Book Reviews

Physics Under the Bolsheviks

Physics and Politics in Revolutionary Russia. PAUL R. JOSEPHSON. University of California Press, Berkeley, 1992. xx, 422 pp. + plates. $39.95. California Studies in the History of Science.

Soviet history provides a fascinating but tragic context in which to examine the relationship of science and politics. Much has been written about the destruction of Soviet genetics at the hands of Lysenko and his allies, backed by Stalin. The very different fate of Soviet physics, which has considerable achievements to its credit, has received much less attention from Western scholars. Paul Josephson's book provides the first detailed account in English of the organization and politics of Soviet physics between 1917 and the outbreak of World War II.

Physics was weak in prerevolutionary Russia, but it flourished in the interwar years. The number of physicists in the country grew from fewer than 100 to over 1000, and several, including Landau, Frenkel, Tamm, and Fock, made international reputations for themselves. Physics was well supported by the Bolshevik authorities, who believed that it would contribute to the creation of a powerful industrial state. But physics also suffered from the Bolsheviks' suspicion of scientists and from the administrative and political controls they imposed on science.

Josephson devotes much of his book to the Leningrad physics community, and in particular to the Leningrad Physicotechnical Institute, which is widely regarded as the "cradle" or "forge" of Soviet physics. The institute was founded by Abram Ioffe, who had done his doctorate in Munich with Wilhelm Roentgen at the beginning of the century. The Bolsheviks had no clear science policy in mind—they had, after all, other things to attend to—and individual scientists therefore had a good deal of scope in pursuing their own ideas on the organization of research. Ioffe was skilled at gaining support, both material and political, from the authorities, and he had a good eye for talented young physicists.

Ioffe had a clear conception of the role of Soviet physics. He believed that it should serve the Soviet state but that it should also form an integral part of European physics. He traveled abroad extensively in the 1920s and organized conferences to which leading foreign physicists were invited. He helped his junior colleagues to spend time at leading centers in the West (mainly Cambridge and Copenhagen). By the end of the 1920s his institute had become, as Josephson says, "an internationally renowned physical research center," focusing on the physics of crystals, the physics of metals, heat engineering, and theoretical physics.

If the 1920s seem, in retrospect, like a golden age, the 1930s were to prove much more difficult for Soviet physics, as indeed for the society in general. The authorities continued to support physics, and out of the Leningrad Physicotechnical Institute several new institutes were created in Leningrad and around the country. But physicists now came under pressure on two fronts: to do more for industry, and to do more to demonstrate their ideological loyalty to the regime.

Ioffe was severely criticized by the authorities for not doing enough to help the industrialization drive. Some of the criticism was misplaced. An extensive discussion of Ioffe's activities, held in the Academy of Sciences in March 1936, showed how the Stalinist command economy discouraged the transfer of scientific knowledge into industrial production; this was to prove one of the great weaknesses of the Soviet economic system. Institutes like Ioffe's were not able to overcome the barriers to innovation, and Ioffe made it clear that he did not regard it as his responsibility to do so. It was up to industry to come to the physicists for help, he said, not for the physicists to persuade industry to innovate.

Soviet physicists were pressed in the 1930s not only to declare loyalty to the Soviet state but also to endorse the view that dialectical materialism provided the proper methodological and epistemological basis for physics. This latter claim had serious political implications because it made the scientific merits of physical theories subject to adjudication by the Party and its ideologists. While debates about dialectical materialism and physics raged in the 1930s, physicists by and large stood firm in arguing for the integrity of physics and in resisting the claims of Party philosophers. In spite of the almost complete curtailment of personal contacts with Western physicists from the mid-1930s on, Soviet physicists never ceased to think of themselves as members of a wider international community and to regard their science as part of an international enterprise; they followed the foreign physics journals with great attention.

