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

framework for the study of man's impact on the surface of the earth.

The diversity of interests and the accelerated pace of research have engendered new findings and new methodology. Much of this growth has taken place since World War II. Although the apparently segregated research communities concerned with drainage basins have in truth many overlapping interests, no book heretofore has drawn together the extensive results of drainage basin studies and made them available to a broad audience. While the authors emphasize the geographers' interest in drainage basins as a fundamental unit for the study of river and hillslope processes, *Drainage Basin Form and Process* accomplishes this.

Proper description of a drainage basin includes analysis of process and form. Because a myriad of physical, chemical, and biological processes operate in concert within a drainage basin, analysis of their linkages demands study of the inputs, movement, and output of the products of all these processes. Field measurement of the clastic load of streams, for example, requires diverse techniques depending on flow, size distribution of material, and quantity. Similarly, measurement of nutrient balances or geochemical processes in drainage basins requires not only the application of field techniques in chemistry but their integration with observations of the movement of water in soil, overland, in channels, and within the ground. Because geomorphic processes are inseparable from the flora and fauna and ecological observations are inadequate without appropriate hydrologic measurements, the techniques of observation and analysis in one field are essential to the successful pursuit of allied fields.

Gregory and Walling have provided an almost bibliographic coverage of the wide and varied studies of drainage basins. Including excellent observations from their own studies in England, they have drawn upon experience throughout the world to bring together the results of descriptions and analyses of a vast range of drainage basin characteristics and processes. From the widely scattered literature they have structured a succession of discussions summarizing such matters as the nature of the hydrograph, the way in which water reaches streams, the variety of methods of measuring bed and suspended load in channels, diverse techniques for analyzing drainage basin morphology, and hypotheses concerning drainage basin evolution. This extensive coverage is not merely a recitation of bits and pieces of information but includes numerous tables and figures providing illustrative and comparative data on many aspects of drainage basin form and behavior including channel characteristics, basin geometry and topology, flow frequency, sediment yield, and their interrelationships. These illustrations are often striking, having been drawn from virtually every region of the world. The discussion of rates of denudation measured as dissolved and suspended load, for example, synthesizes for the first time the results of many studies over the broadest spectrum of climatic conditions.

The book is packed with both historical and current references to and examples from the literature. It is comprehensive, not selective. There is much explanatory material, but shortage of space has prevented discussion of detail and evaluation of the state of the art or of reigning explanatory hypotheses. Not that these are entirely absent; for example, the authors dwell at some length on the evidence for and significance of the partial area concept of runoff. But the emphasis throughout is upon comprehensiveness. The authors succeed in providing an enormously useful review of current methodology, an often fascinating description of findings, and clear statements of different views of drainage basin behavior. Using the findings from many sources including geography, geology, engineering, and biology but without slicing the drainage basin into professional disciplines, they provide a collective picture which will be of use to all workers whether they consider the drainage basin as a handy tool for budgets or as a unique spatial aspect of the landscape.

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