some other multi-author texts, although there are curious anomalies; none perhaps more striking than the interpolation of a review of psychological effects on unemployment between Wyke's "Inter-hemispheric Integration in Man" and Milner's "Neuropsychological Studies of Callosal Agenesis".

The interactionist tone is firmly set by Grahame-Smith's article on "Cerebral Mechanisms of Mood and Behaviour" in which he asserts that to try to view "psychiatric disease in isolation from the patient's environment, problems and past experience, is as much biological nonsense as trying to understand angina without understanding that the heart is a muscular pump that works harder on exercise". As the brain "through 'the inner world of the mind'" is able to modify its own function, so the relationship between environment, cortical and sub-cortical systems and mental events must be better understood. The temporality of mental events which accords a role to memory and experience in judgement and perception is tackled speculatively by McIlwain in his attempt to relate drug actions in animal studies to effects on illness with particular emphasis on the role of cyclic nucleotides at intra-cellular receptors, the nucleotides sequentially activating receptors as they spread along dendrites. The role of noradrenaline in modulating the long-term effects of experience in brain function is considered by Robbins with emphasis on the response of the dorsal noradrenergic ascending bundle to stress, its role in enhancement of specific sensory stimuli and the possibility that changes in arousal affect the beta receptor and cyclic AMP through alteration in synaptic plasticity.

The general difficulty of relating gross monoamine dysfunction to very specific behaviour, in this case sexual behaviour, is reviewed by Everitt who considers that the monoamine systems are important in regulating the selection and expression of goal-directed behaviours; a general conclusion that appears more realistic for that. While biological changes in dementia, including kuru and Huntington's disease, are considered in the next three articles, there is also a comprehensive review of the diverse pathological findings in schizophrenia.

The interactionist emphasis is again taken up in the Genetics section which is opened by Shields with a review of the behavioural variables and psychophysiological risk factors that might contribute to non-genetic influences in the causation of schizophrenia, with particular emphasis on the prospective studies of Mednick and Shulsinger.

The Psychopharmacology section opens with Kumar's critical appraisal of the difficulties of relating behavioural patterns in different species to psychotic syndromes in man but the articles which follow on pharmacogenetics, pharmacokinetics, drug assays and benzodiazepines are too narrow in scope to do justice to the enormous amount of pharmacologically based research in psychiatric illness.

The Psychology section opens with Eysenck's review of the impact of successful behavioural therapy techniques on the underlying psychological theory, and is followed by "Anxiety and the Brain" in which Gray points out that some anxiolytic agents, for example, alcohol, do not bind to the benzodiazepine receptor and that an understanding may come "not by neurochemistry alone". Given the actions, even if short-term, of beta-blockers and clonidine in anxiety it seems not unreasonable that the site of the interactions of various effects should be sought. One possibility is the septohippocampal system which has NA and 5HT afferents and is described as "an organ of hesitation and doubt", overactivity of which gives rise to anxiety. Gruzelier reviews issues relating laterality to psychopathology and concludes that the primary disturbance in schizophrenia is probably in the left hemisphere. One wonders whether this relates to the recent finding of raised levels of dopamine in the left amygdala and what differences in symptomatology and treatability may be produced by the subsequent transcallosal spread of the disturbance. In the Epidemiology section there is again strong emphasis on methodology with useful specific examination of epilepsy and also of alcoholism.

A more general section which concludes the book opens with an enjoyable essay by Murphy on "The Epistemology of Normality". "In the domain of natural knowledge . . . , *a priori* every part of a system is as good, as important, as significant as every other part", a general principle which has applications in, for example, considering the degree of culpability in the commission of a criminal act by a person with a mental illness. The author points out that it has never been ruled that the presence of insanity in a person precludes him from ever being found legally guilty of a crime. He suggests that, although the law does not so state it, "Where a condition is so abnormal as to impose an extraordinary burden on the patient we may invoke it as a defence".

While some of the articles remain highly relevant to the issues confronting research workers today some are now clearly dated.

