the needs and position of the underdeveloped countries. The opportunity they offer for disinterested voluntary service in many ways and many fields may be no less important in its bearing on world stability and co-operation than on the welfare and fulfilment of the volunteers from Britain who respond to the challenge.

BRAIN MECHANISMS AND MODELS

Progress in Brain Research

Vol. 1: Brain Mechanisms. International Colloquium Sponsored by the International Brain Research Organization (IBRO) on Specific and Unspecific Mechanisms of Sensory Motor Integration; Pisa, 1961. Edited by G. Moruzzi, A. Fessard and H. H. Jasper. Pp. xii + 493. 140s. Vol. 2: Nerve, Brain and Memory Models. Edited by N. Wiener and J. P. Schade. Pp. viii + 280. 80s. Vol. 3: The Rhinencephalon and Related Structures. Edited by W. Bargmann and J. P. Schade. Pp. vii + 253. 70s. (Amsterdam, London and New York: Elsevier Publishing Company, 1963.)

VOLUME 1 of the series *Progress in Brain Research* is the product of a colloquium, sponsored by the International Brain Research Organization (IBRO), on specific and unspecific mechanisms of sensory motor integration. As the colloquium was held in honour of Prof. F. Bremer, it was appropriately concerned with the electrophysiology of the nervous system. There are some two dozen papers. The first is by Sir John Eccles and deals with post-synaptic and pre-synaptic inhibitory actions in the spinal cord. Ragnar Granit writes on recurrent inhibition as a mechanism of control. Among papers of more general interest is one by K.-E. Hagbarth and B. L. Finer on the plasticity of human withdrawal reflexes to noxious skin stimuli in lower limbs. It has been shown electro-myographically that there are two components in the withdrawal reflex—an initial spinal one and another later, probably cerebral. The second can be modified profoundly by hypnotic suggestion, being reduced in amplitude if the subject is told that no pain will be felt, and increased if the contrary is suggested. It was shown to be absent in a patient whose loss of sensibility in the limb was due to hysteria. An investigation by P. Dell shows how the reticular formation which influences alertness and attention is involved in a number of feed-back circuits which tend to maintain it in a state of homeostasis. Alternative sensory pathways and their thalamic integrations are discussed by D. Albe-Fessard and A. Fessard. A. Arduini discusses the tonic discharge of the retina and its central effects, among which is the signalling of the intensity of the steady illumination. The convergence of several sensory modalities on the same cortical neurones is a fact of obvious physiological and probable psychological importance, discussed by R. Jung, H. H. Kornhuber and J. S. Da Fonseca. Among the remaining papers are several on sleep, and the physiological contributions to it made at different levels of the nervous system.

This is mainly a book for specialists; but it provides a broad overall survey of present-day trends in the electrophysiology of the central nervous system, and for the non-specialist there are a few items of considerable general interest.

The development of cybernetics and information theory has provided a temptation to speculate on how the brain might work, which many ingenious minds have found irresistible. Some of the consequences are to be found in Volume 2, which contains the proceedings of a symposium on "Cybernetics of the Nervous System" held at the Royal Dutch Academy of Sciences in 1962. Neurologists, psychiatrists, biologists, engineers, mathematicians and physicists all contributed. There is a paper on the engineering approach to the problem of biological inte-

gration by J. D. Cowan from McCulloch's Laboratory at the Massachusetts Institute of Technology. The sequential behaviour of a set of idealized neurones is the subject of P. L. Latour's paper. He investigated nerve nets with mathematical methods similar to those in the theory of linear sequential networks. F. H. George deals with the logical net type representing a sort of idealized or conceptual nervous system. The cybernetic group of the Moscow State University is represented by A. V. Napalkov. P. Müller discusses the characteristics and patterns of learning matrices, and G. W. Zopf the cybernetic significance of the innervation of the accessory motor apparatus of the sensory systems, and the efferent fibres ending on or near the receptor cells. E. Huan approaches the problem of sensory information from the psychiatric point of view, and there are papers concerned with the construction of models explaining some of the parameters of human memory and thinking. G. Pask discusses models of learning and cognition in evolutionary systems and brains, and P. Nayrac puts forward his ideas on the problems of non-linearity in clinical and experimental neurology. Finally, there is a challenging paper by O. D. Wells entitled "Irrelevance of a 'Nervous System'". These are mostly entertaining speculations, and will not become more so until we know more about the finer anatomy and physiology of the neurone.

Volume 3 is a mainly anatomical discussion of the rhinencephalon. F. Valverde writes on fibre degeneration resulting from coagulations in the amygdaloid complex and anterior amygdaloid area, and traces these into three main projecting systems. O. D. Creutzfeldt, F. R. Bell and W. R. Adey investigate the activity of neurones in the amygdala following afferent stimulation, finding that the main input in the anterior area and the basal and cortical nuclei is olfactory, whereas real multi-sensory convergence is the exception.

A. W. Zbronzyna investigates electrical stimulation of the amygdala and shows this to cause autonomic and behavioural effects, which are obtained as components of the defence reaction, and infers the existence of an amygdaloid centre for the defence reaction connected to the integrative centre of this reaction in the hypothalamus. The finer anatomy of the hippocampus is described by T. McLardy and by J. P. Schade and K. Meeter. Other authors discuss the connexions of the olfactory bulb and other anatomical features of the rhinencephalon. The symposium ends with an unresolved debate as to the meaning of this term, A. Brodal wishing to confine it to those structures in the central nervous system which receive fibres from the olfactory bulb. Though by derivation the term rhinencephalon refers directly to the sense of smell, it has come to mean something more for physiologists. In many mammals taste and smell are the primary afferent pathways concerned in feeding and sexual activity, and the parts of the brain in which they terminate are closely linked with pathways which elicit autonomic and emotional responses. Hence to the anatomist the rhinencephalon means one thing, and to the physiologist, another. We may therefore endorse Brodal's concluding suggestion that all who use the term 'rhinencephalon' should put a footnote or make some reference indicating what they mean by it.

BRAIN

RUMFORD REDIVIVUS

Knight of the White Eagle

A Biography of Sir Benjamin Thompson, Count Rumford (1753–1814). By Dr. W. J. Sparrow. Pp. 302 + 10 plates. (London: Hutchinson and Co. (Publishers), Ltd., 1964.) 50s. net.

THIS year marks the one hundred and fiftieth anniversary of the death of Sir Benjamin Thompson Count Rumford, and also sees the publication of the first