Pandas in Captivity

Men and Pandas. RAMONA MORRIS and DESMOND MORRIS. McGraw-Hill, New York, 1966. 223 pp., illus. $7.95.

The lovable, enigmatic, bizarre giant panda (*Ailuropoda melanoleuca*) has seduced the affections of the world more quickly and with more élan than any other animal. It was "discovered" for the western world in 1869 by that indefatigable French priest Abbé Armand David (who also discovered the Chinese deer named for him). David sent panda skins and skeletons to the Museum of Natural History in Paris. Since that date the panda has become one of the leading contenders for the all-time international favorite. It is, as the authors say, "as much loved as it is little known."

Desmond Morris, formerly curator of mammals at the London Zoo, and his wife Ramona have written an absorbing book about this amazing beast. They have assembled and analyzed reams of fact and fiction concerning the panda, and out of their labor of love has come a lucid, comprehensive history of the panda and its relation to man. The book is well organized, following the history of the panda as known in the western world, beginning with the small cousin of the giant panda, the so-called red panda or lesser panda (*Ailurus fulgens*). The chapter on the "discovery" of the giant panda starts with a discussion of the beast in Chinese literature and history. Following in logical sequence are accounts of the early panda hunters, the so-called sportsmen who went out to shoot specimens for museums. The chapter on "the panda pursued" tells the story of the race between Floyd Tangier Smith and Ruth Harkness to bring the first live panda to America or Europe. Mrs. Harkness succeeded, and brought to this country Su-Lin, the panda that became the object of so much affection at the Brookfield Zoo in Chicago. (My predecessor as director of the National Zoological Park, William M. Mann, had the pleasure of Su-Lin's company in his apartment for an evening when Ruth Harkness was trying to find a home for her prize and offered it to the National Zoological Park. Mrs. Harkness and the panda spent a delightful evening with Dr. and Mrs. Mann; however, since in those days the entire annual budget for the purchase of animals was $3000, the Manns could only sit and drool. This is the closest the National Zoo has ever come to having a giant panda, although the lesser panda has been exhibited here and has reproduced.)

Three chapters follow on the panda in captivity in America and London in the post-World-War-II days. They outline the history of the animal in captivity, its food habits, its relationship with its keepers, and in particular the development of the "cult of the panda." The Morrises pay particular attention to this interesting facet of natural history, that is, the relations between humans and the animal.

The last two chapters, on the panda as an animal and on the appeal of the panda, were the most interesting to me. There is a question whether the panda is a bear-like raccoon or a racoon-like bear. The Morrises present both sides of the discussion and leave the conclusion to the reader. However, they do admit that they favor the raccoon side of the family. The description of the anatomy of the panda emphasizes not only the distinctive coat markings but also the specialized intestinal tract and dental development, both apparently adapting the animal to its restricted diet of bamboo. There is an interesting discussion of the "sixth claw" of the panda, which is not a claw but a special development of the footpad and the wrist bone which functions like an opposite thumb, permitting the animal to carry food to its mouth. The Morrises devote considerable space in this chapter and elsewhere in the book to the difficulty of determining the sex of giant pandas. In the zoo world, the pandas' "changing" sex is both a joke and an embarrassment.

The book has three very useful appendices: a concise chronological history of the panda; a list of all pandas that have been brought out of the Orient, and their longevity; and a list of the bamboos which are known to be acceptable as food for pandas. There are a good bibliography and an excellent index.

It is unfortunate that the text was completed too soon to include the information about the pandas in China which was brought back in September 1965 by Caroline Jarvis, editor of the *International Zoo Yearbook* (published by the London Zoo), who had visited Chinese zoos. Her findings, however, are summarized in an appendix, where there is also a brief reference to the attempt to mate the London panda Chi-Chi with the Moscow panda An'-An'.

This book amply demonstrates the need for extensive field studies of the panda, and it is to be hoped that Chinese zoologists are engaging in this work.

The authors evidently love their subject. They write well and wittily. This is a thoroughly readable popular book which more serious readers can use as a springboard for further reading. Stories about the people associated with the panda would never appear in the scientific literature and yet they add much to the history and mystique of the animal.

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Chinese Medical History

Huang Ti Nei Ching Su Wen. The Yellow Emperor's Classic of Internal Medicine. Translated from the Chinese, with an introductory study by ILZA VEITH. University of California Press, Berkeley, 2nd ed., 1966. 282 pp., illus. $8.

The reappearance of Ilza Veith's *The Yellow Emperor's Classic of Internal Medicine* after many years of being out of print is both a welcome event and a sad commentary on modern Western scholarship on the oldest extant system of medical thought and practice—welcome because we again have available a readable English translation of a sizable segment of the most important theoretical text in the huge corpus of traditional Chinese medical literature, and sad because in the 17 years since this book's original appearance there has been no serious book-length study in Chinese medical history.

The *Nei Ching* itself, dating probably from the last centuries before Christ, is the foundation stone of traditional Chinese medicine as an integrated and theoretically articulated system of medicine. A supposed dialog between the legendary Yellow Emperor and his chief minister, it propounds the basic ideas about physiology, pathology, and therapeutics which were to shape the medical thought of China and surrounding countries down to the present century. The work is actually divided into two sections—the *Su Wen* or "Plain Questions," and the *Ling Shu* or "Miraculous Pivot." The former contains most of the basic concepts about

the interaction of that cosmological duality the *yin-yang*, the functioning of the five elements, and the circulation of *ch'i* (pneuma) within the human body. The latter is of a more practical nature, with long discussions of the therapeutic art of acupuncture.

