

a single mechanism can account both for the frequency-driven response and for the irregularities ("stochastic component") in the spike train.

I believe that similarly detailed knowledge of the anatomy and static physiology of neural structures will probably not be available and may even by a misleading goal in the individually variable and intrinsically more complex nervous systems of animals less conservative than *Limulus*. Thus I believe it will be essential to integrate the techniques of testing of models into the techniques for reduction of data, in order to progress to mammalian neural models.

Two papers on quantitative neuroanatomy make rich reading. The first, by Haug, is on macro-measurements, and the second, by Smit and Colon, is on micro-measurements. I hope that the obvious contrasts between types of results from these two approaches will not lead to so great a divergence as between the analogous fields of EEG *vs.* (unfortunately "*vs.*") single-cell recording. The definitions of the basic symbols used in Haug's paper are not easy to understand. Throughout, his concentration on expected values consistently ignores the difficult but essential questions of variability and possible biases due to the techniques employed. A sample of such difficulties is Haug's estimate of  $1.05 \times 10^{10}$  nerve cells in the (presumably cerebral) cortex of man, contrasted with an estimate of  $8.2 \times 10^9$  for cortex of one cerebral hemisphere (giving  $1.64 \times 10^{10}$  for two hemispheres), attributed earlier in the book to "Haug 1959". Clearly, errors and variabilities need to be estimated as carefully as do the major values, in reporting quantitative neuroanatomy.

Smit and Colon report simultaneous micro-measurements in the spirit of some of Bok's work. Again lacking are concurrent estimation of errors, both due to sampling variability and due to systematic properties of the methods used. But an additional source of error arises here: the authors assume various models, for instance concerning the "law" of branching obeyed by a single cell's dendrites, and use these models for interpretation and extrapolation from measured values. But they do little checking on the models, for instance by measuring dendritic trees at another distance from the cell body, to see how accurately their model is likely to extrapolate. I am being severe with pioneers in new areas, which is easy and a little unfair, but because the methods are new, they risk being taken to be more accurate than later experience will probably prove them. Thus, more care about error estimates now will avoid a possible disappointment later.

The remaining papers in this volume are either very general or outside the probable range of interest of readers of this journal. A general comment on this series is in order: after a number of brilliant early volumes, succeeding publications seem to have become less and less exciting. The one under review is passable and collects some interesting material which is otherwise scattered, but librarians should rethink their automatic subscriptions to this series, possibly finding more worthwhile books on which to spend their money. This journal's reviewer of an earlier volume in this series expressed a similar *caveat*.

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**An introduction to psychopharmacology.** — R. H. Rech and K. E. Moore (Editors). (Raven Press, New York, 1970, 353 p., U.S. \$9.75).

Twelve authors have contributed to this book, which covers a remarkably wide range of information. It is organized into nine chapters. The first deals with the fundamentals of pharmacology and psychology and is written in an understandable fashion so that the reader of average intelligence but little background will grasp the material easily. This chapter is followed by a second chapter on the essentials of neuroanatomy and neurophysiology. Again, a short survey of pertinent information is presented as background for the neurological aspects of drug action. The third chapter reviews many of our current ideas regarding the neurochemical aspects of behaviorally active drugs. It emphasizes the interaction of drugs with such putative neurotransmitters as acetylcholine, catecholamines, 5-hydroxytryptamine, and gamma-aminobutyric acid and other amino acids. Chapter 4 is concerned with the pharmacological aspects of drugs affecting the limbic system. Again, the material is presented in an easy-to-read fashion. The next chapter deals with the electrophysiological correlates of action of various psychoactive drugs and is of special interest to the electroencephalographer. There is a brief description of EEG, evoked potentials, single unit activity and the effects of drugs on sleep. A large amount of material is covered in a most adequate manner. Chapter 6 is concerned with the effects of drugs on learning and memory. In accord with the philosophy of this text, only the high points are covered. The reader is also given an introduction to the details of animal testing and screening procedures used in evaluating psychotropic drugs. The book ends with a chapter covering the more clinical aspects of psychopharmacology, including a review of terminology and classification.

The editors have integrated a vast body of material in biochemistry, pharmacology, physiology, psychology and psychiatry. No attempt was made to devote separate chapters to the major classes of psychotropic agents. The lack of emphasis on hallucinatory agents and drug abuse is intentional.

This book is not intended for the sophisticated researcher but rather for the introductory student, irrespective of whether he be in graduate or medical school, in residence or simply a lay person interested in a knowledge of this subject. It is a pleasure to see the editors, two former students of the University of Michigan, develop into mature investigators and teachers and bring together in a very meaningful manner a large body of material. This short text is a welcome addition to anyone's library and serves as a source for the interested reader to pursue both the pleasure and hazards of the interdisciplinary endeavor of psychopharmacology.

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