

Onagraceae by Raven and in the Gramineae by Connor speak not only of the diversity of these systems but of their lability in evolutionary and ecological time. Raven contends that in the Onagraceae self-pollination has evolved independently at least 150 times. Connor shows the great extent to which environmental variables may alter the balance between self- and cross-fertilization and sexual and asexual reproduction in grasses. Self-incompatibility not only is overcome naturally, it may also be circumvented by various laboratory procedures, the practice and application of which are discussed by Pandey and Cocking. The genetic and physiological bases of incompatibility are reviewed by Lewis and Heslop-Harrison respectively.

Scientists interested in reproduction within evolutionary or ecological frameworks will find the volume to be of great value.

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The Behavior of Fishes

Diversity and Adaptation in Fish Behaviour.

MILES H. A. KEENLEYSIDE. Springer-Verlag, New York, 1979. xiv, 210 pp., illus. \$37.80. Zoophysiology, vol. 11.

Students of ethology have long awaited a textbook on the behavior of fishes, not because the behavior of fishes is fundamentally different from that of other organisms but because their remarkable diversity makes them ideal for comparative testing of functional hypotheses. In many aspects of their biology the fishes are more variable than the notoriously diverse insects. Therefore it is not surprising that a book on the diversity of behavior in the fishes is more easily criticized for what it does not say than for what it does say, especially when the text occupies a mere 177 pages.

Keenleyside would seem to be an ideal author for a book on the subject. He has conducted laboratory and field research on many aspects of fish behavior including courtship, parental care, and schooling and has direct experience with freshwater and marine habitats in temperate and tropical climates. He wisely avoids simply recapitulating behavioral principles as they apply to the fishes, and instead emphasizes behavior as an adaptation to the diverse ecological situations faced by fishes. However, by his own admission

the work is highly selective. There is a chapter on locomotion in fishes, but none on sensory mechanisms, and orientation is not discussed. Arthur Hasler's classic series of field studies of orientation in migrating salmon are not cited or listed in the bibliography. Nor is this the only gap in the book's coverage. Because of the prevalence of distinct and specialized larval forms, behavioral ontogeny is an important aspect of fish behavior, yet it is hardly mentioned here. The pivotal role of quantitative and experimental studies of fish behavior in generating many of ethology's fundamental principles is not even hinted at.

Roughly half (85 pages) of the text is devoted to reproductive behavior. This is a subject with which Keenleyside is very familiar, and we see glimpses of the book he might have written. However, this section has an organizational flaw in that the subject is divided among three chapters—on spawning site selection, breeding, and parental care—and the same examples are discussed in each. Keenleyside's use of references is singularly spotty. He cites his own contribution to a recent symposium volume, yet ignores relevant papers by several other contributors to the symposium. These chapters also suffer from unfortunate timing, for several important reviews and discussions of parental care in fishes appeared while the book was in press, too late to be taken into account (the most recent references cited are from 1978). The discussion of schooling in the final chapter is similarly compromised.

The book is not synthetic or comprehensive enough to be a reference monograph for professional fish behaviorists, and because it assumes a familiarity with the basic features of anatomy and functional morphology of fishes it cannot serve as an introduction to the fishes for other behaviorists. It is best suited to the student who is familiar with the basic biology of fishes and now wishes to know something of their behavior. Though not the definitive work we had hoped would appear, however, it is important as the first serious attempt by a senior researcher to produce an overview of the discipline. Previous works have all been symposium volumes or collections of papers haphazardly assembled, and Keenleyside has produced a volume that is of substantially greater value than these. In clearly perceiving that the unique and valuable features of fish behavior are its diversity of form and circumstance, he has charted a course that future authors would be wise to follow.

The book is well produced, well written, and easy to read. The illustrations

are clear and straightforward, although there are occasional gaffes; a drawing of *Pantodon buchholzi* is so inaccurate in fin morphology that the species is scarcely recognizable.

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Books Received

Academic Turmoil. The Reality and Promise of Open Education. Theodore L. Gross. Anchor/Doubleday, Garden City, N.Y., 1980. x, 250 pp., \$10.95.

Acoustical Imaging. Vol. 8, Ultrasonic Visualization and Characterization. Proceedings of a symposium, Key Biscayne, Fla., May 1978. A. F. Metherell, Ed. Plenum, New York, 1980. xii, 790 pp., illus. \$59.50.

Advances in Applied Mechanics. Vol. 19. Chia-Shun Yih, Ed. Academic Press, New York, 1979. viii, 324 pp., illus. \$39.50.

British Coastal Shrimps and Prawns. Keys and Notes for the Identification of the Species. G. Smaldon. Published for the Linnean Society of London and the Estuarine and Brackish-Water Sciences Association by Academic Press, New York, 1979. vi, 126 pp., illus. Paper, \$11.50. Synopses of the British Fauna, No. 15.

Business Conditions in Michigan Metropolitan Areas. Paul J. Kozlowski with assistance from Phyllis R. Buskirk. Upjohn Institute for Employment Research, Kalamazoo, Mich., 1979. viii, 184 pp., illus. Paper, \$4.50.

Calcium Regulation in Sub-Mammalian Vertebrates. Christopher G. Dacke. Academic Press, New York, 1979. xvi, 222 pp., illus. \$39.

Cape Cod Environmental Atlas. Arthur H. Brownlow, Ed. Boston University Department of Geology, Boston, 1979. xvi, 62 pp. + plates. Paper, \$5.

Cardiology. Proceedings of a congress, Tokyo, Sept. 1978. Shoji Hayase and Satoru Murao, Eds. Excerpta Medica, Amsterdam, 1979 (U.S. distributor, Elsevier/North-Holland, New York). xxiv, 1164 pp., illus. \$195.

Chemical Equilibria in Soils. Willard L. Lindsay. Wiley-Interscience, New York, 1979. xxii, 450 pp., illus. \$25.

Chemistry Explained. Robert L. Wolke. Prentice-Hall, Englewood Cliffs, N.J., 1980. xxiv, 552 pp., illus. \$17.95.

Corporate Energy Management Manual. Fairmont Press, Atlanta, Ga., 1979. iv, 124 pp., illus. Paper, \$24.50.

Dossier Caribou. Ecologie et Exploitation du Caribou au Québec-Labrador. François Trudel and Jean Huot, Eds. Recherches Amérindiennes au Québec, Montreal, 1979. 166 pp., illus. Paper, \$7.50. *Recherches Amérindiennes au Québec*, vol. 9, Nos. 1-2.

Dynamos and Virgins Revisited. Women and Technological Change in History. An Anthology. Martha Moore Trescott, Ed. Scarecrow Press, Metuchen, N.J., 1979. iv, 280 pp., illus. \$14.

Ecological Processes in Coastal Environments. Papers from a symposium, Norwich, England, Sept. 1977. R. L. Jefferies and A. J. Davy, Eds. Blackwell, Oxford, England, 1979

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