

may get some of the credit he deserves.

Hediger's book handles a wide range of zoo problems, from the completely practical to the philosophical. His arguments are strongly supported by a splendid selection of photographs. Like many European professors, however, he tends to be hard on colleagues who dare to differ. He hammers without mercy on the head of Hans Wackernagel, who is a proponent of artificial diets. But one suspects that Wackernagel's sin is not so much his advocacy of the Ratcliffe-Philadelphia diets as his location in Hediger's former parish. In spite of this special pleading, perhaps partly because of it, this work is a classic in the sparse zoo literature.

John Perry, a former management consultant who is now assistant director of the (U.S.) National Zoological Park, has written a book so full of common sense and tolerance that it is a pleasure to read. It is, however, rather formless, being a discursive collection of anecdotes and ideas, and the author has been poorly served by his publishers, who allowed it to appear without illustrations. Perry shows an exceptional grasp of the management difficulties and domestic politics of the American zoo business. He makes generalizations with a simplicity lacking in the more earnest professionals. He inflicts no wounds and takes a constructive attitude even in the least hopeful of situations. Like Hediger's book, his is so personal that one is apt to review the man rather than his work. Let us pray for the conversion of more management consultants.

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## Essential Accumulations

**Natural History Collections.** Past, Present, Future. A symposium, Washington, D.C., Oct. 1968. DANIEL M. COHEN and ROGER F. CRESSEY, Eds. Biological Society of Washington, National Museum of Natural History, Washington, 1969. Illus. Paper, \$4. Proceedings of the Biological Society of Washington, vol. 82, pp. 559-762.

Space-consuming accumulations of dead animals, fossils, and dried plants, the tools of the systematist and evolutionist, are not held in the same high esteem as scintillation counters or electron accelerators, but as man modifies and pollutes the environment they may provide the only records we have of the disappearing fauna and flora. This symposium deals with the problems of preserving such records.

The recent shift of research emphasis in systematics and evolutionary biology as it affects ornithological collections is well presented in these proceedings by R. L. Zusi. Bird species, unlike most groups of invertebrates, are well known. Whereas in the past only the skin with feathers was preserved, present needs are for collections of skeletal material, collections of tissues and organs preserved in alcohol (esthetically not so pleasing as stuffed skins), tapes of bird songs, and x-ray pictures to resolve the many problems of phylogeny which remain puzzling. On the applied side, the medical requirement for parasite collections is discussed by W. W. Becklund. The collections are needed for studying what parasites cause or transmit disease, their distribution, their diagnostic features, and the hosts parasitized and for determin-

ing whether a species is new to science. In his report on electronic data processing R. B. Manning discusses the use of computers for storage and retrieval of data concerning stored specimens.

The vast use that is made of natural history collections is indicated by the report that 372,886 lots or specimens were loaned by the U.S. National Museum in 1967 and that 1195 students used its collections during a single year. The importance of the national resource that collections constitute is pointed out. The growth of collections and the increasingly burdensome and costly housekeeping are discussed by several authors. It is suggested that most collections could be housed in less expensive quarters away from exhibitions.

The symposium published here is somewhat one-sided, all the participants being members of the Smithsonian Institution or other government agencies. It is pointed out in the book that 34 percent of the herbaria are owned by government institutions and 59 percent are university facilities. (No comparable figures are given for zoological collections.) Although not so large as the government institutions, the university museums are probably in the majority. Many of these museums were originally started in agriculture schools to aid in determining plant and animal pest species. Their growth, especially in recent years, attests to their value in training and assisting new generations of biologists for systematic, evolutionary, and environmental studies.

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## Chartings of Progress

**A History of Technology and Invention.** Progress through the Ages. MAURICE DAUMAS, Ed. Translated from the French edition (Paris, 1962 and 1964) by Eileen B. Hennessy. Vol. 1, The Origins of Technological Civilization (xii + 596 pp., illus.). Vol. 2, The First Stages of Mechanization (x + 694 pp., illus.). Crown, New York, 1969. \$10 each volume.

As each new multivolume history of technology is published—this is the third in recent years—it becomes more

amusing to read the editors' protestations regarding the uncertain state of knowledge in this new field of study. To those of us who have bet our careers upon the viability of the field as an intellectual discipline, however, the amusement is tempered by the uneasy feeling that, in a fundamental sense, the editors are right. The work under review compares very favorably with other histories of technology, but it does not bring us much closer to un-

derstanding the relations between technology and the social milieu in which it exists. Before arguing the point, however, let us look at the books themselves.

These are translations of the first two volumes of the projected four-volume *Histoire Générale des Techniques*, published by the Presses Universitaires de France. Most of the authors of individual chapters are scholars in French universities or museums; three or four are engineers not in universities. The editor is chief curator of the technical museum of the Conservatoire National des Arts et Métiers, in Paris.

The first volume departs radically and refreshingly from the usual preoccupation with Mediterranean origins