ters must be condensed into single sentences or short paragraphs. This significantly increases the demand for a critical evaluation and presentation of data. Too often, however, Hueper makes little distinction between substantive evidence and data that have only a highly speculative relation to the causation of lung cancer by environmental agents.

To compensate for the brevity of the text, the author has appended an extensive bibliography. The use of the references is complicated in that they are not clearly identified with particular statements in the text, authors' names often being grouped seriatim at the ends of sentences. The bibliography at the end of the book is organized by subject and chapter, so that it is difficult for the reader to associate text references with sources, particularly when several papers of any given author are quoted.

The book is organized into sections, the largest of which is Specific Occupational Cancers and Their Environmental Counterparts, comprising approximately 90 percent of the book. The presentation of several of the topics in this section is difficult to rationalize in the light of existing knowledge. For example, iron is presented in an individual section, though substantive experimental or epidemiological evidence supporting its role in the pathogenesis of clinical lung cancer is as yet lacking. In subsection 12, "Miscellaneous respiratory carcinogens," some seven groups of agents are discussed, although evidence as to their pulmonary carcinogenicity is almost totally lacking. I am wholly in sympathy with the inclusion of suspect environmental carcinogens and the plea that they be studied in greater detail, but surely they merit presentation in a separate section of the book appropriately designated with some such conservative title as Potential Hazards or Areas in Need of Investigation.

The book, though well motivated, is replete with positive assertions, some almost evangelical. The denigration of the idea that cigarette smoking is a possible contributory factor in occupational lung cancer is difficult to comprehend, particularly in light of growing recognition of multiple factors in the causation of cancer. In a discussion of beryllium cancers, the author comments (p. 101) on possible co-factors and says, "The main effect of such unwarranted speculations [about cigarette smoke as a co-factor] is added undesirable confusion of the ill-informed on the relative significance of the multiple causal agents involved in the production of cancer of the lung in man, impediment of badly needed epidemiologic, clinical and experimental research into the numerous actual and potential environmental causes of cancers of the respiratory tract (Hueper), on which rational control measures may be based, and obstruction of justified compensation claims for cancers of the respiratory organs contracted by occupational exposure to recognized respiratory carcinogens, by misleading courts and compensation commissions through a reckless and irresponsible promotion of exaggerated claims on the role of cigarette smoking."

Similarly, in discussing coal tar, tar oils, soots, and so on, the author says that "In view of the widely promoted allegation that cigarette smoking is the predominant cause of lung cancer, although cigarette tar does not seem to induce cancer of the fingers stained with it, it is noteworthy that coal tar workers develop cancer at such sites (Link; Oppenheim; Epstein)." Certainly the data supporting a carcinogenic role for tars, oils, soots, and combustion products of coal are sufficiently recognized that polemical "refutation" of cigarette smoking in the etiology of lung cancer adds nothing.

There are a greater number of errors in the references than one would expect in a well-edited text. A serious defect is the lack of critical distinctions between responsible and irresponsible speculation in the Sir MacFarland Burnett concepts of the term. For workers in the field, the book does provide a comprehensive presentation of useful information on the established occupational lung cancer hazards. Its usefulness is most limited when discussing questionable environmental respiratory carcinogens.

PAUL KOTIN
National Cancer Institute, Bethesda, Maryland

Photochemistry of Organic Molecules

In view of the burgeoning interest in the photochemistry of organic molecules over the past two decades, there is a need for up-to-date systematic texts in this area. Nicholas J. Turro's **Molecular Photochemistry** (Benjamin, New York, 1965. 300 pp., illus. $12.50) is intended "to familiarize chemists with the important concepts involved in organic photochemistry and to present a number of representative examples of organic photochemical reactions which can be understood and interpreted in terms of previously developed principles." It assumes some background in elementary quantum mechanics and is written for "advanced undergraduates, first-year graduate students . . . and to serve as a reference book for those who are doing or who anticipate doing work in the field." Turro succeeds in some aspects in this enterprise, but the book has a number of shortcomings.

The first three chapters "review and explain" various quantum mechanical and spectroscopic results such as the classification of states, types of molecular orbitals, transition probabilities, lifetimes, and Franck-Condon effects. These chapters are the weakest in the book. It is not a question of rigor or completeness, but merely of clarity. The discussions of symmetry and of spin-orbit (termed spin-orbital) coupling, matters which indeed lend themselves to intuitive or pictorial treatment, are particularly opaque. Even with some background, the reader who attempts to study these chapters by himself will surely bog down in statements like "These three components, R_x, R_y and R_z, have symmetry properties which may be represented by arrows, parallel to the x, y and z axes respectively."

Chapters 4 and 5, which deal with the photochemically relevant characteristics of electronic states, are considerably better and will probably be useful to organic chemists. A good general picture is given of the pathways of energy flow following excitation, of radiationless transitions, and of intermolecular energy transfer. The discussion is sufficiently detailed to permit some understanding of the nature of the various processes, and ample references are given to key papers. Surprisingly, there is no explicit discussion of quenching mechanisms (as distinguished from electronic energy transfer).

Chapters 6 through 9 present numerous examples of organic photoreactions. Chapter 6 ("Photoreduction") is essentially limited to hydrogen abstraction reactions of carbonyl compounds.

