

Soviet Science

Soviet Scientists and the State. An Examination of the Social and Political Aspects of Science in the USSR. PETER KNEEN. State University of New York Press, Albany, 1984. x, 138 pp., illus. \$34.50; paper, \$12.95.

This brief monograph is part of a growing literature on the sociology and politics of science in the Soviet Union. It adds to the information available in English on Soviet scientific collectives and the relationship between those collectives and the political leadership. Specialists in Soviet science will already be familiar with the sources Kneen uses. Indeed, it is clear that he has been influenced by the contributors to *The Social Context of Soviet Science* (Linda L. Lubrano and Susan Gross Solomon, Eds., Westview Press, 1980) and other scholars in the field. The more general reader will find the volume useful as a social portrait of Soviet scientists in terms of educational backgrounds, demographic characteristics, and party membership. The data are presented in a way that gives the reader a better understanding of Soviet science than could be obtained from standard descriptions of institutional structures.

One of the purposes of Kneen's book is to show how Soviet scientists interact, as a professional group, with the formal bureaucracies of Soviet science. His reference point is mainly the U.S.S.R. Academy of Sciences, and in this connection he comments briefly on the pressures of planning and the different styles of administrative leadership. Scientists form their own informal communities centered primarily around research topics. These communities must be nurtured, says Kneen, by a continuing exchange of information with scientists around the world. Kneen demonstrates, however, that Soviet scientists have received relatively little recognition from foreign scientists, as measured by the relative frequency of citations of Soviet and of Western scientific publications. Here he draws upon the work of two Soviet scholars, V. V. Nalimov and Z. M. Mul'chenko, and two American scholars, F. Narin and M. P. Carpenter. Kneen questions whether the lower citation rate is a reflection of poorer-quality research in the Soviet Union or is a consequence of inadequate communication between Soviet scientists and their foreign colleagues. He acknowledges that problems in equipment and in the training of young scientists may contribute to the lower quality of Soviet research, but he concludes that the most

damaging factor is the isolation of Soviet scientists from the West.

A central theme in Kneen's monograph is the vulnerability of Soviet scientists to political and economic demands arising outside the domain of science. He suggests that this is the result of an inadequately strong scientific ethos among Soviet scientists. The weakness of that ethos, he contends, is due to the restrictions that Soviet authorities place on the international communication and foreign travel of scientists. There are two flaws in this argument. First, it is circular in logic: Political interference in international communication weakens the Soviet scientific community, which makes Soviet scientists vulnerable to political interference. Second, it assumes that the ethos of science derives primarily from Western science rather than from the very nature of science as a social and intellectual activity. Though one might agree that the traditional values of science are supported more strongly by Western cultures, there is growing evidence that Soviet scientists have developed those values as well.

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Bone and Its Functions

The Mechanical Adaptations of Bones. JOHN CURREY. Princeton University Press, Princeton, N.J., 1984. x, 294 pp., illus. \$37.50.

Bone is not simply bone, as John Currey clearly and engagingly demonstrates in his new book. Rather, as the title implies, bone varies in its mechanical properties and structural organization, dramatically enough to warrant consideration in terms of functional adaptation. Although the adaptation of a structure for a particular function is difficult to demonstrate (as the author acknowledges), to assume adaptation allows one to formulate experimentally testable hypotheses. The author makes a convincing case for the design of bone by natural selection. As he illustrates in a series of interesting examples, many from his own work, the function subserved by the mechanical properties and shape of the bone in question is often straightforward. In other instances, though, the structural mechanics of bone is not so clearly related to function, perhaps because of the complexity of competing demands placed on a bone. That bones are products of "historical

constraint" engendered through phylogeny should not be ignored, yet our ability to decipher the degree to which this is so remains limited and such considerations are thus largely untestable at this time.

There has been a clear need for an integrated volume such as this. Its publication comes after more than a decade of growth in the field, during which biomechanics has become increasingly recognized as an important approach to the study of biological structure and function. The book is well organized, and the insight and perspective the author provides on a variety of subjects are valuable.

The book is intended as an introduction to the field, but the discussion of basic mechanics theory in the first chapter requires some prior familiarity with the concepts discussed. The ensuing chapters, however, are effective and clear. The book covers a range of topics including the mechanical properties of bone, the design and shape of bones, the design and function of joints, the integrated function of bones, muscles, and tendons, safety factors and size scaling, and bone remodeling processes. Despite the disproportionately large amount of research carried out on the mechanical properties of bone, this subject is given no more emphasis than others. The author considers at length how variation in material properties may serve differing functions; examples range from the stiffness and brittleness of the auditory bulla of a whale, designed to mismatch acoustical impedance, to the shape and structural organization of a carpal bone (the scaphoid) in a horse. The book does not attempt to be a comprehensive review of recent work, nor could it be, given the range of topics discussed. Clinical aspects are largely left out. Most of what is said about bone applies directly only to mammalian bone, and frequently only to the bones of large mammals. This is a reflection of the limited number of comparative studies that have been carried out on bone.

