Book reviews

Somatosensory Mechanisms. Wenner-Gren International Symposium Series Vol 41. Editors: Curt van Euler, Ove Franzen, Ulf Lindblom and David Ottoson. (Pp 396; £40.00.) London: Macmillan Press, 1984.

In November 1925, Adrian & Zotterman first succeeded in recording electrical impulses set up in an afferent nerve by stimulation of a single end organ. Compared with today's techniques, the procedure was remarkably difficult. The cathode-ray oscilloscope was in its infancy and did not produce bright enough images to allow photographs to be taken of single sweeps. Only repetitive identical sweeps could be analysed, which was not sufficient for an irregular series of discharges from a sensory receptor. The problem was overcome by Adrian's coupling of a three valve amplifier with a capillary electrometer. Movement of the mercury meniscus in the capillary tube was recorded on a photographic plate travelling at 1 ms^{-1} and the traces corrected at a later time for the damping and restoring forces on the mercury by an ingenious mechanical device invented by Keith Lucas. The cats were ventilated through a semi rotating valve operated by a windscreen wiper motor from a Morris car! Zotterman was a Rockefeller research fellow during his time in Adrian's laboratory and went on to contribute to many fields of sensory physiology including pain, taste and vestibular function.

This book contains the proceedings of a symposium organised in Zotterman's memory, following his death two years ago. The contributions fall into two main classes: those concerned with peripheral sensory mechanisms and those examining central mechanisms. Adrian and Zotterman's original experiment demonstrated the frequency coding of sensory impulses. The most important recent advance in human sensory physiology has been the ability to extend their work to intact human subjects. Recording and stimulating single nerve fibres in man permits, for the first time, a correlation between activity in single peripheral nerve fibres and conscious sensory experience. The technique, which is the subject of several articles in this book, can answer immediately some critical questions of psychophysiology.

Zotterman himself would have been pleased to see that stimulation of single afferent fibres produces a single modality of sensation, no matter what the frequency

of stimulation. Increasing the frequency only increases the intensity of sensation without affecting its quality or its location on the skin. At the threshold of sensation, the CNS can detect a single nerve impulse in certain classes of afferent fibres innervating the finger tips. Detection threshold is not limited in this case by any intrinsic noise in the central pathways, but only by the characteristics of the receptors in the skin. In contrast, a single impulse is not detected reliably in afferents innervating the palm of the hand. Central analysis of input is, in this instance, a limiting factor in threshold discrimination.

As in all current discussions of somatosensory mechanisms, pain comes in for extensive coverage. There is clear evidence for specific myelinated and unmyelinated nociceptive fibres, which fire only in response to potentially damaging stimuli. However, what is not so clear is the role of activity in the peripheral or central pain pathways in producing chronic pain in man. In clinical doses, morphine seems to have a specific effect on unmyelinated nociceptive input, sparing the more rapidly conducting myelinated pain fibres. The former are responsible for late pain, whereas the latter provide faster and more accurate localisation of an acutely painful stimulus. But activity in specific nociceptive afferents cannot account for all types of chronic pain in man. In causalgia, pain may be evoked by innocuous stimuli of various modalities given to the affected area. The painful sensation is known, however, to be produced by activity in the usual specific afferent fibres appropriate to the stimulus. The reaction time to the stimulus is consistent with the stimulus quality used, so that it seems that activity in non-nociceptive fibres can give rise in certain conditions to a sensation of pain.

Central mechanisms of somatosensory sensation are summarised eloquently by Mountcastle in his introductory chapter, from multiple representations of the body surface in areas 3a, 3b, 2, 1 of post-central cortex to the plasticity of the cortical maps following changes in peripheral inputs. What is missing in his contribution is any reference to the work of Hyvärinen and colleagues on the posterior parietal areas 5 and 7. Hyvärinen himself does not seem to have been at this congress, but there is a paper by Leinonen on this topic and some harsh criticisms are levelled in it at Mountcastle's own work on this part of the brain. Personally, I feel much more at ease with the down-to-earth Finns, who believe that the neurons of area 7 show extensive convergence

of inputs from many sensory systems and "serve to localise... objects in reference to various body parts and various sensory systems" and to use this information to direct attention and guide movements. Mountcastle's explanation is far more philosophical: "... area 7 contributes to a continual updating to a central neural image of the spatial frame of the immediate behavioural surround and the perceptual constancy of that space that obtains during body movement."

The book is reproduced from original typed manuscripts, many of which seem to be verbatim accounts of the conference presentation. Unfortunately this leads to unnecessary repetition. It may have been "an honour and a privilege to take part in the symposium", but one doesn't need reminding at the start of each chapter. As with the usual compilation of conference proceedings, there are a number of articles re-hashed from published or about-to-be published papers, but there are several more welcome contributions which attempt to summarise recent work in particular fields. This is a useful change and will allow the book to reach a wider audience.

JOHN ROTHWELL

Penetrating Craniocerebral Trauma.

Arnold M Meierowsky. (Pp 265; \$49.50) Springfield: Charles C Thomas, 1984.

This monograph on the treatment of gunshot wounds of the head is the distillate of the lifetime experience of one of our neurosurgeons, Dr Arnold M Meierowsky. He was a neurosurgeon during the Second World War, taking part in the Okinawa landings. He organised neurosurgical evacuation and hospitals during the Korean conflict, and it was on the basis of the latter experiences that the highly organised evacuation plan during the Vietnam War was moulded. Indeed the very techniques developed for jungle warfare have been used for civilian evacuation in peacetime in many parts of the United States. The monograph therefore represents a unique insight into the history of surgical treatment of penetrating cranial injuries and the reasons for the development of the organisational plans for evacuation.

