had pointed out that Newton's approach was substantially identical to his own, and that a rigorous proof of either method required an application of Archimedes's method of exhaustion—much the modern point of view. Newton surprisingly contests this identification, asserting that his own method of fluxions entirely avoids the use of infinitesimal quantities: it proceeds "in finite quantities exactly by vulgar geometry" without involving any "error" or "approximation". More specifically, the increment of the independent variable, which Newton calls its "moment", is wrongly identified by Leibniz with his differential; in Newton's argument—so he asserts—the moment is never treated as infinitely small; it is first taken finite, and ultimately (after all the terms of the equation have been divided by it !) it is made to vanish exactly. This, he says, conforms to the precepts of geometrical reasoning taught by the ancients. Here, then, we see the root of the opposition between the two giants; it was an opposition of mathematical temperaments, too deep-seated to allow of any conciliation: the one upholding the primacy of abstract logical thinking, the other clinging to geometrical and kinematical intuition. It is a fact inviting reflexion that they both could appeal with equal justification to the example of the Greek masters.

L. ROSENFELD

INSIGHT INTO SENSES

Sensory Inhibition

By Georg von Békésy. (The Herbert Sidney Langfeld Memorial Lectures, 1965.) Pp. x+265. (Princeton, N.J.: Princeton University Press; London: Oxford University Press, 1967.) 81*s*. net.

DR BÉKÉSY is, of course, famous for his studies of the mechanics of the cochlea—studies to which his superlative instrumental skill contributed not a little. But he has also been interested in sensory psychology, and it is this aspect of his work which is covered in this volume. The title is a misnomer; it is not strictly a book about sensory inhibition, even if the word "inhibition" is interpreted very widely, as the author himself does, to mean simply a failure of response.

The material in this volume originally formed a series of lectures and these were designed, no doubt, as much to entertain as to instruct. It is perhaps chiefly valuable, in a way that no collection of formal scientific papers can be, as affording an insight into the ways of thinking of a leading research worker, and into the development of his ideas over a long working life. As far as it has a central theme it is that of an investigation of the analogies which exist between the subjective responses of different sensory modalities. As he explores these analogies, we see once again at work the author's tremendous ingenuity in devising adequate instrumentation for what appear at first sight to be the most unlikely situations. It is salutary to be reminded that the classical methods of experimental psychology, suitably applied, can still turn up unsuspected data, and the results presented here confirm our suspicions that the various sensory systems utilize similar basic neural mechanisms.

Of course, such experiments can tell us little or nothing about what these mechanisms are, or where they are located. It is doubtful, for example, if the old trick of using different stimuli to each of two eyes or ears to answer the question "Central or peripheral ?" has much validity in the light of modern knowledge of centrifugal connexions. It is doubtful, even, if the question is any longer worth posing. The known complexity of central nervous processing makes the attribution of phenomena simply to central inhibition, or indeed central anything else, uninstructive. To say that if we cannot feel a stimulus it is inhibited is to say no more than that we cannot feel it.

It was Békésy's great contribution to the study of hearing that at a time when theoretical models of the cochlea were being constructed on the basis of a combination of the results of subjective response and histological appearance, he took the lid off the cochlea and actually looked at what was happening. Here, however, the lid remains firmly on, and we can only speculate, as he does, about the bases of the phenomena he describes.

I. C. WHITFIELD

UNDERSTANDING THE BRAIN

A View of the Brain

By J. S. Griffith. (Oxford Science Research Papers, 1.) Pp. 79. (Oxford: Clarendon Press; London: Oxford University Press, 1967.) 15*s*. net.

Models of the Nervous System

By Sid Deutsch. Pp. vii+266. (New York and London: John Wiley and Sons, Inc., 1967.)

BRAIN research is rapidly becoming one of the liveliest, and one of the most controversial, branches of modern science. Until a few years ago it was generally acknowledged to be the preserve of conventional anatomy and physiology, illuminated from time to time by clinical observation and ablation experiments on animals. But the classical tradition of Sherrington, Lashley, Penfield and Adrian has now widened into a broad river, fed by tributaries from cybernetics, perceptual psychology, communication theory, molecular biology, psycholinguistics and even computing science. Little wonder that many physiologists and experimental psychologists are apprehensive about their subject becoming a latter-day tower of Babel, or that their fears should find ample justification in the superficiality and unrealism of much that is written about the central nervous system. But when this kind of thing happens in a science, it should not be taken as a sign of intellectual decadence but as a sign that the central problems and concepts have not yet been adequately formulated; it is the loose ends and obscurities that have always been the growing points in the history of science. So when a new book or scientific paper raises the blood pressure of an experimental neurophysiologist, perhaps his most appropriate reaction is to ask himself whether there may not be some important problems which are worrying the author, which he himself may have overlooked in his own thinking. Perhaps the author is concerned with logical rather than physiological problems; questions as to the logical design rather than the micro-anatomy of a particular cerebral system; questions which the computer scientist might classify as relating to software rather than to hardware. Perhaps such distinctions are not always sharp; but we are most unlikely to understand the brain completely unless we pay attention to both kinds of question.

Professor Griffith's book is a research monograph in which he directs attention to a few central problems about the brain and describes some of his own ideas about them. He asks how it is that millions of neurons "know" how to join up together and how the resulting enormously complicated network can behave in an integrated manner. His view on the former question is dominated by the idea that every type of neuron is characterized by whether or not it possesses each of a number of chemical messengers. Cells with the same set of messengers are regarded as constituting a "mode", and such modes behave as physiological units. Within a mode the cross-connexions are supposed to be excitatory but between different modes inhibitory. In these terms he discusses the stream of consciousness which he