length the various methods used to obtain hydration numbers and the reasons the various methods do not give concordant results. They appear to accept the thesis of "primary" and "secondary" solvation and the concept that values of "secondary solvation" are dependent on the method used in their determination.

Parsons gives an outline of recent attempts to evaluate the electric potential of interfaces, devoting a large portion to the concepts of Lange. Parsons clearly points out wherein various theories fail to represent experimental observations and where necessary evidence for a hypothesis is lacking.

Bockris, in a systematic manner, outlines recent concepts regarding the kinetics of electrode reactions. His chapter is highly mathematical. He presents, in an interesting way, modern aspects on polyelectrodes, sonic electrode kinetics, and photo-electrode kinetics.

Floyd presents a most enjoyable discussion of the electrochemistry of nerves and muscles. His chapter can be followed readily by those not engaged in electrophysiology. It is well illustrated and gives emphasis to chemical aspects.

An extensive bibliography is included with each chapter. Most readers will find this book well worth while. It should be read by those who are engaged in or who contemplate work in electrochemistry.

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La Cybernétique. Du cerveau humain aux cerveaux artificiels. Paul Cossa. Collection, Evolution des Sciences. Masson, Paris, 1955. 98 pp. Illus. Paper, F. 525.

This little book, by a neurologist, is written in a sprightly and popular style and betrays no indications that the author is the least bit overawed by the claims of enthusiastic cyberneticists. Its nine chapters touch on the origin of cybernetics (following the introduction of Wiener's *Cybernetics* and, so, underestimating the contribution of early work in communication engineering, process control industries, and the like), models of vital behavior, feedback, the mechanical "animals" of Grey Walter, Albert Ducrocq, and the homeostat of Ashby (referred to generally as "les petits monstres") electronic calculators (numerical and logical) and translators (dubbed "les grandes monstres"), the information concept and entropy, aspects of the new industrial revolution implied by automation, and finally whether machines can think, learn, or create, and similar metaphysical considerations.

Cossa has done an excellent job of popularization without becoming sloppy in his treatment of concepts that are not always elementary. The only bone I would pick with him concerns the opinions expressed on what machines cannot do. It is no real limitation on machine behavior to say that a machine can do only what its creator designs it to do, for it is not inconsistent with science to view man himself, exhibited by the author as not so limited, as a creature that can do only what his Creator designed him to do! To say that a machine cannot create, perform a critical function, or learn is mere rhetoric without an operational specification of what these words mean. I find it more plausible to believe that (i) what can be specified operationally can be realized in principle in a machine, and (ii) insofar as the mechanistic viewpoint is valid in biology, admitting creativity, and so forth, in man, it implies the same for the machine. Of course, no machine can do these things now, but denial of the possibility of it ever doing so seems unjustifiable.

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The Chemistry of Petroleum Hydrocarbons. vol. I. Benjamin T. Brooks, Cecil E. Boord, Stewart S. Kurtz, Jr., and Louis Schmerling, Eds. Reinhold, New York, 1954. viii + 646 pp. Illus. $18.

This volume of *The Chemistry of Petroleum Hydrocarbons* has been written by 60 outstanding chemists who have spent the major portion of their lives in this field. They have concentrated in 646 pages the chemistry of a field of hydrocarbons that bears an intimate relationship to the 8-million-barrels daily production of petroleum which plays such a highly important role in our economic life, our welfare, and the defense of our nation. Many of these experts are in the petroleum industry.

