995. Institute of Physics, London, England, 1994. iv, 140 pp.

Physiological Basis of Aging and Geriatrics. Paola S. Timiras, Ed. 2nd ed. CRC Press, Boca Raton, FL, 1994. x, 326 pp., illus. $79.95.

Phytoplankton in Turbid Environments. Rivers and Shallow Lakes. J.-P. Descy, C. S. Reynolds, and J. Padisák, Eds. Kluwer, Norwell, MA, 1994. x, 214 pp., illus. $155 or £102.50 or Dfl. 250. Developments in Hydrobiology, 100. From a workshop, Mont Rigi, Belgium, July 1993. Reprinted from *Hydrobiologia*, vol. 289 (1994).

Pioneers in Historical Archaeology. Breaking New Ground. Stanley South, Ed. Plenum, New York, 1994. xiv, 233 pp., illus. $45.

Profession of Conscience. The Making and Meaning of Life-Sciences Liberalism. Robert Hunt Sprinkle. Princeton University Press, Princeton, NJ, 1995. x, 257 pp. $21.95 or £21.50.

Profiles in Cognitive Aging. Douglas H. Powell, with Dean K. Whitla. Harvard University Press, Cambridge, MA, 1994. xviii, 251 pp., illus. $39.95.

Protein Structure by Distance Analysis. H. Bohr and S. Brunak, Eds. IOS Press, Burke, VA., 1994. xxiv, 335 pp., illus. $82 or Dfl. 160 or £55 or DM 143.

Symmetry and Topology in Chemical Reactivity. Pieter E. Schipper. World Scientific, River Edge, NJ, 1994. xii., 272 pp., illus. $58.

The 20-cm Schmidt-Cassegrain Telescope. Peter L. Manly. Cambridge University Press, New York, 1994. xviii, 265 pp., illus. $29.95.