you dissect a cytogenetic interval is essential. It was worth periodically thumbing through Lindsley and Grell, because you were likely to encounter a mutation or rearrangement of interest that you had previously overlooked. Clearly, Lindsley and Zimm provides a vital updated snapshot of the *Drosophila* genome. It is 2½ times longer and much more densely packed, and whether it will be as easy to thumb through isn't clear. That, however, is not a criticism of the text but rather a statement about the field.

A review of Lindsley and Zimm should not end without acknowledging the incredible effort that went into it. Compiling and curating all of the information contained in our new "red book" qualifies as a genuine *tour de force*. It will save the *Drosophila* community many thousands of person-hours in hunting down information vital to all of our research programs.

William M. Gelbart
Biological Laboratories, Harvard University, Cambridge, MA 02138

■

Cellular Structures

Molecules of the Cytoskeleton. L. A. AMOS and W. B. AMOS. Guilford, New York, 1991. xvi, 253 pp., illus. $50; paper, $25. Molecular Cell Biology.

When Theodor Boveri, the great cytologist of the late 1800s, first described some of the elements of the cytoskeleton, he certainly had no idea of the richness of molecular details awaiting future cell biologists. A century of research, and in particular the application of the molecular techniques of the last decade, has resulted in a vast amount of information about the proteins that make up the cytoskeleton and their effects on its role in cell growth, division, and differentiation. *Molecules of the Cytoskeleton* attempts to organize and discuss this information at a level suitable to graduate students of molecular biology. The book is unique in its focus, as many cell biology textbooks emphasize the phenomenology of the cytoskeleton, giving only cursory treatment to the molecules. Amos and Amos make it clear from the start that their aim is to acquaint the reader with the molecules and their functions. Their combined experience in the cytoskeletal field makes them well suited to the task.

The book starts with a brief introduction to the cytoplasm, the three major filament systems in it (actin filaments, microtubules, and intermediate filaments), and some of the general cellular functions of a cytoskeleton. A chapter on intermediate filament proteins follows, being given an oddly prominent position for the filament system about which we know the least, and the remaining chapters are evenly split between the actin and microtubule cytoskeletons. Each chapter is followed by a summary, a set of thoughtful questions, and an annotated list of references. All are concisely written and packed with useful tables and figures. I particularly liked the paste-together actin and microtubule models; they make it much easier to get a feeling for the filaments. The authors try to include all of the latest information, even that which is not readily interpreted, lending a desultory air to some of the chapters, but this is made up for by the comprehensiveness of the text.

It is when the authors go beyond cataloging proteins to discussing the molecular mechanisms of their action that *Molecules of the Cytoskeleton* becomes most stimulating. I was impressed by the treatment of the dynamics of actin and microtubule assembly, a topic that many find confusing. For both polymers, nucleotide hydrolysis by the subunits provides the energy for some interesting behaviors, such as treadmilling for actin and dynamic instability for microtubules. It is important to understand the properties of the polymers themselves, as they go a long way toward explaining the workings of the different filament systems in the cell, and the authors provide a clear analysis of the important issues. Similarly, the processes of cell locomotion and mitosis are covered in detail, and several of the more likely models that have been proposed are described. Locomotion is covered at the end of the section on actin and mitosis at the end of the section on microtubules, allowing readers to transform the knowledge they have gained about the molecules important to each filament system into an understanding of how they work together in a complex biological process. Because of the strict emphasis on molecules, some aspects of the cytoskeleton receive less attention than their importance would seem to warrant. For example, microtubule-organizing centers, which are the sites of microtubule initiation in vivo and largely determine the spatial localization of microtubules but which are not well defined molecularly, are only mentioned briefly.

Any book that makes a point of being up-to-date in an active field is certain to have some unfortunate omissions by the time it is printed. *Molecules of the Cytoskeleton* covers papers through late 1989, and since then the crystal structure of actin has been solved, alternative actin and tubulin molecules have been discovered, and major advances have been made on both actin and microtubule motors. At the least, readers whose interest is piqued by this book will be well prepared for consulting the most current literature. The stated purpose of this book is to provide an authoritative text on the molecules of the cytoskeleton that can be digested in a postgraduate or advanced undergraduate course. In this it succeeds admirably, and I would recommend it to anyone interested in the details of how cells are organized.

Tim Stearns
Department of Biochemistry, University of California Medical School, San Francisco, CA 94143–0448

■

A Need in Astronomy

An Introduction to Astrophysical Hydrodynamics. STEVEN N. SHORE. Academic Press, San Diego, CA, 1992. xvi, 452 pp., illus. $49.95.

Is hydrodynamics really necessary?

Theoretical astrophysics is a field full of people using concepts drawn from other fields, which they learn only when it's absolutely necessary, and frequently later. This is particularly true when it comes to the application of hydrodynamics and magnetohydrodynamics to astrophysical problems. It is therefore somewhat surprising that although the answer to the opening question is clearly "yes," there are few astronomy departments that give their students a general introduction to the topic and even fewer books about it aimed at the beginning student. The consequences of this omission include not only the occasional embarrassing mistake but a general difficulty in communicating work to astrophysicists researching other topics.

This problem is compounded by the fact that most standard texts on hydrodynamics or magnetohydrodynamics are aimed at imparting an understanding of laboratory experiments or, somewhat more rarely, terrestrial phenomena.

These examples are apt to seem irrelevant to the budding astrophysicist. In fact, sometimes they are as irrelevant as they seem, largely because the physical parameters applicable to a realistic astrophysical problem may be many orders of magnitude different from those found in the laboratory (or even in a computer simulation). It is therefore a pleasure to read a book aimed at an astrophysical audience that gives an introduction to the topic laced with astronomical examples. I can only hope that the publication of this book will encourage more departments to offer a course on astrophysical hydrodynamics.