

Genetic Consequences of Man-Made Change, Academic Press, London, 1981). Though Meehan appreciates the importance of genetic resistance to rodenticides, population genetics is his blind spot (e.g., p. 279: "mutated animal"; p. 178: what is a "normal population"?). Chronic exposure to rodenticides produces strong selection for genetic resistance (e.g., Taylor and Georgioui, 1979, *J. Econ. Entomol.*), an area that must be addressed more fully because switching rodenticides can cause the development of cross resistance (e.g., Greaves et al., 1982, *Ann. Appl. Biol.*). Choice of familiar foods (e.g., Patridge, 1981, *Anim. Behav.*) probably influences bait acceptability. Learning and instinct interact (e.g., J. Hailman's *Ontogeny of an Instinct*, Brill, Leiden, 1967), whereas Meehan treats them as a dichotomy.

Population biologists, high school biology teachers and students, and exterminators will see opportunities here for studying these rodents and for learning the best means of control for different situations.

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THE GIANT PANDAS OF WOLONG.

By George B. Schaller, Hu Jinchu, Pan Wenshi, and Zhu Jing. *The University of Chicago Press, Chicago (Illinois)*. \$25.00. xvii + 288 p.; ill.; no index. 1985.

Since its discovery in 1869, the giant panda has remained an enigma to scientists. With striking black-and-white coloration, dextrous thumb-like sesamoid, peculiar herbivorous diet (uncommon for a member of the order Carnivora), behavioral habits restrictively bound by the unpredictable flowering cycles of bamboo, and obscure evolutionary history and taxonomic status, the giant panda has been the source of many biologists' longtime ambitions. For example, Dwight D. Davis in 1964 used the giant panda for his classic treatise on evolutionary comparative morphology and, more recently, Stephen Jay Gould and Steven Stanley have formulated revisionary models for evolutionary change using the panda as a test case. All of these discussions, however, have developed despite any real information on how the giant panda lives in nature. Because of improving Chinese-American relations, George Schaller was invited in 1980 to head the first scientific expedition to study the giant panda in its natural habitat of southern China. Because of the giant pandas' dwindling population size, the ongoing project's primary aim is to study aspects of the panda's life

history that are critical to establishing effective conservation measures.

This volume, the first of two, describes the giant panda's role in the history of Chinese civilization; past and present geographical distribution; Wolong nature preserve, the primary study site; feeding behavior, food selection, water intake, nutrition, and effects on bamboo; home range and daily movement patterns; activity cycles; population dynamics and social behavior; behavioral (nutritional) constraints imposed by a strictly herbivorous diet; and, conservation guidelines.

Primary emphasis is given to the fragile nutritional condition of the giant panda, in which 99 per cent of its food consists of bamboo stems, branches and leaves. With essentially a carnivore digestive system, the giant panda quickly and inefficiently processes such foliage and, because of its large size, is forced to consume approximately 12.5 kg (fresh weight) of bamboo per day. Detailed measurements of organic and inorganic constituents of bamboo and digesta characteristics are described along with rigorous analyses of daily activity patterns, which together provide a basis for calculating the energetic needs of the giant panda.

Schaller's previous field studies, most notably of the mountain gorilla, tiger, African lion, and Himalayan ungulates, are crowning examples of how to do good ethology and animal ecology. *The Giant Pandas of Wolong* is a significant departure from his previous books as it emphasizes physiology and nutrition, undoubtedly because these areas present immediate problems for the giant panda's future. Behavioral information is frequently presented in general form, based on descriptions of only six animals, and some behaviors, especially reproductive patterns, are mainly described from observations on captive animals. Clearly, Schaller and his Chinese colleagues faced tremendous physical difficulties in tracking a large, skittish, and potentially dangerous animal at high altitudes through thick bamboo forest. Nevertheless, I would have been more comfortable if some of the singularly adaptive explanations were presented with alternative explanations or, at the very least, were placed within shortcomings of the data at hand. For example, in explaining the unusual coloration of the giant panda, the authors assert, "Striking colors send complex signals to other members of a species, and it is in this context that the adaptive value of the pelage must lie" (p. 163). With virtually no behavioral information supporting this hypothesis, other explanations concerning phylogeny, crypticity, or thermoregulation should have been elaborated. In general, though, this may be asking too much of the first and only expedition to have truly "seen" the giant panda. This book is certainly satisfying

in providing a broad summary of what the panda is actually doing in nature and, perhaps more importantly, will allow future generations of biologists to test their pet theories against the solid information resulting from this study.

