Stress Physiology of Man and Other Mammals

Introduction to Environmental Physiology. Environmental Extremes and Mammalian Survival. G. EDGAR FOLK, JR. Lea and Febiger, Philadelphia, 1966. 308 pp., illus. $12.

One can assure the primary audience to which Folk has addressed this book —graduate students, and environmental physiologists in general—that it is a volume worth more than its price. Some details aside, the author has succeeded in quickly encompassing the modern environmental physiology of man and other mammals, and has done it well, in a profusely illustrated work of a moderate size.

Stress physiology is emphasized. The two major stressor land environments, symbolized on the cover of the book by tundra and desert, are not equally treated. The author is clearly more at home in cold climates than in hot, and one of the book's greatest values results from Folk's large personal experience with men and animals in cold, harsh environments.

This is a creative synthetic work, albeit at an elementary level, and in many ways it fills a gap. It begins with a mammal-oriented discussion of the acclimation-acclimatization terminological problem, out of which comes refreshing emphasis of the distinction between physiological adjustment and genetic adaptation. Even with Folk's lengthy and much appreciated treatment of the problem we undoubtedly still have a long wait ahead before the final demise of the use of the unfortunately misleading combination "physiological adaptation" for physiological adjustment.

A review chapter on biological rhythms is followed by the major coverage of stress physiology, most of which is deliberately rather extensive than intensive in treatment. Thus it is not intended to satisfy advanced students interested in relevant mechanisms, which are as diverse as those pertaining to energy exchange and evolution. Greater emphasis on statistical analysis of both environment and rate function would have been welcome. It is not clear why scientific names have been removed from the text and replaced, sometimes with obvious difficulty, by vernaculars of vague description (for example, "a rat-sized rodent related to guinea pigs").

Throughout the book the author leaves little room for doubt that he is a physiologist first and an environmentalist and evolutionist second. Thus he is to be highly commended for his very considerable effort in providing the student of functional environmental biology with a diversified and useful book that provides wide coverage for the harsh effective environments on earth, environments that have molded some of the most interesting mammalian evolutionary adaptations and concomitant mechanisms for physiological adjustment.

CHARLES H. LOWE
Department of Zoology, University of Arizona, Tucson

What To Do with What We Know

Knowledge and Power. Essays on Science and Government. SANFORD A. LAKOFF, Ed. Free Press, New York, 1966. 512 pp. $9.95.

It is only a slight exaggeration to say that since Albert Einstein wrote his famous letter to President Roosevelt, American scientists have been trying to unlock the secrets of the universe with the keys to the federal treasury. This is, no doubt, as it should be, since one of a developed nation's most precious assets economically and politically is its capacity to produce technological innovations. These in turn depend upon its capacity to produce and assimilate fundamental knowledge. And so an understanding of the linkages between persons specializing in the exercise of power and those specializing in the production of knowledge is crucial to an understanding of any modern society.

It is by no means clear to me what these linkages are or ought to be; but this collection of essays by diverse people gives a good bit of raw material from which answers applicable to the contemporary United States could be constructed. Its 15 chapters are perhaps not quite 50 percent more useful for these purposes than the 10 essays in Gilpin and Wright's very similar *Scientists and National Policy-Making*, published three years ago (Columbia University Press). But the overlap between the books has to do with shared subject matter; no essay appears in both collections.

Judging from the Lakoff volume, the most striking characteristic of present-day relations between science and government is that they are highly institutionalized. I infer this from the amount of space devoted to the description of governmental institutions in being, emergent, or proposed. Separate chapters by Enid Curtis Bok Schoettle, Roger A. Kvam, Carl William Fischer, and Eileen Galloway chronicle the establishment of NASA, the operations of Comsat, the President's Science Advisory Committee, and three proposals to institutionalize scientific advice to Congress. They all seem to me to be quite competent, clear, and useful narrative accounts.

Two essays pose somewhat more sharply within the context of specific cases a problem that scientists will recognize as especially important—namely, the extent to which scientific findings can be employed in the making of national policy. The two cases have to do with the feasibility of a nuclear test ban (described by Cecil Uyehara) and the relationship between smoking and health (by Stanley Joel Reiser). In the first case, scientists found themselves making judgments that mixed scientific findings with political evaluations. In the second, politicians found themselves unable to interpret scientific advice. These cases demonstrate that the line that runs from scientific evidence to scientific conclusions and from these conclusions to judgments of national policy does not always run straight.

This is not exactly news. It occurs to me that had editor Lakoff been somewhat more intrusive in shaping his material, or more explicit in expressing criteria for his selections, he might have included some remarks that grapple directly with the problem of finding rational decision rules under conditions of scientific ignorance—such as Warner Schilling has discussed in his "Scientists, foreign policy, and politics" (in the Gilpin and Wright volume).

A third cluster of essays addresses the problem of finding appropriate criteria for determining the level and distribution—among projects, disciplines, and institutions—of national resources for the support of science. Most of the essays falling under this rubric—by Alan Waterman, Alvin M. Weinberg, Harvey Brooks, and Philip Abelson—are uplifting rather than penetrating. But in fairness to the authors it should be said that many of these essays were originally written for ceremonial occasions.

