The chapters cover genetics, reproduction, behavior, olfactory and acoustic senses, food, energetics, parasites and diseases, predation, movements, population dynamics, and woodland small mammal communities as a whole. Those interested in any of these aspects of mammalian biology would profit from reading the relevant chapters. In addition, connoisseurs of the intricacies of population dynamics will find the three chapters on this subject an excellent overview of the field as seen by small-mammal ecologists. None of these chapters concludes that population regulation is simple in these species. All invoke multiple interacting parameters but avoid proffering an explicit multifactorial explanation. True to tradition, they call instead for further research. Both the bank vole and the wood mouse have the potential for contributing greatly to the theory of population regulation. In the case of the bank vole, considerable geographic variation occurs in the demographic patterns exhibited (annual cycles, non-cycles, and multiannual cycles), and the wood mouse, which is found in a variety of habitats, offers an opportunity to test hypotheses relating to habitat-induced variations in ecology and behavior.

Especially welcome is the chapter on parasites and diseases (Healing and Nowell), as this is a badly neglected topic in small-mammal biology and one destined for major expansion. The authors stress how the host-parasite system is influenced by various host properties (sex, age, nutritional state, behavior, immunological status) and by parasite variables, particularly host specificity and parasite species interactions. Some additional features of interest are: (i) Stenseth offers an excellent discussion of the advantages and disadvantages of mathematical modeling in ecology. (ii) Wolton and Flowerdew provide rare data on the critically important subject of frequency and distances of excursions out of home ranges. (iii) King concludes her survey of predation by claiming that the supply of alternative prey and habitat heterogeneity are critical variables in determining the influence of predators on prey populations. (iv) Stoddart and Sales give us a data-rich review of two little-studied sensory modalities (olfaction and hearing) in small mammals and urge studies focused on the interactions of these senses.

Given that the chapters in the volume overlap broadly, a good index would have been especially helpful for locating specific information, but the one index provided proves to be grossly inadequate. The volume remains an important contribution, however, not only as a compendium of what we know about several species of common rodents but as a statement of how small-mammal biology integrates into the larger arena of ecology, behavior, physiology, and evolution.

WILLIAM Z. LIDICKER, JR.
Museum of Vertebrate Zoology, University of California, Berkeley, CA 94720

Ciliates

The Molecular Biology of Ciliated Protozoa. JOSEPH G. GALL, Ed. Academic Press, Orlando, FL, 1986. x, 352 pp., illus. $49.50.

Like many other scientists, I was first introduced to biology by peering at *Paramecium* through a school microscope. The ciliates as a group of organisms have also provided an impressive number of experimental firsts. In the field of molecular biology, these include the first descriptions of self-splicing RNAs, the sequence and structure of telomeres, telomere-specific proteins, and extensive genome reorganization. Certain aspects of ciliate biology offer unique advantages to the molecular biologist. Perhaps the most dramatic is the presence of dimorphic nuclei. The micronucleus, which provides genetic continuity, is organized into conventional chromosomes but is transcriptionally inert. The highly polyploid and transcriptionally active macronucleus consists of subchromosomal DNA molecules whose segregation is amitotic in nature. This nuclear dualism makes ciliates natural model systems for a number of basic biological questions, such as genetic differences between somatic and germline nuclei or the chromatin structure of active versus inactive genes. Likewise, the generation of the macronucleus from the micronucleus provides an opportunity to determine in synchronized populations the mechanisms by which specific chromosomal rearrangements occur, including sequence elimination, DNA splicing, and generation of new telomeres.

The purpose of *The Molecular Biology of Ciliated Protozoa* is both to provide a general introduction to ciliate biology and genetics and to highlight those areas of research in which molecular progress has been most marked, with a special focus on areas unique to ciliates. The book certainly achieves these goals and, in so doing, fills a hole in the scientific literature. Each of the 11 chapters is a contribution from a recognized expert. Individual chapters are well written and readable, for the most part focusing on broad issues rather than experimental minutiae. Although each chapter can stand alone, they are well integrated with an admirable degree of cross-referencing and a minimum of repetition that reflect skilled and attentive editing. Where subjects are treated more than once, as in the case of the genomic rearrangements that accompany macronuclear development (discussed in detail in four chapters), the treatments take different perspectives.

Although the quality of the individual chapters is uniformly high, I especially enjoyed David Nanney's introduction, which provided fascinating insights into the history of ciliate studies. Nanney details the reasons for *Paramecium*'s early popularity as an experimental system (its large size facilitated visualization with the microscopes of the 1880s), as well as possible reasons for its fall from favor (being an organism in which extrachromosomal inheritance had been well documented, it became associated with anti-Mendelian, pro-Lamarckian factions). Eduardo Orias's chapter on conjugation presents a thoughtful discussion of the factors governing alternative pathways for the differentiation of genetically identical nuclei. Meng-Chao Yao describes the life history of *Tetrahymena* ribosomal DNA in impressive molecular detail: the multiple, palindromic, extrachromosomal copies in the macronucleus are derived from a single "half-palindromic" integrated copy in the micronucleus (thereby making *Tetrahymena* the only eukaryote in which it is possible to conduct genetic studies on the genes encoding ribosomal RNAs).

My only complaint with this book is to wish it were longer. It would have been especially useful to include more chapters on *Paramecium*, for example on its use as a system for neurobiologic and behavorial studies, and a description of the bacterial endosymbionts that confer the killer trait. I also would have liked to see even more photographs of the visually appealing ciliated protozoa, including pictures of replication bands, crescent nuclei, and preconjugative cilia loss. Like all books, this volume suffers from the fact that science moves faster than publishing. Thus, although some chapters list 1986 references, the book does not include discussion of the most recent advances, such as the transformation of both *Tetrahymena* and *Paramecium* or the non-templated replication of telomeres. However, the fact that much has happened in the past year is a tribute to the vitality of ciliate research. In any case, these reservations are minor. *The Molecular Biology of Ciliated Protozoa* is a welcome addition to the scientific literature and one that is likely to attract new converts to these fascinating and tractable creatures.

VIRGINIA A. ZAKIAN
Basic Sciences Division, Hutchinson Cancer Research Center, Seattle, WA 98104