

*Lysosomes* is intended for advanced students or other scientists wishing to gain a broader background in the general area of endocytosis and lysosome function. It is also useful, however, for many of us "modern era professionals" whose direct knowledge of certain topics (such as autophagy) is not always as well developed as it should be. In this respect, it is nice to see early electron micrographs (many from Holtzman's own work) that show organelles that have been periodically rediscovered in subsequent years. Of course, the functional significance of many structures—such as tubular extensions on endosomes, presumably involved in the recycling of internalized material back to the cell surface—could not have been appreciated without recent insights into the pathway of receptor-mediated endocytosis.

*Lysosomes* is not a literature review. The text is devoid of citations of the primary literature, although lists of fundamental references are provided at the end of each chapter. The absence of citations, or even association of individual ideas with the workers responsible for them, is at times frustrating, since it can be difficult to check the basis for a number of controversial statements. It may also be difficult for students to direct their subsequent reading from these non-annotated lists. Nevertheless, Holtzman's book is a unique and valuable source to which one can refer for information on almost any question pertaining to lysosomes.

Not unexpectedly, one can find a variety of small errors of fact, interpretation, or omission, especially in sections dealing with more recent aspects of lysosome biology. Among these are: (i) the contention that sulfatides secreted by *Mycobacterium tuberculosis* are still thought by many to inhibit phagosome-lysosome fusion; (ii) a strange reference to the AIDS "organism"; (iii) failure to mention that one major reason for concluding that newly synthesized lysosomal enzymes exit from the *trans* face of the Golgi stack is that they are terminally glycosylated; (iv) the omission of Wollman's syndrome (acid lipase deficiency), which leads to impaired cholesterol transport out of lysosomes, as a lysosomal storage disease; (v) failure to emphasize that lysosomal membrane components are likely to be transported in a manner entirely different from soluble lysosomal enzymes; (vi) underestimation of the degree of skepticism that exists concerning endocytosis of fluorescent tracers in yeast; and (vii) the claim that antibody-coated virus always replicates more poorly than uncoated virus—for infection of Fc receptor-bearing cells, the opposite is often true.

Perhaps my only serious criticism of the

book, however, pertains to its overall organization. Even allowing for the difficulty of constructing a linear, logical account of such a broad area, one cannot help but feel that *Lysosomes* could have been arranged more economically. The book is written in a pleasant narrative style that at times seems to require a good deal more effort to get points across than the more Spartan prose one is used to. Holtzman also tends not to deal completely with any one issue in one place (though there is extensive cross-referencing to compensate for this). The decision to defer until the end a consideration of recent concepts pertaining to lysosome biogenesis may be partly to blame, since it was necessary to utilize portions of this information in earlier chapters; the opposite arrangement might have made for fewer redundancies—you do not need to understand autophagy in order to appreciate how the mannose-6-phosphate receptor works. Holtzman also does not always clearly distinguish issues of great current importance from those that remain ill-defined or are less important. Finally, there is no overall summary (such as

a diagram) of how the author believes the pathway of lysosomal targeting actually looks at present. A great deal of information that is dutifully described and clearly analyzed is never integrated. Nevertheless, almost everything that one needs to know about lysosomes and intracellular pathways to lysosomes can be found somewhere in the book, and referring to it will still prove far more efficient than referring to the confusing and often contradictory primary literature. This is justification enough for anyone who has more than a passing interest in lysosomes to look carefully at this monograph.

In science as it is today taking the time to read a book devoted to a single subject has come to represent something of a luxury. Writing one is an admirable if almost altruistic act for which the rest of us should be grateful, and it should inspire us all to read once again.

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## Conservation Needs Close to Home

**Conservation Biology in Hawai'i.** CHARLES P. STONE and DANIELLE B. STONE, Eds. University of Hawaii National Park Resources Studies Unit, Honolulu, 1988 (distributor, University of Hawaii Press, Honolulu). xxiv, 252 pp., illus. Paper, \$16.

**Islands in a Far Sea.** Nature and Man in Hawaii. JOHN L. CULLINEY. Sierra Club Books, San Francisco, 1988. xiv, 410 pp., illus. \$24.95.

**Hawaii.** The Islands of Life. GAVIN DAWS. Signature, Honolulu, 1988 (distributor, Publishers Group West, Emeryville, CA). 156 pp., illus. \$29.95. Produced by the Nature Conservancy of Hawaii.

The 1980s have seen the rise of scientific and public concern over biodiversity and growing efforts to preserve some fraction of diverse tropical ecosystems. These efforts are sometimes perceived as the industrialized world dictating to developing nations. Ironically, the United States itself possesses a rich, biologically unique tropical system—the Hawaiian Islands. The endemic biota of Hawaii has been tragically damaged by human action, and conservation efforts there are relatively poorly developed. These three books each present compelling arguments for the uniqueness of Hawaii's biological heritage and the urgency of the need for immediate conservation action.

*Conservation Biology in Hawaii* stresses throughout the woeful ignorance (on the part of residents and visitors alike) of Hawaii's biological character and uniqueness. Stone and Stone seek to provide a resource, particularly for educators, that can serve as an introduction to the richness of Hawaiian nature. The book is highly accessible—each chapter uses a few pages to introduce an ecosystem, a group of organisms, or a particular conservation problem. Scientific terms are highlighted in the text and defined in the glossary; citations are few but relevant. Public ignorance is a partial reflection of gaps in scientific knowledge; many chapters call for surveys, systematic work, and basic biological studies to inform conservation efforts for Hawaiian taxa. Two valuable chapters by Loope and Carson describe the importance of colonization, endemism, speciation, and extinction cycles in the islands' biota; Carson speculates that perhaps this history of repeated founder effects and bottlenecks has reduced the vulnerability of some Hawaiian taxa to inbreeding depression. (They need such an advantage, given the dire state of many species today.) The book closes with some unusual and helpful sections on policy and implementation (for example, a discussion of practical problems of limiting alien species, by Smith), the need for direct coordination with the tourism

industry, and the role of conservation education (the niche of this book) and a review of Polynesian cultural values that are stimulating new assessments of the island environment.