Crow's 1979 account of ECT has been followed by several controlled studies of ECT and studies on receptor sensitivity in animals given ECS which have provided much more information than was then available. In general, though, the affective disorders are the least well represented of the major psychiatric disorders. The scope of neither the data collection, nor the development of theories about depression and mania is fully suggested. There is, however, much in the book that is good to read and is likely to remain so for some time, and with the range of topics it will be of value to many as a basis for integrating further information.

FA CORRIGAN

Taurine: Biological Actions and Clinical Perspectives. (*Progress in Clinical and Biological Research Volume 179*). Edited by Simo S Oja, Liisa Ahtee, Pirjo Kontro and Matti K Paasonen. (Pp 500; £52.00.) New York: Alan R Liss Inc, 1985.

This is a record of the proceedings of a symposium held at Hanasaari in Finland in August, 1984, and is the 7th international meeting on taurine to be organised over the past 10 years. Although taurine has been recognised as an important amino acid for several decades, and is known to occur in very high concentrations in heart, skeletal muscle, brain and retina, its function is still uncertain. Over the past decade various suggestions have been made: that it acts as a classical inhibitory neurotransmitter, that its function is more likely to be in terms of modulation of neuronal excitability. Its putative modulator function has been seen mainly in terms of contributing to an homeostasis (especially Ca^{2+}) or of membrane-stabilising effects due to its antioxidant properties. In the heart it has been associated, in a protective capacity, with congestive heart failure, and in the brain, also in a protective capacity as an anticonvulsant.

In the first section, six presentations are devoted to dietary and developmental aspects in man and a variety of experimental animals. These emphasise the need for dietary taurine during development and its protective effects generally. Its possible role as a detoxifying agent and antioxidant stabiliser in man is emphasised in the first paper by Gaull and his colleagues.

The second section is on the cellular metabolism of taurine. Some of the eight papers discuss biosynthetic pathways, from which it emerges that detailed knowledge is still not available, but that different tissues

Book reviews

probably use different routes. In the brain it seems that the pathway via cysteine dioxygenase and through hypotaurine is the major one. The oxidation reaction which produces taurine from hypotaurine is suggested to be important in anti-oxidative function in the brain and that hypotaurine itself may contribute as an antioxidant (Tillman & Roth) but this is not the view of the authors of the next paper (Kontro & Oja). In this and other topics covered in the book, one would have preferred to be able to read of the discussions of such papers, if these occurred.

A group of papers in this metabolic section describe the peptides of taurine that have been discovered (mainly γ -glutamyltaurine) and the roles of these and of γ -glutamyl transferase are speculated upon. There is some evidence that taurine produces hypoglycaemia and the paper by Kulakowski *et al* considers a possible involvement of the amino acid with insulin receptors. The last paper (van Gelder & Barbeau) of this section describes what is the current knowledge on the involvement of taurine in osmoregulation.

The third section concentrates on the role of taurine in the heart. The topics discussed include its possible involvement as a modulator of the regulation of intracellular and extracellular Ca^{2+} . One interesting contribution describes a clinical trial on the therapeutic effects of taurine treatment in cases of congestive heart failure (Azuma *et al*). The results indicate some improvement in "clinicoradiographic score" of heart failure severity. A subsequent presentation describes an investigation on the accumulation of taurine by blood platelets; the authors conclude that it does not provide a useful indicator of taurine levels elsewhere, for example, in the heart.

The fourth section deals with taurine as a neurotransmitter or modulator. Several of the 10 papers deal with electrophysiology and neuropharmacology of the amino acid in hippocampal slices, and tend to focus upon its suggested role in affecting Cl^- conductance. Of interest to the precise functional role of taurine was the use of immunocytochemistry (based on cysteine sulphinate decarboxylase immunoreactivity) to map "taurine neurons"; the authors (Wu *et al*) suggest that taurine may function as a neurotransmitter, not only in retinal amacrine cells, but also in interneurons making synaptic contacts with pyramidal cells in the hippocampus. The introduction to this paper gives a good critical summary of current evidence on taurine as a neurotransmitter. Also of interest in this section

