# Book Reviews

## On the Problem of Communication among Scientists

**Frontiers in Physics.** A lecture and reprint series. David Pines, Ed. *Problems in Quantum Theory of Many Particle Systems*, L. van Hove, N. M. Hugenholtz, and L. P. Howland (259 pp.); *The Many-Body Problem*, David Pines, Ed. (469 pp.); *S-Matrix Theory of Strong Interactions*, Geoffrey F. Chew (192 pp.); *The Theory of Fundamental Processes*, R. P. Feynmann and H. T. Yura (182 pp.); *Quantum Electrodynamics*, R. P. Feynmann. Notes corrected by E. R. Huggins and Y. T. Yara (208 pp.); *Nuclear Magnetic Relaxation*, N. Bloembergen (187 pp.); *The Mössbauer Effect*, Hans Frauenfelder (350 pp.). Benjamin, New York, 1962. Paper, $3.95 each.

This series forms an important new development in scientific publishing and makes a very valuable contribution to the solution of a serious problem: the growing difficulty of communication among scientists in the presence of a high level of background noise created by the large and growing number of papers that are published by a growing number of journals. Any newcomer to a given domain of physics—and one can become a neophyte these days at an alarmingly rapid rate—is faced by the problem of selecting out of the myriads of published papers those that are most significant and seminal. Even experienced hands have trouble and resort to the word-of-mouth method, which is perhaps the most important function of conferences. In fact, it is probably true that at the present time there is a greater possibility than ever before that a really important piece of work will remain unnoticed. There is much duplication, for there are some who would rather write than read—that is, they would rather work out their own ideas than spend an equivalent amount of time digging out, from the huge mass of publications, that paper which is relevant. This rather painful situation appears to be growing worse with time.

Clearly this problem of communication is greatly eased by these volumes in which are made available the important papers in a given field. An introductory analysis of the papers is provided in most of the volumes. What a relief it is to be presented with those original contributions that form the basis for a contemporary treatment of a problem rather than to face the alternative of extracting the fruitful papers from the vast barren majority! Experts are needed to make these judgments, and the authors of this series satisfy that criterion.

Pines, the editor of the series, contributes what is to be regarded as a model volume for the series. In the first hundred pages of *The Many-Body Problem*, Pines presents a clear discussion of the concepts and methods employed in this field. This is followed by about 350 pages in which the important original papers are reprinted. Much the same attack, and one that is also very successful, is used by Frauenfelder in his book, *The Mössbauer Effect*. Chew's volume, *S-Matrix Theory of Strong Interactions*, is also in the same spirit but in a somewhat different sense; because of its very particular type of approach (and the very broad range of application), Chew's volume does not contain as many reprinted papers as the other volumes.

The volume edited by van Hove, Hugenholtz, and Howland, *Problems in Quantum Theory of Many Particle Systems*, suffers because it contains no introductory analysis, which would have been very useful. Bloembergen's *Nuclear Magnetic Relaxation* is a reprint of his Ph.D. thesis. *Quantum Electrodynamics* contains Feynmann's notes for a one-semester course designed "to present the main results and calculational procedures of quantum electrodynamics in as simple and straightforward a way as possible." In *Theory of Fundamental Processes*, we are presented with an almost semi-popular (if the populace are graduate students) treatment of the problem of elementary particles.

All of these volumes contain very worthwhile material. They do not all have the same sort of goal in mind. In my opinion, the most useful and probably the most significant for the future of physics are those that follow the format which Pines employs in his volume.

The books are clearly printed and legible, although there is considerable reduction in the format of those articles that are reprinted from journals published by the American Institute of Physics. All of these books are paperbound.

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## Mathematics Textbooks

**Introductory College Mathematics**. Chester George Jaeger and Harold Maile Bacon. Harper, New York, ed. 2, 1962. xvii + 423 pp. Illus. $6.50.

**Elementary and Advanced Trigonometry**. Kenneth S. Miller and John B. Walsh. Harper, New York, 1962. xi + 350 pp. Illus. $5.75.

**Analytic Geometry: A Vector Approach**. Charles Wexler. Addison-Wesley, Reading, Mass., 1962. x + 291 pp. Illus. $6.

**Foundations of Geometry and Trigonometry**. Howard Levi. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1960. xiv + 347 pp. Illus. Trade ed., $10.60; text ed., $7.95.

The common features of the mathematics texts reviewed here are that they are written for freshman courses and that none is designed for the increasingly popular course in which analytic geometry and calculus are studied simultaneously. Apart from this, the texts have little in common and are designed for distinct courses. Three are distinct departures from usual texts; for one, the departure is complete.

The one text that covers its subject matter in the standard way is *Introduc-*

*tory College Mathematics* by Jaeger and Bacon. This new edition, of increased scope, is primarily designed for the student who will need some elementary mathematics and who can devote only a 1-year course to its study. Topics covered range from algebra through introductory integral calculus. The text seems to be carefully written by experienced teachers, who are well aware of student stumbling blocks. The treatment is traditional and employs the degree of rigor commonly used at this level, with the material arranged so that a choice of topics may be made for a shorter course.

