clarifying the significance of Cuvier's concept of geological catastrophes, and to free it and Cuvier's opposition to biological evolution from the taint of speculative theorizing and biblical literalism.

Cuvier was, first and foremost, a comparative anatomist. His contributions to geology and paleontology were extensions of that interest. Thus, readers will find much of interest here on the development of Cuvier's biological ideas, especially on the relationship between form and function and his opposition to the evolutionary theories of his time. Anglophone scholars will welcome this book as a valuable addition to the still sparse literature on an important period in the histories of geology, paleontology, and systematic biology. Even scholars who might normally read Cuvier's works in French will find Rudwick's argument stimulating, and will appreciate having these texts made so readily accessible.

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GENERAL BIOLOGY

LIFE ON OTHER WORLDS: THE 20TH-CENTURY EXTRATERRESTRIAL LIFE DEBATE.

By Steven J Dick. Cambridge and New York: Cambridge University Press. $24.95. xiii + 290 p; ill.; index. ISBN: 0-521-62012-0. 1998.

The concept of a biological universe has fascinated scientists and philosophers since the time that the size and nature of planets and the solar system were realized. The last few years have seen a flood of related books and articles, stimulated no doubt by the space program with promise of sample return from Mars and exploration of Jupiter's moon Europa, and with the discovery of extrasolar planets. This book adds a lively and well-structured account of the development of thought on this subject.

The author naturally devotes some attention to chemical modeling of possible origins and early evolution of life. In this area the narrative lags behind modern developments that derive from the discovery of catalytic activity of RNA and emphasize the chemistry of information-carrying molecules and their components—the RNA world.

In the chapter, The Origin and Evolution of Life in the Extraterrestrial Context, the discussion of well-established lifeless organic matter in space is intertwined with the speculative subjects of the actual existence of extraterrestrial life forms and the possibilities for their propagation through space. As a modern contribution to the discussion of extraterrestrial organisms, the author mentions the work by the great chemist Harold Urey, stimulated by the finding by Nagy and collaborators of "organized elements" believed to be microfossils in carbonaceous meteorites. Urey's persistent support of this research, however, was not based on belief in life on other worlds, but on his interest in earliest life on Earth. He postulated that the Moon at passage close to Earth during capture would have raised such large tides that water with suspended sediments, containing primitive terrestrial organisms, would have splashed onto the Moon. This biological contamination would have preserved there a record of the earliest life on Earth, lost on our planet. Urey's idea was championed by NASA as a scientific rationale for the Apollo program. The concept was on physical grounds vigorously contested by Sir Fred Hoyle—the return of the Apollo samples, soon to follow, confirmed Hoyle's prediction of the Moon as "a lifeless slag heap."

Such lapses in the account are understandable in view of the author's major emphasis on intelligent extraterrestrial life rather than on micro- and molecular biology. The question of other civilizations takes a central place in Dick's book, including historical, philosophical, artistic and religious implications of extraterrestrial intelligence. These provide a background for discussion of 19th-century claims of intelligent life on Mars, the UFO phenomenon, and of the scientific aspects of search for extraterrestrial intelligence embodied in the SETI project. As a participant in the latter enterprise, the author gives a detailed and engaging account of the project, its origin and development, and the individual roles of its imaginative creators.

The book is a valuable, concentrated, critical and engagingly written treatise of the multifaceted and elusive subject of possible extraterrestrial civilizations. A list of annotated references offers readers access to the dispersed modern literature dealing with the many social, cultural, literary and scientific aspects of a biophysical cosmology.

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EARTH: EVOLUTION OF A HABITABLE WORLD.

By Jonathan I Lunine; original illustrations by Cynthia J Lunine. Cambridge and New York: Cambridge University Press. $74.95 (hardcover); $29.95 (paper). xix + 319 p + 8 pl; ill.; index. ISBN: 0-521-47287-3 (hc); 0-521-64423-2 (pb). 1999.

EARTH STORY: THE SHAPING OF OUR WORLD.

By Simon Lamb and David Sington. Princeton (New Jersey): Princeton University Press. $29.95. 240 p; ill.; index. ISBN: 0-691-00229-0. 1998.

Many biologists are deeply concerned about the future of our planet and its life. These two modestly priced books attempt to establish a long-term view,

against which troubling modern events (such as global change) may be assessed. Both books describe Earth's history (including the development of our scientific understanding of its past and present) and the interplay between physical and biological processes in its evolution.

