Book Reviews

The Reactive Intermediates of Organic Chemistry. John E. Leffler. Interscience, New York, 1956. 275 pp. Illus. $6.

During the last year or two, a number of books dealing with reaction mechanisms and physical organic chemistry have appeared. A few have been good, but more have been unsatisfactory for one reason or another. John Leffler has pulled off a major feat by writing not only a fine book but also one that differs notably in approach from all previous ones, and one that is written in such an engaging style that most chemists who are at all interested in these fields will wish to read it.

As the title, *The Reactive Intermediates of Organic Chemistry,* implies, radicals, carbonium ions, and carbanions are used as a framework for discussing reaction mechanisms and a variety of other topics in organic chemistry. The sections on each of these intermediates are introduced by a discussion of the physical and other evidence for the existence of these species. A brief discussion of the effect of structural variations on rates and equilibriums of formation is followed by well-thought-out sections on reactions which go through these intermediates. Although the classical experiments are adequately described, Leffler has managed to find less familiar examples to demonstrate many of his points, so that even someone who is familiar with the field is not left with the feeling of having heard it all before. Although the approach is not at all a kinetic one, qualitative discussions of such topics as solvent effects on rates, ion pairs, and neighboring group rate enhancements are included. But the absence of a discussion of the displacement reaction is to be regretted.

Undoubtedly, the most valuable parts of the book are the chapters that are devoted to free radicals—their production and reactions. Usually, free radical reactions are relegated to a small section buried somewhere near the back of chemistry textbooks. Finding the first four chapters of this book devoted to this topic is likely to be a wholesome shock and is perhaps a landmark along the road to respectability for radical chemistry. In these chapters, as elsewhere, Leffler resists the temptation to oversimplify. However, his qualifications and asides are usually unobtrusive enough not to confuse the novice, yet strong enough to give pause to more advanced readers. Advanced students, especially, will profit from a careful reading of the text, since Leffler presents the material in a very scholarly manner, with full awareness of the many pitfalls for the unwary and with no personal theories to push. On the other hand, the small size of the book makes long discussions impossible, and there are few wasted sentences. Persons who meet this field for the first time in the pages of this book may well find the going difficult. The returns, in terms of a mature understanding of the subject matter, should be correspondingly great.

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Elasticity, Fracture and Flow. J. C. Jaeger. Methuen, London; Wiley, New York, 1956. 152 pp. Illus.

Elasticity, Fracture and Flow, a beautifully written little volume, provides a concise perspective of the theories of deformation and failure of materials under the influence of external loading. It is especially characterized by the care with which assumptions and definitions are stated and by the emphasis that is placed on the limitations inherent in each argument presented. There has been a tendency in a great deal of the literature on this subject to rush into formal manipulation without a critical examination of the physical applicability of the hypotheses that underlie the formal approach. J. C. Jaeger's exposition is the antithesis of this.

In a sense, the method of attack is similar to that in comparative physiology or comparative anatomy, where a deeper understanding of the functions and structure of organs is acquired by comparing them in different species. Instead of pursuing the theory of perfectly plastic materials or that of viscous fluids or that of brittle substances as separate disciplines, Jaeger makes an attempt here to show how the properties of substances differ from one another on the basis of the various theories. Thus, this book goes far toward supplying a much needed "connective tissue" for the topic.

The text is divided into three chapters and subdivided into 41 sections. The first chapter provides a thorough and facile introduction to the specification of stress and strain in deformation. Of particular interest are the sections on finite strain.

The second chapter, on the behavior of actual materials, includes discussion of the stress-strain relationships for elastic isotropic solids, anisotropic substances, natural strain, the Griffith theory of brittle strength, Mohr's theory of fracture, the maximum shear stress theory (Tresca), and the maximum distortional strain energy theory (Maxwell-Huber-Hencky-von Mises). There is also a short section on rheological models, including Hookean, Newtonian, Kelvin-Voigt, Maxwell, general linear, and Bingham substances.

The last chapter opens with a discussion of some simple problems that illustrate the differences between the various substances mentioned in the preceding paragraph. The elastodynamic stress equations are derived, and properties of dilatational (P), shear (S), and Rayleigh waves are presented. Some problems of elastostatics are also given. These include a brief description of the stress function (Airy) and of plane stress and plane strain. Finally, some special problems in viscosity and plasticity are treated.

In my opinion, in view of the range of topics covered, the book is outstanding. Very little a priori knowledge of the subject on the part of the reader is assumed by the author. Extreme clarity, unusual consideration for the reader in pointing out limitations, and a combination of comprehensiveness and conciseness all contribute to make this book a desirable acquisition for materials specialists, engineering students, and interested scientists in other fields.

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Human Generation, Conclusions of Burdach, Döllinger and von Baer. Arthur W. Meyer. Stanford University Press, Stanford, Calif.; Geoffrey Cumberlege, Oxford University Press, London, 1956. 143 pp. Illus. $3.50.

In this little book, which will be of real interest to all those who concern themselves with the history of embryology, A. W. Meyer has translated, from the Latin, some of the less accessible monographs of the great early 19th-century figures in this field and has

added chapters of annotation and explanation. The first two chapters are concerned with K. F. Burdach (1776–1847) and give a translation of his paper on the first changes in the formation of the human fetus. The next two chapters deal with the life and work of J. J. I. von Döllinger (1770–1841) and add a translation of his history of human reproduction. The last seven chapters are concerned with K. E. von Baer (1792–1876), no doubt the greatest of the three, and give a translation of his commentary on the eggs of mammals and man. There is a biographical synopsis, a study of the influence of the *Naturphilosophie* on von Baer, and a discussion of his education, personality, period of exhaustion, and unclaimed and uncredited discoveries.

