

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.

LINDA L. LUBRANO
*School of International Service,
American University,
Washington, D.C. 20016*

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-