The illustrations in the book are highly schematized. Most often they are effective in getting the author's points across, but in representing tissue organization and functional aspects of fine structure, especially that of cancellous bone, the drawings oversimplify and make relevant geometries difficult to grasp. Light or electron micrographs would have been valuable in these instances. Highlights of the book are the chapters on the shapes of bones and bone remodeling. I found the author's derivation of the theory for minimum mass design and his discussion of cancellous bone architec-

ture especially thought-provoking. The book concludes with several questions left unanswered, particularly with regard to the puzzling role of secondary Haversian systems and bone remodeling processes in general. As is evident from the author's discussion of this topic, the current theories do not adequately explain the curvature of long bones or many of the responses of bone to mechanical stimuli; it appears that, whatever the mechanism by which such responses are mediated, it involves an integration far more complex than has been imagined.

This is an important book that will serve a broad readership, both student and professional, whose work entails an interpretation of bone structure and function. It is a delight to read and is filled with many good biological examples, new ideas, and questions that will certainly have an important impact on research in the field.

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Some Other Books of Interest

Ecological Entomology. CARL B. HUFFAKER and ROBERT L. RABB, Eds. Wiley-Interscience, New York, 1984. xvi, 844 pp., illus. \$75.

In this book the editors "have sought to bring together the known facts and reasonable concepts and theories relating insects to the factors of their environment, both biotic and abiotic, over both the short term . . . and longer . . . spans of time" and have attempted to present the subject in a degree of generality, breadth, and detail not equaled by any other book in the field. The book has 44 contributors, all but six from North America. The editors report that extensive editing, including cross-referencing among chapters, has been done to reduce problems of integration and unevenness. The introductory section of the book consists of two chapters, "Meaning of ecological entomology—the ecosystem" by Huffaker, H. T. Gordon, and Rabb and "The concept of the ecosystem" by Peter W. Price. Section 2, Basic Biological and Ecological Adaptations, Properties, Behaviors, and Processes, contains eight chapters on subjects ranging from growth and development (Gordon) to biogeography and evolutionary history (Eugene Munroe). There follow sections headed Natural Control of Insect Populations (eight

chapters), Roles or Effects of Insects in Ecosystems (four chapters), and Application of Ecology to Insect Population Management (three chapters). Each section has an introduction by the editors. The book concludes with a 48-page subject and taxonomic index. There is no general bibliography or author index.

—KL

Spatial Orientation. The Spatial Control of Behavior in Animals and Man. HERMANN SCHÖNE. Princeton University Press, Princeton, N.J., 1984. xviii, 348 pp., illus. \$55; paper, \$14.95. Princeton Series in Neurobiology and Behavior. Translated from the German edition (Stuttgart, 1980) by Camilla Strausfeld.

This volume inaugurates a Princeton University Press series to be edited by Robert R. Capranica, Peter Marler, and Norman T. Adler. In the preface the author sketches the history of approaches to the study of his subject from the time of Jacques Loeb and Alfred Kühn through the advent of systems analysis. In the present treatment, he writes, "The focus . . . is on the analysis of the system as a whole: the physiology of the orientation behavior. We shall look at mechanisms from the stimulus-response relationships and the determination of the central reference value to the structure of interactions within the whole system, e.g. to human spatial perception and to space constancy. Sensory physiology is covered where it is necessary for the understanding of the orientation itself." A brief opening section, Orientation: Its Meaning and Scope, is followed by a section concerned with external aspects of orientation—directing stimuli, components of orientation, spatial referents, and so on. The third and final section of the book deals with orientation according to sensory modality. In addition to visual, auditory, tactile, and chemosensory orientation, orientation to heat, magnetic fields, vibration, currents, and gravity and angular acceleration are considered. The book has a reference list of 1028 entries, including some as recent as 1981 as well as many from the early German literature.—KL

Books Received

The Acid Rain Sourcebook. Thomas C. Elliott and Robert G. Schwieger, Eds. McGraw-Hill, New York, 1984. vi, 290 pp., illus. \$37.50. Based on a conference, Washington, D.C., March 1984.

Acquired Immune Deficiency Syndrome. Michael S. Gottlieb and Jerome E. Groopman, Eds. Liss, New York, 1984. xxii, 438 pp., illus. \$60. UCLA Symposia on Molecular and Cellular Biology, New

Series, vol. 16. From a symposium, Park City, Utah, Feb. 1984.

Advances in Applied Mechanics. Vol. 24. John W. Hutchinson and Theodore Y. Wu, Eds. Academic Press, Orlando, Fla., 1984. xii, 376 pp., illus. \$89.

Advances in Drying. Vol. 3. Arun S. Mujumdar, Ed. Hemisphere, Washington, D.C., 1984. xiv, 361 pp., illus. \$62.50.

Advances in Immunology. Vol. 35. Henry G. Kunkel and Frank J. Dixon, Eds. Academic Press, Orlando, Fla., 1984. xx, 281 pp., illus. \$36.50.