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THE GRAY WHALE: *Eschrichtius robustus*.

Edited by Mary Lou Jones, Steven L. Swartz, and Stephen Leatherwood; with illustrations by Pieter Arend Folkens. Academic Press, Orlando (Florida). \$75.00. xxiv + 600 p.; ill.; index. 1984.

This well-organized book brings together much of what is known about gray whales in 25 chapters written by a total of 38 investigators. It is divided into four broad categories: evolution, fossils, and subfossil remains (2 chapters); historical relationships and exploitation (6 chapters); demography, distribution, and migration (9 chapters); and biology and behavior (8 chapters).

The final section gives excellent up-to-date information on the gray whale fossil record and on the now-extinct Atlantic gray whale. The section on exploitation explores early Japanese whaling, whaling by aboriginal cultures of the north Pacific, early Yankee whaling, and the activities of modern commercial pelagic whaling vessels. The third section describes the seasonal abundance of gray whales in the Bering Sea, the lagoons of Baja California, and at several points of the migration route in between. The final section describes some aspects of feeding ecology, selected biological notes gleaned from recent Russian whaling activities, acoustic behavior of gray whales in a calving lagoon and in the arctic, and dive and movement pattern information obtained from the most successful radio-tracking of whales accomplished to date.

Although quite a few researchers have looked especially at occurrence and migration patterns of gray whales in the past dozen years, very little detailed work has actually been done on descriptive behavior of the species, and virtually nothing is known about social organization. Because of the dearth of such information, discussions of social ecology and interindividual interactions of gray whales are almost totally lacking in this book. Gray whales occur close to shore in nearly all parts of their range, and dedicated field biologists could study details of behavior during long field stays. Humpback whales and right whales recently received such detailed attention, and I hope that in the near future, studies of gray whales will progress in similar fashion.

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AQUATIC SCIENCES

RESPONSES OF MARINE ORGANISMS TO POLLUTANTS. *Based on papers presented at the Second International Symposium on Responses of Marine Organisms to Pollutants, held at Woods Hole, Massachusetts, on April 27-29, 1983. Reprinted from the journal Marine Environmental Research, Volume 14, Numbers 1-4.*

Edited by John J. Stegeman; Consulting Editor: G. W. Heath. Elsevier Applied Science Publishers, London and New York. \$163.00. xxvii + 547 p.; ill.; index. 1984.

The 90 papers presented here are grouped into four categories: (1) biochemistry of cytochrome p-450 and organic compound biotransformations, (2) biochemistry and biological significance of metal-binding proteins, (3) biochemistry, physiology and bioassay, and (4) immunology and pathology. The papers range in length from two-page extended abstracts to full manuscripts. With very few exceptions, the work reported in this volume reflects the sophistication gained in pollution research since the Stockholm Conference on the World Environment in 1972. In fact, most of this volume could not have been written five years ago.

The majority of the papers dealing with specific pollutants are on the toxic metals (copper, cadmium, lead, and mercury) and the polycyclic aromatic hydrocarbons; only a few papers deal with the chlorinated hydrocarbons. More than half the papers are on some aspect of the biochemistry of cytochrome p-450. In fact, both the symposium and this volume serve as a focal point for clarifying the nomenclature and method of reporting the apparent nature of an isolated form of p-450.

I recommend this volume to workers in the field of pollution research despite the high price. The papers are well written and are profusely referenced and reflect some of the best work done to date on organism responses to common environmental pollutants.

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OSMOREGULATION IN ESTUARINE AND MARINE ANIMALS. *Proceedings of the invited lectures to a Symposium organized within the 5th Conference of the European Society for Comparative Physiology and Biochemistry, Taormina, Sicily, Italy, September 5-8, 1983. Lecture Notes on Coastal and Estuarine Studies, Volume 9.*

Edited by A. Pequeux, R. Gilles and L. Bolis; Series Editors: Richard T. Barber et al. Springer-Verlag, Ber-