The book is in four parts: firstly, general principles which include resuscitation and assessment of the patient. The second section, *Neurosurgical Technique*, occupies half of the book, and is a classification of injuries and a detailed description of their surgical management. The third section,

Postoperative Considerations, 50 pages in length, outlines the care of infections, cerebrospinal fluid fistula, repair of cranial defects and surgery for an inadequate primary operation. The final section, *Conclusions*, 12 pages in length, is more of an appendix of after-thought to the subjects already discussed in detail.

The book is written by a man with a wide clinical experience and knowledge of the literature. He points out that during the Korean conflict "standardization of the management of neurosurgical casualties evolved", by the end of that conflict 95% of all head injuries were evacuated by helicopter. The importance of planned evacuation, definitive surgery by surgeons who know what they are doing, is stressed. He also lays to rest a recurring neurosurgical myth that civilian or urban bullet injuries of the brain are somehow different from those experienced on the battlefield. (Most of the injuries sustained in the Korean War were low velocity in type). In the major section in the book there is a detailed description of the surgical management of various injuries of the head. Most of the diagrams have been reprinted from a book that he co-edited with JB Coates Jr *Neurological Surgery of Trauma* 1965. This latter volume is a classic, and as essential reading as the *War Surgery Supplement* of the *British Journal of Surgery* 1947 for those likely to treat missile injuries. The present monograph apart from adding one or two CT scan pictures does not enhance the details of the surgical technique in his former classic book. He emphasises the importance of adequate debridement, haemostasis, dural repair, and subsequent cranioplasty.

As a monograph of one man's extensive experience and knowledge of the literature, the development of the definitive treatment for injured patients, the book must be recommended. As a surgical guide, however, it must be regarded as a companion to the original book for which he is justly famous.

HA CROCKARD

The Olivopontocerebellar Atrophies. (*Advances in Neurology Series Volume 41*). Edited by Roger C Duvoisin and Andreas Plaitakis. (Pp 304; \$53.50.) New York: Raven Press, 1984.

This is a most useful volume on a long-neglected subject. System degenerations, which used to be a backwater for pedants,

are now in the mainstream of biochemistry, genetics and even possible treatment and prevention. Olivopontocerebellar atrophies (OPCA) are a very heterogeneous group of disorders despite sharing some major clinical and morphological features with other ataxias and extrapyramidal disorders. A central issue in the evolving OPCA story has been the biochemical defect. This book gives most useful clarification of previous chaos and contains detailed reviews of the clinical, pathological and biochemical features of OPCAs. The CT changes in various types of OPCA are illustrated in detail and autonomic failure in these disorders is discussed in depth. A full repertoire of ocular motor dysfunction with loss of "burst" cells is described, although perhaps surprisingly there is no mention of REM sleep changes with brainstem lesions; or of the possible biological significance of absent REM sleep. Also possible respiratory complications of autonomic failure in OPCA are not considered.

The pharmacology of OPCA remains rudimentary but there have been great advances in biochemistry largely owing to experimental lesions of the olivary system caused by 3-acetyl-pyridine. Glycolipids in renal epithelial cells, changes in GABA, aspartate and glutamic acid in the brain, and deficiency of glutamate dehydrogenase in the leukocytes have all been found in various types of OPCA. Despite these major advances, the exact brain function of glutamate dehydrogenase remains unknown. Altogether this is a useful, exciting, well edited and well produced book.

JD PARKES

Norepinephrine. (*Frontiers of Clinical Neuroscience Series Vol. 2.*) Edited by Michael G Ziegler & Raymond Lake. (Pp 521; £76.00.) London: Williams & Wilkins, 1984.

Noradrenaline is a critical neurotransmitter substance in both the brain and the periphery which is involved in numerous physiological processes and which is implicated in many disease states. Since it was one of the first neurotransmitter substances identified a wealth of literature exists on the actions of this catecholamine.

This book contains 32 chapters occupying some 500 pages dealing with a variety of topics relating to noradrenaline. The coverage is extensive and provides many in-depth reviews of noradrenaline action. From the measurement of noradrenaline

concentrations, to its anatomical distribution and physiology and function through to clinical implication of noradrenaline action, the reader is bombarded with information.

It must have taken a mammoth effort to produce such a volume and the editors and authors have clearly laboured long and hard. However, it is difficult to see who is going to read the result. Perhaps as a library reference volume it will be of some use but I suspect the cost will be prohibitive. Certainly, not light informative reading for those with a passing interest in this area. Indeed, it is difficult to see who this volume is directed at for it would be very few whose interests are sufficiently wide to encompass its content.

P JENNER

Progress in Aphasiology. Advances in Neurology Series Vol 42. Edited by F Clifford Rose. (Pp 382; \$65.00.) New York: Raven Press, 1984.

Real progress in aphasiology has perhaps not quite kept pace with the flurry of books proclaiming it. This new addition to the well-known series includes reviews and research papers written from various standpoints, rather less than half of them neurological in orientation. The remainder (by linguists, speech therapists and psychologists) will present varying degrees of difficulty to this Journal's readership and a few may be impervious even to some "cerebral" neurologists.

The book is a report of a symposium and is not therefore as well integrated as a purpose-written book. There is for example much repetition in the two chapters on Natural History and Recovery (both in themselves good). Amongst the other sections of neurological interest and enjoyed by the reviewer, are those of L'Hermitte, Kertesz, Vignolo and others covering mainly subcortical contributions to language, and praxis. The useful paper by Poeck *et al* highlights those difficult cases where scanning localisation does not correlate well with aphasia types, and Stein and Fowler provide new data in support of their interesting theory about the mechanism of dyslexia. Some other chapters are idiosyncratic or of less interest and the book is in no sense a comprehensive text. Its main value to neurologists will probably be in the library where those interested can delve into its better parts.

JOHN C MEADOWS