sical perfect fluids" and advanced research monographs. That a better title might have been "Fundamental Topics from the Dynamics of Viscous Fluids" is illustrated by the following abbreviated headings of the chapters: Navier-Stokes equations, steady and unsteady laminar boundary layers, instability, turbulence, and turbulent shear flows. Although the book is based on lectures originally presented at Georgia Institute of Technology and only thereafter at the author's own Imperial College, London, its manner of presentation reflects British rather than American pedagogy, emphasizes analysis rather than application, and is slanted toward aeronautics rather than toward oceanography (the author's field) or any of the many other professions that now use such material. Much of the subject matter necessarily stems from semiempirical findings that have subsequently been subjected to more formal analysis; however, although the physical aspects of the present derivations are usually discussed, not only are illustrations a rarity but, the reader is referred for substantiating experimental data to the source material. Because roughly half of the references cited are books (Schlichting, Townsend, Hinze, and so on), the volume under review is in large measure a digest of digests—as most educational material perforce is. When viewed solely in this light, the book does have its obvious merits. They become the more apparent as one ponders his own ability to select and present with comparable skill material of equal significance in as little space. The chapter on turbulence, for example, seems to be an especially effective condensation.

HUNTER ROUSE
Institute of Hydraulic Research, University of Iowa

Plankton and Protozoa

Life in the Sea. Photography by Lennart Nilsson; text by Gösta Jägersten. Basic Books, New York, [1964]. 184 pp. Illus. $10.

There are many picture books about life in the sea, and there will be many more. Very few of them, however, have been prepared by zoologists of the highest competence, who can provide interesting and accurately written commentaries for the pictures. This book

Larvae of *Luidia*. [Basic Books]

is an ideal example of a happy union of photographer and zoologist. The competence of the photographer, who has taken all but one or two of the photographs from living material, is attested to by the quality of the illustrations. There are many unusual views of familiar subjects and some startling close-ups, at fairly high magnification, of subjects not usually found in books of this type. The attempt has been made to illustrate in a comprehensive and orderly manner the representatives of the invertebrate groups found in Swedish waters. Most of the subjects were photographed at the Biological Station at Fiskebäcksil, of which Gösta Jägersten is the director.

Although the book has no index, it can be consulted as a supplement to a standard zoology text since the arrangement is an orderly sequence from plankton and protozoa to fish. Among the unique or seldom photographed subjects are *Noctiluca* (enlarged), a Tintinnid, a tremotode infesting *Sagitta*, a myzostomid, *Tomopteris* (unfortunately somewhat obscured across the fold of the page), *Protodrilus* (Jägersten's favorite research animal), and a group of metamorphosing *Luidia* larvae. A number of photographs have been made with phase contrast, and while they make spectacular patterns, the bright halo around the subject conceals details or conveys an erroneous impression in some cases. There are eight color photos—but there should be more.

JOEL W. HEDGPETH
Pacific Marine Station, Dillon Beach, California

Lipid Chemistry

Analysis and Characterization of Oils, Fats, and Fat Products. vol. 1. H. A. Boekenoogen, Ed. Interscience (Wiley), New York, 1964. xiv + 421 pp. Illus. $12.75.

The series, *Analysis and Characterization of Oils, Fats, and Fat Products*, is designed to publish from time to time, in collected form, a number of chapters on subjects of an analytical nature for the benefit of those research groups who are, in the widest possible sense, engaged in the investigation of lipids. This breadth of interest is fully borne out in the nine chapters of volume 1—"Classical chemical methods in fat analysis" by J. Baltes; "The assay of essential fatty acids" by R. Reiser and M. C. Williams; "The application of urea inclusion compounds in fat analysis" by J. M. M. Moreno and P. W. Hendrikse; "The analysis of butter and cheese" by J. G. Van Ginkel; "The analysis of monoglyceride and related emulsifiers" by G. F. Longman; "The determination of fats in oils, especially in linseed oils" by E. L. Delvaux and J. E. Bertrand; "Nuclear magnetic resonance spectroscopy in fat chemistry" by R. Keuning; and "The use of ion-exchangers for the analysis of detergents" by P. Voogt.

The first three chapters were of major interest to me, and they will perhaps be of widest interest to readers. Particularly timely is the one on methods of assaying the essential fatty acids, in view of the current interest in these compounds in relation to their importance in the diet in human health. The chapter on classical methods of analysis is decidedly European in its flavor and leaves out many advances based on the work of lipid chemists in America. The general discussion of the theory and practical applications of urea inclusion compounds is good, although I do not believe this analytical procedure has found wide usage. The chapters on dilatometry and nuclear magnetic resonance spectroscopy are high-level discussions of these physical procedures which are presently useful in relatively few laboratories. The remaining four chapters appear to be very limited in use, each to specific industries or control laboratories.

The format of the chapters is excellent, with a table of contents, an introduction, theoretical explanation of terms, and finally descriptions of meth-

odology and usually a summary. An index of all authors cited is included with each chapter in addition to the alphabetical list of all authors at the end of the volume.