The whole book is the product of very respectable scholarship and must be regarded as a permanent and extremely welcome contribution to the literature of this important branch of the history of biology. Certainly, no greater formative period in this science existed than that at the beginning of the 19th century—the time of the discovery of the mammalian ova—and everyone concerned with this field will be eager to possess this volume.

I feel duty bound to note, with regret, that the learned author did not select for translation Burdach's monograph, *De Commutatione Substantiarum Proteinacearum in Adipem*. In this writing, if my memory is correct, Burdach claimed to have found an actual increase in the fat content of the developing egg of mollusks (pond-snails). This observation seems extremely strange in the light of all that is known about the use of reserve substances during embryonic development, but modern knowledge indicates that the biochemistry of the developing egg of mollusks *is* very strange (as, for example, in its stores of galactogen), and it would be curious if modern research were to confirm such experiments, carried out more than a century ago.

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Fleas, Flukes and Cuckoos. A study of bird parasites. Miriam Rothschild and Theresa Clay. Macmillan, New York, ed. 3, 1957. xiv + 305 pp. $5.

Fleas, Flukes and Cuckoos is the third editon of a work first published in 1952 [see *Sci. Monthly* **75**, 252 (1952)]. The mere fact that such a book has gone through three editions in 5 years indicates that it has met, and has successfully answered, a real need. The text of the volume is essentially the same as in the earlier printings, but on pages xiii and xiv are listed the additional data and the changes in qualifications of statements taken from the first edition.

The two authors are among the most prominent specialists on avian ectoparasites and are highly competent to handle the various topics that are discussed. The book is divided into three main parts. The first of these includes a general discussion of parasitism, commensalism, symbiosis, the mutual effects and interrelations of parasites and hosts, and the origins of parasitism. The second part deals with fleas and feather lice, while the third part has a much more heterogeneous content: it deals with endoparasites, such as protozoans and worms, and also with ectoparasites such as flies and mites. The latter are grouped here probably because their larvae are subcutaneous parasites of the avian host. From these, the authors go on to include food predator-parasites such as the skuas, and brood parasites, exemplified by the European cuckoo, but the treatment afforded these topics is much less detailed than is the discussion of body parasites.

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Medical Sciences. ser. VII, *Progress in Nuclear Energy*. J. C. Bugher, J. Coursaget, and J. F. Loutit, Eds. McGraw-Hill, New York; Pergamon, London, 1956. 165 pp. $6.

This book is a product from the pens of ten different authors, each distinguished in his own right and carefully selected from among the participants in the 1955 International Conference for the Peaceful Uses of Atomic Energy, held in Geneva. Perhaps only a few readers will be thoroughly familiar with all the medical and physics terminology, but, for the most part, there is sufficient supporting discussion to enable the reader who has only a general scientific knowledge to glean an immense amount of useful information. For those busy persons in medical research, radiology, medical physics, and health physics who do not have time to read all the voluminous medical and health physics reports given at the 1955 conference, this book provides a welcome opportunity to make this review in a few evenings of thoughtful reading. The long lists of supplementary references should be helpful, as a quick source of information and a valuable starting point for one writing papers in this field. In some cases, mention is made of a new application of radionuclides to medical research, or to medical diagnosis, with little or no indication of its success or probable ultimate application to medical practice. This limited and tantalizing introduction to a variety of subjects can be expected in such a cursory review of a frontier subject, and, as a result, readers interested only in having a look at descriptive information will be discouraged, while those who like to tease their imaginations will have much to reflect on, and a few may be encouraged to read some of the references.

The fact that this book has two forewords may be, at first, a surprise to the reader, but later he realizes that these two forewords are not written for one but for about ten different books, all condensed and bound into this single volume. Here we have, summarized, the most interesting and important disclosures in the fields of medicine, radiobiology, and health physics, as presented by approximately 100 speakers at the 1955 conference.

Those readers who have been apprehensive about predictions of miracles that will be performed in the therapeutic use of radioactive material will be interested in the statement of Stone that, with the single exception of the method of using radioiodine, no radical departures from previous techniques have been set forth, and that the field of greatest usefulness of radioisotopes to medicine is that of applying tracer techniques to obtain more insight into the workings of the body. Ernest Rock Carling points out the great advances made by industry in adapting the radioisotope tool to research, and, at the same time, he calls our attention to the many associated problems of radiological protection.

The first chapter, titled "Radioactive isotopes in medical diagnosis," by E. H. Belcher and M. V. Mayneord, is very thought-provoking and reviews an immense variety of medical diagnostic studies, such as blood volume, red cell life, tumor detection, and thyroid function.

Chapter 2, by J. F. Ross, deals with the "Diagnosis and investigation of disease with radioactive isotopes." Ross points out the unique contributions of radioisotope tracer techniques in clarifying the dynamic aspects of metabolic and physiologic processes, through determination of the actual rates at which vital functions proceed, the chemical pathways involved, the localization of sites in the body where they occur, and so forth.

Chapters 3 and 4, by J. S. Mitchell, deal with "Nuclear radiations for radiotherapy with external sources and radioactive materials for internal therapy." The reader learns that, for external radiotherapy, Co^{60} is somewhat superior to Ra, and that Ir^{192}, Ce^{144}, Eu^{152}, and Cs^{137} offer certain advantages as external sources for radiotherapy. The P^{32} treatment of patients with lymphatic leukemia and lymphoblastoma of giant follicles yields very favorable results. The mean life of patients with chronic myelogenous leukemia is about the same