in a handier format, it would stand even stronger as a classic in the ever-growing field of butterfly conservation and sustainable development. Either way, I'm glad Mike Parsons went to Papua New Guinea and came back to write about it, and I hope he will go again and be given the chance to follow through on his recommendations for *O. alexandrae*. His strong call for real habitat conservation instead of deflective regulations is heartening at a time when bureaucratic reaction to sampling intensifies. And his call for all lepidopterists to "adopt a policy of actively caring for the 'goose that lays the golden egg'" is something we certainly need to hear and heed.

ROBERT MICHAEL PYLE, *Swede Park, 369 Loop Road, Gray's River, Washington 98621-9702.*

Journal of the Lepidopterists' Society
50(2), 1996, 159–161

BUTTERFLIES AND CLIMATE CHANGE, by Roger L. H. Dennis 1993. Manchester University Press, Manchester. 301 pp., 25 × 38 cm. Hard cover, ISBN 0-7190-35058, £50 (about $80 US); soft cover, ISBN 0-7190-40337, $39.95 US (distributed by St. Martin's Press, New York, NY).

The day my review copy of *Butterflies and Climate Change* arrived, I happened to commiserate with a colleague about the poor intellectual health of ecology. I complained that almost every other branch of biology had progressed more in the past 25 years than had ecology. "True," she said, "and the biggest breakthrough ecology *has* made is the rediscovery of history."

Since the eighteenth century, biogeographers have recognized that the distributions of plants and animals have two components: history and ecology. History determines whether an organism has the opportunity to live in a place: ecology, whether or not it does. Somehow this simple truth evaded a whole generation of ecologists, who in their search for mathematical elegance in the structure of the biosphere had no taste for the messiness of historical contingency. But it forced itself on them; for lack of it, their oversimplified research program failed. Now history is suddenly trendy. Roger Dennis is to be congratulated for doing ecohistory long before it became trendy.

The British Butterflies: Their Origin and Establishment (E. W. Classey, London, 318 pp.), Dennis' first major excursion into ecohistory, appeared in 1977. That happened to be the centenary year of Samuel H. Scudder's first paper on the fossil insects of the Scarborough Bluffs, a paper generally considered the beginning of paleoentomology as a discipline. When Scudder died, he was eulogized (in *Science*, 1911) by T. D. A. Cockerell as the entomological equivalent of the three great vertebrate paleontologists Leidy, Cope, and Marsh combined. We lepidopterists tend to remember Scudder as one of the nineteenth century's greatest butterfly workers. He combined his two passions in early studies of fossil butterflies and attempts at lepidopteran phylogeny reconstruction. As a former student of Louis Agassiz, the intellectual father of the Ice Age concept, Scudder was very aware of the heavy hand laid by the glaciers on the New England landscape, and he speculated on Pleistocene influences in butterfly biogeography. It was he who told and retold the tale of the White Mountain butterfly, *Oeneis melissa semidea,* as a living relict of the Ice Age. Nothing much happened in butterfly ecohistory for the next 90 years.

Meanwhile, paleovegetational reconstruction advanced; palynology (study of fossil pollen in bogs and other environments) and the study of plant macrofossils made immense conceptual and methodological strides. Beginning in the 1960s and largely as an offshoot of archeological digs, paleocoleopterology—the study of fossil beetles—joined paleovegetation as a tool for reconstructing ecohistory. This work, pioneered by G. R. Coope and H. K. Kenward in England, attracted little attention at first. Meanwhile, no one was finding rich troves of fossil butterflies in peat or early man's kitchen middens, and butterfly biogeographers seemed preoccupied with the then-trendy question of why there were so many species in the tropics.

Because we lacked real fossil data, butterfly workers were reduced to the role of consumers of the stuff palynologists, paleobotanists, and eventually paleocoleopterists would produce. But by the mid-1960s it had dawned on some of us that we could use that stuff to try to understand butterfly distributions in temperate and high latitudes. The first major breakthrough was *Geography of the Palearctic Papilionoidea* by A. S. Kostrowicki, published in English in Warsaw in 1969 and to this day read by almost no one. In 1970, before I had heard of this book, I published a little paper (*J. Res. Lepid.* 9:125–155) on the historical biogeography of North American skippers associated with sedges. I remember wondering as I did this work why no one had thought of doing it before, when there was so much ecohistorical information out there.

Roger Dennis did the same thing, but for the *entire British butterfly fauna,* in his 1977 monograph. I should have reviewed that book in this journal but didn't. That, however, is probably not the reason it failed to create much of a stir; ecohistory was still on the fringes of respectability in 1977. Now it is "hot," and with a title like *Butterflies and Climatic Change* Dennis and the publishers can hope for healthy sales to the diverse group of scientists and amateurs preoccupied with global warming and other signs that the Last Judgment is nigh. Those who buy this book knowing nothing about butterflies will know a great deal when they are done reading it.

In it, Dennis seeks to define a conceptual structure in which butterfly-climate relationships can be analyzed, and then to use it to forecast the future of the British fauna. The first 40% of the book (Chapters 1–3) is devoted to this conceptual structure. It constitutes a quick lesson in meteorology and climatology, followed by a condensed textbook of butterfly biology with particular attention to coloration, thermoregulation (behavioral and physiological), and other topics Dennis considers relevant. He covers more butterfly ecology than is needed to make the point that butterflies are very vulnerable to density-independent mortality factors, i.e., weather. Some of the topics, such as pattern ground plans and ontogeny, are really extraneous and many have been better and more thoroughly covered recently elsewhere. The treatment of atmospheric processes, microclimate, and heat transfer is broad and inescapably superficial. These are quantitative topics not easily explained without mathematics—even a gifted writer like Bernd Heinrich has trouble—and Dennis has probably done as well as can be expected. He does steer us to sources, and, for the sophisticated, some of these, such as Joel Kingsolver's work, are a sheer delight; those who flunked or never took college physics need not pursue them.

