sions, the most notable a thorough presentation of the generation of variant RNA molecules by phage replicase in the presence and absence of templates, an aspect of RNA phage research that may bear on the origin of polynucleotide templates and their evolution. Altogether this monograph demonstrates in an impressive and useful way how concentrated effort on one of the simplest viruses has resulted in major insights into fundamental genetic processes. For the specialist and the nonspecialist alike it will serve as a convenient source of background material and references, and for those who are working in related fields it may help determine new directions of research.

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Exploring the Brain

Handbook of Drug and Chemical Stimulation of the Brain. Behavioral, Pharmacological and Physiological Aspects. R. D. MYERS. Van Nostrand Reinhold, New York, 1974. xviii, 760 pp., illus. $37.50.

The book under review is a comprehensive and critical survey of published research related to chemical stimulation of the brain. The book is well written and clearly organized, providing a wealth of information for workers in pharmacology, physiology, psychology, neurology, and biochemistry. It has continuity and can be read with pleasure, and yet, because it is clearly indexed, it can also serve as a ready reference source.

The first chapter is an excellent introduction to chemical stimulation of the brain. It discusses the rationale behind the technique, deals with the key concepts of chemical sensitivity and chemical receptors, and provides basic information on the neuroanatomy and neurochemistry of the brain. The chapter concludes with a description of the purpose and limitations of the helpful Master Summary Tables that appear at the end of each subsequent chapter. These tables summarize the drugs, doses, species, and injection volumes and sites used in the studies presented in the particular chapter.

The second chapter describes the methods used for applying chemicals directly to the brain and follows with a comprehensive discussion of the various problems (such as drug diffusion, dosage, and cannula lesions) associated with these techniques.

The following ten chapters present the results of the vast number of central injection studies, organized according to the different types of physiological and behavioral responses involved. They cover cardiovascular, respiratory, gastrointestinal, and other autonomic functions; adrenal and thyroid hormonal systems and growth hormone; reproductive functions and sexual behavior; temperature regulation; hunger and feeding behavior; thirst and drinking behavior; sleep and arousal; sensory and motor systems; emotional behavior; and learning and memory.

Myers presents this material clearly. He focuses on key issues with a critical and experienced eye, continually stressing the importance of anatomical mapping, dose-response analyses, determining pharmacological specificity and species differences, and using a diversity of drugs to explore a given neurochemical system. He discusses the weaknesses of particular studies, such as the use of large injection volumes or high doses or failure to provide proper controls or present adequate histology. This critical approach helps the reader to evaluate the material presented.

The reader should bear in mind two additional points. The first is that most of the studies covered in the book were published before 1972 (a few 1972 articles are cited). In some cases, the problems or controversies surrounding these studies have been at least partially resolved by advances made in subsequent research. The second is that the book focuses, by design, on studies employing the central injection technique. To properly evaluate our knowledge of brain neurochemical mechanisms, one must also consider the important contributions made through the use of other experimental techniques, such as lesioning, electrical stimulation, iontophoresis, or histochemistry. Although the book mentions these results, it does not (and could not) give full representation to such broad areas of research.

Chapter 13, the epilogue, provides the perspective needed for a well-rounded view of the literature on brain neurochemical mechanisms. Here Myers discusses such important issues as anatomical specificity and center versus "primary monitoring zone," presents data on the in vivo release of humoral factors, and discusses and further defines the key concepts of neurochemical coding and neurotransmitter function.

Because of the range of the relevant research, a survey of this field is a major undertaking. Myers's book is a commensurate achievement.

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New Particles Considered

Theories and Experiments in High-Energy Physics. Papers from a meeting, Coral Gables, Fla., Jan. 1975. ARNOLD PERLMUTTER and SUSAN M. WIDMAYER, Eds. Plenum, New York, 1975. x, 486 pp., illus. $39.50. Studies in the Natural Sciences, vol. 9.

The conference of which this book is the proceedings took place soon after the spectacular series of discoveries, at Brookhaven and at Stanford, of several new, high-mass, subatomic particles with somewhat unexpected properties. The organizers therefore wisely invited a number of theoretical and experimental physicists closely associated with these developments to describe the discoveries and to discuss some of the ideas that had been prepared to understand them. Most of the papers in the book deal with these topics.

The papers of Lynch and of Hofstadter are a valuable summary of the experimental situation concerning the new particles as it was in mid-January 1975. They describe in detail the basic properties of the 3.1-Gev and 3.7-Gev resonances, emphasizing their production in electron-positron collisions. Omitted, of course, from these accounts are the more recent discoveries of other particles in this energy range that occur as radiative decay products of these two resonances.

Among the theoretical contributions concerning the new particles, the most useful is the review by Gilman of the theoretical analysis of electron-positron scattering and of the interpretation of the new particles as bound states of heavy quarks that carry some new quantum number. This interpretation has received additional support from the more recent discoveries. Also of interest is the outline by Greenberg of an alternative approach to understanding these particles, the color meson hypothesis, which now seems untenable.

The book also contains a fascinating discussion by Dirac of the reasons for, and implications of, his proposal that the Newtonian gravitational constant varies with the radius of the universe and so is time-dependent.

In spite of these positive features, it is difficult for me to recommend buying the book, as its usefulness is likely to be transitory because of the rapid development in particle physics and the price seems exorbitant. Perhaps it would be of interest to research libraries who want a summary in hard covers of the recent excitement in particle physics.

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