actions in their interiors, with which they enrich the interstellar medium through mass loss, and generally reach such high luminosities that, despite their relative scarcity, their light dominates the optical spectra of distant galaxies.

In recent years, high-resolution spectroscopy, aided by advances in the theory of stellar atmospheres, has revealed the great complexity of the physical conditions and the chemical abundances of red giant surfaces, while computer modeling of their interiors has provided a link with the theory of stellar evolution.

This active and multifaceted field is the topic of this symposium proceedings. The book contains 50 contributions divided into sections on the evolution and composition peculiarities of red giants: red giant variability and envelope dynamics; winds, chromospheres, grains, and mass loss; red giant masses; and red giant remnants.

The book begins with a review by I. Iben of the physical properties of red giant interiors, with particular emphasis on problems of nucleosynthesis and mixing. The highlight of the paper and of the first section of the book is the discussion of the origin of the carbon stars observed by Blanco and McCarthy, Richer, and Frogel and his co-workers in the Magellanic clouds. The difficulties in reconciling current theoretical models with the observations point to a promising field for future research.

B. Gustafsson then discusses atmospheric theory, emphasizing the need to clarify the little-known consequences of density inhomogeneities, non-LTE (local thermodynamic equilibrium) effects, and molecular absorption on the structure of the photosphere of red giants. The section also includes two detailed reviews of the problem of chemical abundances, one by D. Lambert on the observed effects of the first dredge-up phase, the other by J. Scalo on the more general topic of abundance peculiarities. Scalo's attempt to classify these peculiarities and to identify them with specific mixing mechanisms is a welcome addition to the literature on the subject.

In the second section, six papers treat the observations and dynamics of the reddest among red giants, whose envelopes are known to pulsate and in the process to eject a substantial amount of mass into interstellar space. This discussion introduces the third section, which is concerned with quiescent mass loss. Here considerable progress in both the variety and the quality of observations of mass loss is described. The situation is much less satisfactory on the theoretical side. Several mechanisms are described that may play a role in different physical contexts and may even interact with each in complex and still poorly understood ways.

The contributions on stellar masses stand apart from the others. The physical situations discussed are fascinating in themselves, but it is still difficult to assess at this point what impact if any this research will have on the broader astrophysical picture.

The book ends with six contributions on the evolutionary status of planetary nebulas, viewed here as red giants that have recently lost most of their envelopes.

One of the unavoidable drawbacks of such proceedings is the uneven treatment given to various topics. Little is said in this book, for instance, about old disk and halo population stars, about chemical inhomogeneities among globular cluster red giants, or about the physics of the helium core flash, all very active areas of research at this time. But within these limits *Physical Processes in Red Giants* is an excellent survey of current research in the field, highly recommended as reading in any graduate course in stellar physics.

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Biota of Hawaii

Island Ecosystems. Biological Organization in Selected Hawaiian Communities. DIETER MUELLER-DOMBOIS, KENT W. BRIDGES, and HAMPTON L. CARSON, Eds. Hutchinson Ross, Stroudsburg, Pa., 1981 (distributor, Academic Press, New York). xx, 584 pp., illus. $34. US/IBP Synthesis Series, 15.

By far the most provocative parts of this book are the final two chapters by Mueller-Dombois. In these some old ideas are aired in a modern context. The discussion is sometimes unconvincing but will be of benefit as a thought-starter to both academic nesologists and government personnel entrusted to conserve and manage island ecosystems.

Mueller-Dombois suggests that the stability of island ecosystems (meaning resistance to invasion by exotic pest species) is probably unrelated to species diversity because pest species have narrow requirements and most communities offer a low diversity of potential host species. Other questions discussed are: Is it possible to restore some of the original vegetative cover if stresses introduced by humans are removed? Can relict stands survive under protection? Is the extinction of island biota inevitable? Is there a way to predict which exotic organisms, once introduced to islands, have the potential to become disruptive invaders? What makes some island ecosystems more stable than others?

Early naturalists like Darwin and Wallace argued that indigenous species on islands are inferior competitors to species evolved on continents. Mueller-Dombois rejects this thesis and points out that other kinds of ecological interactions, especially with herbivores, can tip the balance on the side of exotic competitors. The leitmotiv of this book is succinctly put (p. 500): "If humans had not entered the island environment as a new dispersal agent, island ecosystems could be considered biologically very stable." With this I concur.

Hawaii in 1778 (the year of its discovery by James Cook) had Polynesian humans living on it but no other mammals (except for one bat species), an avifauna rivaling that of the Galápagos in peculiarity, and a lush tropical green mantle. The key to the survival of many native species on Hawaii appears to be the Koa and ʻŌhiʻa forests, which have suffered a dramatic decline through farming, urbanization, and browsing by introduced mammalian herbivores.

The bulk of the book consists of extensive ecological details on the present-day biota, covering an impressively wide variety of organisms—vascular plants, birds, rodents, ectoparasites of rodents, canopy-associated arthropods, arthropod predators of seeds, wood-boring beetles, various flies including *Drosophila*, soil arthropods, terrestrial algae, and soil and leaf fungi. As one would expect, some are studied inadequately. There are four themes: distribution and abundance along an elevational transect; the allocation of niches in the forest; phenology; and genetic variation. The coverage of this last subject is not broadly based, as nearly all the papers deal with the very diverse *Drosophila* fauna. I would have hoped for comparable studies on the ecological genetics of the surviving indigenous bird and snail faunas.

This book will make students of island ecology cast an envious eye upon the Hawaiian archipelago, for here is a large quantity of base-line data that will aid biological conservation in the islands and also permit meaningful comparative studies with other islands in the archipelago and elsewhere in Polynesia.

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