Book Reviews

MOLECULAR GENETIC NEUROSCIENCE. Edited by Francis O. Schmitt, Stephanie J. Bird, and Floyd E. Bloom. Published by Raven Press, New York. 492 pages. $92.50 Cdn. approx.

This book is a collection of papers presented at a conference at Woods Hole, Massachusetts, under the auspices of the Neurosciences Research Program. The purpose of the meeting was to bring together the disciplines of molecular genetics and neurobiology. The list of participants as well as the scope and quality of the papers is impressive.

The book is divided into two basic parts. The first part deals with recent advances in molecular genetics, and the second with recent research in neurobiology. Each chapter is preceded by a brief introduction by the editors which comments on the content and relevance of the following pages.

In the first part, the topics covered include the organization of DNA, control of gene expression, and post-transcriptional processing. Some of the specific areas discussed are the method of antibody gene diversity, the structure and expression of the insulin gene, and processing of neurohypophyseal hormones. In addition, papers on the uses of monoclonal antibodies, somatic cell genetics, and recombinant DNA technology are presented.

The second part of the book deals with research areas in neurobiology such as the structure and regulation of opioids, the effects of steroid hormones on neural tissue, and the actions of neurotrophic factors. Genetic disorders of the human nervous system, in particular Huntington's disease are only briefly addressed. Of historical interest now, is the article by Housman and Gusella discussing the techniques they plan to employ to isolate the gene for Huntington's disease, although it is still relevant to other neurodegenerative disorders.

This book provides a useful, well-edited compilation of recent developments in the fields of molecular genetics and neurobiology. It is successful in its purpose of introducing neuroscientists to the rapidly advancing field of molecular genetics and showing the uses of recombinant DNA technology in neurobiological research. However, as the basics of recominant DNA technology are not covered, interested readers who are not well versed in this area are advised to read an introductory text before tackling this collection.

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PROGRESSIVE SPINAL MUSCULAR ATROPHIES. (International Review of Child Neurology Series). Edited by Ingrid Gamstorp and Harvey B. Sarnat. Published by Raven Press. $28.00 Cdn. approx.

Spinal muscular atrophy is the second most common disorder seen in pediatric neuromuscular clinics. For this reason, the editors have assembled a group of recognized authorities in the field, each of whom contributes a specified topic, and each chapter is followed by a commentary that creates interest by either supporting the previous author or emphasizing different aspects of the topic.

The subjects covered include a lucid historical review of progressive spinal muscular atrophies (S.M.A.'s) by Ingrid Gamstorp followed by a chapter on the genetics of S.M.A. by Pearn. He discusses the problems created by the hetergeneity of S.M.A. and also rare conditions such as distal S.M.A. that may be confused with Charcot-Marie-Tooth disease. In view of the apparently high rate of incorrect life span estimates given to survivors of S.M.A., which are discussed later in the book, the importance of correct diagnosis is obvious.

There is a very full description of pathology of S.M.A. by the group from Warsaw as well as of the clinical picture of the disease based on their large series and prolonged experience. Electrodiagnostic studies in this sad condition are covered in detail in a further chapter. Ultrasound and CT scanning of muscle are well discussed later. I particularly appreciated the sections on medical and orthopedic management and the role of parent support groups. The symposium closes with 2 thoughtful chapters, one by Peggy Hanson and the other by Harvey Sarnat on present and future research strategies.

The commentaries that follow most chapters are often as interesting as the chapters themselves and are a tribute to the Calgary group who supplied most of them. It would have been helpful to have had an overview of the extent to which investigation is needed for the clinical management of these children, since the proponents of biopsy, electrodiagnostic studies and ultrasound are all dedicated to their particular technique. This book is a stimulating review of a topic that all practising pediatric neurologists have to manage at times and provides us with the current state of the art.

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ELECTROENCEPHALOGRAPHY IN DRUG RESEARCH. Edited by Werner M. Herrmann. Published by Butterworths. 608 pages. $157 Cdn. approx.

This volume contains the proceedings of the symposium "EEG in Drug Research" held in Berlin, June 27 - 29, 1980. The symposium was held under the auspices of the Institute for Drugs of the German Federal Health Office and the International Pharmaco-EEG Group.

Neuroscientists have been aware of the qualitative effects of various drugs (cocaine, barbiturates, scopolamine, etc.) on the EEG since Hans Berger's first description in the 1930's. His descriptions were based on visual inspection of the analog signal. Interest in more quantitative approaches to analysis of EEG data developed but had to await the development of modern, economically feasible computerized reduction of EEG data. The multiple authors of this symposium refer to this attempt at quantitation as "pharmaco-EEG". The symposium attempted to outline basic standards for the use of EEG data in

assessing the effects of drugs on the central nervous system. This list of guidelines and the rationale for these guidelines constitutes the preamble and first chapter of this book.