is the paper (Lehmann *et al*) describing the use of an implanted perfusion dialysis tube to monitor very small levels of metabolites such as taurine in cerebral extracellular fluids. They found taurine to be released to the extracellular space in "emergency situations", for example neuronal hyperexcitation and during ischaemia. They also suggest that taurine may affect Ca^{2+} homeostasis. The possible role of taurine in Ca^{2+} homeostasis was investigated (Segawa *et al*) by examining the involvement of calmodulin in the ability of taurine to modulate K^+ -evoked release of catecholamines *in vitro*. They interpret their results as indicating that taurine may act by modifying the binding of Ca^{2+} to calmodulin. The final paper in this section examines the role of taurine in thermoregulation, possibly involving hypothalamic serotonin.

The fifth section is on taurine and the retina. Here the major themes are its role in photoreceptor membrane stabilisation by preventing lipid peroxidation (Pasantes-Morales & Cruz) and its possible intervention in Ca^{2+} flux rates, from some evidence that it affects relevant retinal protein kinase activities (Lombardini).

The final section on neurological disorders includes contributions on its role in abnormal muscle function (denervated muscles and dystrophy) and especially in its potential role as an anticonvulsant. The paper by Tariello and colleagues provides a useful review of this topic and makes a plea for more clinical trials. This is followed by some experiments (Izumi *et al*) showing that taurine affects the potency of established anticonvulsants (phenobarbitone and diphenylhydantoin) and others on the improved anticonvulsant properties of lipophilic taurine analogues (Huxtable and Nakagawa). The last paper describes the GABA-like antimuricidal properties of taurine.

The concluding remarks by Huxtable summarise the progress in knowledge in this area over the past decade.

This publication, like so many proceedings of international symposia, is produced as camera-ready copy and suffers the inevitable disadvantages of this type of publication. Some of the articles suffer from the lack of editing or of sub-editing so that errors in referencing have not been picked up, and the language of some contributions (where the authors are not English-speaking) could have been improved by skilled editorial attention. Also, as much of the work presented herein will prove to be of interest to many scientists and clinicians, the lack of discussion of novel or controversial papers is disappointing, as is the dearth of

summaries or abstracts: only one-sixth of the 39 papers included these.

All in all, despite these shortcomings, the book gives a comprehensive view on the current state of knowledge about taurine.

HS BACHELARD

Experimental Allergic Encephalomyelitis. A Useful Model for Multiple Sclerosis. Progress in Clinical and Biological Research Vol 146. Edited by Ellsworth C Alvord Jr, Marian W Kies and Anthony J Suckling. (Pp 574; £52.00.) New York: Alan R Liss Inc, 1984.

This thoughtfully titled book comprises 10 sessions, each introduced and summarised by a distinguished chairman, and ends with a summary of some of the most interesting contributions. This layout helps the non-specialist, and the book should be useful to postgraduates of immunology and medicine as well as those working on autoimmunity for whom it illustrates a variety of important techniques. There are two appendices useful to the specialist. One is an up-date on the primary and secondary structure of myelin basic protein (MBP) by Martenson; the second is a summary of the species-restricted encephalitogenic determinants on MBP by EC Alvord Jr.

The main part of the book includes several sections on the mechanisms of lesion formation in multiple sclerosis and experimental allergic encephalitis. Some appear to be immunological and several papers describe the migration of inflammatory cells to the CNS. Changes in peripheral T cells such as the T4/T8 ratio appear not to correlate with multiple sclerosis relapses. An elegant paper by Tabira *et al* shows that an antigen depot is necessary for relapses in experimental allergic encephalitis, and a provocative paper by Wege *et al* describes MBP-reactive lymphocytes in JHM virus infected rats.

Several authors emphasise non-immunological factors, such as blood-brain barrier permeability and the susceptibility of MBP to enzymatic degradation. An important paper by Barna *et al* suggests that astrogliosis in experimental allergic encephalitis may be regulated immunologically, by lymphokines.

Two sections are devoted to suppression in experimental allergic encephalitis and multiple sclerosis, including a controversial paper by Werkerle describing a T cell line which suppresses experimental allergic encephalitis induced by adoptive transfer of another T cell line. Both lines are MBP reactive and W3/25 positive.