running throughout this volume is that variation in the length of favorable seasons is a critical factor determining patterns of insect life history variation.

Studies of insects have generated new ideas and approaches in community ecology as well as in the narrower area of life history patterns. Comparing hispine beetle co-occurrences on rolled leaves with frequencies of co-occurrences expected randomly, Strong concludes that interspecific competition has no apparent influence on hispine distributions. Simberloff also reports data that are consistent with a null hypothesis of randomly assembled arthropod communities. On the nonrandom side, Simberloff shows that good colonizers of mangrove islands tend to be both good dispersers and good persisters. Tallamy and Denno connect species-specific overwintering strategies to the organization of a guild of sap-feeders in *Spartina* marshes, suggesting that coexistence is maintained in part because severe winters keep the community "in a state of nonequilibrium."

I cannot think of a book that better illustrates current fads in ecology, touching on topical issues such as nonequilibrium communities, plant-herbivore coevolution, null hypotheses of community organization, island biogeography, and, of course, life history theory. But this is much more than a trendy symposium publication; it is a well-edited and revealing portrayal of evolutionary approaches to understanding life history patterns in general.

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Centennial Contributions

The Evolving Earth. L. R. M. COCKS, Ed. British Museum (Natural History), London, and Cambridge University Press, New York, 1981. viii, 264 pp., illus. Cloth, $72.50; paper, $22.50. Chance, Change and Challenge.

The Evolving Biosphere. P. L. FOREY, Ed. British Museum (Natural History), London, and Cambridge University Press, New York, 1981. viii, 312 pp., illus. Cloth, $79.50; paper, $24.95. Chance, Change and Challenge.

The British Museum (Natural History) has been celebrating the 100th anniversary of its move to South Kensington in 1881, and one of the events marking the occasion was the publication of these two volumes. Written largely by staff scientists at the museum, both books are collections of essays that "do not set out to review the research output of the last century, neither are they intended to serve as text-books," in the words of R. H. Hedley, the museum's director, in the foreword that appears in both volumes. After reading the books I was left wondering precisely what purpose each might be expected to serve.

Though the books are unified by the overtitle Chance, Change and Challenge and have a single overall editor (P. H. Greenwood) and identical formats (the artwork is generally good and reminiscent of the style of, say, *Scientific American*), there is little other reason to consider them together. *The Evolving Earth* is a tome useful to a broad spectrum of readers, from interested laypersons through professional scientists. *The Evolving Biosphere*, on the other hand, hardly contains a single contribution of truly general interest. The reason for such uneven success in such a highly coordinated publishing effort seems to be what the authors and editors made of the word "evolving." "The evolving earth" seems to have inspired something of a fresh approach to the salient features of earth history, whereas "the evolving biosphere" evoked merely another potpourri of articles (some of them, to be sure, quite good) on specific aspects of the evolutionary process.

The Evolving Earth consists of 15 chapters organized into five sections. Each section is separately introduced, and it is in these introductions (as in those in the other volume) that we find some of the better and more informative writing. For example, Jefferies and Cocks, in their introduction to part 2—The Evolution of Continents—draw an amusing, but telling, parallel between their section, which "starts with the largely molten world of the Pre-Archaean, more than 3800 million years ago, and finishes with the soils round Hemel Hempstead in Hertfordshire," and the Book of Genesis: as one gets closer to the present, the story told becomes more recognizable and prosaic—and hence more believable. And M. K. Howarth's introduction to part 4—Continental Drift and Plate Tectonics—forcefully reminds us just how much our views of the earth and its history have been altered in very recent times: he quotes a 1959 statement by the secretary of the Mohole Committee predicting that oceanic sediments "could contain an uninterrupted record of the earth's development for two thousand million years . . . if palaeontologists can obtain cores of fossil-bearing strata considerably older than Cambrian sediments, one of their fondest dreams will be realized." As recently as 1959 no one had the faintest idea that no part of the present-day ocean basins is older than 200 million years.

