

necessity for such a high price.

Few typographical or other errors were noted. One might, perhaps, question the author's repeated insistence that the endosperm, not being a part of the seedling, can have no significance in seedling classification. This is especially puzzling since mention of the endosperm and its behavior recurs constantly in his descriptions and his discussion of the criteria for his system.

This book presents the results of a tremendous effort and the gathering of a vast amount of information, and, as such, is a valuable addition to botanical literature. It can scarcely, however, be recommended as essential botanical reading to more than a very few persons.

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HAWAIIAN MARINE SHELLS. By E. Alison Kay. REEF AND SHORE FAUNA OF HAWAII. Section 4: MOLLUSCA. Bernice P. Bishop Museum Special Publication 64(4). Bishop Museum Press, Honolulu, 1979. 653 p. \$30.00.—This excellent volume is the second to appear in the Bishop Museum's new series, Reef and Shore Fauna of Hawaii, and it bodes well for the continued success of this ambitious venture. There are about a thousand species of marine molluscs in Hawaii, and even long-time students of tropical Pacific molluscs (like myself) will marvel at the book's breadth of coverage.

A concise introductory section briefly describes Hawaiian marine environments, with natural history notes on the predominant molluscs of each. The introduction also treats introduced species, the economic importance of molluscs as food, tools, and ornaments, and the distribution and historical biogeography of Hawaiian molluscs. Although several of the main islands have extensive fossil deposits, the sketchy information available suggests opportunities for productive future research on Pleistocene history. Kay hypothesizes the origin of the Hawaiian shallow water molluscan fauna from the western North Pacific, via early Tertiary stepping-stone islands now represented by seamounts between Hawaii and Micronesia. The evidence presented is suggestive but modest, and data on other taxa in future volumes of the series could bear fruitfully on this interesting hypothesis.

The longest section of the introduction, titled Historical Resumé, begins with the first knowledge of Hawaiian molluscs in Europe from the study of

specimens returned by Captain Cook's voyage, extends to the contributions of the author of the original Reef and Shore Fauna of Hawaii, C. H. Edmondson, and includes some events of the last century that indirectly facilitated my own initial researches on Hawaiian molluscs.

Kay tells of collecting by early missionaries and their offspring in Hawaii, and their socializing with naturalists of expeditions that called there. Missionary ships also ventured between Hawaii and other Pacific islands. Several of the missionaries were Yale men, and some sent shells back to the natural history collections of *alma mater*, later incorporated into its Peabody Museum of Natural History. These collections were reorganized and curated in the 1940's by the late Percy A. Morris, who used them as the basis for the Hawaiian section of his FIELD GUIDE TO SHELLS OF THE PACIFIC COAST AND HAWAII (1952). His increasing knowledge led Morris to realize that many species labeled in the Museum as having been obtained by missionaries in Hawaii were not known to live there. He was able to translate his concern for accurate locality records into a small sum that helped finance my initial studies on *Conus* in Hawaii (in 1954), in return for my making a collection of *bona fide* hawaiian marine molluscs for the Museum.

Most Hawaiian marine molluscs are prosobranch gastropods, and most of the systematic section of the book (400 pages) is devoted to them. Each species entry includes a streamlined synonymy, description of shell characters, habitat and habits, and distribution. There are keys to the genera of 8 families and to species of 3 others. If a species was originally described as endemic to Hawaii but this has later been debated, the author tends to side with the splitters. This is probably a wise policy, because if Hawaiian and central Indo-West Pacific forms are later shown to be conspecific, it is easier to lump after splitting than to partition the earlier published records of lumpers.

An unexpected feature of the section on gastropods is the description of 43 new species of prosobranchs, from 34 genera in 18 families. The author's well-known fondness for microscopic molluscs has now been brought to fruition: some of the newly described species have shells scarcely a millimeter long!

While the book emphasizes shells, 100 pages are devoted to the opisthobranch gastropods, whose major evolutionary trends have been toward loss of the shell. Kay describes one new species of

opisthobranch and provides 22 fine color photographs of Hawaiian species. These are her best illustrations, although some could have been larger. Almost all species mentioned in the book are illustrated with black and white photographs; their quality ranges from excellent to fair. Most are quite good, and the scanning electron micrographs of some of the smallest shells and of radulas are striking. Most of the illustrations are conveniently placed adjacent to the species accounts.

In the section on bivalves, many species described as new in the 1938 monograph of Hawaiian bivalves by Dall, Bartsch and Rehder are returned to their widely distributed Indo-West Pacific "parent" species. This action reduces somewhat the previous unusually high degree of endemism in the Bivalvia, compared with other taxa of Hawaiian

marine invertebrates.

The Hawaiian molluscan fauna contains only 4 chitons, 3 scaphopods, and 6 cephalopods. Some recently collected aplacophorans remain to be studied and are mentioned only briefly, and the Class Monoplacophora is as yet unknown in Hawaiian waters. A few molluscan families are known only from their pelagic veliger larvae; they offer intriguing possibilities for future research.

HAWAIIAN MARINE SHELLS culminates many years of patient and painstaking research by the author, who has served the interests of Hawaiian natural history—and Hawaii—with generosity and grace and in many ways.

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