The ephemerides of the moon show the Babylonian concern for calendarial problems. The beginning of each month occurred at the first visibility of the new moon's crescent. Hence the aim of Babylonian lunar theory was to predict accurately the evening on which this event would occur, which might be at the end of either a 29- or 30-day interval. Cognate problems are the determination of the syzygies, last visibilities of the moon, and eclipses. "The results," Neugebauer concludes, "are amazingly good and can hardly be improved upon with elementary mathematical means. It is not surprising that the theory of eclipses is the weakest part of the whole theory because one essential element, the parallax of sun and moon, is completely disregarded."

Neugebauer tells us that this edition of *Astronomical Cuneiform Texts* is "intended to furnish the basis for a chapter on Babylonian Mathematical Astronomy in a larger History of Ancient Astronomy." In that work, Neugebauer will undoubtedly deal with the major questions of the extent to which these mathematical methods may have influenced the later course of astronomy, on which topic he has given us an earnest in his *Exact Sciences in Antiquity*. For the present, we must be content with his careful presentation of the methods and calculations at almost the beginnings of exact physical science.

I. Bernard Cohen
Harvard University

The Chemistry and Fertility of Sea Waters. H. W. Harvey. Cambridge Univ. Press, London, 1955. viii + 224 pp. $5.50.

The vigorous and imaginative writings of earth scientists are in part responsible for the popularity enjoyed by their fields of interest. H. W. Harvey, one of the pioneering scientists of marine chemistry, has written a vigorous book on the chemical interactions of the plants and animals of the sea with their environment. His ability to focus attention on the significant variables influencing population changes in the ocean and the importance of his own extensive experimental work have given his previous writings a prominent and influential place in oceanography.

His present book is divided into two parts. The first concerns changes in the composition of marine waters as a result of biological activity, while the second part describes the chemical composition of the hydrosphere. A final chapter, in collaboration with F. A. J. Armstrong, considers some of the more popular chemical analyses made in productivity studies. The noncritical air that pervades this book is somewhat compensated by the full documentation and bibliography. The neglect of the extensive postwar Japanese work is disappointing.

The book will find and deserve its principal audience among entrants to the fields of marine biology and chemistry. The chapter on the carbon dioxide system of the oceans and marine water compositional changes owing to the flora and fauna stand out as elegant presentations. The recent successes of isotopic and atomic chemistry in interpreting natural phenomena, such as Thode's sulfur work and Urey's carbonate thermometry, are not cited. Such omissions are a neglect of potentially powerful tools that are available for application to the yet unsolved problems of marine productivity.

Edward D. Goldberg
Scripps Institution of Oceanography

Diffusion and Heat Exchange in Chemical Kinetics. D. A. Frank-Kamenetskii. Trans. by N. Thon. Princeton Univ. Press, Princeton, N.J., 1955. xii + 370 pp. Illus. $6.

As its title indicates, this interesting and important treatise deals with the theories of processes that involve chemical reactions as well as heat and material flow. The subject might be said to be intermediate between fluid dynamics and isothermal chemical kinetics in static systems, but it actually involves both of these. Scientific interest in the subject is a natural consequence of the rapid advances in classical chemical kinetics, but the subject has also acquired a major practical importance because of current industrial interest in rapid-flow reactors and in combustion phenomena. In the West, the subject has been approached more frequently from the point of view of fluid dynamics; in the U.S.S.R., it has been mainly explored by N. N. Semenoff and his pupils, who were trained as chemical kineticists. Among Semenoff's pupils, the author of this book is known for his many important theoretical contributions, which have placed him in a small group of internationally known experts in the field.

The book starts with a brief chapter summarizing the basic concepts of the theory of chemical kinetics and the theory of diffusion and heat transfer, including the effects of laminar and turbulent flow. Chapter II, "Diffusional kinetics," deals with reactions at surfaces the rates of which may be controlled either by kinetic or diffusional factors. The third chapter considers the condensation of vapors. The fourth is a brief exposition of the theory of thermal diffusion. Chapter V, "Chemical hydrodynamics," is devoted largely to the nature of the boundary layer in streaming fluids. The sixth, seventh, and eighth chapters are devoted to the theories of thermal explosions and of the propagation of flames. Chapter IX, "Thermal regime of heterogeneous exothermal reactions," deals mainly with the problem of ignition at solid surfaces. The last chapter contains brief comments on the theory of periodic chemical processes.

Even this brief listing of the main subdivisions of the book should give some idea of the importance of the problems dealt with. Throughout the text the author makes frequent use of dimensional analysis (similitude theory) and is thus able to obtain approximate solutions to problems that appear insoluble by analytic techniques.

To an experimentalist, the book will be a rich source of ideas for experimental work; a theoretician will find many problems requiring further analysis.

