

ture—was revolutionary according to textbook knowledge of the time, whereas the demonstration persuasive to the phage group depended upon the conventional generalization that proteins contain sulfur and never phosphorus, which was not expected to hold, either as a generalization or experimentally, below the 10 percent level. I find it also somewhat unexpected that the x-ray analysis of long spacings in macromolecules that led up to the structural studies of DNA are also considered to be unrevolutionary. Probably this is because each step was preceded by another one, and the giant step to helical structures and fibers could be technically supported in a most unromantic way. Nevertheless, if this reviewer put all of his favorite giant steps into Stent's competent framework, he would merely have slightly reduced the impact of a thought-provoking work that may send many of us scurrying to reexamine our motives and aims in the months ahead.

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Regulating Man

Physical Control of the Mind. Toward a Psychocivilized Society. JOSÉ M. R. DELGADO. Harper and Row, New York, 1969. xxii, 282 pp., illus. \$7.95. World Perspectives, vol. 41.

Until recent times, our knowledge of the human brain and its specialized functional regions came largely from the study of disease. Thus, the lesions of epilepsy with their propensity for localized activation of brain circuits provided a "Pandora's box" of information that could be interpreted in physiologic terms and thereby provide functional maps of the human brain. With the advent of electronic technology, nature's relatively crude experiments have been supplemented by accurate methods of electrode access and stimulus control so that now the clinician or neurophysiologist can activate virtually any selected neuronal population within the human brain. In *Physical Control of the Mind* Delgado gives us a timely review of what this technic can effect in the animal and in the human patient that has bearing on the control of the mind. If the book had appeared ten years ago, its impact would have been greater, since today it is very apparent that effective physical control of the mind is more likely to be achieved

through some of the powerful chemical agents that are being used by the youthful populace to "expand the mind" than through the technically difficult methods involved in applying an electrical stimulus to appropriate regions within the cranium.

Delgado has also attempted a more ambitious task, namely to define the philosophic and sociologic implications of these advances in scientific knowledge in line with the intent of the monograph series *World Perspectives* as stated on the dust jacket: "to reveal basic new trends in modern civilization, to interpret the creative forces at work today, in the East as well as in the West, and to point to the new consciousness which can contribute a deeper understanding of the interrelation of man and the universe, the individual and society, and the values shared by all society." With these goals in mind, Delgado sets in the first nine chapters an evolutionary background for the development of mind-brain concepts. The next seven chapters review the progress that has been made in the control of primate behavior in social groups by intracerebral stimulation. The remaining ten chapters discuss work on brain stimulation in patients and attempt a synthesis of human and animal studies. In the final chapter Delgado considers the social implications of work in this field and properly emphasizes the urgent need for further multidisciplinary research before social problems pass out of rational control.

By many readers the treatment of the mind-brain problem so intimately involved in stimulation experiments in man will be judged as simplistic and cavalier. One might illustrate Delgado's approach by quoting the definition of mind which he adopts, namely, "the intracerebral processing of extracerebral information." This appears to beg the question and is out of step with contemporary efforts to reach a more meaningful approach to this complex subject. An example of such an approach can be found in the monograph *Free Action* by A. I. Melden, which treats in great depth the philosophic-physiologic interface involved in such apparently simple voluntary acts as flexing the finger. Questions of equal complexity appear in relation to such effects as memory change, hallucination, and illusion produced by depth stimulation, and one would have welcomed a more penetrating analysis than is offered in this book.

The most informative chapters are

those in which Delgado describes his own work concerning the effects of electrical stimulation of the brain on the behavior of primates in a social environment. This is unique research bridging a gap between brain mechanisms and their expression as sociosexual forces in the group. Here we see Delgado's talent for technical inventiveness combined with his experience with the social structure of a primate colony to produce a unique addition to our knowledge of how brain mechanisms contribute to our understanding of social and group activities. Furthermore, this kind of research seems particularly relevant as providing basic data for use in the interpretation of the breakdown now becoming apparent in social groups and institutions at a human level. In this respect the book fulfills some of the wide-ranging objectives of the *World Perspectives* series.

In his closing chapters, Delgado ranges over a variety of topics including the ethical problems encountered in human experimentation and in the assessment of brain death. His final plea for a "psychocivilized" society is not very convincing, for it gives the impression of a demand for action on the basis of rather fragmentary data.

The general reader will find in this book much well-documented and useful information about aspects of brain function that is not readily available elsewhere.

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Nociperception and Analgesia

Pain. Proceedings of an international symposium, Paris, April 1967. A. SOULAIRAC, J. CAHN, and J. CHARPENTIER, Eds. Academic Press, New York, 1968. xii, 562 pp., illus. \$19.50.

The 54 contributors to this symposium sought in their 41 papers to cover the neural and psychic bases of pain; experimental methods for producing pain in animals and man and for evaluating analgesic agents; the biochemical and psychopharmacologic basis of action of such agents; the psychopharmacology of analgesics; the modification of neuroelectric activity by analgesics and local anesthetics; and finally some clinical applications of studies of those subjects. The editors have generously published in English all but three papers.