Plainly, there is much food for thought in this volume. It did not seem

to me, however, for all the polish, eloquence, and command of detail these essays display, that this book can be said to have brought the political science of science more than a short distance forward.

NELSON W. POLSBY
Department of Government, Wesleyan University, Middletown, Connecticut

Health Service in Britain

Medical Practice in Modern England. The Impact of Specialization and State Medicine. ROSEMARY STEVENS. Yale University Press, New Haven, Conn., 1966. 415 pp., illus. $10.

This book touches upon almost every aspect of England's National Health Service. It is long—almost 400 well-filled pages of text. A final section entitled "Additional notes" includes a guide to the graduate diplomas available to British physicians—40 or more, one judges—the histories of which are given in the text. There are five full pages of references described as "major," exclusive of citations to journals which are included as footnotes. This will give the reader some notion of the exhaustiveness of Stevens' work.

The 24 chapters deal with the history of medical education and medical practice prior to the National Health Service, the formation of the National Health Service, and finally its development since 1948. An American who looks at British medical care finds much that is puzzling. The sharp separation between consultants (specialists), who work in hospitals, and the general practitioner, who works largely outside of hospitals, is not only strange but somewhat alarming to an American visitor. Stevens' history makes clear how this arose—how the general practitioner descended historically from the rude, apprentice-trained apothecary who worked in earlier times under the university-educated physician.

The book is mainly descriptive and informative; the author has been sparing with her own opinions. Two examples, one historical and another related to present problems, illustrate this. Planning for the National Health Service began under a Tory Minister of Health in 1942. After the election of 1945, Aneurin Bevan, an ardent socialist, became the minister and changed the direction of previous planning quite radically. Stevens accepts a commonly held opinion of that era that it was probably necessary to nationalize the hospitals as Bevan did. The Labour intellectuals had much greater faith in nationalization as an economic and social tool in the 1940's than they have today. This "necessity" may well have been a self-serving argument and deserves more critical attention than Stevens gives it. She notes briefly in the text that the National Health Service had been in existence for almost a decade before the Ministry of Health set up a statistical section, and in her conclusions she again mentions briefly the obvious lack of information about medical care. It is characteristic of her writing that she touches lightly where much heavier blows might be justified. But the book is, on the whole, a very good description and history of a very complex subject. I have always felt that there were two major enigmas in Britain—medical organization and the difference between the public and saloon bars in pubs. One of these is no longer an enigma.

OSLER L. PETERSON
Harvard University Medical School, Boston, Massachusetts

Physiology of Motor Control

Muscular Afferents and Motor Control. Proceedings of the First Nobel Symposium, Lidingo, Sweden, June 1965. RAGNAR GRANIT, Ed. Almqvist and Wiksell, Stockholm; Wiley, New York, 1966. 466 pp., illus. $20.

Some of the most exciting recent work in neurophysiology has occurred in the analysis of those structures which are related to motor functions. *Muscular Afferents and Motor Control* is a valuable collection of nearly 40 papers on the motor systems. The conference at which the papers were presented inaugurated an experimental venture into a new area of activity for the Nobel Foundation and at the same time represented a continuation of the 1961 Hong Kong symposium on muscle receptors, but with somewhat greater emphasis on central rather than peripheral nervous structures.

Among the reasons for recent rapid progress in understanding motor control are the *rapprochement* of neuroanatomy and neurophysiology in the study of muscle spindle function, the development of new methods for studying neuronal activity during normal movement, the great convergence of experimentation on cerebellar physiology, and the introduction of concepts from systems analysis. All of these new developments and many others are fully discussed in a manner that not only clarifies the way in which normal movements come about but also elucidates abnormal states such as spasticity and tremor. This volume is especially valuable for its summaries of recent work linking the dual organization of the gamma motor system (Boyd and Davey) with the detailed histology of the muscle spindle (Barker), and the dynamic and static physiological response of primary spindle afferents (Smith, Bessou, Laporte, Jansen, Andersson and Lennerstrand). Several ambiguities of nomenclature and interpretation in spindle physiology are clarified.

A group of papers by Eccles, Lundberg, Terzuolo, Llinas, and Oscarsson shows the way in which utilization of the now classic microelectrode technique has expanded from early studies of the basic properties of neurons and their synapses to more recent preoccupations with the detailed organization of synaptic connections. This recent work involves analysis of interneuron pathways, including those in laminated structures such as the cerebellar cortex, and delineation of the locus of synaptic action on different portions of neurons. Such work is providing a refined functional microanatomy of many regions of the nervous system intimately concerned with motor control. An extremely important new approach, described by Pompeiano in connection with his studies on sleep, employs long-term implantation of electrodes in the spinal cord of unanesthetized animals. This promises to yield insights into the operation of cord structures under more normal conditions than ever before. Related to this concern with normal function are papers by Granit, Kernell, Eldred, Wilson, von Euler, Shapavolov, Sears, and Eyzaguirre dealing variously with topics such as repetitive firing of neurons, the development of rhythmic activity, the functional role of recurrent inhibition, and the use of respiration as a physiological movement that can be analyzed in experiments with immobilized animals under anesthesia.

This book will allow investigators from many different basic and clinical disciplines now focusing on various aspects of motor control to share in the excitement generated at this conference.

WILLIAM ALDEN SPENCER
New York University Medical Center, New York