The scope of this volume covers mainly scientific fundamentals. There are 21 chapters: "Hydrocarbons in Natural Gases," by D. T. McRoberts (United Gas Co.) and T. W. Legatski (Phillips Petroleum Co.); "Hydrocarbons in Gasolines, Kerosenes, Gas Oils and Lubricating Oils," by A. N. Sachanen (Socony-Vacuum Oil Co.); "Composition of Petroleum Waxes," by B. T. Brooks (consultant, New York); "Types of Crude Petroleum," by W. A. Cruse (Mellon Institute of Industrial Research); "The Composition of Shale Oils," by H. N. Thorne and J. S. Ball (U.S. Bureau of Mines); "Origin of Petroleums," by B. T. Brooks (consultant, New York); "Extractive and Azeotropic Distillations," by C. S. Carlson (Standard Oil Development Co.); "Separation of Aromatics by Selective Absorption," by A. E. Hirschler (Sun Oil Co.); "Principles of Solvent Extraction," by A. W. Francis and W. H. King (Socony-Vacuum Oil Co.); "Separation of Paraffins by Urea and Thiourea," by R. L. McLaughlin (Mellon Institute of Industrial Research); "Physical Properties and Hydrocarbon Structure," by S. S. Kurtz, Jr. (Sun Oil Co.); "Ultraviolet Spectra of Hydrocarbons," by W. Priestley and B. F. Dudenbostle (Standard Oil Development Co.); "Molecular Structure and Spectroscopic Data," by E. J. Rosenbaum (Sun Oil Co.); "Analytical Applications of Infrared and Raman Spectroscopy," by H. M. Tenney (Esso Standard Oil Co. of Louisiana); "Mass Spectroscopy of Hydrocarbons," by W. S. Young (Atlantic Refining Co.); "Analysis and Composition of the Heavier Petroleum Fractions," by K. Van Nes (Royal Dutch Shell Co., Amsterdam); "Preparation of Pure Paraffins and Olefins," by B. T. Brooks (consultant, New York); "Syntheses of Low Molecular Weight Alicyclic Hydrocarbons," by J. M. Derfer (Ohio State University); "Syntheses of Low Molecular Weight Aromatic Hydrocarbons," by J. M. Derfer (Ohio State University); "Syntheses of High Molecular Weight Hydrocarbons," by R. W. Schiessler and R. L. McLaughlin (Pennsylvania State University); "The Fischer-Tropsch Process," by H. H. Storch (U.S. Bureau of Mines).

After studying this book I have come to the conclusion that no one in the oil industry who has to do with hydrocarbons in oil can afford to be without it. It is a handbook of knowledge on a subject that has been long overdue.

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International Review of Cytology. vol. III. G. H. Bourne and J. F. Danielli, Eds. Academic Press, New York, 1954. 530 pp. Illus. $9.50.

Subjects reviewed in this volume include nutrition of animal cells; karyometric studies on cells in tissue culture; properties of urethane and its action on mitosis; composition, and structure of giant chromosomes; chromosomes in mammalian somatic cells; enzymes in isolated nuclei; differential centrifugation of homogenates; enzymatic aspects of embryonic differentiation; azo dye methods in enzymatic histochemistry; transparent chamber methods; the mast cell; elastic tissues; and composition of the nerve cell. All are by outstanding authors—Weymouth, Bucher, Cornman, Alfert, Beatty, Dounce, De Duve and Berthet, Gustafson, Pearse, Williams, As-

boe-Hansen, Dempsey and Lansing, and Brattgard and Hyden.

Especially useful for background information is the review on karyometric studies, since nucleocytoplasmic ratios are becoming increasingly significant to exfoliative cytologists in distinguishing among normal, suspicious, and malignant cells. The enzymes in nuclei and methods for fractionating particulates as obtained from homogenates by differential centrifugation are comprehensively covered. The probable roles of enzymes in embryonic differentiation offer newer slants on the complex problems of development and differentiation in general. The review on giant chromosomes and another on the composition of nerve cells present a valuable survey of these important topics.

Several reviews are illustrated with diagrams or photographs. There is a fairly complete review of the important literature relevant to each topic. The volume carries an author and subject index as well as a table of contents for each article.

Altogether, this and the previous two volumes in the series (1952 and 1953) are beginning to shape up so that in time the essential features of cytology in its broadest sense will be covered. These volumes should be especially helpful to teachers and research workers alike, if for no other reason than that they offer a convenient means for the highly specialized investigators of today to maintain a proper perspective of the manifold problems that are now being attacked from the cellular or subcellular points of view.

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Principles of Internal Medicine. T. R. Harrison *et al.*, Eds. Blakiston, New York–Toronto, ed. 2, 1954. xxiii + 1703 pp. + index. Illus. + plates. Student 1-vol. ed., $16; professional, 2-vol. ed. boxed, $21. (Order from McGraw-Hill, New York).

