over time, and on their rates of fossilization, were published for a nearby clam flat in 1959 by Bradley and Cooke, but this work is not cited by Purdy or by Johnson.

The central problem of paleoecology, one that is approachable only through historical data, would appear to be the evolution of stable community structure. Hedgpeth discusses it in a brilliant introductory chapter, but he has found no takers, at least not in this symposium, for his suggestion that changing specific diversity over time be studied by the methods of Lotka and MacArthur. Shotwell's huge collections of late-Tertiary mammal bones may be appropriate for the purpose, but his crude quantitative methods (not discussed in his chapter) accept the diversity of a "savanna" or "woodland" community as if it were something given a priori, rather than a parameter to be estimated from biased samples.

Collections of foraminiferans are ideally suited for analysis of specific diversity and community organization, but the treatment of these problems by the experts, Walton and Bandy, leaves much to be desired. The longest chapter in the book is Walton's report on the foraminiferal ecology of the Gulf of Mexico, which is based on 950 samples of recent sediments. "Faunal variability" (diversity) is defined as the number of ranked species (pelagic and benthic, living and dead) whose cumulative percentage in the sample is 95, and "dominance" is the percentage abundance of the commonest species. Not surprisingly, the fewer the species, the higher the percentage of the dominant, but this relation is used only to establish some fuzzy "depth zones," which are complex functions of salinity, bottom type, increasing ratios of pelagic to benthic species in deeper water, and the size and specimen density of the samples. The same mixture of environmental factors and statistical artifacts enters in the recognition of "depth" and "geographic" facies from maps of the percentage abundance of species or genera. Walton does not discuss the relation of diversity to sample size, the misleading nature of percentages, or the ways in which closely similar data are treated by students of diatoms, soil arthropods, or pollen. Underlying his splendidly arbitrary approach, of course, is the geologist's stubborn belief that depth of water *ought* to be an environmental parameter, regardless of what ecologists say. Its justification is that it works, at least as applied to foraminiferal zones of "transgression" and "regression" in the Oligocene Anahuac formation of Texas. One ventures to doubt that it will work outside the Gulf province, just as one doubts the generality of Bandy's observation that species of *Virgulina* are smaller in deeper water while those of *Cyclammina* are larger.

A group of organisms held together, like moths at a light, by common responses to physical environment is not a community, but an aggregation. Ironically, the term *Biocoenosis* was invented for a marine assemblage that is much of this sort. Little community structure of an interesting kind is to be expected where waves and currents reshuffle water masses, substrata, and organisms with impartial thoroughness. Compared to a soil or a lake, or even to a coral reef, sea-bottom communities in temperate seas have little more organization than insects in amber. Hence, when Johnson concludes that "many, if not most, of the species in level bottom communities appear to be quite independent of one another" (p. 128), he states no more than the truth, but he also explains why problems of organization are not prominent in the thinking of paleoecologists. Their slowness to make use of population dynamics, however, is not so easy to account for.

The sedimentary record being what it is, geologists' bias toward shallow-water marine ecology will undoubtedly continue. They have already made many outstanding contributions, most of which are referred to in this book but cannot be discussed in this review. Paleoecologists are being steadily recruited from geology, bringing to ecology the freedom from old prejudices and the strong motivation of the autodidact, as well, naturally, as some of the blind spots. As more of them move from level sea bottoms to coral reefs, while a few take up grasslands, forests, and lakes, they will encounter ecological organization for themselves. When they do, we can expect fundamental and exciting contributions to the history of biological order, of a kind that no biologist can make. Meanwhile, their youthful enthusiasm for his subject gladdens the heart of an elderly ecologist, weary and grown hypercritical, no doubt, from long discourse with deans.

EDWARD S. DEEVEY

Department of Biology,
Yale University, and
Department of Zoology, University of Canterbury, Christchurch, New Zealand

Physics

Atomic Collision Processes. Proceedings of the Third International Conference. M. R. C. McDowell, Ed. North-Holland, Amsterdam; Interscience (Wiley), New York, 1964. xvi + 1165 pp. Illus. $38.50.

This large volume contains the papers presented at the Third International Conference on the Physics of Electronic and Atomic Collisions, which was held at University College, London, from 22 to 26 July 1963. The first two conferences in the series were held in New York (in 1958) and in Boulder, Colorado (in 1961), and the fourth is scheduled for Quebec in August 1965. The present volume marks the first appearance in print of the full proceedings of one of these conferences, and also reflects the growth of interest and participation in these meetings which resulted in the presentation of a more select group of papers at the London meeting.

The 140 papers have been divided into 12 sections: slow electron scattering by atoms, resonances, polarization of radiation emitted on electron impact, excitation and ionization of atoms by electron impact, further theory (mainly electron-atom collisions), electron-molecule collisions, recombination, negative ions, photo-processes, inelastic heavy-particle collisions, elastic heavy-particle collisions, and collisions with molecules and other topics. Of these nine were invited review papers by Massey, Heddle and Seaton, C. A. McDowell, Bates, Biondi, Dalgarno, Bailey and Hughes, Bernstein, and Patel. Both theoretical and experimental papers are presented in all of the sections, with theory predominant in the first six sections which cover collisions of electrons with atomic systems, while most of the papers on heavy-particle collisions are experimental. This perhaps reflects the greater difficulties associated with the theory of the mutual scattering of composite systems as opposed to the somewhat more tractable theory of an electron impinging upon a composite system.

