

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.

One of the most striking aspects of this volume is its clarity. I think this may rank as one of the most readable science books I have ever come across. The author writes in a friendly, informal style, and the text accompanying equations actually explains their physical meaning, instead of stringing together a purely formal exposition of the mathematics. This stress on physical content makes it possible to get an intuitive feel for many of the topics, even when the discussion is on a fairly general level.

I was particularly pleased to note that the book starts out with a detailed explanation of the fundamental equations of hydrodynamics and magnetohydrodynamics. Unlike many derivations, this one stresses the physical meaning of the various approximations involved and shows how transport effects (such as viscosity and conductivity) arise in a natural way from general considerations.

One of the most difficult issues the author of a work such as this has to face is how to incorporate astronomical observations. Any attempt to apply this kind of theoretical discussion to models of real astronomical phenomena has to include enough details to make it clear to the student that the models are not completely arbitrary. On the other hand, the lines of reasoning that connect the models to the observations are frequently long, and occasionally tenuous. There may be no way to do complete justice to real examples without completely sacrificing brevity, but this book comes very close. When some painful choice presented itself, the author did not hesitate to leave out the finer observational points in order to produce a manageable discussion. I found myself applauding his resolve, even while regretting some of the excisions.

Given the changing nature of conventional wisdom concerning many astrophysical topics, it is difficult to avoid including dated information in a book like this, and indeed there are a few spots where the discussion is slightly misleading. For example, the discussion of the snowplow phase of supernovae shocks manages to avoid any mention of the important role played by the thin, uncooled gas left behind the shock. This point may loom disproportionately large in my mind, but I suspect that similar minor reservations will occur to most expert readers. On other points, the level of disagreement between experts is such that no introductory text could be expected to provide a thorough introduction. The few pages devoted to accretion disk theory manage to avoid making any objectionable statements, but the interested student will have to go elsewhere to learn about the intense controversies surrounding this topic. Fortunately the references included provide adequate guidance for further study.

The book concludes with a brief list of problems and questions that will lead the student into the depths of the field. Some of the questions could serve as homework in a course based on this book. Others will be a lot of fun for the ambitious reader and a terror to the rest.

This volume makes an excellent text for beginning graduate students or advanced undergraduates, and as such it fills an important need. I should add that it is less useful as a reference for an active researcher in this field, but only a much longer (and less readable) book could have combined both roles.

Ethan Vishniac

Department of Astronomy,  
University of Texas,  
Austin, TX 78712

## Books Received

**Archaeological Research at Aztec-Period Rural Sites in Morelos, Mexico.** Vol. 1, Excavations and Architecture. Michael E. Smith, Ed. University of Pittsburgh Latin American Archaeology Publications, Pittsburgh, PA, 1992. xxiv, 425 pp., illus. Paper, \$32. University of Pittsburgh Memoirs in Latin American Archaeology, no. 4. Text in English and Spanish.

**Aromatic Heterocyclic Chemistry.** David T. Davies. Oxford University Press, New York, 1992. viii, 88 pp., illus. Paper, \$9.95. Oxford Chemistry Primers, 2.

**Artificial Life.** The Quest for a New Creation. Steven Levy. Pantheon (Random House), New York, 1992. viii, 391 pp., illus., + plates. \$25.

**Cluster Models for Surface and Bulk Phenomena.** Gianfranco Pacchioni, Paul S. Bagus, and Fulvio Parmigiani, Eds. Plenum, New York, 1992. xvi, 693 pp., illus. \$110. NATO Advanced Science Institutes Series B, vol. 283. From a workshop, Erice, Italy, April 1991.

**Coalitions and Alliances in Humans and Other Animals.** Alexander H. Harcourt and Frans B. De Waal, Eds. Oxford University Press, New York, 1992. x, 531 pp., illus. \$87.

**Cognitive Models of Science.** Ronald N. Giere, Ed. University of Minnesota Press, Minneapolis, 1992. xxviii, 508 pp., illus. \$44.95. Minnesota Studies in the Philosophy of Science, vol. 15.

**Entropy Optimization Principles with Applications.** J. N. Kapur and H. K. Kesavan. Academic Press, San Diego, CA, 1992. xx, 408 pp., illus. \$64.50.

**Erwin Schrödinger's World View.** The Dynamics of Knowledge and Reality. Johann Götschl. Kluwer, Norwell, MA, 1992. viii, 237 pp. \$110. Theory and Decision Library Series A: Philosophy and Methodology of the Social Sciences, vol. 16.

**The Evolution of Character.** Birth to 18 Years: A Longitudinal Study. Sylvia Brody and Miriam G. Siegel. International Universities Press, Madison, CT, 1992. xxiv, 553 pp., illus. \$70.

**Fractals for the Classroom.** Part 1, Introduction to Fractals and Chaos. Evan Maletsky *et al.* Published in cooperation with the National Council of Teachers of Mathematics by Springer-Verlag, New York, 1992. xiv, 450 pp., illus. \$29.

**From Nyet to Da.** Understanding the Russians. Yale Richmond. Intercultural Press, Yarmouth, ME, 1992. xxiii, 175 pp. Paper, \$15.95. InterAct Series.

