the treatment usually found in elementary textbooks on physical chemistry. In a chapter on the design of multiple reactions, he considers certain typical situations and introduces the student to general approaches for handling such systems. His treatment of solid-catalyzed fluid reactions is relatively concise. A wealth of problem material is provided, but very few of the problems relate to experimental data on true-to-life systems. The majority of the problems deal with the old friends A + B; inkahol and googliox are also represented.

In order to provide adequately rounded instruction for chemical engineering students, supplementary material on chemistry must be used with Levenspiel's text. For example, catalysis is presented as an insoluble mystery, and he gives no indication that a catalyst must provide a new reaction path in which it enters molecularly.

Despite certain shortcomings, this text appears to accomplish its objectives more successfully than any other available for chemical engineers. One major virtue is that it does not use the case method of instruction. The numerous illustrative examples are just that, and the principles that they embody are explained carefully in the preceding text.

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Multidisciplinary Forum

Physical Sciences: Some Recent Advances in France and the United States. Hartmut P. Kallmann, Serge A. Korff, and Sidney G. Roth, Eds. New York University Press, New York, 1962. ix + 243 pp. Illus. $7.50.

Much is said these days about the economic miracle that has occurred in Western Europe since World War II. Coupled with this is the new level of international cooperation among the European countries, symbolized by the Common Market and the North Atlantic Treaty Organization. While it is true that the structure is threatened by what may be called de Gaulleism and related *isms*, such as that which caused the United Kingdom to resist the formation of the Common Market in the first place, one feels that this story will have a happy ending once those who grew to maturity in the atmosphere of nationalism which prevailed before 1914 leave the scene and a younger generation takes its place on the stage.

Parallel to the emergence of a new spirit in Europe has been a renaissance of science in France on a scale that is truly remarkable. Historically speaking, no one need apologize for French science, as one well might for science in the United States prior to 1900. Names such as Descarte, Fermat, Lagrange, Laplace, Fresnel, Pasteur, and de Broglie speak for its vitality since the time the Western world first turned to science. Nevertheless, a sequence of events did make French science more stagnant than the opportunities of recent decades merited. This book is a modest tribute to the new spirit that promises to provide France, and the rest of the world, with all of the scientific productivity of which the French people are capable. The volume is based on a conference, held in New York City 2 years ago and sponsored by New York University with the financial backing of the Sloan Foundation, at which a dozen French and American scientists addressed themselves to a number of subjects of mutual interest. Some of the topics were general, such as those concerning the organization of support for science, including government financing and education; others were specialized, such as those devoted to radio astronomy, solid state physics, magnetic resonance, geology, and hydraulics. The treatment is by no means encyclopedic. Rather it seems to have generated an atmosphere in which the traditional amity between France and the United States shines alongside some accounts of the successful struggle going on in France to enhance the support of science.

The opening chapter, by Pierre Piganiol, to whom de Gaulle in 1958 gave the task of leading a study of science and technology in France (Piganiol served as delegate general of scientific and technical research and reported directly to the prime minister), gives a vivid and detailed account of the governmental apparatus designed to support and stimulate all aspects of science. It should be added that Piganiol has since left this arduous post after bringing about very great and productive reforms. I had the good fortune to live in Paris at the height of Piganiol's tenure in office and to witness first-hand both the operation of his group and the widespread, intelligent discussion of his work which was held throughout the country in all channels of public communication. Those who are interested in such matters will find the book worth reading for this chapter alone.

Both Richard T. Arnold and George D. Stoddard contributed essays on general aspects of research and education; Arnold's essay is entitled "Trends in academic and industrial research," and Stoddard's, "Education for science."

The remaining chapters deal with special fields of science; individuals from the two countries described progress in research in the special areas mentioned earlier. As is often the case with a symposium volume, the different contributions are uneven, since the angle of vision of the different authors is different. Each reader must determine the extent to which he is interested in any particular contribution. The American contributors are Serge A. Korff, Fred Haddock, N. Bloembergen, J. H. Van Vleck, J. Joseph Lynch, and Hunter Rouse; the French are Jean Denisse, J. C. Pebay-Peyroula, Louis Néel, Georges Millot, and L. Escande.

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Bibliographed Syllabus

Biological Transport. Halvor N. Christensen. Benjamin, New York, 1962. viii + 133 pp. Illus. $6.50.

This modest volume is a welcome addition to the growing literature on biological transport processes. Halvor Christensen, who has made valuable contributions to this field over a period of many years, is well qualified to write on the subject. He has succeeded admirably in his intention to write a book which "should be interpreted more as a bibliographed syllabus" for the instruction of graduate students in the biological sciences "than as a review." The monograph contains chapters on the scope of the problem, concepts and terms, the kinetic approach to transport, the specificity of transport, site isolation-membrane separation, clues from associated events, nutritional and genetic approaches, and the endocrinology of transport; there is a general summary which includes some cogent specula-

tions on the future course of research on biological transport processes. The printing is of good quality and easily readable. Illustrations are frequent and clarifying.