In addition to the formal program, there were discussion sessions on theoretical and on experimental problems, and these have been recorded in the proceedings. The discussions of theoretical problems were based on a set of conference papers that were chosen to illustrate a number of different ap-

proaches to the scattering problem, such as the close-coupling approximation, Born approximation, and variational methods. The session on experimental problems covered the problems associated with charged-neutral, charged-charged, and neutral-neutral particle interactions.

Most of the papers in this volume contain sufficient background material so that they are self-contained and useful for reference. They are well edited, and I noted only a very few typographical errors. Included are contributions from most of the major centers engaged in atomic collisions work in the United States, Canada, the United Kingdom, the Netherlands, France, West Germany, Poland, and the Soviet Union. Unfortunately, owing to its high price, the volume will be inaccessible to the private purchaser, but all laboratory groups working in this area of research will find it a most worthwhile addition to their library collections.

SYDNEY GELTMAN
Joint Institute for Laboratory Astrophysics, University of Colorado

Genetics

Genetics for the Clinician. C. A. Clarke. Davis, Philadelphia, ed. 2, 1964. xx + 377 pp. Illus. $9.

"Ford has pointed out a close parallel between the behaviour of the chromosomes as seen under the microscope and that of the genes whose action can be inferred by tracing the inheritance of the characters which they control." Thus, we learn on page 1 that the author is not interested in historical perspective.

The first edition of this book, designed to acquaint clinicians and medical students with genetics, appeared in 1962. One might have hoped that the many errors and half truths of the first edition would have been corrected, but most are retained in the second edition. The bands of the giant chromosomes of salivary glands of *Drosophila* are still called chromomeres (p. 2), and DNA still will stand boiling for 1 hour (p. 7). On page 45, mutation is said to lead to abnormal genetic ratios.

On page 50, Clarke makes the following statement: "It is at first sight difficult to understand why a very disadvantageous gene such as that controlling epiloia or achondroplasia remains 'dominant.' One would have expected that the more extreme forms of these diseases would have been selected against and those less severe selected for, which would eventually result in the character becoming recessive." However, there is no difficulty if one does not assume, as Clarke does, that "genes always have more than one effect (pleiotropy)" (p. 49) and that these diseases are polymorphisms maintained by heterozygote advantage.

The following statement is on page 52: "Primaquine sensitivity, as opposed to favism . . . is controlled by a single gene, the effects of which are much more marked in Caucasians than in Negroes and presumably in the latter the gene-complex partially inhibits the action of the gene." By gene-complex is meant the genetic background, but it is now well established that different alleles are involved in Caucasians and Negroes. Furthermore, favism is well established as a single gene effect.

On page 54, assortative mating is given as one situation that upsets the constancy of gene frequencies from one generation to the next as predicted by the Hardy-Weinberg law. On page 103, partial sex linkage in man is discussed as if it were an accepted fact rather than a most unlikely event.

In the first edition, the discussions of nondisjunction ignored the possibility that nondisjunction might occur at the second division of meiosis. The present edition acknowledges the possibility in a footnote (p. 25), but the discussion of recognition of maternal versus paternal nondisjunction (pp. 34 and 35) still assumes that all nondisjunction must occur at the first meiotic division. Thus, we learn that mating of a man with normal color vision to a woman heterozygous for color blindness cannot produce a color-blind offspring who is XXY (Klinefelter's syndrome). However, two such cases are listed in the review of chromosome abnormalities by M. A. Ferguson-Smith (*Prog. Med. Genet.* **1**, 292, 1961).

Clarke uses Haldane's rule as a point of departure in introducing some new material on race crossing (p. 84): "There is a hint that there *may* [italics his] be an excess of women in a population of F. 1. hybrids (Negro × Caucasian) studied by Miller and Harrison (personal communication)." Such an effect would be very interesting, but it should be subjected to careful scrutiny before being included in an introductory book. The use of italics does not relieve the author of this responsibility. Furthermore, the author presents a pedigree of a Caucasian × Chinese mating in which one son (the propositus) died of carcinoma of the rectum at age 24, and one of his sons (by a Caucasian wife) subsequently died of leukemia. It is suggested that genic imbalance due to diverse racial origins of the parents might have been a contributing factor. This cannot be refuted, but the answer will not come from study of haphazardly collected pedigrees, and the inclusion of this pedigree is a great disservice to those who are trying to arrive at correct answers by carefully controlled observations.

I noted many other errors, but their recital will serve no useful purpose. Fortunately, there are several other books from which clinicians and medical students can learn genetics.

H. ELDON SUTTON
Department of Zoology, University of Texas, Austin

Textbook

Wood and Cellulose Science. Alfred J. Stamm. Ronald, New York, 1964. x + 549 pp. Illus. $15.

Technical books are often written during or at the close of a segment of a career. This one was written between careers. After years of pioneering work at the U.S. Forest Products Laboratory, where he introduced and successfully exploited new approaches to the understanding of the properties of wood, the author, Alfred J. Stamm, turned his generally acknowledged talents for communication to teaching. The book was written to meet the needs for a textbook on the physiochemical properties of wood and related materials. The topics are well balanced between theoretical subjects (such as x-ray diffraction, thermodynamics of adsorption, capillary properties, diffusion, electrokinetics, and molecular properties) and technological subjects (such as dimensional stabilization, drying, preservation, gluing, and sheet formation). The contents of the 27 chapters reflect the author's broad research interests. The literature cited at the end of most of the chapters contain references to his original work, and many of the figures and tables are taken from his publications. Although one normally questions the merit of a book written in