Quinone photochemistry is barely mentioned, and nothing is said regarding dye photochemistry or photo-redox processes involving electron-transfer as such. Rearrangements and isomerizations are described in chapter 7, beginning with some interesting examples of dienone photochemistry. The treatment of valence isomerization of dienes is rather brief and is followed by a detailed discussion of *cis-trans* isomerization, evidently reflecting the author's own experience in photochemistry. The unfortunate terminology "non-vertical excitation" is propagated anew, and the confusion will not be lessened by a figure which shows non-vertical excitation of *trans*-stilbene where the text and cited literature refer to *cis*. The Schenck sensitization mechanism is described, but no adequate idea is given of the body of chemical evidence supporting Schenck's views. Chapter 8, "Photochemical cycloadditions," gives a good impression of the rich variety of these reactions. Chapter 9, "Photochemical fragmentations and related reactions," discusses, among other matters, carbene formation, photolysis of azo compounds, oxidative photocyclizations, and the Barton reaction. The final chapter ("Miscellaneous topics") offers some inadequate remarks on photochemical technique and lasers.

A few dubious statements appear, such as (p. 75), "There is evidence that every S_1 which does not fluoresce passes to T_1." If this refers to symmetrical aromatic hydrocarbons, this should be stated; otherwise, it is contradicted by recent work by Lindqvist and on page 107 of Turro's own book. Again, one cannot conclude, simply from a corresponding change in the φ_p/φ_f ratio, that "k_{ST} (quinoline) increases by two orders of magnitude when the lowest (excited) singlet is switched from π-π^* to n-π^*." Since related discussion in the text shows that Turro is clearly aware of this, such statements can only be attributed to carelessness in writing and editing. Unfortunately, many other instances of such carelessness can be cited.

The book does not deal explicitly with photoreaction of interest in biology, such as those of nucleotide bases or proteins, although the general discussions of energy dissipation and transfer pathways may be helpful to photobiologists. In summary, despite some lapses and ambiguities, *Molecular Photochemistry* offers a useful survey and bibliography of that limited area of organic photochemistry which has been most active in recent years, together with enough background material to enable the reader to appreciate some of the kinetic factors controlling reaction and sensitization paths. Other books should be read for a better understanding of the quantum mechanical background. The paper and printing are mediocre, particularly in view of the price.

HENRY LINSCHITZ
Department of Chemistry, Brandeis University, Waltham, Massachusetts

Embryology

As Elizabeth M. Deuchar points out in the preface to **Biochemical Aspects of Amphibian Development** (Wiley, New York, 1966. 216 pp., illus. $4.50), the years since 1960, when Brachet's *Biochemistry of Development* appeared, have seen an unparalleled growth in the literature of chemical embryology. The present monograph was undertaken in order to survey the recent literature and to present us with a much-needed general progress report. Since a critical summary of progress in the entire area would require more space than was available, Deuchar elected to write a current review of recent trends in biochemical embryology as reflected mostly by studies of amphibian material.

The subject matter is organized and delivered from two different approaches: one according to the morphological stages of the embryo and the other according to biochemical topics. Because the author writes from the viewpoint of one who seeks biochemical explanations for morphological changes, it is not surprising that the largest amount of space (chapters 2 through 9) is given to the first approach. The review begins with an outline of the morphological highlights of the development of *Xenopus laevis* and goes on to present biochemical findings that deal with oogenesis, fertilization, cleavage, gastrulation, neurulation, and so forth.

The second approach is found in a single chapter, which is devoted to a summary of biochemical features of development. Included are such topics as respiration, the synthesis of nucleic acids and proteins, the storage and utilization of precursor molecules, and the regional localization of specific enzymes and antigens. The discussion concludes with a consideration of the biochemical basis of differentiation.

The text is well supplemented with illustrations, and the reader will find a vast amount of information and a large, selective reference list contained within the 216 pages. Deuchar's critical comments, sometimes detailed but most often brief, about the state of a particular problem or experimental approach to it appear throughout the review. Especially well delivered are her remarks concerning regional biochemical differences in the embryo, chemical studies on neurula, and the advisability of determining adequate expressions of results.

The shortcomings of the book arise mostly from the brevity of the treatment given the several topics. Because of this the reader may feel that the presentation is a bit rushed and incomplete; he may wish for a larger, more complete volume to follow.

If the reader expects to find in this monograph a detailed treatment and critical interpretation of the subject, he will no doubt be disappointed. If, however, he expects to find, as the author intended, "a brief, critical review of the recent findings as well as an adequate guide to further reading," he should be more than satisfied.

J. DOUGLAS CASTON
School of Medicine, Western Reserve University, Cleveland, Ohio

Encyclopedia of Woods

Modernization, extensive revision, the incorporation of new concepts, and the correction of errors are valid reasons for the production of a new edition of a book. Yet in F. H. Titmuss's **Commercial Timbers of the World** (Technical Press, London; Chemical Rubber Publishing Company, Cleveland, 1965. 285 pp., illus. $15), a third edition of the author's *Concise Encyclopaedia of World Timbers*, I do not find that any of these conditions have been fulfilled. In a review of the second edition [*Garden Journal* **10** (No. 3) 107, 124 (1960)] I pointed out error after error and omission after omission, as well as the inadequacy of the bibliography and the author's lack of anatomical knowledge. Although the new edition is described on the jacket as being "thoroughly revised and enlarged" (in the preface Titmuss merely states that he has taken the opportunity of "slightly amending the text"), nothing substantial has been done to improve on the 1959 edition, except for the addition of 20 more