The translation of this difficult text is the work of the late N. Thon. "Editing was restricted to verifying technical consistency in translation and consistency with usage of expression in the field," states the editor. Unfortunately, very little evidence of this editing is apparent. Regarded as a first draft, the text is an outstanding accomplishment; as a final version, it is, to say the least, much below par. It abounds with technical inconsistencies ranging from an almost (but not completely) consistent reference to the Reynolds, Prandtl, and other such numbers as "criteria" to devoting pages 51 and 52 of the book to a discussion in which the term *mass velocity* is used when the subject matter is clearly momentum. The heat of reaction is indiscriminately referred to as "heat effect" or "thermal effect." Typographic errors are very numerous. Some polishing of the style would have made the book much more readable. The price seems excessive.

G. B. Kistiakowsky
Harvard University

Grundlagen der Analytischen Chemie und der Chemie in Wässrigen Systemen. Fritz Steel. Verlag Chemie GmbH, Weinheim/Bergstrasse, 1955. 348 pp. Illus. DM. 29.

As the author indicates in his foreword, this is not a textbook of analytical chemistry. It is, rather, a physicochemical treatment of the principles of chemical equilibrium as applied to aqueous solutions and a fundamental exposition of the theoretical principles of qualitative and quantitative analysis. As such, it may be expected to serve both as a supplement to sets of laboratory directions in beginning analytical chemistry

and as a helpful reference and guide for such a course of instruction. Because of its orderly and logical presentation, its completeness, and its clarity, the book will be welcomed by both student and teacher. It should serve each admirably and it should be a useful reference work in the technical laboratory as well.

The treatment throughout is modern and quantitative. The discussions are interestingly and clearly presented, and the mathematical approaches are logical and easy to follow. Numerous tabular and graphical presentations of data add to the scope of the volume and increase the general appeal that the volume has. Many of these represent new and stimulating points of view and are of particular utility in demonstrating the importance of theory as applied to laboratory practice. After an introduction to general principles and solution chemistry, the discussion proceeds to the law of mass action. These concepts are then extended to precipitation, complex-ion, acid-base, water, indicator, ion-exchange, and oxidation-reduction equilibria, and additional chapters deal with reactions in fused salts, buffer solutions, quantitative methods involving various types of equilibria, and electrolytic precipitation and separation processes. The appendix gives a comprehensive tabulation of equilibrium constants of various types and standard oxidation potential data.

In my opinion, this is an exceptionally well written book and one which anyone interested in the theoretical basis for analytical chemistry would be advised to examine. The publishers are to be complimented also upon the excellence of the printing and binding and upon the over-all attractiveness of the volume.

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Books Reviewed in The Scientific Monthly

January

The Crime of Galileo, G. de Santillana (Univ. of Chicago Press). Reviewed by R. J. Seeger.

Management of Addictions, E. Podolsky, Ed. (Philosophical Library). Reviewed by K. M. Bowman.

Practical Horticulture, J. S. Shoemaker and B. J. E. Teskey (Wiley; Chapman & Hall). Reviewed by G. V. S. Raynor.

Patent Law in the Research Laboratory, J. K. Wise (Reinhold). Reviewed by H. G. Dyke.

Island Bibliographies, M. H. Sachet and F. R. Fosberg (National Acad. of Sciences–National Research Council). Reviewed by E. H. Walker.

Hungry Generations, H. Boner (King's Crown Press). Reviewed by F. J. Weiss.

Laboratory Studies in Biology: Observations and Their Implications, C. Lawson, R. Lewis, M. A. Burmester, G. Hardin (Freeman).

Introducing Sea Shells, R. T. Abbott (Van Nostrand). Reviewed by J. W. Hedgpeth.

Miscellaneous Publications

(Inquiries concerning these publications should be addressed, not to Science, *but to the publisher or agency sponsoring the publication.)*

Les Corrections Barométriques dans la Nouvelle Convention Internationale. Contributions, No. 20. R. Sneyers. 11 pp. *Aperçu des Circonstances Météorologiques et Climatologiques de la Tempête des 31 Janvier et 1 Fevrier 1953.* No. 21. Lucien Poncelet. 43 pp. *Eléments de Météorologie.* No. 22. Chapitre I, *Considerations Générales;* P. Defrise, 23 pp. Chapitre II, *Instruments et Observations;* P. Defrise, J. Grandjean, L. Poncelet; 48 pp. *Projet d'une Expedition Scientifique sur le Continent Antarctique.* No. 23. Edmond Hoge. 6 pp. *Techniques Modernes de Mesure de l'Éclairement Énergétique Solaire.* Publ. Serie B., No. 16. R. Dogniaux et R. Pastiels. 49 pp. *Contribution à l'Étude Théorique de la Variation Locale de la Pression Atmosphérique.* No. 17. A. Vandenplas. 17 pp. Institut Royal Météorologique de Belgique, Bruxelles, 1955.

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