The heart of the book is to be found in Fig. 4.3 (pp. 146–148), captioned "Colonization, extinction and evolution of British butterflies during the last glacial-interglacial hemicycle," and Table 4.1 (pp. 154–157), "Historical data for resident British butterflies for the last deglacial hemicycle." These are somewhat updated summaries of what was in the 1977 book, intended to allow us (in Chapter 5) to extrapolate to the future of the British fauna. Lacking our great-grandchildren's hindsight, we can still try to evaluate Dennis' claims by examining the assumptions he employs in arriving at them. After all, there are no fossils: past butterfly "data" are pseudo-data.

Dennis is aware that what he proposes to do is risky. On page 144 he states (correctly) that climatic correlations with species boundaries do not prove causation. Yet to do what he wants to do, one has little choice but to act as if they do. It is even more dangerous to assume that climatic adaptation is static in time. Paleocoleopterists and palynologists often act as if congruent morphologies imply identical climatic adaptations, but they know better. They know, for example, that pack rats in the southwestern United States just sat there, adapting repeatedly to the radical changes in climate and vegetation going on around them for millennia. They know too that many morphospecies of both plants and animals contain "ecotypes," ecological races which may be very different physiologically despite a complete lack of apparent markers. Suppose one found an isolated fossil *Papilio zelicaon.* Was it a multivoltine *zelicaon* from a subtropical-Mediterranean climate like San Diego's, or did it live at tree line? If it is found with other organisms they might be useful in defining the climate. But those who do this kind of work have had to admit the reality that multispecies paleoassociations sometimes combine forms with seemingly incompatible ecologies today—meaning either the prior existence of novel ecotypes or different climates from those extant today, or both.

Lacking fossils, Dennis has to use paleoclimatic reconstructions and knowledge of the climatic adaptations of extant species to try to reconstruct butterfly paleofaunas. This is more or less the inverse of what ecohistory data producers do, and it has no obvious reality checks.

In 1994 Scott Elias published *Quaternary Insects and Their Environments* (Smithsonian Institution Press, Washington, DC, 284 pp.; reviewed by B. Drummond in *News Lepid. Soc.* 1994:77). There is almost nothing about butterflies in it, but it should be read by everyone who reads the Dennis books. The mountains of paleocoleopterological data give us a fine lesson in humility. (The only pretenders to truth who fare worse than ecohistorians and paleoecologists are vicariance biogeographers.) The biggest problem turns out to be not changing climatic adaptation by morphospecies but vagility beyond our wildest dreams. An endemic Sicilian beetle with nothing at all to suggest it had ever been anywhere but Sicily turns out to have been in Britain during a warm interglacial. A related beetle now confined to the Tibetan Plateau was in Britain during a periglacial stage. And so on. How can we retrodict faunas when we cannot define the pool of potentially available players? Similarly, how can we hope to predict future faunas? The lack of fossils makes butterfly workers dependent on a handful of bizarre relicts to remind us how feeble our imaginations are. The fact that *Vanessa indica,* a patent relict in the Canary Islands and Madeira, was rationalized away as a recent introduction in commerce (Leestmans 1978, *Linneana Belgica* 7:130–156; Shapiro 1992, *Entomologist* 111:10–21) is a case in point.

Butterflies and Climate Change is a well-produced book. It is nearly free of typographical errors; I noted five plus a serious *lapsus calami* (*Colias* for *Colotis* on p. 207). The text is very dense and cannot be read casually. The bibliography is huge—some 1100 entries—and eclectic, but in some ways unsatisfying; hardly any non-English-language works are cited, and it is surprisingly light on paleoentomology (three Coope papers, no Kenward) and on the conceptual framework of paleoenvironmental reconstruction. On the other hand, it cites very recent theoretical papers in ecology and, as noted above, could even be used as a short text in butterfly biology in general. The fact is that once one begins doing a work like this, the limits to one's coverage eventually become arbitrary and highly personal. Had I written this book I would have a somewhat different, but no "better," set of " in" and "out" topics and citations.

I have only one public complaint about interpretation: on page 169 Dennis seems content to accept Shields' claim that all the butterfly families were already in existence in the Mesozoic. This may be true, but there are no fossils to support such a claim. It is strictly a backward extrapolation of evolutionary rates. But does anyone think rates of *adaptive* evolution are constant in geologic time?

Dennis is to be congratulated for an important achievement, even if I doubt the British fauna will behave predictably. It was G. K. Chesterton who described (in *Napoleon of Notting Hill*) the game of "Cheat the Prophet," in which the young people listen respectfully to the predictions of the sages, wait until the sages die, and then do something different. Perhaps British lepidopterists will need updated versions of Torben Larsen's Mid-East or tropical African butterfly books to identify the fauna of gardens in South Kensington!

One final observation: modern biochemical-genetic techniques ("phylogeography" or "genography") as applied to historical biogeography are rapidly rendering work of this sort obsolete. Arm-wavers like Dennis and me will have to go molecular or join an increasing number of butterfly species in oblivion.

ARTHUR M. SHAPIRO, *Center for Population Biology, University of California, Davis, California 95616.*

Journal of the Lepidopterists' Society
50(2), 1996, 161–166

BUTTERFLIES THROUGH BINOCULARS: A FIELD GUIDE TO BUTTERFLIES OF THE BOSTON-NEW YORK-WASHINGTON REGION, by Jeffrey Glassberg. 1993. (Forward by Edward O.