This book represents a deliberate attempt to conform with the pattern of education of the modern medical student. The authors feel that the practice of internal medicine should be based on an understanding of preclinical sciences. Hence, the common features of disease, such as pain, headache, fever, shortness of breath, and many others, are adequately discussed from the standpoint of their underlying physiological and biochemical disturbances by a qualified group of contributors. This section of the book presents a challenge to the writers that they have met skillfully, leaving little to be desired.

Since a considerable fraction of the total number of patients seen by an internist have no organic disease, it is important to consider extensively those symptoms that are based on the so-called "functional" disturbances. This is done in a new section devoted to neurological signs of human suffering. Perhaps more attention could be given to discussing the mechanisms by which many and widely differing symptoms can be projected by the patient and in language that appeals more to the busy internist than to the psychiatrist.

An important feature of the book is a chapter that stresses the immediate sympathetic concern that must be shown the patient, in the form of useful measures that can bring relief, before the sometimes elaborate mechanisms of diagnosis can be started.

This book, although geared to the education of the student, will not fail to satisfy the practitioner who will find brief and adequate descriptions of the diseases that represent an assembly of the symptoms and features previously described in fundamental explanations. Treatment becomes obvious. Finally, the index is apparently accurate—a feature not always found in textbooks.

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Laboratory Techniques in Rabies. Monogr. Ser. No. 23. World Health Organization, Geneva, 1954. 150 pp. Illus. + plate. Paper, $3; cloth, $4. (U.S. distrib., Columbia Univ. Press, New York.)

A project of the WHO Expert Committee on Rabies and the product of 14 distinguished contributors—including Habel, Johnson, Koprowski, and Sellers —this book is truly authoritative. However, it is intended as a manual and not as an exhaustive treatise. The contributors were asked to describe practical and dependable procedures that "could be adapted to the limited facilities and personnel of many rabies laboratories in different parts of the world." The scope embraces the important problem of diagnosis, the production and potency testing of both vaccines and hyperimmune serum, and the breeding and care of laboratory animals.

Many photographs, including an exceptional color plate illustrating the histologic diagnosis of rabies, accompany the usually very clear descriptions. Alternative methods are frequently presented to facilitate adaptation of procedures to local conditions. To this same end, considerable stress has been laid on the rationale underlying the procedures described. Elementary as much of it will seem to the sophisticated reader, this is a book of real importance to those concerned with the operation of public-health laboratories located throughout the world.

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Inventories of Apparatus and Materials for Teaching Science. vol. III: **Technical Colleges.** pt. 4, **Electrical Engineering.** UNESCO, Paris, 1954. (Distrib. by Columbia Univ. Press, New York.) 147 pp. Paper, $2.75.

This book is one of a series bearing the same title. The other volumes are devoted to different types and levels of educational institutions in which science is taught. All are published as aids to educators whose task it is to rehabilitate schools in war-damaged or underdeveloped areas.

The training of electrical engineers in France, as it is done in Paris at the Ecole Supérieure d'Electricité, is discussed in the first part of the book. A complete inventory of the technical apparatus of the school is presented with the dollar value of each item. To clarify the uses of the apparatus, the curriculum is outlined in great detail. A rather complete picture of the operation of the school is thus available, although it may be somewhat misleading because the importance of, and emphasis given to, various courses is not explained.

In the second part of the book, the corresponding information is presented for the electrical engineering course at the Kungliga Tekniska Högskolan (Royal Institute of Technology), Stockholm.

The third and final part concerns the higher teaching of electricity in Great Britain. This section is extremely brief and is devoted to a general explanation of the educational practices of the country. No inventories are presented and no particular school is used to illustrate these practices.

To those readers for whom the book was intended, its contents will undoubtedly be of great value and interest. Aside from this specific purpose, educators in the electrical engineering field may find some interest in the purposes and methods of other schools. It would seem that the value of the book would have been considerably increased if a wider variety of educational institutions had been discussed.

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