cosmological constant accurate to a few percent will be made. For both the people making these claims and those attempting to understand their validity, this book will be an essential resource.

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Molecular Aides

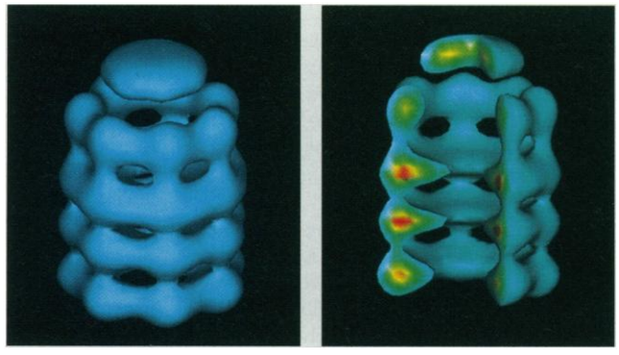
The Chaperonins. R. JOHN ELLIS, Ed. Academic Press, San Diego, 1996. xvi, 323 pp., illus., + plates. $79.95 or £59. ISBN 0-12-237455-X. Cell Biology.

The so-called protein-folding problem—that is, how proteins adopt and maintain their distinctive configurations or native state—remains one of the major unresolved questions of biology. The processes of protein folding are directly related to the pathology of such diseases as mad cow disease, amyloidosis, cystic fibrosis, and sickle cell anemia. Likewise, protein folding is of importance to biotechnology and the pharmaceutical industries, bearing as it does on the assessment of new biological protein targets, the creation of novel drugs, and the hoped-for ability to predict protein structures.

Research on protein folding was, until recently, primarily the province of biophysicists. However, observations over the past decade in molecular genetics, biochemistry, and cell biology have provided novel insights into a family of proteins, known collectively as molecular chaperones, whose functions are to assist in the processes of protein folding, assembly, translocation, and degradation. Indeed, molecular chaperones have been identified as important participants in numerous biochemical events involving the cell cycle and extracellular and intracellular signaling. The discovery of molecular chaperones does not belie the importance of intrinsic properties of proteins in guiding their folding to the native state. Indeed, it was recognized in the 1960s by Christian Anfinsen that "another large molecule . . . could influence the folding process by intermolecular reactions" that could catalyze these events or enhance the kinetics of protein folding.

The subject of *Chaperonins* is a single well-investigated group of the molecular chaperone family that falls into the subclasses GroE and TCP-1 chaperonins. The book has a thematic coherence lacking in more general books on molecular chaperones. Key facts and highlights are presented in a detailed and balanced fashion, the volume is well organized, and the chapters are clearly written and use a common nomenclature, a feature that should be appreciated by readers. Consequently, the volume is an excellent resource for both students and advanced researchers. Topics addressed range from the evolutionary relationships among chaperonins to their possible roles in infectious diseases.

Appropriately, the emphasis of the volume is on the biological and biochemical properties of chaperonins found in chloroplasts, photosynthetic bacteria, and mitochondria and on the regulation and function of chaperonins in *Escherichia coli*. The introduction provides a useful historical perspective on the discovery of chaperonins; we are reminded of the importance of serendipity in science and of the convergence of observations from genetics and biochemistry. Much of the current excitement is provided by in vitro studies of chaperonins in protein folding and biophysical studies on the unique structure of the chaperonin oligomer and its role in recognition and folding reactions. A conceptual understanding of the role of chaperonins in protein folding has been provided by electron microscopic and crystallographic images, which have revealed two seven-membered rings that associate with non-native proteins, leading, upon binding and hydrolysis of ATP and the co-chaperonin, to conformational changes in the chaperonin complex and the release of the substrate, often in a native state. The elegance of these images is tantalizing because they leave most essential phenomena visible but unexplained. We are left with the compelling picture of a macromolecular structure, a "protein-folding machine," that can be best described as a protein test tube or cage that provides the environment that facilitates the folding of an unfolded protein to its native state while restricting inappropriate inter- and intramolecular interactions, a function appropriate to the moniker chaperonin.



Electron microscope reconstruction of chaperonins. *Left*, GroEL-GroES toroid; *right*, cross-sectional view. [Helen Saibil]

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Browsings

Invention by Design. How Engineers Get from Thought to Thing. Henry Petroski. Harvard University Press, Cambridge, MA, 1996. xii, 242 pp., illus. $24.95 or £16.50. ISBN 0-674-46367-6.

Case studies of the paper clip, the pencil, aluminum cans, airplanes, high-rise buildings, bridges, and other "familiar objects."

A Field Guide to the Birds. Giving Field Marks of All Species Found in Eastern North America. ROGER TORY PETERSON. Commemorative edition. Houghton Mifflin, Boston, 1996. xxiv, 167 pp. + plates. $18.95. ISBN 0-395-85493-8.

A facsimile reproduction of the original 1934 edition of this "bird book on a new plan," whose author died in July 1996.

A Scientist Speaks Out. A Personal Perspective on Science, Society and Change. Glenn T. Seaborg. World Scientific, River Edge, NJ, 1996. xvi, 446 pp., illus. $48. ISBN 9810222041.

Texts of 39 lectures, 1955–1991, by the chemistry Nobelist and former chairman of the Atomic Energy Commission and University of California chancellor.

The Thermal Warriors. Strategies of Insect Survival. Bernd Heinrich. Harvard University Press, Cambridge, MA, 1996. xvi, 221 pp., illus., + plates. $27 or £17.95. ISBN 0-674-88340-3.

An informal "primer" on the regulation of insect body temperature by the author of *Bumblebee Economics* and *The Hot-Blooded Insects*.

The Ultimate Resource 2. JULIAN L. SIMON. Princeton University Press, Princeton, NJ, 1966. xliv, 734 pp., illus. $35 or £27.50. ISBN 0-691-04269-1.

An updated and much expanded edition of a 1981 work by an author well known for his vigorous criticism of environmentalist and demographic "doomsayers"; in his view the "ultimate resource" is "skilled, spirited, and hopeful people" who will find ways of meeting the challenges others worry about.