Most of the presentations utilize computerized analysis of EEG data. The analog EEG signal for these data has been collected from two to over forty separate scalp recording sites. Some studies examine simple averaged evoked potentials from a limited array of scalp electrodes. Others attempt a toposcopic assessment of various evoked potential components. Many of the papers are based on digitization of the analog EEG signal and derivation of power spectral data using a fast Fourier transform for initial data reduction. The spectrum is then divided into "classical" (alpha, delta, theta, beta) frequency bands and the spectra in these bands is viewed as a probability density distribution. Relative and absolute power of these bands and their variabilities following drug administration are correlated and profiles or "fingerprints" for various classes of drugs and their dose-response-time relationships studied. (Drugs studied include tranquillizers, hypnotics, enkephalins, as well as antidepressant and antiepileptic preparations.) The conclusions based on these EEG statistical manipulations should be viewed with skepticism since complex changes within these frequency bands are difficult to interpret in a meaningful way. In other words the physiological and behavioral correlates of these changes are tenuous at best.

Some studies also utilize toposcopic and temporal profiles of changes in the various parameters with drug administration. A variety of statistical measures are utilized to massage the derived EEG data. These include linear autoregressive modelling of the spectra and identifying spectral peaks by computation from regression coefficients.

A number of the studies reported, correlate computerized EEG data or indexes derived from this data with positron emission tomography data, regional cerebral blood flow data, various measures of vigilence and physiological profiles.

Most of the reported studies in this book are based on human data although some, such as the studies of enkephalins and the antiepileptic effects of benzodiazepine derivatives following cortical application of penicillin are in animals.

A few chapters in the book are concerned with analysis of analog EEG data primarily, relating to sleep studies. One chapter in particular deals with the problems of quantitation of sleep data using the limited number of scalp leads classically applied. The difficulties in automated analysis data using this format are discussed but few solutions are proposed. There is also a section on the use of EEG data in the evaluation of drugs utilized in dementia and the geriatric population.

Introductory remarks in this book suggest it embodies the "state of the art" using EEG data for assessing the effects of drugs on the central nervous system. The diverse approaches to methods of data collection and analysis and their correlations with drug effects points to the need for a better understanding of the physiologic substrate of EEG data before guidelines in this field can be established.

Several of the chapters in this book are written in a clear, concise manner. Many, unfortunately, are confusing by virtue of the complex and convoluted presentation of the methods and/or results. It is clear from reading the papers in this book that mathematical manipulation of EEG data has reached a new peak but the meaning or clinical import of this data is often doubtful. For example, some studies reported claimed to use the EEG data as an index of the therapeutic efficacy of various drugs. This may be partially true with drugs such as hypnotics and antiepileptic drugs but even in these cases requires a careful clinical correlation. Drugs affecting the central nervous system may be associated with EEG changes but these EEG changes are complex and often due to multiple factors including changes in vigilance, mood, personality, etc. Complex computerized EEG data is often used to infer therapeutic efficacy of drugs but seldom is as suitable a parameter as objective clinical improvement measured by other means.

Overall, this book is an interesting volume and highlights the many problems inherent in analysing complex physiological data in a meaningful way.

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"TEST YOUR UNDERSTANDING OF NEUROPHYSIOLOGY". 1st Edition. Murray, R.W. (1983). Cambridge University Press, Cambridge. 291 pages. $62 (Cdn. hardback) $21 (Cdn. paperback).

This fascinating and diabolical book belongs in the library of every self-respecting neurophysiologist. On reading the title, I feared that I would have to wade through another list of trivial multiple-choice questions, oversimplified and unexplained. Instead, I was delighted to find a rigorous, quantitative and experimental approach to neurophysiology, coupled with painstaking explanations. Intended primarily for the senior undergraduate or beginning graduate student, the first part of the book explains the fundamental physics of electricity, devoting special attention to the concepts of capacitance and exponential wave forms, which many biological science students (who have tried to avoid exposure to mathematics) find difficult. There follows a valuable series of chapters on the physical basis of recording techniques, often glossed-over in conventional texts, such as voltage-clamps and sucrose-gap. Instructions for answering problems are followed by a series of 80 problems, the majority of which employ actual experimental data, usually in the form of oscilloscope tracings. Areas covered in the problems include: experimental techniques; membrane potentials; passive electrical properties of membranes; ion-channel conductances; sensory transduction and synaptic transmission. You will need graph paper, ruler and calculator to get the answers, and you can check yours against the comprehensive answers provided in the final section of the book. Here, further explanations allow you to see where you went wrong, or highlight some additional point of interest.

All of us who profess to understand and teach the cellular aspects of neurophysiology should submit to the challenge of this book: for most of us, I believe it would show that remedial work was required. I hope that the publishers will regard this as the first in a series. Similar books on, for example, acid-base or respiratory physiology would do much to clarify the teaching, and accelerate the learning, of medical physiology.

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