Book Reviews

Studying Primates

Behavioral Regulators of Behavior in Primates. Papers from two congresses, Tokyo, 1968, and Atlanta, Ga., 1968. C. R. CARPENTER, Ed. Bucknell University Press, Lewisburg, Pa., 1974. 304 pp., illus. $27.50. The Primates.

Theories of primate social behavior, like any other theories, reflect their makers and their times as much as the phenomena they are designed to explain. Starting in the 1930's and up until the middle of the 1960's, the key themes were dominance, sex, and the attempt to be objective, which at that time meant devising a special laboratory apparatus to train animals into what you were after, and forgetting whatever did not fit onto this Procrustean bed. Field studies did not fit, and no one could decide whether or not they were really science. Compared to the study of learning, as defined by and enthroned in the Wisconsin General Test Apparatus, the study of social behavior formed an inconsequential part of primate studies, and one could summarize the major findings in about 30 pages of text—as, for example, Henry Nissen did in 1951.

The 1960's saw the rise of the Romantic Era, in which primate societies were gradually seen to be really held together by democratic and benign leaders, love of mother and kin, species-specific communication systems, play rather than fighting, grooming rather than sex, and above all a simple *liking* of each other. Fighting presumably occurred only when man interfered by confining animals in his nasty laboratories and zoos; dominance fell as the top-ranking explainer of social organization to a minor and nonmonolithic trait; sex was no longer a many-splendored thing lasting throughout all seasons of life; and each species, if not each social group, had its own unique culture, as it were, which could not be forced into the old clichés about primate behavior in general, let alone the behavior of organisms in general. Authors became increasingly cautious about generalizing even to the same species of monkeys in a different forest—although this of course did not inhibit them from generalizing from squirrel monkeys or rhesus to man. "Primatology" also sprang to life as a specialty in its own right, and its truly international character came to be clearly recognized. One index of this was the establishment of the International Congress of Primatology, and then national and even local societies. Slowly but surely the unique approaches and outstanding contributions of Japanese researchers came to receive the attention they deserved. Many Western investigators are still no doubt concerned about the apparent reluctance of some Japanese investigators to view their animals as objects and themselves as idealized observers who not only can but must remain outside of nature. Many Japanese students have in turn studied in Western laboratories to learn what foreign brands of "objectivity" are supposed to be about. Whether or not any clear mutual understanding has been achieved here, there can be no doubt that Japanese field studies were a major factor in making this area of research exciting to the younger generation of graduate students, theoretically provocative to their elders, and eventually even respectable to governments, universities, and granting agencies.

This book may be one of the capstones of the Romantic Era, which I fear passed away right about the time the articles for the book were first written. The articles are the outcome of two symposia held in 1968. Ten American and 17 Japanese authors summarize their own research on topics which are grouped under the more general labels of Theoretical Contributions (three chapters, all by Americans), Dynamics of Primate Colonies (five chapters on sociological studies, all by Japanese), Grooming (two chapters), Ontogenetic Development (two chapters), Maternal Regulation of Infant Behavior (three chapters), and Communicative and Adaptive Behavior (three chapters). All but one of the chapters (which is concerned with the performance of Japanese macaques on Wisconsin-type learning tasks) are concerned with social behavior. Perhaps half the studies are field studies and the other half were done in the laboratory; but nearly all are concerned with problems that derive their basic logic from field observation. The editor of the volume is unquestionably the dean of primate field studies. He and Ruth J. Carpenter have edited the volume carefully and with firm hand.

For one who is not well acquainted with this area of research, the present book will be at least moderately useful. It fulfills its stated objectives and portrays the study of primate behavior in America and Japan about as well as would be expected from short conference papers. However, it contains relatively little information that will be new to the specialist, and the content of many of the chapters is considerably less general than their titles. If the reader is looking for a view of primate behavior as it is in its present era, he is advised to go personally to the Fifth International Congress of Primatology, to be held in August 1974 in Japan.

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Neurogenesis

Developmental Neurobiology of Arthropods. D. YOUNG, Ed. Cambridge University Press, New York, 1973. viii, 268 pp., illus. $16.50.

The ancestors we share with the arthropods had a brain and segmented nervous system organized along lines that we consider basic to the construction of our own nervous system. Selective pressures that guided evolution emphasized and elaborated on different aspects of that primitive nervous system, but fundamental elements and, presumably, many of the forces that organize the developing human and arthropod nervous systems are the same. The editor and authors of the nine chapters of this book have approached arthropod development with an eye toward revealing similarities to (and differences from) vertebrate neurogenesis. For technical reasons insects seem to be the most favorable invertebrates in which to study neural development, and insects, not arthropods in general, are the principal subject of this book. Insects are distinguished by a

short life-span, small size, high degree of specialization, and limited learning ability. These properties are reflected in their rapid development and compact, economical, precise, and rigid nervous system. This has placed restrictions on insect nervous development, and in this book these factors are not always kept in mind. But the reliability of the insect nervous system, the hormonal regulation of development, and the possibilities for genetic analysis with insects provide the neurobiologist with an opportunity to make meaningful manipulations of neuronal development.

