

of star formation. Jura discusses the chemistry in circumstellar envelopes around mass-losing red giants; some of the more exotic molecular species, including polyacetylenes (essentially long linear carbon chains), are found in such regions. Observations of the recent Supernova 1987A are described in a very readable chapter by McCray.

The penultimate chapter, by Shields, considers moderately ionized regions, such as planetary nebulae. These are atomic rather than molecular regions, and one might wonder why they are included in this book. Perhaps it is because atom-atom charge transfer is important for the physics in these regions, and Dalgarno, to whom the book is dedicated, played a seminal and continuing role in calculating rate constants for such processes. The final chapter, by Black, considers the possibility of molecule formation in the early universe and the possibility of observing these molecules in objects with large red shifts.

Though *Molecular Astrophysics* provides rather comprehensive coverage of work in this field, a few topics have been slighted. There is essentially no discussion of experimental aspects: the telescopes, receivers, or methods of data analysis. Some interesting work—theoretical quantum chemical calculations and innovative laboratory spectroscopy—was needed to identify the “exotic” interstellar species, and this is not discussed. Also missing is discussion of possible mechanisms for pumping the interstellar masers.

A number of other collections of papers, generally proceedings of meetings, have been published on these same topics, but apart from some invited reviews these are just collections of primary research papers. *Molecular Astrophysics* is not just another such collection; a strong editorial intent is apparent. Most chapters present good overviews of their subjects, and for the most part the chapters are organized to present a coherent and reasonably complete picture of the field. A good index is provided. On the other hand, I do not believe that this volume is a “self-contained introduction to molecular astrophysics . . . suitable as a text for advanced postgraduate courses” as claimed. Because of the multiple authorship, many of the topics are not developed in as logical or coherent a manner as desired for a textbook. For example, discussions of the chemistry and of the theory of shock waves are fragmented among separate chapters, with attendant overlap in some areas and failure to note interrelationships in others.

*Molecular Astrophysics* would provide a good source of more recent and advanced material for an undergraduate course if used in conjunction with a text such as J. E. Dyson and D. A. Williams's *Physics of the*

*Interstellar Medium* (Wiley, 1980) or W. W. Duley and D. A. Williams's *Interstellar Chemistry* (Academic Press, 1984). It is also an excellent book for researchers in related fields who would like an introduction to this fascinating subject.

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## Books Received

**The Adaptive Character of Thought.** John R. Anderson. Erlbaum, Hillsdale, NJ, 1990. xiv, 276 pp., illus. \$45. Studies in Cognition.

**Advances in Biomagnetism.** Samuel J. Williamson et al., Eds. Plenum, New York, 1989. xx, 771 pp., illus. \$125. From a conference, New York, Aug. 1989.

**Advances in Cancer Control.** Screening and Prevention Research. Paul F. Engstrom, Barbara Rimer, and Lee E. Mortenson, Eds. Wiley-Liss, New York, 1990. xxii, 495 pp., illus. \$129.50. Progress in Clinical and Biological Research, vol. 339. From a meeting, Bethesda, MD, March 1989.

**Advances in Electrochemical Science and Engineering.** Vol. 1. Heinz Gerischer and Charles W. Tobias, Eds. VCH, New York, 1990. xii, 295 pp., illus. \$120.

**The Age of Intelligent Machines.** Raymond Kurzweil. MIT Press, Cambridge, MA, 1990. xiv, 565 pp., illus. \$29.95.

**Binding and Linkage.** Functional Chemistry of Biological Macromolecules. Jeffries Wyman and Stanley J. Gill. University Science Books, Mill Valley, CA, 1990. xvi, 330 pp., illus. \$44.50.

**Biochemical Engineering VI.** Walter E. Goldstein, David DiBasio, and Henrik Pedersen, Eds. New York Academy of Sciences, New York, 1990. xii, 714 pp., illus. Cloth or paper, \$175. Annals of the New York Academy of Sciences, vol. 589. From a conference, Santa Barbara, CA, 1988.

**A Computational Model of Metaphor Interpretation.** James H. Martin. Academic Press, San Diego, CA, 1990. xxiv, 229 pp., illus. \$34.95. Perspectives in Artificial Intelligence, vol. 8.

**The Computing Neuron.** Richard Durbin, Christopher Miall, and Graeme Mitchison, Eds. Addison-Wesley, Reading, MA, 1989. xiv, 417 pp., illus. \$44.25. Computation and Neural Systems Series. Based on a meeting, Cambridge, U.K., summer 1988.

**A Concise Dictionary of Mathematics.** Christopher Clapham. Oxford University Press, New York, 1990. vi, 203 pp., illus. \$29.95; paper, \$7.95.

**Connections.** The Geometric Bridge Between Art and Science. Jay Kappraff. McGraw-Hill, New York, 1990. xxii, 473 pp., illus. \$39.50; paper, \$19.50.

