

synopsis of current views in brain research. For this chapter alone the book is worth having.

S. S. Kety, who writes on "Biochemical Aspects of Mental States", describes the relation of noradrenaline and other biogenic amines to emotional states such as anger, euphoria and depression. In a chapter on learning and memory, H. Hyden writes imaginatively on the role of RNA. J. C. Eccles chooses as his theme "Evolution and the Conscious Self". After a long discourse on the mechanics of evolution and the relation of individuality to gene structure, he admits a somewhat grudging acceptance of the theory of evolution as "a partial and limited explanation" of his origin, but he is unable to believe that his "experiencing self" derives merely from his brain with its biological origin and genetic inheritance. Finally, abandoning reasoned argument, he asserts his belief in creation by God and in a personal life hereafter. This chapter illustrates the dilemma of the human mind when it tries to reconcile scientific explanations of natural phenomena with explanations at a supernatural level.

Of the two non-scientific contributors to this book, J. M. Gustavson writes as a theologian on the moral responsibilities of those engaged in brain research and the principles for direction in applying our new knowledge about the brain. Huston Smith writes on the relative capabilities of human and artificial brains. He concludes predictably that human brains are better. And if this is now a rather well-worn theme, his skill as a writer is such that the reader never loses interest. The final chapter, by N. K. Stähle, gives a brief account of the work of the Nobel Institutes.

DEREK RICHTER

VISION IN TRANSLATION

Eye Movement and Vision

By Alfred L. Yarbus. Translated from the Russian by Basil Haigh. Translation edited by Lorrin A. Riggs. Pp. xiii + 222. (New York: Plenum Press, 1967.) \$17.50.

THE eyeball in its socket is obviously adapted for turning the gaze in any direction, and, on analogy with the ball-and-socket mounting of a camera, we might expect that the eye once turned to the proper point would then be clamped there to avoid smudging of the photographic image by tremor or drift. But not only does the eye in fact both tremble and drift when we believe that we are holding our gaze absolutely fixed, but (incredible as it may seem) when, by some optical trick, the image is held stationary on the retina (stabilized), we do not see better; we do not see at all! This is analogous to touch; we feel the texture of a surface by "feeling" it—and that does not mean holding the finger as still as possible in contact.

This astonishing visual discovery was first published by Ditchburn and Ginsborg (1952) in this country, and independently by Riggs and colleagues (1953) in the United States. Yarbus, in Russia, pursuing his studies of recorded eye movements in various conditions, encountered the fade-out of stabilized images in 1956, and his book describing his researches concerning eye movements and their absence, published in Russian in 1965, is now translated by Haigh and edited by Riggs.

Yarbus's technique is simple in concept and skilful in application. A little optical device is held by suction tight against the anaesthetized eye so that both move exactly together. Some devices bear a tiny mirror whose reflected beam traces the nature of eye movements or the point of gaze. Some carry patterns seen sharply in focus by means of a little supplementary lens, but fading away in 3 seconds because that sharp image is stabilized on the retina. These devices are described in practical detail so that the reader may make them and repeat the observations.

The book is entirely devoted to describing the records and observations of the author with these devices. It is

an impressive catalogue, but would have become much more illuminating if he had not passed over in silence most of the 150 contributions by other workers listed in his (Russian edition) references.

Very attractive is the last chapter in which many pictures are reproduced (better than in the Russian edition) together with records of viewers' eye movements showing the pauses and quick jumps in the point of gaze as the picture is scanned—how the eyes return again and again to the centres of interest in the picture.

An important but difficult chapter deals with the bizarre appearances which occur when all or some of the visual field is stabilized. It reads like someone's factual account of someone else's nightmare.

Many of the graphs in the Russian edition lack labels to the axes and it is a pity that this omission was not rectified in the new edition. The time axis is usually presented vertical but time's arrow is always shown pointing both ways, and I was usually uncertain of the true direction.

Unlike the clarity and accuracy of Professor Riggs's own writings, this translation contains rather a large number of errors or infelicities of language and shows some haste in proof-reading. However, to make a translation of a book like this must be very exacting, and our thanks are due to Riggs and Haigh for making available Yarbus's extensive and original researches.

W. A. H. RUSHTON

ALL THAT CONTRACTS

The Contractile Process

Proceedings of a Symposium sponsored by the New York Heart Association. Pp. 299. (London: J. and A. Churchill, Ltd., 1967.) 57s. 6d.

THE thirteen papers presented at this symposium deal with contractile phenomena in a very wide variety of systems, ranging from mitotic chromosome movements to insect flight muscles. The organizers and the symposium chairman (Dr A. Stracher) are to be commended on making available the proceedings of what appears to have been a very lively meeting. The four sections of the book concern contractile processes in macromolecules, in striated muscle, in non-muscular systems and comparative aspects of muscular contraction. The fact that the last named section contains five out of the total of thirteen papers illustrates the growing importance of this topic. In a chairman's address, Perry refers to Ebashi's experiments on the relaxing system in muscle, which are recognized to represent one of the most exciting advances in our knowledge of the mechanism of muscular contraction. Therefore, I think this work should have figured much more prominently.

It is almost inevitable that practically all the new information presented in the several contributions has by now appeared in the journals. Nevertheless the book is useful as a collection of review articles. The account of the discussions following most of the papers reveals something of the flavour of the meeting and there is an occasional glimpse of the personalities of the more vocal (and sometimes more knowledgeable) participants. There is even one of the very rare instances of fireworks: following the papers by Scheraga and Mandelkern, H. E. Huxley and Mandelkern discuss with some passion the possible relevance of the configurational changes in axially-oriented macromolecules to the mechanism of contraction in living muscle. The book also contains its fair share of quotable *ex cathedra* pronouncements. Here is one from Scheraga's paper (page 7): "While any macromolecule can serve our purposes, it is natural to focus attention on the proteins since many naturally occurring contractile systems contain proteins. This is not to say that all contractile systems contain proteins or that all