The claim to novelty of Miller and Walsh in *Elementary and Advanced Trigonometry* lies in the second part of the text, which includes complex numbers and hyperbolic functions (often considered as elementary topics), solutions of trigonometric problems by methods of finite and infinitesimal calculus, Fourier series, and Tschebyscheff polynomials. In the first section, on elementary topics, the treatment is, in my opinion, substandard. Definitions are unnecessarily vague and sometimes incomplete. The logic is at times faulty. Average students *would* be confused, and good students *should* be confused, by the presentation.

The alleged purpose of the second part of the Miller-Walsh text is to answer the student's question about what can be done with trigonometry (if it is assumed that the student is not inclined toward flagpole sitting). No satisfactory and understandable answers are given, and one is likely to conclude that mathematics is a lot of nonsense. The claim that this material can be taught at this level is no reason why it should be taught there. Only those students who will continue in mathematics should study trigonometry, and they should not spend time on special problems treated in a watered-down manner. I fail to see to whom this text can be properly directed; thus, I cannot agree with the authors' intended purpose in giving us the book. We need concrete courses covering purposeful material.

The study of lines and planes using vectors differentiates Wexler's *Analytic Geometry: A Vector Approach* from the usual texts. This approach provides an interesting simultaneous study of some aspects of the geometry of two and three dimensions. Apart from this early use of vectors, the text is not particularly different from others, although a late discussion of tangents and normals is included. Wexler has included a large amount of optional material (without exercises) early in the text, dealing with properties of abstract vector spaces which are of doubtful digestibility at this level. A part of the author's motivation for this text was his dissatisfaction with the late appearance of analytic geometry in the popular course that unifies geometry and calculus. Usually geometry ends up as the neglected partner in a marriage that is much more apt to succeed if each partner strengthens the other. A student who completes this text will have a good supply of functions and ideas that will make his study of calculus more interesting and meaningful.

*Foundations of Geometry and Trigonometry* by Levi is a radically new text. It is new because it presents a logically rigorous development of affine and Euclidean geometry, in which analytic geometry and trigonometry play an integral part. The text is composed throughout of two parts: the formal development, in large type, giving content in the spirit of modern mathematics; and an informal discussion, in small type, telling the student what is going on and helping to motivate him to study the formal development. As a result, the distinction between mathematics and talk about mathematics is clear. As Levi indicates, the text is for a course not generally given in this country. One reason for this is that most students lack a proper background which would include a knowledge of elementary set theory and a good understanding of the real number system [such as is found in Levi's earlier text, *Elements of Algebra* (Chelsea, New York, ed. 4, 1961)]. An equally great obstacle for the average student is his inability to understand definitions and proofs. This inability is in part due to the nonrigorous, hand-waving type of mathematics that has composed his earlier training. Levi deplores the principle that mathematics "must be learned in a wrong version before it can be learned in a right one." Most mathematicians dislike the principle, but we will not be able to teach otherwise until more bold ventures, such as this text, indicate that we may be released from our bondage. This text could afford an exciting experience for well-fortified students, endowed with a patient and able teacher.

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## Trace Elements

**Atomic-Absorption Spectrophotometry.** W. T. Elwell and J. A. F. Gidley. Macmillan, New York, 1962. vii + 102 pp. Illus. $5.

One of the newest physical methods to join the arsenal of analytical techniques used to determine trace elements is atomic-absorption spectrophotometry, first proposed by Walsh in 1955. Information on the determination of 23 metallic elements has since been published, including detailed applications for a much smaller number of these in both biological and metallurgical materials.

In view of the newness of the field and the limited number of studies, one might regard the publication of a book at this time as premature; however, the compilation of the pertinent information in one source in an organized fashion is welcome and should do much to arouse interest in this promising technique. At the outset the authors state that "an attempt has been made to bring the reader up to date with developments in those fields of analysis in which atomic-absorption spectrophotometry has, or is likely to have, useful applications. Because limitations of the technique are equally important, this aspect has also received due attention and comment." This objective has been faithfully fulfilled in a very clear and concise fashion.

The book systematically treats the theory, equipment, and technique; the concluding chapters provide a collection of specific methods for the determination of the elements zinc, lead, magnesium, manganese, iron, calcium, sodium, potassium, copper, and cadmium.

In their treatment of theory, the authors have faithfully followed Walsh's original presentation [*Spectrochimica Acta* **7**, 108 (1955)]. The chapter on equipment includes an elementary discussion of the essential components, namely, a sharp-line source, a means for vaporizing samples, a wavelength selector, and equipment for measuring and recording intensity. The method of producing hollow-cathode lamps is given in great detail, however, optics and instrumentation are neglected. The comparison of atomic absorption and flame photometry is valuable.

It is in presenting the compilation of the admittedly limited number of specific methods available in the literature