Josephson's book is based on extensive Soviet sources and research in Soviet archives. There is a great deal of information here about individual scientists and their research, about the social and political conditions under which they worked, about the organization of science, about the philosophical disputes, and about the effects of the Great Terror on the physics community. The detail may overwhelm the reader who is not specifically interested in Soviet physics, for Josephson does not always provide general arguments, or a more general framework, to draw out the significance of the information he provides; he does not, for example, offer a systematic discussion of why the fate of Soviet genetics was different from that of Soviet physics. This is, nevertheless, a pioneering study of one of the key physics communities of our century and an important contribution to our understanding of the organization of science.

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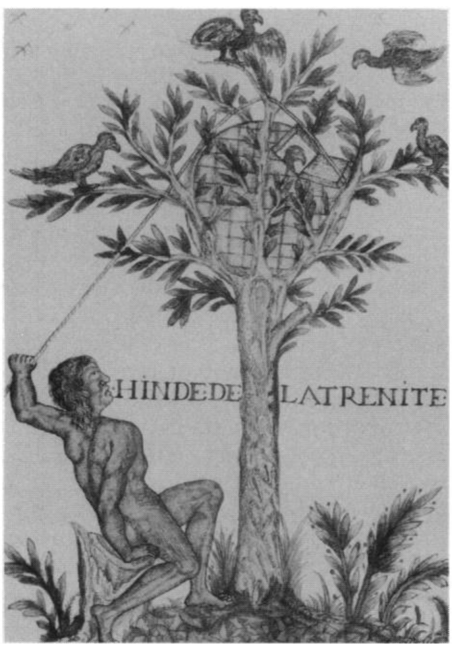
Avian Targets

New World Parrots in Crisis. Solutions from Conservation Biology. STEVEN R. BEISSINGER and NOEL F. R. SNYDER, Eds. Smithsonian Institution Press, Washington, DC, 1992. xvi, 288 pp., illus. $35; paper, $16.95.

Parrots have had special appeal for human beings for perhaps millennia. Their bright colors, intelligent personalities, human-like social bonding (including use of speech), and sheer beauty have sealed our love affair with these birds. Unfortunately, the very qualities that attract us to parrots may cause their extirpation in the wild, through a love-affair-gone-wrong. The astounding statistics in this volume will cause you to sit up with alarm. In addition to the usual threats facing most tropical wildlife, including habitat destruction and local hunting, parrots face the "rapacious live bird trade," as Forshaw calls it in his moving foreword to the volume. Moreover, the hard-hitting chapters by Collar and Juniper, by Clubb, and by Thomsen and Mulliken leave no doubt as to the major villain in the potential extinction of New World parrots: the gentle citizens of the United States, a supposed conservation-enlightened First

World country in which exploitation of its own native wildlife is illegal. We provide over 80% of the market for neotropical psittacines—a total of some 1.4 million wild-caught parrots arriving legally and alive to our quarantine stations between 1982 and 1988 alone. An industry that garnered, during this period, more than $1 billion for American entrepreneurs left relatively little economic or other benefit in the countries of origin of these birds.

With its state-of-the-art information on parrot conservation, this book is certainly a must for any biologist or conservationist interested in parrots. In addition, the thematic approach it takes—a deliberate departure from the species-by-species approach taken by its predecessor, *Conservation of New World Parrots*, edited by R. Pasquier (Smithsonian Institution Press, 1981)—makes it a powerful case example of contemporary problems in conservation biology. Reflecting the field of conservation biology, the chapters in the volume represent a blend of basic science, human sociology, economics, management, law, and policy. Highlights include Munn's chapter with intriguing calculations of the value of ecotourism (and the first publication that I know of of some of his wealth of basic data on macaw reproductive biology); Butler's fabulous success story in the Lesser Antilles, the result of a truly innovative approach to saving showcase species (with benefits to many other, less conspicuous species sharing the same habitat); Clubb's surprisingly sharp admonition of private aviculturists, without the soft gloves others have used for this group of people who hold conservationists "over a barrel" with their possession of endangered species and who have yet to act responsibly as a group; Beissinger and Bucher's analysis of whether a harvest of wild psittacines is truly sustainable (including an honest discussion of the contradictions in exploiting a species you are trying to protect); Wiley, Snyder, and Gnam's well-balanced and tightly written chapter on the variable success of reintroductions; and Bucher's discussion of how to manage a species that is considered a pest by some and that is in imminent danger of extirpation. The only possible omission might be a full chapter on legislation (national and international), although various legal aspects are mentioned in several chapters and such information can go out of date quickly.