Bacterial and Viral Inhibition and Modulation of Host Defences. G. Falcone *et al.*, Eds. Academic Press, Orlando, Fla., 1984. xii, 249 pp., illus. \$24. From a symposium, Pisa, Sept. 1982.

Basic Human Neurophysiology. David F. Lindsley and J. Eric Holmes. Elsevier, New York, 1984. xvi, 368 pp., illus. \$32.50.

Beat the Racetrack. William T. Ziemba and Donald B. Hausch. Harcourt Brace Jovanovich, San Diego, Calif., 1984. xxii, 392 pp., illus., + plates. \$22.95.

The Bioorganic Chemistry of Enzymatic Catalysis. Myron L. Bender, Raymond J. Bergeron, and Makoto Komiyama. Wiley-Interscience, New York, 1984. xvi, 312 pp., illus. \$39.50.

Bone Marrow Biopsies Revisited. A New Dimension for Haematologic Malignancies. R. Bartl, B. Frisch, and R. Burkhardt. Karger, Basel, 1985. xiv, 138 pp., illus. \$34.75.

Cell Culture and Somatic Cell Genetics of Plants. Vol. 1, Laboratory Procedures and Their Applications. Indra K. Vasil, Ed. Academic Press, Orlando, Fla., 1984. xxxii, 825 pp., illus. \$85.

Cephalopod Life Cycles. Vol. 1, Species Accounts. P. R. Boyle, Ed. Academic Press, Orlando, Fla., 1983. xviii, 475 pp., illus. \$120.

The Classics of Science. A Study of Twelve Enduring Scientific Works. Derek Gijtsen. Barber, New York, 1984. x, 374 pp., illus. \$24.95.

Climate Processes and Climate Sensitivity. James E. Hansen and Taro Takahashi, Eds. American Geophysical Union, Washington, D.C., 1984. viii, 368 pp., illus. \$28. Geophysical Monograph 29. Maurice Ewing Volume 5. From a symposium, Palisades, N.Y., Oct. 1982.

Coherence and Energy Transfer in Glasses. Paul A. Fleury and Brage Golding, Eds. Plenum, New York, 1984. xiv, 419 pp., illus. \$62.50. NATO Conference Series VI, vol. 9. From a workshop, Cambridge, England, Sept. 1982.

Cybernetics. Theory and Applications. Robert Trappl, Ed. Hemisphere, Washington, D.C., 1983. xii, 455 pp., illus. \$80.

Cytochrome P-450. Structural and Functional Relationships, Biochemical and Physicochemical Aspects of Mixed Function Oxidases. Klaus Ruckpaul and Horts Rein, Eds. Akademie-Verlag, Berlin, 1984. 405 pp., illus. 80 M.

Data Bases for Mortality Measurement. United Nations, New York, 1984. x, 164 pp., illus. Paper. Department of International Economic and Social Affairs Population Studies, no. 84. From a meeting, Bangkok, Oct. 1981.

The Day the Sun Rose Twice. The Story of the Trinity Site Nuclear Explosion, July 16, 1945. Ferenc Morton Szasz. University of New Mexico Press, Albuquerque, 1984. xii, 233 pp., illus. \$15.95.

Diagnostics for Fusion Reactor Conditions. P. E. Stott *et al.*, Eds. Published for the Commission of the European Communities by Pergamon, New York, 1984. Three volumes. xvi, 1192 pp., illus. Paper, \$75. From a school, Varenna, Italy, Sept. 1982.

Evolution and Tumor Pathology of the Neuroendocrine System. Sture Falkmer, Rolf Håkanson, and Frank Sundler, Eds. Elsevier, New York, 1984. xviii, 599 pp., illus. \$146. Fernström Foundation Series, vol. 4. From a symposium, Lund, Sweden, July 1983.

Evolutionary Theory. Paths into the Future. Jeffrey W. Pollard, Ed. Wiley-Interscience, New York, 1984. xxii, 271 pp., illus. \$37.95.

Exercises in Biological Science. Merle K. Heidemann. Willard Grant (PWS), Boston, 1985. vi, 293 pp., illus. Paper, \$16.25.

Experimental and Clinical Toxicokinetics. Abraham Yacobi and Hebert Barry, III, Eds. American Pharmaceutical Association, Washington, D.C., 1984. xvi, 188 pp., illus. \$39. From a symposium, San Diego, Calif., Nov. 1982.

The Eye. Vol. 1b, Vegetative Physiology and Biochemistry. Hugh Dawson, Ed. 3rd ed. Academic Press, Orlando, Fla., 1984. xiv, 509 pp., illus. \$70.

Federal Biotechnology Funding Sources. Oskar R. Zaborsky and Brenda K. Young. OMEC Publishing Company, Washington, D.C., 1984. x, 262 pp. Paper, \$69.95.

Finite Element Solution of Boundary Value Problems. Theory and Computation. O. Axelsson and V. A. Barker. Academic Press, Orlando, Fla., 1984. xviii, 434 pp., illus. \$59. Computer Science and Applied Mathematics.