Culliney's *Islands in a Far Sea* is more a substantial narrative than a resource book. Chapters focus on Hawaiian ecosystems (marine, lowland, freshwater, montane) and associated biota; evolutionary history, ecology, history of human impacts, and current status are explored in language suitable for the non-scientist but with enough rich detail to satisfy a biologist. References from the scientific literature are thorough, current, and well chosen.

Both books survey the unparalleled diversity of Hawaiian life, from the well known (the spectacular radiations of endemic honeycreepers, tree snails, lobelioid forest plants, and drosophilid flies) to the obscure (the small fish and invertebrates climbing thousands of feet up rushing streams and waterfalls to breed in fresh water, or the endemic insects of lava tubes, recently evolved from surface forms). Both also tell of the overwhelming impact of European colonization and exploitation; the frontier-conquering spirit that devastated Laysan Island, for example, has the resonance of a Wild West setting. More surprising is the evidence of massive ecological disruption by the Polynesians—agricultural clearing, huge irrigation works, and the relentless killing of native birds for feathers all refute the idea of a gentle people living in perfect harmony with a benign environment.

Even more saddening are the examples of the destruction of native biota during a period (1960 to the present) when Hawaii's uniqueness has been well understood and conservation has been of public concern. Culliney saves his harshest words for developers and state agencies who are making decisions with irreparable consequences. For example, the importation of non-native ungulates and their maintenance as a game resource in vulnerable native forests has been allowed or even encouraged by state agencies, despite direct conflict with critically endangered forest birds and high-elevation plants. Recent development of coastal resorts has destroyed a major fraction of known anchialine systems, brackish pools supporting a fragile and unique community of invertebrates, only recently described and not yet well understood. Similarly, astronomical and other activity on Mauna Kea's summit is destroying another unique and scarcely known ecosystem; a complex group of invertebrates survives there as aeolian scavengers on whatever insects are blown to the summit from lower elevations. The primary threats to Hawaiian nature (habitat



The long-billed iiwi and a flower of ohia lehua. [From *Hawaii: The Islands of Life*; photo, David S. Boyton]

destruction, introduced diseases, non-native predators and grazers) are dealt with thoroughly.

Scientific expertise is badly needed to provide a basis for conservation decisions. The entire genus *Achatinella*, comprising the diverse tree snails of Oahu, has been listed federally as endangered for seven years; at least half the species are extinct and the others are succumbing to an introduced carnivorous snail, but no recovery plan has yet been written. Similarly, huge efforts are dedicated to captive propagation and releases of the Hawaiian goose, the nene, but there is no understanding of why released birds fail to reproduce.

The third book, *Islands of Life*, was produced by the Nature Conservancy, with proceeds to go toward land preservation in the islands. The title refers both to the

archipelago and to the preserves or fragments of natural areas painstakingly acquired—or yet to be established. The text is brief and is lyrical rather than technical—only Hawaiian or common names are used, and the threats to Hawaii are mentioned rather than dwelt upon. The photography is a stunning evocation of the beauty of native Hawaiian landscapes and life forms. It is certain to create a desire to see firsthand these places and unique beings; the loving photography of pristine Hawaii, however, will not prepare first-time visitors for the unlikelihood of seeing native birds or native forest without deliberate effort to get away from tourist locations.

Hawaii's story is a melancholy one, of finite island ecosystems and the irrevocable damage caused by introduced predators, plants, and disturbance; of the loss of the chance to study evolutionary patterns richer than those of the Galapagos; and worst, of the replacement of the unique by the weedy, so that a visit to Oahu might be a visit to any densely populated tropical area—Bermuda, Mexico, Asia. The message of these books is not defeatist, but a call for acknowledgment and preservation of what remains of Hawaii's uniqueness. Those who call for halts to tropical deforestation or who desire to contribute to the scientific basis of conservation efforts might do well to focus their expertise on the Hawaiian biota, whose evolutionary complexity is unrivaled and whose plight is as desperate as that of any tropical assemblage.

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## A Cladisticization

**Phylogenetic Relationships of the Lizard Families.** Essays Commemorating Charles L. Camp. RICHARD ESTES and GREGORY PREGILL, Eds. Stanford University Press, Stanford, CA, 1988. xvi, 631 pp., illus. \$80. Based on a symposium, Knoxville, TN, Dec. 1982.

One of the greatest scientific enterprises is the attempt to understand how the biosphere came to be as it is. To pursue this goal, we need to know how organisms, both previous and present, are genealogically related to each other. Such a map of the past, even if incomplete and not entirely accurate, is essential if we are to consider such questions as whether there are regularities in the way things evolve and, if so, what factors have been responsible for restricting change to produce such patterns. Attempts to devel-

op such schemes of relationship—phylogenies—have been made since the appearance of the *Origin of Species* but fell from favor in English-speaking countries about 60 years ago. Renewed interest came with the 1966 translation of Willi Hennig's *Phylogenetic Systematics*. This was a much-expanded version of a book originally published in 1950. In fact some of the ideas that this second edition contained were already available in English. For instance, Paul Maslin had discussed how to recognize primitive and derived states of taxonomic characters in 1952. But it is an oddity of intellectual advance that a long, obscure text, preferably translated from another language, often has proportionally more effect than concise and lucid accounts.

Hennig's methods, which were subse-