The Evolving Earth is successful because chapter after chapter takes some major aspect of the physical earth—its ocean basins, its atmosphere, its climate, its sediments, and so on—and traces what we think we know about how they have changed through the past 3.8 billion years (the age of the oldest rocks so far discovered) to become as we find them today. There is, throughout, a spirit of open inquiry: rather than the usual litany of linear historical "events," one reads constantly of the dilemmas and uncertainties that beset the student of the earth's remote past. The chapters are rich in details, but usually the general points emerge clearly. To take but one example, I approached chapter 4, "The evolution of sedimentary environments" (by Cocks and Parker), warily: after all, how can sedimentary environments be said to "evolve" in any meaningful sense? But, thinking of "evolution" simply as "change through time," the authors told me that the relative proportions of the several major sediment types have changed rather drastically over the eons. Virtually all the chapters of *The Evolving Earth* have much food for thought as we share the authors' struggles while they grapple with various changes through geologic time.

The latter part of *The Evolving Earth* looks at process—plate tectonics—before reverting to history: the differential movement of plates through time, and the changing positions of lands and seas. Here I was entranced by the handling of the views of H. G. Owen, a staff member of the museum and one of the few voices crying out in the wilderness in favor of the notion of an expanding earth. Owen thinks that 200 million years ago the earth's diameter was only 80 percent of what it is today. He bases his claim on the better fit of the continents he obtains using his model of a reduced diameter for remote times. Owen sets his views out nicely in his own chapter, but it is his colleagues' treatment of them that proved to me to be one of the more appealing features of the book. In his frank introduction to part 4 Howarth tells us of the relative unpopularity of Owen's ideas, remaining tantalizingly neutral himself. But Howarth's own chapter on the palaeogeography of the Mesozoic, in which he prefers a model of a constant-diameter earth, nevertheless

uses several maps supplied by Owen to contrast the resultant differences in paleogeography. One major difference is that that familiar old seaway known as Tethys is purely epicontinental according to Owen's maps, while we must invoke subduction of oceanic crust to explain Tethyan closure if we use conventional maps. The result of Howarth's willingness to state his preference without being closed-minded, an approach seen in a number of other chapters in this volume, is a model of good science writing—and might also serve as a model for all of us seeking to characterize the scientific endeavor.

I cannot say as much for most of the chapters of *The Evolving Biosphere*. Conflict, to be sure, can be found here: there are "cladists" and "evolutionary taxonomists," "vicariance" and "dispersalist" biogeographers, even "gradualists" and (semi-, at least) "punctuationalists." But there is little verve—certainly nothing to recall the recent public spectacle in which some critics of the exhibition policy of the museum have (wrongly) equated "cladistics" with "punctuated equilibria" and the latter with, of all things, Marxism. In this volume we get no histories of biological systems through time (except some restricted examples) such as *The Evolving Earth* provides with respect to geology. We do get interesting discussions, such as Greenwood's spirited introduction to the section curiously entitled Coexistence and Coevolution, where he examines some of the problems some people find with natural selection as a viable scientific notion. Throughout the book, though, natural selection is used, but nowhere does anyone bother to discuss it or even to tell us what he thinks it is. Thus, though many chapters scrutinize aspects of the evolutionary process, there is little attempt in any of them to relate the discussion to any of the several major issues in contemporary evolutionary theory. The book, in short, eschews the notion of "evolving" evinced in *The Evolving Earth*, and, in focusing primarily on processes rather than on pattern, provides little that is novel, stimulating, or useful as a comprehensive review.

Individually, however, many of the essays of *The Evolving Biosphere* are of respectably high quality. I especially liked B. R. Rosen's handy and comprehensive summary of all the various sorts of ideas ever entertained to explain why there are more different kinds of organisms in the tropics than in the higher latitudes. But, too often, most readers are likely to find these chapters hard going—too rough in view of the rewards to be gained.

Indeed, few of the chapters of either book can be considered an easy read. It is my feeling, though, that the essays of *The Evolving Earth* repay the effort more often than not, but that the same, unfortunately, is not true of those in *The Evolving Biosphere*.

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