A View of an Uneasy Alliance

Scientists and War. The Impact of Science on Military and Civil Affairs. SOLLY ZUCKERMAN. Harper and Row, New York, 1967. 191 pp. $4.95.

This book is important. Scientists should not dismiss it because it is short, because the essays in it were prepared for other occasions over the last few years, or because of an almost exaggerated concern for a general reader who requires definitions of seconds of arc and microwave radar. Although a certain importance might be attributed to it merely because of the author's eminent position as science adviser to the present British government, the basic significance stems rather from the ideas it contains and from the place it takes in the continuing Anglo-American dialogue on science policy.

In the first five chapters, Zuckerman describes the uneasy alliance between science and military which has taken shape in the last quarter-century. Distinguishing among basic research, mission-oriented basic research, applied research, and technology, he sketches the main outlines of the present science-based military system both in terms of the development of ever obsolescent and more sophisticated weapons and of the use of operational research. His views on the nature of science are sensible. For instance, while describing the great organizational changes in the conduct of research, he asserts that the "tidal wave of interest in science has made little difference to the nature of the individual research worker." He has no use for the distinction between tactical and strategic nuclear weapons in the age of mutual deterrence, and the "plain fact is that neither the Western nor the Soviet blocs could ever afford to put the concept of strategic nuclear war to experimental test." In his glance at the future he sees "nothing as revolutionary as radar, nuclear weapons and nuclear power, guided weapons and ballistic missiles, communication satellites, or high-speed computers emerging over the next ten, fifteen years." Science's greatest impact on military affairs will stem from political transformations, on which science will have its effect in a general way rather than through the military machine.

Fortunately, Zuckerman goes on to put his view of science and military affairs in a larger frame by considering the social function of science, as he has done before, in July 1940 at the height of the Battle for France. "There are major constraints to the freedom with which the goals of scientific and technological activity can be selected, and whatever the goals that may be chosen, their achievement carries the risk of being associated with unpredictable social repercussions." Here he is bringing up to date the discussion begun in the 1930's by J. D. Bernal on one side and Michael Polanyi on the other. In insisting that science has social consequences and is amenable to planning, Zuckerman is in the Bernal tradition. But he sees that in Britain and the United States planning came to science in the service of freedom and democracy as traditionally constituted rather than in the service of a Marxian revolution. Indeed, without making this book a polemic, he deflates many of the favorite positions of that other who has "reanimated" Bernal, Sir Charles Snow. Snow's views on Lindeman versus Tizard, the moral unneutrality of science, and the possession of prescience by scientists as a group fall under Zuckerman's skepticism. Many of the confusing and unnecessary detours into which one of the great debates of the 20th century has been diverted are thus closed off.

As we confront what some see as the beginning of a time of unprecedented troubles in the adjustment of science to the military and to society, this distillation of the experience of a crucial generation gives a wide audience a chance for informed reflection.

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Vertebrate Nervous Systems

Evolution of the Forebrain. Phylogenesis and Ontogenesis of the Forebrain. A symposium held in Frankfurt and Sprendlingen, Germany, August 1965. R. HASSLER and H. STEPHAN, Eds. Thieme, Stuttgart, 1966; Plenum Press, New York, 1967. 472 pp., illus. $28.

In recent decades, a vast quantity of original investigations on living and even fossil vertebrates has furnished many significant data which have contributed substantially to the formulation of current concepts of the vertebrate nervous system. During this period relatively few treatises, conferences, and symposia have been concerned with making comprehensive assessments of these data in the primary context of comparative vertebrate neurology. This conference successfully brought together the variety of topics necessary for such an assessment of the vertebrate forebrain. The proceedings volume includes 42 papers presented by participants from 12 different countries. Most of the articles are written in English and the others in German or French with English summaries. The book, which is indexed, has an excellent format.

The papers, mainly neuroanatomical in scope, analyze phylogenetic and ontogenetic aspects of observations made on many vertebrates. Some contributions present observations and conclusions based on such modern techniques as electron microscopy, autoradiography, and histochemistry. The flavor of the conference may be gauged from several of the articles. The value of topology is emphasized by Nieuwenhuys, who notes that comparisons between the everted forebrain of the teleosts and other actinopterygian fish and the everted forebrain of other vertebrates cannot be made on a topographic but only on a topologic basis. The fundamental similarities of the forebrain of the living fossil crossopterygian *Latimeria* to those of others fishes are analyzed by Millot and Anthony. The fact that many of the main fiber bundles of the forebrain are present in almost all vertebrates, even though the bundles vary in many features, suggests the underlying stability of this pattern (Crosby, DeJonge, and Schneider). Paleoneurology, with its literature of 1500 publications, is represented by an evaluation, based on fossil brain casts, of the evolution of the brain of the Camelidae by Edinger. The basic homologies of the entopeduncular nucleus (cat), the globus pallidus (monkey), and the paleostriatum (chicken) are indicated by their ultrastructural similarities as revealed by electron microscopy (Fox, Hillman, Siegesmund, and Sether). Valuable contributions to unraveling the significance of the limbic system are made by MacLean's demonstration of a direct pathway from the visual system to the limbic cortex (squirrel monkey) and the quantitative studies of Stephan and Andy on the septum and allocortex in insectivores and primates. The analysis of the corti-