Light Microscopy

Progress in Microscopy. M. Françon. Pergamon, London, 1961; Harper and Row, New York, 1962. ix + 295 pp. Illus. $9.

This volume, the ninth of the International Series of Monographs on Pure and Applied Biology, edited by P. Alexander and Z. M. Bacq, was copyrighted by the Pergamon Press and printed in Poland. The author, professor of physics at the Sorbonne and the Institute of Optics, has devoted all 11 chapters exclusively to light microscopy.

The first chapter is a treatment of image formation, particularly with respect to the Airy disc obtained under various conditions of illumination, focus, and objective design. Chapter 2 is a skillful and critical review of phase contrast in transmitted light. In the next two chapters the author demonstrates his specialization in interference microscopy by transmitted light and reflected light respectively. Chapter 4, on reflected light, also deals with phase contrast, oblique illumination, dark field, polarized light, and the technique for examining hot metals. The fifth chapter is on accurate geometrical measurements. The next two chapters are on unpolarized, two-wave, interference microscopes and on polarizing interference microscopes.

In chapter 8 Françon again discusses the interference microscopes—this time for measurements. The next two chapters are neat reports on progress in infrared and ultraviolet microscopy and in microspectroscopy and microspectrometry. Although the final chapter is entitled "Chemical microscopy," it is strictly confined to fusion methods. The wealth of material presented in *Chemical Microscopy* (vol. 1, 1958), by Chamot and Mason, is merely mentioned in the all too short "Short bibliography."

The book suffers from the use of authors' surnames without any more specific reference to the literature, except in the incomplete bibliography. While there are very few typographical errors, some of the terms are European, for example *actionless* for inert and *microscopic* for microscopical. Nevertheless, the book will be very valuable to scientists working in many disciplines.

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Space Science

Basic Physics of the Solar System. V. M. Blanco and S. W. McCuskey. Addison-Wesley, Reading, Mass., 1961. xii + 307 pp. Illus. $7.50.

This book evolved from a series of lectures given at Case Institute of Technology to groups of research scientists, engineers, and administrators, working on problems of "space science" in the Cleveland area. Members of the group were trained in the basic physics and technology appropriate to their problems, but had little background in astronomy. The purpose of the lectures was to provide this background in a form related to current problems of space research. Only the solar system was discussed, and only selected aspects of its study were treated—those most in line with the present directions of advance.

The resulting book has the form of a textbook for university students of physics or mathematics on the senior or first-year graduate level. It has only six chapters, averaging less than 50 pages each. The subjects are coordinate systems, planets and satellites, the earth-moon system, the two-body problem, three- and n-body problems, the sun and interplanetary space. Appended to three chapters are problems for the student, and every chapter has an extensive and valuable list of references. The presentation is very compact, with few wasted words; it is also very systematic, so that, from the beginning, the large and varied array of observed data form a significant pattern. The principal physical theories applied are those of particle mechanics under gravitation, mechanics of rotating bodies, absorption and emission of thermal radiation, gravitational and radiative equilibrium of gaseous masses, and spectral emission and absorption of radiation. Relevant numerical tables and name and subject indices are given.

I cannot compare this book with others of its kind, for as far as I know there are no others. It fills a place that has long awaited it. But in comparison to an ideal book, I note the absence of three (or four) chapters: one on ionization processes and plasmas, one (or two) on line spectra, and one on the chemical composition of the sun and solar system. I can see why these were omitted, but both as an astronomer and as a physicist, I miss them. It seems to me that the dynamical sections are handled more systematically and concretely (even to worked examples) than other sections—perhaps reflecting our less complete understanding of the thermal and radiative state of the solar system. Format and typography are excellent, as usual with books published by Addison-Wesley. The whole is a very welcome contribution to the literature of the "space sciences."

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Petroleum Engineering

Formation Evaluation. Edward J. Lynch. Harper and Row, New York, 1962. xviii + 422 pp. Illus. $12.50.

Formation Evaluation represents a major contribution to the technical literature available to petroleum engineers. It may well become a standard textbook, and it should find a place on the bookshelf of development engineers throughout the industry.

Lynch has carefully compiled and presented in an excellent format the current knowledge on all phases of formation evaluation. Each phase of the evaluation process—coring, core analysis, logging, drill-stem testing, and the like—is analyzed, by first considering the theory behind the methods described, then describing their application, and finally interpreting and applying the results.

The chapter on drill-stem testing is particularly noteworthy. The author wisely observes that this test is the most suitable tool available for use in formation evaluation, in that it simulates, if properly conducted, the conditions that will obtain in a completed well. He carefully describes the tools and their use, and he cautions against the hazards that are extant in such testing. He completes the chapter with a thorough discussion of the qualitative and quantitative analysis of the results of the test.

In an appendix, Lynch presents a series of checklists to be used in logging the bore-hole. This is a step-by-step procedure for the entire logging program. It covers preparation for the logging run, a general checklist for all log runs and prints, and specific checklists for each type of log to be

run, including the tasks to be accomplished before, during, and after the run.