Veith's translation is limited to about the first third of the *Su Wen* section, which does indeed "contain nearly all the basic ideas of the *Nei Ching*." She explains these ideas in a 76-page introduction indispensable for the reader's first encounter with traditional Chinese medicine and philosophy.

The book, then, provides a ground-level entrance into the thought behind one of the world's great medical traditions, a tradition which (as the new preface notes) is still very much alive. The real regret must be not just that the bulk of the *Nei Ching* remains untranslated and its text not yet subjected to thorough philological analysis, but that the entire field of Chinese medicine has been so neglected. The original appearance of this translation was, Veith acknowledges, largely due to the inspiration of Henry Sigerist. The book remains a tribute to his efforts to break medical history out of its Western cultural boundaries, and a reminder of how much yet needs to be done.

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Echinoderms

Physiology of Echinodermata. RICHARD A. BOOLOOTIAN, Ed. Interscience (Wiley), New York, 1966. 840 pp., illus. $45.

The echinoderms are a distinctive group of marine invertebrates whose relationships, both among themselves and to other phyla, have long been perplexing to zoologists. They were once placed in the biological limelight as ancestors of the vertebrates. This was based on the presence of the vertebrate muscle phosphagen, creatine phosphate, in a few species belonging to the Echinoidea and Ophiuroidea. The subsequent identification of creatine in other invertebrate phyla caused the validity of such biochemical evidence of vertebrate ancestry to be questioned, and for this as well as more sound phylogenetic reasons the idea of a direct origin of the vertebrates from the echinoderms has generally been discarded. Echinoderms are well known to developmental biologists because of the extensive use of their gametes in research and laboratory exercises on fertilization and early embryogenesis.

This book is an attempt to bring together what is known of the biology (and not necessarily physiology, as the title would imply) of echinoderms. As in most multi-authored volumes, the actual degree of attainment of the stated objective, "to summarize our knowledge to date and attempt to indicate the direction in which research appears to be heading," is as varied as the information in each area and each contributor's skill in assembling it. The book is, however, an up-to-date compilation of a great deal of information.

The introductory chapter appropriately presents the morphological diversity of the echinoderms and gives one view of their evolution. A recently proposed classification scheme for the Echinodermata is included in this chapter. Because the more familiar taxonomic scheme of L. H. Hyman is generally used throughout the remainder of the book, one cannot help feeling that a comparison of the different views of taxonomy and phylogeny would have served a better purpose. The ecology and biology of crinoids, holothurians, echinoids, asteroids, and ophiuroids are treated in a series of five chapters which are surprisingly uniform in their coverage and include aspects of growth, age, population dynamics, feeding habits and mechanisms, locomotion, predation, and so on, and the responses of the members of each group to environmental factors such as light, salinity, temperature, and depth and pressure. There is also a chapter dealing with the symbioses in which echinoderms participate.

With the exception of the nervous system and its integration, the more classical areas of echinoderm physiology are more or less restricted to single chapters. For the nervous system, the topics covered include aspects of its functional morphology, neurohumors and neurosecretion, coordination of spine movement, photosensitivity and reception, and behavior. There are also chapters on the specialized physiology of the water-vascular system, external respiration, the coelomic fluids and coelomocytes, salinity tolerance and ion regulation, bioluminescence, muscle physiology, nutrition, and the pharmacology of substances isolated from echinoderms. A chapter on the chemical composition and structure of the endoskeleton might also be included in this category. In general, these chapters present a balanced and comprehensive coverage of each topic.

In spite of the early interest in the comparative biochemistry of the echinoderms, there have been surprisingly few studies of their biochemistry, and the dearth of information is obvious from this book. The echinoderms are among the more brightly colored invertebrates, and they present a diverse array of distinctive pigments such as the spinochromes and echinochromes. The comparative biochemistry of these quinone pigments, the carotenoids, melanins, and some miscellaneous pigments occurring in echinoderms is covered in two chapters. There is a chapter on the gross chemical composition of various echinoderms, their tissues and organs, and the variations therein. The chapter on amino acid metabolism is mainly concerned with the amino acid and nitrogen composition of sea urchin eggs and the utilization of the amino acid pool for protein synthesis during early development. Brief discussions of other facets of echinoderm biochemistry are found in several other chapters. Little is known of the basic metabolism of either carbohydrates, lipids, or amino acids in these organisms.

Two chapters on reproduction and development are perhaps among the more valuable contributions. In one, lucid instructions are given for acquiring and handling echinoderm gametes for experimental purposes, and in the other there is an up-to-date review of knowledge of fertilization and development. These chapters are destined to be well thumbed by developmental biologists. The other topics covered in this general area include autotomy and regeneration, sex determinism, and reproductive cycles.

The book is relatively free of typographic errors. The illustrations, although scarce in some chapters, are for the most part adequate. Much of the information is presented in table form. According to the editor's preface, the manuscripts were returned to the contributors for updating just prior to publication, and some chapters include 1966 citations. An author index and a very essential species index