Lunine's book appears aimed at college students who are taking an introductory course that discusses planet Earth. It begins with Earth's place in the cosmos, its origin, how past events can be dated, and the kinds of evidence that led to the discovery of plate tectonics. Topics such as the origin of the moon, the origin of life, the early atmosphere, possibilities for life on other planets, the roles of water, oxygen and carbon dioxide, the explosion of multicellular life, and mass extinctions are discussed. The book concludes with a discussion of Ice Age climate changes, global warming, and limits to growth.

Lunine's treatment of the issues that I am familiar with is authoritative, balanced and suitably critical. In other areas his presentation is clear and easy to follow. For example, he explains how some meteorites could be fragments of Mars, but is skeptical about claims that they contain bacteria-like fossils; his presentation of the chemical origin of life emphasizes the incompleteness of our current understanding. My only regret about the book is that too few of the illustrations are in color.

Lamb and Sington's book is a companion volume to a recent BBC television series. They explain how the sequence of events can be read from rocks, and how rocks are correlated and dated. Subsequent chapters deal with mid-ocean ridges, magnetic striping, island arcs, hot spots, volcanoes and earthquakes, and their explanation by the theory of plate tectonics. Two chapters describe the internal structure of the Earth, and plate collisions illustrated by the origin of the Himalayas. A chapter on Pleistocene Ice Ages, their causes and effects, is followed by one about the origin of life, fossils, and major events in the history of life. A final chapter treats Earth as a planet, and its differences from other known planets and large moons.

Earth Story is more of a visual feast—it is attractively illustrated in color—than Lunine's book. It appears no less authoritative, but it attempts less in terms of both breadth and depth.

The authors of both books emphasize that Earth's unusual properties, supporting both complex life forms and an active crust, owe much to an extraordinary balance between physical and biological conditions. Both suggest that abundant free water was necessary for the establishment and maintenance of plate tectonic activity, which in turn recycles (some) carbon dioxide into the atmosphere through volcanic eruptions, preventing its permanent loss in the form of buried carbonates and weathered silicates. Water was also necessary for the origin of life and of photosynthesis, which increased atmospheric oxygen, allowed diversification of aerobic organisms, and sequestered carbon dioxide (in the buried bodies and shells of organisms), preventing a massive greenhouse effect that might have overheated the Earth's surface and vaporized its liquid water. In effect, both life and plate tectonics depend on liquid water, although continued existence of liquid water depends on life and possibly on plate tectonics. Somehow, Earth seems even more delicately balanced, more fragile, and more unusual, in this emerging long-term perspective.

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INFORMATION TECHNOLOGY, PLANT PATHOLOGY AND BIODIVERSITY. *Based on a conference held at the University of Kent at Canterbury, 16–19 December 1996. Edited by Paul Bridge, Peter Jeffries, David R Morse, and Peter R Scott. Published in association with the British Society for Plant Pathology and the Systematics Association by CAB International; distributed by Oxford University Press, Oxford and New York.* $90.00. xiv + 478 p; ill.; index. ISBN: 0-85199-217-X. 1998.

"Technophile or technophobe, we are all exposed to the incredible pace of technological change" (p 1) is the opening comment by P R Scott in this intriguing book. It features 40 review articles by 58 contributors on the interface between information technology (IT) and its applications to plant pathology and biodiversity. Based on a conference held in 1996, this book is thoughtfully organized into nine parts that reflect both the themes and content of the conference: Setting the Scene (2 chapters); Handling Facts to Produce Information (6 chapters); Interpreting Information to Produce Knowledge (4 chapters); Using Knowledge to Support Decision Making (6 chapters); Computer-based Species Identification (5 chapters); Applications of Computer-based Species Identification (6 chapters); Passing on Knowledge in Education and Training (5 chapters); Storing and Disseminating Knowledge (4 chapters); and Biology and Information Technology: The Road Ahead (2 chapters). Although several articles seem out of place or are familiar from other sources, most present current perspectives and applications of IT to various aspects of biology, biodiversity, plant pathology and pest management, including two chapters on insect identification.

This book has "something for everyone," and individual articles cover topics as diverse as managing international quarantine information, geographic information systems (GIS), taxonomic applications of IT, the role of a professional society in IT, and