"Ripening pods on cacao trees in a plantation, and in a pile after harvesting." [From *The Chocolate Tree*]

natural history of the tree, Young describes its biological features: cauliflory, or the growth of flowers directly from the trunk; a tendency toward self-incompatibility with respect to pollination; relatively large, football-shaped fruits; and spreading roots that accommodate mycorrhizal symbionts. Holes chewed by squirrels and monkeys and decaying plant material supplied by farmers provide breeding niches for the midges on which the tree depends for cross-pollination. Young recounts in some detail his research on cacao pollination, including investigation of the possible role of bees but focused mainly on various midges, including such topics as their breeding habits and the floral fragrances that attract them. A general conclusion he states is that "Because of cultivation practices in place for several hundreds of years, an imbalance exists between the flowering behavior of cacao trees, the spatial arrangement of these trees, and the natural behaviors of pollinating insects"; in other words, *Theobroma cacao* "is still ecologically tied to the rhythms of the rain forest," not the plantation. The book is illustrated with photographs, drawings, and color plates and includes an appendix giving common and scientific names of plants and animals mentioned in the text, a bibliography, and an index.

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intriguing biological story to tell." The role of humans in its dispersal from its natural habitat as a rain forest understory tree in Amazonia is uncertain, but its attractions include not only the seeds from which our familiar chocolate is produced but a sweet and nutritious pulp surrounding them. Today two main domesticated types, *criollo* and *forastero*, exist. Young devotes two chapters of his book to the history of cacao cultivation, carried out in Central (but apparently not South) America before European contact. Of both economic and symbolic importance in Mesoamerican prehistory, the plant today is cultivated throughout the humid tropics, generally on plantations of modest scale. Young discusses its place in the Costa Rican agricultural economy, describes the efforts of the Centro Agronómico Tropical de Investigaciones y Enzeñanza to improve its uncertain yield through selective breeding and other means, and outlines procedures used to process it for consumption. Turning to the

"*Theobroma cacao*. This drawing originally appeared in *Rerum medicarum Novae Hispaniae thesaurus* (1651) by F. Hernández. [From *The Chocolate Tree*, after R. E. Schultes, "Amazonian Cultigens and Their Northward and Westward Migrations in Pre-Columbian Times"]

The Biology of Tardigrades. IAN M. KINCHIN. Portland, London, 1994 (U.S. distributor, Ashgate, Brookfield, VT). xii, 186 pp., illus. $65 or £40.

Known in the vernacular by such names as water bear or moss piglet, tardigrades were among the first "animalcules" observed by Leeuwenhoek in his microscope. Over 300 years later these cylindrical-bodied aquatic creatures with four pairs of clawed legs remain of uncertain taxonomic affinity. In his introduction to this work Kinchin attributes the lag in research on tardigrades to their lack of economic or medical importance but notes a resurgence of interest in them, citing the 1983 publication, in Italian, of a monograph and six international symposiums in recent years. Arguing that the (presumably) phylum is of considerable evolutionary importance, Kinchin here sets out to "give a balanced view of the current state of knowledge" regarding it. The treatment begins with a discussion of the origins of the group (which is represented in the fossil record by only two species) in light of invertebrate evolution generally and of its systematics, there being two principal classes, distinguished on the basis of the presence or absence of dorsal plates, with some 750 known species. There follow chapters on external and internal morphology, reproduction and life history, cryptobiosis (important for survival in the fluctuating moist terrestrial environments some species inhabit), and ecology. Because of collecting difficulties deep-sea benthic species are relatively unstudied compared to those that inhabit mosses, soil and leaf litter, or other marine environments. The text ends with a brief summary of collecting and preserving techniques, a "Guide to common species," and an outline of future research needs, with respect to which the author sees "ample scope" for contributions by amateurs as well as professionals. These are followed by a glossary, a 19-page selective bibliography, and a subject index. The volume is extensively illustrated with drawings and electron micrographs and includes a number of tabular summaries.

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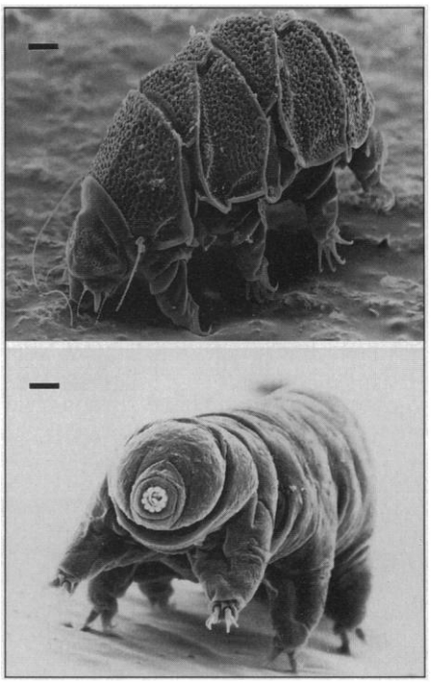

"Antero-lateral views of a typical limno-terrestrial heterotardigrade, *Echiniscus mauccii* (top) and a typical eutardigrade, *Macrobiotus tonollii* (bottom)." Bars = 20 μm. [From *The Biology of Tardigrades*; SEMs courtesy of Diane Nelson]