**The Dosimetry of Ionizing Radiation.** Vol. 3. Kenneth R. Kase, Bengt E. Bjarnagard and Frank H. Attix, Eds. Academic Press, San Diego, CA, 1990. xii, 631 pp., illus. \$199.95.

**Early Embryo Development and Paracrine Relationships.** Susan Heyner and Lynn M. Wiley, Eds. Wiley-Liss, New York, 1990. xii, 176 pp., illus. \$59.50. UCLA Symposia on Molecular and Cellular Biology, New Series, vol. 117. From a symposium, Taos, NM, Feb. 1989.

**Electron Microscopy of the Lung.** Dean E. Schraufnagel, Ed. Dekker, New York, 1990. xx, 612 pp., illus. \$175. Lung Biology in Health and Disease, vol. 48.

**The Emergence of Bacterial Genetics.** Thomas D. Brock. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 1990. xxii, 346 pp., illus. \$55.

**Enclosed Experimental Marine Ecosystems.** A Review and Recommendations. C. M. Lalli, Ed. Springer-Verlag, New York, 1990. x, 218 pp., illus. \$49. Coastal and Estuarine Studies 37. A Contribution of the Scientific Committee on Oceanic Research Working Group 85.

**The Flowering of Gondwana.** Mary E. White. Photography of Fossils by Jim Frazier. Princeton University Press, Princeton, NJ, 1990. 256 pp., illus., + plates. \$49.50. Second edition of *The Greening of Gondwana*.

**Food Hoarding in Animals.** Stephen B. Vander Wall. University of Chicago Press, Chicago, 1990. xii, 445 pp., illus. \$76; paper, \$29.95.

**Genetic Mechanisms in Carcinogenesis and Tumor Progression.** Curtis C. Harris and Lance A. Liotta, Eds. Wiley-Liss, New York, 1990. xviii, 235 pp., illus. \$75. UCLA Symposia on Molecular and Cellular Biology, new series, vol. 114. From a symposium, Keystone, CO, Jan. 1989.

**Human Adult Odontometrics.** The Study of Variation in Adult Tooth Size. Julius A. Kieser. Cambridge University Press, New York, 1990. xii, 194 pp., illus. \$54.50. Cambridge Studies in Biological Anthropology.

**The Human Nervous System.** George Paxinos, Ed. Academic Press, San Diego, CA, 1990. xii, 1195 pp., illus. \$195.

**Immunobiology of Normal and Diabetic Pregnancy.** Domenico Andreani et al., Eds. Wiley, New York, 1990. xiv, 329 pp., illus. \$69.50.

**Introduction to Quantum Field Theory.** S. J. Chang. World Scientific, Teaneck, NJ, 1990. xii, 382 pp., illus. \$68; paper, \$36. Lecture Notes in Physics, vol. 29.

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**Karnali Under Stress.** Livelihood Strategies and Seasonal Rhythms in a Changing Nepal Himalaya. Barry C. Bishop. University of Chicago, Committee on Geographical Studies, Chicago, 1990. xviii, 460 pp., illus. \$24. Geography Research Papers, nos. 228–229.

**Lectures on Hadron Physics.** Topics on the Structure and Interaction of Hadrons. Erasmo Ferreira, Ed. World Scientific, Teaneck, NJ, 1990. viii, 253 pp., illus. \$64. From two symposia, Brazil, 1988 and 1989.

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**The Nuclear Equation of State.** Part B, QCD and the Formation of the Quark-Gluon Plasma. Walter Greiner and Horst Stöcker, Eds. Plenum, New York, 1990. xii, 600 pp., illus. \$125. NATO Advanced Science Institutes Series, vol. 216B. From a meeting, Peñíscola, Spain, May 1989.

**Numerical Explorations of Community Patterns.** Otto Wildi and László Orlósci. SPB Academic, The Hague, 1990. viii, 124 pp., illus. Paper, \$22.

**The Peripheral Nerve.** Structure, Function and Reconstruction. Julia K. Terzis and Kevin L. Smith. Raven, New York, 1990. xvi, 176 pp., illus. \$54. A Hampton Press Publication.

**Philosophical Perspectives on Newtonian Science.** Phillip Bricker and R. I. G. Hughes, Eds. MIT Press, Cambridge, MA, 1990. viii, 248 pp., \$34.95. From a conference, New Haven, CT, 1987.

**Phthalocyanines.** Properties and Applications. C. C. Leznoff and A. B. P. Lever, Eds. VCH, New York, 1990. xii, 436 pp., illus. \$135.

**Phylogeny and the Classification of Fossil and Recent Organisms.** Norbert Schmidt-Kittler and Rainer Willmann, Eds. Parey, Berlin, 1989. 300 pp., illus. DM 98. From a symposium, Mainz, Germany, March 1988. Abhandlungen des Naturwissenschaftlichen Vereins, Hamburg, NF 28.

**Radiation Biophysics.** Edward L. Alpen. Prentice Hall, Englewood Cliffs, NJ, 1990. xx, 392 pp., illus. \$60. Biophysics and Bioengineering Series.

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