The central portion of *Underwater Acoustics* is devoted to electroacoustic transduction, magnetostrictive and piezoelectric systems, radiation patterns of various sources, transducer evaluation, and the principles of active and passive sonars. Because of the widespread use of explosives as underwater sound sources, it is disappointing to find them omitted.

The last section presents a discussion of sonar signal processing including incoherent and coherent processors. A brief discussion of nonideal signals in an ocean medium is also included.

Although this book is not suitable as a text on underwater acoustics, it could be used for a course on transducer design for underwater sound applications at the upper undergraduate or graduate level. Each chapter (except two) contains appropriate problems, and answers to these problems are provided at the end of the book. An instructor, however, will have to cope with numerous editorial errors ranging from mistakes on a curve (page 19) to mistakenly attributing P. M. Morse's book, *Vibration and Sound*, to W. P. Mason (page 36). It is unfortunate that a book that brings so much information together should be subject to errors that reflect a disregard for careful editing by the authors and the publisher.

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Physics: A Modern Approach

By Walter Thumm and Donald E. Tilly
344 pp. Cummings, Menlo Park, Calif., 1970. $8.95

Physics: an ebb and flow of ideas

By Stuart J. Inglis
424 pp. Wiley, New York, 1970. $9.95

Both books reviewed here were written for one-semester liberal-arts physics courses, can be used for one-year courses, and cover much the same physics topics in a reasonable number of pages, using only high-school algebra. The results, however, are poles apart. Walter Thumm and Donald E. Tilley, who teach at Canadian colleges, wrote theirs for "college students who do not necessarily intend to pursue a major in the field of Physics," emphasizing the technical and applied aspects. The book by Stuart J. Inglis is designed "to introduce the concepts of physics," relying almost entirely on an historical approach.

Thumm and Tilley cover Newtonian mechanics, electromagnetism, special relativity and quantum physics. They include sizable chapters on nuclear physics and on circuit theory and a tiny chapter on the ideal gas law and kinetic theory. The writing, exposition, and references to applications for each piece of physics are very good and totally honest. The one- or two-page historical introductions beginning each chapter are interesting and informative, and have a definite Anglophilic accent.

What is absent is the story line. Neither the overall picture of our understanding of the physical universe nor the view of science as an exploration of the ways of physical universe emerge from the separate pieces of physics exposited in the text. Astronomy, and cosmology are not mentioned. The space-time world view explorations from Aristotle to Copernicus to Galileo to Newton to Einstein are not discussed. Thermodynamics, the properties of matter in bulk, and the drive towards equilibrium are not treated; so they lose the opportunity to discuss entropy, the arrow of time, and the relation between macro and microphysics, surely fascinating topics at every level of discussion.

There is ample material for a full year's work and more, if the teacher is willing to add the story line or other aspects to the course. But the book is very difficult. It is pitched at a high sophistication level, intellectually, scientifically and mathematically, in spite of using only algebra. The density of information is also high, leading frequently to a handbook style of presentation.

In my opinion (I have been teaching physics to nonscience majors for several years) Thumm and Tilley's book should be used only for students who have an understanding of the grammar of science and already have facility with quantitative reasoning. The book is almost certainly too difficult for most nonscience majors at most American colleges, and even for many beginning science majors.

In Inglis's book, the physics concepts are generally introduced by describing the experiments and considerations of original workers in the field. Biographical sketches and excerpts from original publications are used very liberally throughout, from Aristotle through the middle ages to Galileo, Newton and up to Carl Anderson and the positron. Logical and pedagogical exposition and development of the concepts is used only incidentally. The topics covered are Aristotelian physics, Newtonian physics, electromagnetism, special relativity, quantum physics, nuclear physics, and temperature and heat.

The approach used succeeds in demonstrating Man's historic drive to explore and understand the ways of nature. The excitement of the exploration is clearly evident in some of the excerpts from the original works.

On the other hand, the concepts are not generally developed to the point

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where the student could actually understand and use them. In fact, this does not seem to be a real objective of the book, as evidenced by the lack of illustrative examples, and by the type of questions and problems, averaging about six of each per chapter. The problems are almost all formula substitutions, and many of the questions may be answered by thumbing backwards through the chapter to find the appropriate paragraph.

Further, basic facts of nature are frequently lost or hidden, because of the lack of logical-pedagogical exposition. As an example, the student reading chapter 6 on electricity and magnetism, might miss learning that electric current consists of moving charges, and is not told that matter contains positive and negative charge. He is told that "electric virtue" can be transported along metals, and that the one- and two-fluid theories are both acceptable. Not until chapter 12 does it appear that the electron is negative, that the hydrogen atom is presumably neutral, and the nucleus, therefore, positive. The strict historical approach used in the book does not get the physics together.

The teacher who wishes to try Inglis can present either a one- or two-semester course by omission or addition of topics and case histories. The teacher who would have his students experience some of the pleasures or excitement of actually understanding and using physics, of being in this sense participants rather than spectators, would have to add large amounts of his own material, or use another book instead of or in addition to Inglis.

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Gas Laser Technology

***By* D. C. Sinclair, W. E. Bell**
161 pp. Holt, Rinehart and Winston, New York, 1969. $7.25

A number of books have been written on the specific subject of gas lasers, reviewing past achievements and compiling reprints. These were written mainly for readers already working in the area of lasers. This book is intended as an introduction to gas lasers and as a textbook for students. The authors have written a clear and concise book that will fulfill a useful purpose, particularly as a text for senior and graduate level courses.

Their method of referencing what they consider the most pertinent articles at the end of each chapter is open to criticism as to their particular choices but it is a valuable guide to those using the book. The reader then relies on the authors' judgment for references to specifics and details, and thus eliminates the literature search required when a more complete list of references are given.

The chapter devoted to Lamb's theory of the laser is easily followed. The treatment of transverse mode structure, with the explanation of geometrical construction of the propagation of laser beams in cavities, is very useful and is the most complete treatment in the book.

The book contains a chapter on the construction of gas lasers that applies mainly to low-power visible lasers but also contains general information on vacuum processing of laser tubes as well as dc and pulsed electrical power supplies for visible lasers.

In an introductory book such as this, a brief historical review of the development of gas lasers would be useful as well as at least a mention of the wide variety of gas lasers that have been developed. The introductory chapter briefly discusses the helium–neon, argon-ion and carbon-dioxide lasers, which are representative of three types of gas lasers. No mention is made of chemical lasers or of metal-vapor lasers. The book does not treat the general fields of pulsed technology (such as Q-switching) or diagnostics of the laser output (such as detectors, power meters, and so on). The book does contain a complete introduction to the fundamentals of gas lasers, and the concepts of inversion and gain, cavity modes and the basic construction techniques of gas lasers are well presented.

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Annual Review of Astronomy and Astrophysics, Vol. 9. D. Goldberg, ed. 394 pp. Annual Reviews, Palo Alto, Calif., 1971.

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THEORY AND MATHEMATICAL PHYSICS

Applications of Green's Functions in Science and Engineering. By M. D. Greenberg. 141 pp. Prentice-Hall, Englewood Cliffs, N. J., 1971. $6.95

Kinetic Equations. R. L. Liboff, N. Rostoker, eds. 346 pp. Gordon and Breach, New York, 1971. $19.50