Although most of the information presented is available elsewhere in the literature, the author has done an outstanding job of compiling and organizing the knowledge available into a single volume.

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Introductory Textbook

Principles of Physics. Earnest S. Greene. Prentice-Hall, Englewood Cliffs, N.J., 1962. xxiv + 608 pp. Illus. $9.75.

This book successfully achieves its goal—that of being a text for an introductory liberal arts physics course—by combining modern physics with what has been conventionally taught of classical physics in an introductory course. The first few chapters also show that Greene has a sympathetic understanding of the average student's problems in learning physics, for these chapters constitute his advice and instructions to the student on study habits and, in particular, on how to study physics. It is debatable whether this advisory material should be a part of the text. The student should have such advice, but I am inclined to think verbal advice is more effective.

Most of the paragraphs and topics are very well handled, but there are a few rather standard poorly-done sections. By standard I mean that in most other textbooks they are also inadequately treated. Two sections which could be improved are those that treat electric potential and relativistic motion. In the case of the electric potential, too much is said about the analogy with water pressure and too little about the different character of energy associated with electron flow.

I wish that, along with his excellent psychological advice about study, the author had gradually increased the mathematical level of his approach to physics. An approach to physics, or to any science, in which a minimal amount of mathematics is used is comparable to a study of Germanic literature by a student who cannot read the German language.

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Nuclear Industry

Advances in Nuclear Science and Technology. vol. 1. Ernest J. Henley and Herbert Kouts, Eds. Academic Press, New York, 1962. 366 pp. Illus. $12.

This is the first volume of a new annual series that promises to cover every aspect of the nuclear industry except pure mathematics, theoretical physics, and radiation biology and medicine. The articles are reviews of rather specific engineering systems (proposed and actual) or of broader fields of technology. In all cases the authors treat their subjects by invoking both specific and general principles, as the case permits, in order to achieve maximum usefulness and clarity for the reader. Volume 1 contains seven comprehensive articles that average 50 pages each.

In the first article, "Thermodynamic analysis of nuclear power stations," S. Baron reviews the thermodynamics of various steam cycles and the overall plant factors that govern the efficiency and economics of operation. Particular emphasis is given to the importance of steam separators and the efficiency of the high pressure saturated steam cycle relative to the superheated steam cycle.

The GBSR concept is discussed in considerable detail in the second article, "The GBSR, a graphite moderated boiling water steam superheat reactor," by L. S. Mims and D. J. Stoker, and its competitive position with respect to fossil fuel plants is outlined.

"Radiation-induced graft polymerization," by G. Odian and H. W. Chandler, provides a comprehensive account of both the basic kinetics and the copolymer properties that result from grafting one polymer onto another by the use of ionizing radiation. Included in the presentation is a table that displays yields on a wide variety of grafted polymers synthesized by the technique of mutual irradiation.

The fourth article, "Diffusion in uranium, its alloys and compounds," by S. J. Rothman, is a most scholarly presentation, replete with tables, graphs and an extensive bibliography. A considerable portion of the article is devoted to the diffusion of rare gases in both uranium and uranium oxide.

In "Performance characteristics of large boiling water reactors," G. M. Roy and E. S. Beckjord give a very good account of the basic reactor dynamics of such plants, and they specifically illustrate the properties of these systems in terms of the Dresden performance and test.

J. E. Ullmann's paper, "Economics of nuclear power," is qualitative and brief, but clear and to the point. The expectation that a real growth in nuclear power will begin by about 1965 is defended by a broad analysis of all the factors involved.

"Chemonuclear reactors and chemical processing," by M. Steinberg, is the most extensive of the papers. Numerous tables and graphs are given which are basic to the design of such as yet unrealized systems. The properties of specific chemonuclear processes, such as nitrogen fixation, carbondioxide cracking, and the production of ethylene glycol, phenol, and hydrazine are given.

In conclusion, I am happy to agree with the editors that these articles meet the requirements of being authoritative, complete, coherent, and critical, although in principle I am only able to testify to the last two properties (note the introduction to the book).

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Russian Geotectonics

Basic Problems in Geotectonics. V. V. Beloussov. Translated by Paul T. Broneer for the American Geological Institute. John G. Maxwell, Ed. McGraw-Hill, New York, 1962. xvi + 816 pp. Illus. $14.

Something old, something new,
Something borrowed, something Red.

This ambitious volume demands the attention of all geologists interested in the problems of earth structure. Its scope is rather overwhelming—too much for a single volume—and the results are brilliance in some areas, mediocrity in others. Throughout, it is a fascinating insight into the Russian geologic viewpoint and attitude. The author is the dean of Russian structural geologists, and in recent years his name has become familiar among earth scientists throughout the Western world.

This volume, essentially a translation and revision of a Russian edition published in 1954, is divided into eight parts. In the first 50 pages Beloussov deals with the methods and historical development of geotectonics, and he