As one might expect, the treatment is most comprehensive in areas related to the author's research interests, particularly amino acid transport. However, sufficient attention is given to the transport of other substances to provide the reader with a good introduction to the entire field. Pertinent literature is quoted extensively, and reference is made to most of the currently promising lines of investigation. The mood of the writing is that of a scholarly and personal appraisal of current knowledge about transport processes in living systems. As the author anticipated, "The result can hardly seem to have ideal balance to all the scientific areas now interested in transport." However, Christensen thinks and writes clearly about the matters that he has chosen to treat. For example, I found particularly sensible and timely the critical discussion of the use of the term *permease* to describe a site of membrane penetration.

This book will be of value to those biological scientists interested in or actually working on the subject of the transport of substances across the biological membranes. It will be particularly useful for the instruction of graduate students in this field.

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Infrared Spectroscopy

An Introduction to Infrared Spectroscopy. Werner Brügel. Translated from the German by A. R. Katritzky and A. J. D. Katritzky. Methuen, London; Wiley, New York, 1962. xv + 419 pp. Illus. $9.

Progress in Infrared Spectroscopy. vol. 1. Herman A. Szymanski, Ed. Plenum Press, New York, 1962. vi + 446 pp. Illus. $16.

The first of these books is an English translation and revision of Brügel's *Einführung in die Ultrarotspektroskopie*. Since Brügel's book is one of the better books available as an introduction to the rapidly growing field of infrared spectroscopy, it is a pleasure to note the publication of this English edition. For the most part, this edition is identical to the German second edition, although a few minor changes have been made to bring the book up to date as of 1961. Unfortunately, even some typographical errors have been carried over from the German edition, but errors are few and far between.

The format of Brügel's book follows the logical course of first introducing the theory, then the instrumentation, and finally the experimental techniques that are necessary for infrared spectroscopists. While the book necessarily covers each subject superficially, it does provide the bare essentials necessary for the novice, and it contains many references for those interested in obtaining more detailed knowledge of each subject. The portions on instrumentation are already somewhat out of date in that the latest far infrared instruments and instrumentation are not discussed. It is also unfortunate that Japanese and Russian spectrometers are not described, but I imagine those instruments were omitted because they have not found an international market.

Although Brügel's book seems to have been written for workers in analytical laboratories, or for those specialists in other fields who are primarily interested in using infrared spectroscopy as a supplementary tool, those who are starting on a career in this field will find that it is an excellent introduction to infrared spectroscopy.

The second book, *Progress in Infrared Spectroscopy*, is a collection of lectures given at the advanced sessions of the Fifth Annual Infrared Spectroscopy Institute held at Canisius College (Buffalo, N.Y.) in August 1961.

The lectures seem to have been collected and published without any editing. As a result the volume is a group of poorly organized chapters, and its astronomical price is not warranted. That is not to say the lectures do not contain worthwhile information. In particular, much emphasis is placed on the use of the newly developing field of far infrared spectroscopy. In addition there is an excellent exposition on group theory as it applies to infrared spectroscopy and a well-written review of the "analytical application of absorption spectrophotometry." On the whole, this book seems to be of greatest value as a very wordily annotated, and often repetitious, bibliography on applied infrared spectroscopy.

Progress in Infrared Spectroscopy will undoubtedly find its way into many industrial libraries, even though better books are available at a more reasonable price. The translation of Brügel's book, on the other hand, is an excellent introductory book that belongs in many libraries. Although some portions of its treatment of instrumentation are rapidly going out of date, *An Introduction to Infrared Spectroscopy* contains much material of lasting interest.

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Historical Survey

Nitrogen Metabolism in Plants. H. S. McKee. Oxford University Press, New York, 1962. 728 pp. Illus. $16.80.

The chapter contents, which are indicative of the scope of this volume's 15 chapters, are sources of nitrogen, assimilation of nitrate, fixation of nitrogen, nitrification, denitrification, assimilation of nitrogen compounds, amino acids and betaines, biosynthesis and breakdown of amino acids, amides, proteins, alkaloids, cyanides and nitro compounds, storage and transport, and the nitrogen cycle.

The book's title is misleading because neither an enzymological approach nor a biochemical point of view is provided. Rather, the book is a treatise on the compounds of nitrogen that happen to occur in plants. Its greatest value is that it summarizes the historical points of view and preserves the early literature. A second value is the thoroughness with which it records the occurrence of unusual nitrogen compounds in plants. There are about 4500 references (225 pages), of which approximately 400 are references to publications prior to 1900.

Anyone concerned with nitrogen compounds in plants will find that this book is a thorough guide to the literature in the classical tradition. Current work is moving too fast to be properly considered, and the stage is hardly set for the excitement of the immediate future in protein synthesis.

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