In summary, it may be said that this book, and hopefully the forthcoming volumes in the series, is a valuable contribution to the literature armamentarium of lipid methodology. In its present form it is perhaps of more value to specific industrial research laboratories than to research groups working on the role of fats in health or in the training of graduate students. It is my present impression that only three or four of the chapters would be recommended to graduate students for general reading. This is not intended to detract in any way from the value of certain of the chapters to highly specific research groups. As a matter of fact, it would perhaps have been better not to include so many spectra of interest in fat research in one volume. Thus, it would be difficult to secure a reviewer competent to critically evaluate all of these chapters, a task that I certainly am not attempting to do.

J. B. BROWN
Department of Physiological Chemistry, Ohio State University

Weyl Colloquium

Solutions Métal-Ammoniac. Propriétés physicochimiques. G. Lepoutre and M. J. Sienko, Eds. Université Catholique, Lille, France, 1964 (order from Benjamin, New York). 320 pp. Illus. $10.50.

This volume contains the papers presented at a colloquium held in June 1963, at Lille, France, to commemorate the 100th anniversary of Weyl's discovery of the solubility of alkali metals in liquid ammonia. Charles A. Kraus, who probably contributed more to the subject than any other single individual, provided a forward and M. C. R. Symons, an orienting introduction. The topics covered and the contributors are as follows.

"On the coexistence of liquid phases in metal-ammonia systems; and some surface tension studies on these solutions above their consolute points" (M. J. Sienko); "The mechanical properties of metal-ammonia solutions" (R. Catterall); "On the volume expansion accompanying the formation of dilute solutions of sodium and potassium in liquid ammonia at −45°C" (C. W. Orgeel, A. M. Filbert, and E. C. Evers); "Heat of solution and volume studies of metal-ammonia solutions" (S. R. Gunn); "Propriétés thermodynamiques des solutions métal-ammoniac" (C. Moreau); "Activités du sodium en solution dans l'ammoniac liquide" (J. L. Dye, G. Lepoutre, P. R. Marshall, and P. Pajot); "Activities and equilibria in alkali metal-ammonia solutions" (P. R. Marshall); "Electrical conductivities of sodium-ammonia solutions" (S. Naiditch); "Electrochemical properties of metal-ammonia solutions: e.m.f. and transference numbers" (J. L. Dye); "Electrochemical properties of metal-ammonia solutions: conductance and thermoelectric properties" (D. S. Berns); "Calculation of conductivity in sodium-liquid ammonia solutions" (E. Arnold and A. Patterson); "The reaction of adsorbed water with a dilute solution of sodium in liquid ammonia at −78°C." (I. Warshawsky); "The absorption spectra of metal-ammonia solutions (with an addendum on the calcium-ammonia phase diagram)" (W. L. Jolly, C. J. Hallada, and M. Gold); "Spectres d'adsorption et cinétique de décomposition des solutions potassium-ammoniac à température ambiante" (J. Corset and G. Lepoutre); "Nuclear and electron resonance spectra and optical reflection spectra of metal-ammonia solutions" (K. S. Pitzer); "Cellule de conductance sans électrodes; cinétique de décomposition des solutions métal-ammoniac" (P. Pajot, A. Demortier, and G. Lepoutre); "Proton and nitrogen Knight shifts in sodium-ammonia solutions" (T. R. Hughes, Jr.); "Nuclear magnetic resonance of Li^7, Na^{23}, Rb^{87}, Cs^{133}, and N^{14} in alkali metal ammonia solutions" (D. E. O'Reilly); "Theories and models of electron binding in solution" (J. Jortner, S. A. Rice, and E. G. Wilson); "The effect of added elecyrolytes on the electron spin resonance absorption of solutions of the alkali metals in liquid ammonia" (R. Catterall and M. C. R. Symons); "Electron trapping centers in metal-ammonia solutions" (E. Arnold and A. Patterson, Jr.); "Theory of a solvation model for the alkali metal-ammonia solutions" (L. Paoloni); "On the electron spin density distribution in the Na-NH_3 system" (J. V. Acrivos); and "Transport processes in concentrated metal-ammonia solutions" (J. C. Thompson).

In general, these reviews are authoritative, comprehensive, and adequately documented. Accordingly, this volume is and will continue to be a valuable source of information for both the specialist and the uninitiated. Either directly or by inference, all of the various models that have been proposed to account for the unusual properties of metal-ammonia solutions are examined critically.

The Weyl Colloquium was deliberately restricted to consideration of physical properties of metal-ammonia solutions; perhaps this was a wise decision. It seems noteworthy that the vast amount of effort devoted to the study of the physical properties of these systems has resulted in little that is useful in interpreting the chemical reactions in which these solutions participate.

The many typographical errors in this volume are unlikely to be a source of satisfaction to either the editors or the publisher.

GEORGE W. WATT
Department of Chemistry, University of Texas

Chemical Technology

The Cyanine Dyes and Related Compounds. Frances M. Hamer. Interscience (Wiley), New York, 1964. xxxiv + 790 pp. Illus. $45.

Frances M. Hamer, the author of this specialized treatise, has long been recognized as an authority in the field of cyanine dyes, and much of the work that he describes here is his own work or is work based on his developments. Hamer's work provides a bridge between the early work of Pope and Mills (1917) and the work today in the photographic industries.

The principal use of cyanine dyes has been in the selective color sensitization of photosensitive materials. One is, of course, concerned with the wavelength limits of sensitization and the selective absorption of the dye itself. Booker and others have published extensive data on the absorption spectra of these dyes, and it therefore seems strange to find only two figures with a total of six spectra in the book. Not only are absorption spectra omit-