population processes, or the evolutionary biologist who seeks to interpret the genetic differences between species in terms of one- or two-locus models. The patterns we observe in biological communities and evolutionary radiations are the sum of many lower-order processes and interactions. Such systems are so complex, and their structure results from so many factors, as to appear randomly assembled. Indeed, the success of Monte Carlo simulations of evolutionary patterns and R. H. MacArthur's "broken-stick" model of the relative abundances of species point out the similarities between natural patterns and randomly generated systems. It is not clear that an understanding of deterministic processes and both internally and externally imposed constraints will necessarily elucidate macroevolution.

Patterns of Evolution reveals both awakening interest in an evolutionary synthesis and entrenchment of old ideas and uncritical approaches. It also reveals both the richness and the limitations of the fossil record. It is difficult to predict whether the time for interchange between paleontologists and evolutionary biologists has come, but the attraction of an evolutionary synthesis may now be strong enough for a new beginning.

ROBERT E. RICKLEFS
Department of Biology, University of Pennsylvania, Philadelphia 19104

Plate Tectonics

The Evolving Continents. BRIAN F. WINDLEY. Wiley, New York, 1977. xviii, 386 pp., illus. Cloth, $29.95; paper, $11.95.

It is now 12 years since Tuzo Wilson outlined the basic ideas of plate tectonics in his transform fault paper and only about seven years since geologists began to apply seriously the qualitative aspects of plate tectonics to rock assemblages. In view of the now enormous literature of plate tectonics and its geologic corollaries it is surprising that so few serious books have been written on the subject, but the scarcity is perhaps a reflection of our ignorance of how the geology of plate tectonics works in detail. *The Evolving Continents* is a bold attempt to fill the gap; it is the first and only fairly advanced textbook in physical-historical geology at the senior undergraduate and beginning graduate student level that is largely based on the plate tectonic paradigm.

The dominant merits of the book are the extraordinary quantity of well-synthesized information, the cohesive, integrated way in which the data are presented, and the informal, succinct style. Here, in one book, are really careful summaries of a range of Precambrian and Phanerozoic tectonic provinces and orogens and their evolution in an unashamedly plate tectonic framework with bets sensibly hedged for the Archean and early Proterozoic.

A peculiar and difficult aspect of the work is that the first half or thereabouts is a fairly exhaustive treatment of the Precambrian; such basic tools as the elements of plate tectonics, paleoclimatology, and paleomagnetism are introduced in dribs and drabs as the Precambrian description and discussion progresses, and a full treatment of plate tectonics appears only in chapter 15. The book could have been rearranged in almost reverse order to great effect, at least for the student, who should be taken from the most well known and least problematic, that is Quaternary, geology back to the dawn of the rock record in the Archean.

JOHN F. DEWEY
Department of Geological Sciences, State University of New York, Albany 12222

Cancer Research

Genetics of Human Cancer. Papers from a conference. JOHN J. MULVIHILL, ROBERT W. MILLER, and JOSEPH F. FRAUMENI, JR., Eds. Raven, New York, 1977. xxii, 520 pp., illus. $20. Progress in Cancer Research and Therapy, vol. 3.

This volume is the proceedings of a conference at which 58 contributors and 20 discussants brought their knowledge and foresight to bear on one of the critical problems in oncology: what part do genetic changes, in both germ and somatic cells, play in neoplastic transformation?

A large number of constitutional anomalies that predispose to neoplasia have now been documented; J. J. Mulvihill lists some two hundred single gene traits, many of which are discussed in detail by other contributors. But these, as well as congenital chromosome anomalies, which likewise carry a risk of leukemia or solid tumors, are on the whole rare, and, although their study may illuminate mechanisms of oncogenesis, their impact on the sum total of human malignancy is quite small.

Perhaps of greater importance, therefore, is the evaluation of the respective roles of constitutional and environmental factors (many of the latter being known mutagens) in bringing about the forms of cancer common in the population at large. In this connection, R. W. Miller remarks that "it is as important to know who gets cancer and why as it is to know what environmental agents induce neoplasia in man," and M. Swift points out that heterozygous carriers of genes for rare autosomal recessive syndromes predisposing to malignancy may be relatively common and may themselves be predisposed. (The risks of malignancy in such carriers have yet to be evaluated, however.) The usefulness of epidemiologic studies in tackling these broader problems is affirmed by several of the contributors, particularly those describing special situations such as are presented by "cancer families," cancer in twins, and the genealogically and medically well-documented Mormon population in Utah. It is salutary, however, that some of these contributors give as much space to a discussion of the potential value of a study and the difficulties involved as to the presentation of results so far achieved.

Cancer risk may be associated with the presence of genetic markers, defined by M.-C. King and N. L. Petrakis as proteins or other phenotypes determined by single loci with two or more alleles present at significant frequencies in the population of interest; several contributors discuss the usefulness of genetic markers in epidemiologic studies. P. J. Fialkow summarizes results obtained from the study of the glucose-6-phosphate dehydrogenase marker as they pertain to the question whether the origin of neoplasms is unicellular or multicellular. Limited coverage is given to several other topics, including chromosome abnormalities in cancer cells, immunosurveillance, the use of somatic cell hybrids in the genetic analysis of malignancy, and the place of oncogenic viruses in the order of things.

As is not unexpected in view of the large number of contributors, there is a degree of overlap on some of the topics. This is hardly a disadvantage, however, since different authors frequently present different points of view. For example, on the topic of mutations and cancer, there are separate contributions by A. G. Knudson, Jr., and L. C. Strong relating to the former's model of two mutational steps in carcinogenesis (one either inherited or acquired, the other always acquired), while different approaches are presented by J. Herrmann and D. E. Comings.

N. B. ATKIN
Department of Cancer Research, Mount Vernon Hospital, Northwood HA6 2RN, England