Techniques for capturing parrots as illustrated in the 16th-century Drake Manuscript. Lures to attract parrots are still widely used in the neotropics. [From J. B. Thomsen and A. Brautigan's paper in *Neotropical Wildlife Use and Conservation* (University of Chicago Press), reviewed 3 July; J. P. Morgan Library]

If the book has a fault, it would be some redundancy among the longer chapters. In particular, the criticisms of captive propagation in several chapters seem not only excessive in length but excessively pessimistic, particularly for a taxon such as parrots that will be kept and bred in captivity whether we conservationists like it or not. No one disputes that habitat preservation should be the highest priority, but I believe that conservationists should exploit the often extensive and healthy captive populations of endangered and threatened species that already exist within countries like the United States. No one says it will be easy, and conservation is not for the faint of heart. This is the ending sentiment and nutshell message of the volume. The problems are bad—very bad—and the word "crisis" does not overstate them. The word "despair" should not be in our vocabulary, however, and the volume offers a variety of solutions for saving one of the world's most appealing animals, with benefits extending to other species, including ourselves.

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Sensory Studies

Olfaction. A Model System for Computational Neuroscience. JOEL L. DAVIS and HOWARD EICHENBAUM, Eds. MIT Press, Cambridge, MA, 1991. xii, 319 pp., illus. $50. A Bradford Book. From a conference, Wellesley, MA, May 1990.

The olfactory system has emerged from decades of obscurity to become a subject of wide interest among neurobiologists, experimentalists and theorists alike. There are multiple reasons for this. Thousands of genes may be involved in coding for odor molecular receptors, the anatomical organization of the receptor epithelium is of utmost simplicity, and projection areas of the olfactory bulb and olfactory cortex are architecturally much less complex than comparable structures for other sensory systems. Olfaction is unrivaled in its capacity for receptor neuron replacement and regeneration and for developmental plasticity in relatively mature animals. A variety of central nervous system cells trace their lineages to cells of the embryonic olfactory placode.

Experimental advantages are equally compelling. Stem cells for olfactory receptors grow and differentiate in culture, and the olfactory placode in organ culture becomes a functional receptor organ and establishes synaptic connection with olfactory bulb neurons in culture. Voltage-sensitive dyes allow simultaneous monitoring of odor-evoked activity in many cells geometrically layered to allow unambiguous interpretation of that activity. A variety of preparations allow membrane properties of receptor cilia and of receptor and higher-order neurons to be investigated.

This symposium volume examines, in a well-organized way, the advantages of the olfactory system for computational modeling of brain activity. About two-thirds of the volume consists of chapters on the anatomy, physiology, and plasticity of the olfactory system, and all are written from a computational perspective. There are models for the formation of molecular images and their transformations as the signals proceed centrally (Shepherd), models describing evoked responses of receptor cells and cells of the olfactory bulb (Kauer *et al.*), oscillatory responses of olfactory cortex (Ketchum and Haberly), subcortical and cortical interactions (Price *et al.*), and discussions of hippocampal connectional plasticity (Leon *et al.*) and its implications for memory processing (Lynch and Granger, Eichenbaum *et al.*).

The second part of the volume considers computational models of the olfactory system, with contributions from Wang *et al.*, Freeman, Granger *et al.*, Bower, and Hammerstrom and Means. The issues raised are provocative and the chapters provide a fair representation of much of current thought in this field.

One major issue, that of an adequate experimental basis for model building and theory construction, receives scant attention. Little is known about odor coding in receptor neurons. It is not known whether these cells respond to a few or many odorous chemicals or what concentration of