**From Sea to Space.** Ben Finney. Massey University, Palmerston North, New Zealand (distributor, University of Hawaii Press), 1992. vi, 128 pp., illus. Paper, \$10.95. Macmillan Brown Lectures.

**High-Temperature Superconductivity.** Physical Properties, Microscopic Theory, and Mechanisms. Josef Ashkenazi *et al.*, Eds. Plenum, New York, 1992. xii, 665 pp., illus. \$135. From a workshop, Miami, FL, Jan. 1991.

**Highlights in Condensed Matter Physics and Future Prospects.** Leo Esaki, Ed. Plenum, New York, 1992. xiv, 708 pp., illus. \$149.50. NATO Advanced Science Institutes Series B, vol. 285. From a conference, Biarritz, France, Sept. 1990.

**Mapping the Next Millennium.** The Discovery of New Geographies. Stephen S. Hall. Random House, New York, 1992. xvi, 477 pp., illus., + plates. \$30.

**Marine Biology.** Peter Castro and Michael E. Huber. Mosby-Year Book, St. Louis, MO, 1992. xvi, 614 pp., \$34.95.

**Mars.** Ben Bova. Bantam, New York, 1992. 502 pp. \$20.

**The Mask of Benevolence.** Disabling the Deaf Community. Harlan Lane. Knopf, New York, 1992. xviii, 310 pp. \$23.

**A New Look at Tumor Immunology.** A. J. McMichael and W. F. Bodmer, Eds. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1992. viii, 216 pp., illus. \$66. Cancer Surveys, vol. 13.

**Perturbing the Organism.** The Biology of Stressful Experience. Herbert Weiner. University of Chicago Press, Chicago, IL, 1992. xvi, 357 pp., illus. \$35. John D. and Catherine T. MacArthur Foundation Series on Mental Health and Development.

**The Photovoltaic and Photorefractive Effects in Noncentrosymmetric Materials.** Boris I. Sturman and Vladimir M. Fridkin. Gordon and Breach, Philadelphia, 1992. x, 238 pp., illus. \$55. Ferroelectricity and Related Phenomena, vol. 8. Translated from the Russian by J. E. S. Bradley.

**Physical Properties of High-Temperature Superconductors III.** Donald M. Ginsberg, Ed. World Scientific, River Edge, NJ, 1992. x, 630 pp., illus. \$86; paper, \$42.

**Plant-Animal Interactions in the Marine Benthos.** D. M. John, S. J. Hawkins, and J. H. Price, Eds. Published for the Systematics Association by Clarendon (Oxford University Press), New York, 1992. xvi, 570 pp., illus. \$130. Systematics Association Special Volume no. 46. From a symposium, Liverpool, U.K., Sept. 1990.

**Polycystic Kidney Disease.** M. H. Breuning, M. Devoto, and G. Romeo, Eds. Karger, New York, 1992. vi, 142 pp., illus. \$113.75. Contributions to Nephrology, vol. 97. From a workshop, Parma, Italy, Sept. 1991.

**Relativity Theory.** Concepts and Basic Principles. Amos Harpaz. Jones and Bartlett, Boston, 1992. viii, 224 pp., illus. \$29.95.

**Reliability Evaluation of Engineering Systems.** Concepts and Techniques. Roy Billinton and Ronald N. Allan. 2nd ed. Plenum, New York, 1992. xvi, 453 pp., illus. \$59.50.

**Rethinking the Ozone Problem in Urban and Regional Air Pollution.** Committee on Tropospheric Ozone Formation and Measurement. National Academy Press, Washington, DC, 1992. xxiii, 489 pp., illus. Paper, \$47.95.

**Skywatch East.** A Weather Guide. Richard A. Keen. Fulcrum, Golden, CO, 1992. xii, 204 pp., illus. Paper, \$19.95.

**So Human a Brain.** Knowledge and Values in the Neurosciences. Anne Harrington, Ed. Birkhäuser Boston, Cambridge, MA, 1992 (distributor, Springer-Verlag, New York). xxiv, 355 pp., illus. \$79.50. A Dabner Institute publication.

**Supercritical Fluid Technology.** Theoretical and Applied Approaches to Analytical Chemistry. Frank V. Bright and Mary Ellen P. McNally, Eds. American Chemical Society, Washington, DC, 1992. x, 374 pp., illus. \$86.95. From a symposium, Atlanta, 1991.

**Surface Water Quality.** Have the Laws Been Successful? Ruth Patrick. Princeton University Press, Princeton, NJ, 1992. xviii, 198 pp., illus. \$35.

**Survey Sampling.** Theory and Methods. Arijit Chaudhuri and Horst Stenger. Dekker, New York, 1992. xx, 349 pp. \$140. Statistics: Textbooks and Monographs Series, 130.

**2-Knots and Their Groups.** Jonathan Hillman. Cambridge University Press, New York, 1992. x, 164 pp. Paper, \$24.95. Australian Mathematical Society Lecture Series, 5.

**Writing Successfully in Science.** Maeve O'Connor. HarperCollins, London, 1992. xii, 229 pp., illus. \$49.95; paper, \$14.95.