sorption of bone; hormones and bone; mineral metabolism; radiation, isotopes, and bone; postfetal osteogenesis; the healing of fractures; and pathologic physiology of bone. A bibliography and an index are appended.

Biology and Medicine

Physical Techniques in Biological Research. vol. I. *Optical Techniques.* Gerald Oster and Arthur W. Pollister, Eds. Academic Press, New York, 1955. xiii + 564 pp. Illus. $13.50.

This book is the first volume of a comprehensive series addressed to research workers in the biological sciences whose over-all objective is to present a description of the more recent developments in physical methods of analysis and instrumentation. In the words of the editors, "It is hoped that this treatise will serve as a real orientation for biologists and for chemists and physicists who may be potential biologists."

Following the modern trend of treatise preparation, each chapter is written by an individual contributor who is an expert in his particular field. In view of the complexities and diversity of modern instrumentation, the multi-author approach is to a large extent inescapable, and certainly one which facilitates the completion of the treatise shortly after its conception. Alexander Pope's lines: "One science only will one genius fit; so vast is art, so narrow human wit," written in an age when experimental science was in its infancy, becomes more difficult to refute with the passage of time and the accumulation of classified knowledge. This frailty of the human mind is apparently limited to the compilers of encyclopedias. It is a limitation to which book reviewers as a genus have not subscribed, and I have no intention of establishing a dissenting precedent.

The first chapter of the present volume consists of a comprehensive review by Jerome L. Rosenberg of photochemistry and luminescence, covering both the mechanism of photochemical reactions and the associated experimental techniques that are employed in their study. The bulk of the volume is composed of a series of related essays dealing with light scattering, birefringence and dichroism, absorption spectroscopy in the visual region, followed by independent treatments of ultraviolet and infrared spectrophotometry. The latter section, by Carl Clark, is particularly comprehensive; it also contains a brief description of infrared microscopy with Burch-type reflecting optics as applied to the absorption spectra of large cells. The several chapters contain a wealth of information that at times is critically evaluated by the authors; all chapters contain individual bibliographies of the fields surveyed.

The volume also covers the theory and operation of the light microscope, (phase and interference microscopy) and terminates with a chapter on electron microscopy. These sections are especially well prepared, present the reader with a mathematical background of the optical principles for the diverse types of lens systems, and also describe the practical adjustments for securing optimum performance. The section on the light microscope, by L. C. Martin, discusses the working distance of objectives and means for its increase by the Dyson reflecting attachment. However, no mention is made of the availability of "nuclear-type" oil-immersion objectives with working distances up to 3 millimeters and possessing an N.A. of 1.0. These refracting objectives, which are designed primarily for the study of tracks recorded by nuclear particles in very thick photographic emulsions, are equally effective in the examination of tissue autoradiographs and in *in vivo* histological techniques that necessitate a large separation between the front element of the objective and the lower layer of the sample.

It is difficult to evaluate the over-all effectiveness of this treatise, on the basis of the contents of the first volume, as a means of bridging the hiatus between the physicists who created the modern working tools and the investigators in the biological sciences whose work would profit by their application. The contributors have expended considerable effort on a lucid presentation that is further benefited by an unusually large number of charts and line drawings. Nevertheless, the book is not an easy one to read. It is a work that must be studied and one that is well worth the reader's effort.

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Embryologie. Ein Lehrbuch auf allgemein biologischer Grundlage. Dietrich Starck. Georg Thieme, Stuttgart, 1955. xix + 688 pp. Illus. $18.55.

Several decades ago, most textbooks of embryology were essentially descriptions of the serial changes in the morphological mold that an egg undergoes on the way to becoming a free-living individual. Textbook embryology was natural history of the initial phase of the life span, presented, like old-fashioned history in general, as a chronological record of events, with no more than side glances given to the forces, mechanisms, and interactions that do the molding. Meanwhile, the active study of development has become ever more analytic, with the center of interest shifting steadily from chronological seriation to causal explanation. Not just what happens, but precisely how and why it happens as it does, has become the focal issue. Moreover, developmental principles and mechanisms were found to be in operation way beyond the embryonic period, as, indeed, they form the rational basis for the understanding of pathological variations and subsequent repair throughout the life span. There has thus gradually come about a great widening of scope and outlook in the field of embryology. For such a reorientation at the research front to permeate the teaching process, and eventually the textbooks, quite commonly takes decades. The present text proves very convincingly that, for the teaching of embryology, this lag period has at last passed.

The book is the product of a scholarly effort to combine the disciplined description of detailed facts with a modern treatment of their underlying dynamics, and the effort has been crowned with admirable success.

Here is a book that conveys both information and understanding, treats its subject with breadth as well as depth, and above all, with a fine sense of proportion. In particular, it has resisted the temptation to make concessions to the modern analytic approach at the expense of rigorous treatment of morphological facts. There is always the danger that preoccupation with causal explanations may dim the exposition of the concrete factual phenomena that are to be explained. Some recent publications point up this danger. The present text, however, has carefully avoided it. It has struck a satisfactory balance between descriptive detail and excursions into the areas of genetics, cytology, physiology, endocrinology, experimental morphology, and evolution, through which the observational data are interwoven into an intelligible fabric. In full recognition of the fragmentary state of this fabric, the author has placed the emphasis on problems rather than on solutions, and he has been careful to present controversial issues as unresolved, without bias in favor of future solutions not warranted on the basis of existing evidence.

Quite naturally, such a broad treatment of the field, with equal attention to all three of its parameters—namely, morphological description, causal analysis, and evolutionary interpretation—required restraint in the choice of pertinent examples. Again, the choice has been very fortunate. There would be no point, therefore, in complaining that, for instance, histogenesis has been given only cursory consideration, for it could not possibly have been included without seriously weakening the rest of the offering. There are certainly no major omis-