Each chapter of the book is a research summary accompanied by a review of related work. Most of the research emphasizes morphological changes that take place at the cellular level and physiological events that can be recorded extracellularly. Observations of synaptic connections and synaptic physiology are notably missing from this book, although not from the literature. Often insufficient data are given to permit the critical reader to reach the conclusions of the authors, but the following are some of the significant points that emerge. The factors that control the development of a neuron are not simply intrinsic to that cell. Meinertzhagen indicates that waves of development may take place according to a sort of "domino theory," and that some sequences in development may hinge on contact by presynaptic elements. Levi-Montalcini and her coworkers find that patterns of axonal growth can depend upon available targets. Bate and Lawrence show that in insects an antereoposterior concentration gradient of some undefined substance may act quantitatively in determining cell differentiation, growth, and connectivity. Although Huber discovered that the circuitry for cricket song exists unexpressed long before its normal use, Bentley concludes that some other circuits (for example, for flight) are not preformed and might even develop with experience. Evidence is repeatedly presented that existing contacts can reorganize or break during development, but it is surprising that Potter, Furshpan, and Lennox's classic demonstration of broken electrical coupling in the developing embryo is not mentioned. Edwards and Palka show that sensory neurons regenerating de novo in crickets seem to grow as in the developing nervous system. In contrast, the mode of crustacean motor nerve regeneration remains paradoxical. Hoy claims that severed motoneuron stumps fuse, but lacks crucial anatomical evidence; the possibility that regeneration awaits degeneration is not considered.

Young makes no pretense at having chosen his authors to represent the field as a whole. It is nonetheless unfortunate that biochemical, autoradiographic, and hormonal studies are hardly mentioned and that scant reference is made to studies from Atwood's laboratory on regeneration after autotomy in crabs, a process closely resembling development. The *Drosophila* nervous system presents one of the most fruitful materials for research, yet much work on it by Seecof, Benzer, and others gets no mention.

On the whole this book is not broad enough for the general reader, but it does nicely summarize much important work to 1972 on the development of the insect nervous system.

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Effects of Exercise

Exercise and Sport Sciences Reviews. Vol. 1. JACK H. WILMORE, Ed. Academic Press, New York, 1973. xvi, 458 pp., illus. $24.

This is the initial volume of a continuing series devoted to bringing high-quality reviews to practitioners in physical education. However, it deserves to be read by all those interested in exercise and sports. There are three major topic groupings in this first volume—physiological and biochemical aspects of exercise, movement analysis, and statistical design. The quality of the various contributions varies considerably. Some chapters, such as those on aerobic metabolism and the responses of women to exercise, are exceedingly well written, not only providing excellent background material but also raising a number of provocative questions for additional research.

The interest in women's response to exercise and their participation in a greater variety of sporting events will require increased research activity on their capabilities. The prior limitations imposed on women's activities were a consequence of Victorian attitudes toward the so-called weaker sex and were, in fact, encouraged by many of the women who were responsible for organizing women's programs. The fact that the best time for a 50-mile marathon run has been made by a woman should result in changes in the taboos that have constrained their participation. Women swimmers have long demonstrated that such limitations should be eliminated. The present lack of knowledge not only on the long-term physiological effects of intensive sport participation by women but on the primary and secondary psychological and sociological effects as well should be soon ended. It is interesting that while we know the influence of the aging process on males' physical work capacity very few comparable studies have been conducted on the female. The increasing incidence of cardiovascular disease in women also raises some problems concerning the role of physical activity in women in protection from or alleviation of these diseases.

Many of the contributors, unfortunately, have limited themselves to presentation of data from recent investigations, with little critical analysis of the questions readers may have or will raise. The sections on statistical analysis and experimental design are textbookish and do not really concern themselves with the problems of application to exercise and activity research. However, they cover a large field and even though wordy are worthwhile reading. The same general comments apply to the biomechanical sections. In general, this and succeeding volumes should (if the topics to be reviewed follow the suggested patterns) be worthwhile reference volumes for all those readers interested in exercise and its value to man.

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Fluvial Geomorphology

Drainage Basin Form and Process. A Geomorphological Approach. K. J. GREGORY and D. E. WALLING. Halsted (Wiley), New York, 1974. x, 456 pp., illus. $18.95.

As the authors of this book observe, interest in drainage basins has burgeoned among diverse students, those concerned with evolution of the landscape, engineers concerned with flow and design, ecologists with interests in energy and nutrient balance, and geographers concerned with the shape of the land and its uses. Thus the drainage basin is an object of study in its own right, a vehicle for fundamental studies of natural processes, and an excellent