



Vignettes: Mathematical Works

The pages are wrinkled and darkened with coffee stains and not in any order. Mathematics dominates the words, which peer tentatively between equations like timid forest animals. Most of these few furtive words are of the species of It obviously follows that, or Thus, or An excellent approximation is

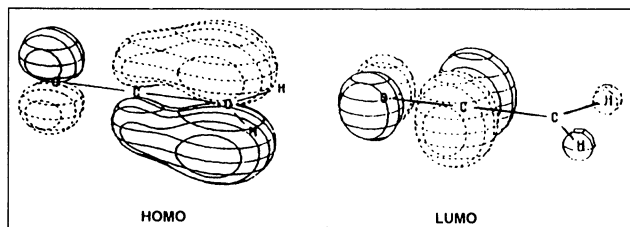
—From *Good Benito*, a novel by Alan Lightman (Pantheon)

[Johann] Radon was an internationally recognized authority. He was also rather nervous. Once it took him two blackboards to derive $0 = 0$. "Das is richtig," he said with sadness in his voice; "aber es hilft uns nicht weiter."

—Paul Feyerabend, in *Killing Time: The Autobiography of Paul Feyerabend* (University of Chicago Press)

tude range; not be a part of a larger system; and have separations between members that are comparable to the size of the galaxies themselves. Groups meeting these criteria were identified by a search of Palomar Sky Survey red prints and were further studied observationally by a number of workers at various telescopes to obtain information on optical spectra, redshifts, and radio, infrared, and x-ray emissions. The illustrations provided are digitally combined and processed images obtained with the 3.6-meter Canada-France-Hawaii Telescope. The atlas proper consists of two-page treatments of each of 100 groups—60 quartets, 25 quintets, 8 sextets, 6 septets, and 1 octet—arranged and numbered in order of increasing right ascension of the group center. For each group a page of photographs is accompanied by a schematic diagram, a one-paragraph general description of the group, and two tables listing data (where available) on 12 properties of the group and 13 of each of the member galaxies.

Katherine Livingston



Frontier molecular orbitals of ketene. "The most distinguishing feature of the electronic structure of ketene is the presence of the highest occupied molecular orbital (HOMO) perpendicular to the ketene plane, and the lowest unoccupied molecular orbital (LUMO) in the ketene plane. These place substantial negative charge on oxygen and C_β and positive charge on C_α , and show that electrophiles are expected to attack ketene perpendicular to the molecular plane at the former positions, while nucleophiles will approach in the plane at the latter position." [From *Ketenes*; F. P. Cossio *et al.*, *J. Am. Chem. Soc.* 115, 995–1004 (1993)]

Ketenes. THOMAS T. TIDWELL. Wiley, New York, 1995. xvi, 665 pp., illus. \$69.95 or £70.

Ketenes—molecules containing the $C=C=O$ grouping—were first prepared and characterized by Hermann Staudinger and by N. T. M. Wilshire in the first decade of this century, and Staudinger published the first monograph on ketene chemistry in 1912. Various reviews of the subject have been published since, but a comprehensive, up-to-date work has been lacking. Given that a thorough treatment on the model of Staudinger's would no longer be possible within reasonable compass, Tidwell has in the present work set out to provide an introduction to "almost all aspects" of the subject by keeping the discussions relatively brief and providing "leading references" for full detail. A short historical introduction includes mention of the importance of ketenes in the production of acetic acid, penicillins, prostaglandins, and quinones. The first main chapter describes some recent theoretical

studies of ketenes, and the second summarizes their spectroscopy and physical properties. Chapter 3 (98 pages) outlines preparation methods, and in chapter 4 (396 pages) the types of ketenes (carbon-substituted, nitrogen-substituted, oxygen-substituted, and so on) are enumerated on the basis of a search of the *Chemical Abstracts* Registry File. The fifth and final chapter of the book (212 pages) covers reactions, from oxidation and reduction through nucleophilic and electrophilic addition

to polymerization, stereoselectivity, and miscellaneous "other additions." Tables as well as structural diagrams are used to present the information, and the chapters of the book are subdivided according to a decimal system, with subheadings given in a detailed table of contents and each subdivision having its own reference list. The names of those authors who are mentioned in the text are included in the index that ends the work.

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Books Received

Autism. An Introduction to Psychological Theory. Francesca Happé. Harvard University Press, Cambridge, MA, 1995. viii, 152 pp., illus. \$24.95.

Aviation. A Smithsonian Guide. Donald S. Lopez. Macmillan, New York, 1995. 256 pp., illus. \$24.50; paper, \$18.

Bacterial Toxins and Virulence Factors in Disease. Joel Moss *et al.*, Eds. Dekker, New York, 1995. xxvi, 627 pp., illus. \$195. Handbook of Natural Toxins, vol. 8.

Barriers and Bridges to the Renewal of Ecosystems and Institutions. Lance H. Gunderson, C. S. Holling, and Stephen S. Light, Eds. Columbia University Press, New York, 1995. xvi, 593 pp., illus. \$50 or £36.50.

The Beauty of the Beastly. New Views on the Nature of Life. Natalie Angier. Houghton Mifflin, Boston, MA, 1995. xxii, 278 pp. \$21.95. Revised versions of articles from the *New York Times*.

Behavioral Development. Concepts of Approach/Withdrawal and Integrative Levels. Kathryn E. Hood, Gary Greenberg, and Ethel Tobach, Eds. Garland, New York, 1995. xxii, 468 pp., illus. \$74. Research in Developmental and Comparative Psychology, vol. 1. Based on a conference, State College, PA, Nov. 1989.

Constellations of the Northern Sky. Gary Mechlér and Mark Chartrand. Knopf, New York, 1995. 192 pp., illus. Paper, \$7.99 or \$10.95. National Audubon Society Pocket Guide.

Conversations on Mind, Matter, and Mathematics. Jean-Pierre Changeux and Alain Connes. Princeton University Press, Princeton, NJ, 1995. xii, 261 pp., illus. \$24.95 or £19.95. Translated from the French edition (1989) and edited by M. B. DeBevoise.

Conversations with Neil's Brain. The Neural Nature of Thought and Language. William H. Calvin and George A. Ojemann. Addison-Wesley, Reading, MA, 1995. viii, 344 pp., illus. Paper, \$12. Reprint, 1994 ed.

The Crowd. Gustave LeBon. Transaction, New Brunswick, NJ, 1995. vi, 232 pp. Paper, \$19.95. Translated from the French edition (1895). New introduction by Robert A. Nye.

Crusading for Chemistry. The Professional Career of Charles Holmes Herty. Germaine M. Reed. Forest History Society, Durham, NC, and University of Georgia Press, Athens, 1995. xvi, 474 pp. \$45.

Cryopreservation and Freeze-Drying Protocols. John G. Day and Mark R. McLellan, Eds. Humana, Totowa, NJ, 1995. x, 254 pp., illus. Spiralbound, \$79.50. Methods in Molecular Biology, vol. 38.

Currents in High-Energy Astrophysics. Maurice M. Shapiro, Rein Silberberg, and John P. Wefel, Eds. Kluwer, Norwell, MA, 1995. xii, 336 pp., illus. \$150 or £95.50 or Dfl. 235. NATO ASI Series C, vol. 458. From an institute, Erice, Sicily, Italy, May 1994.

The Cyclical Serpent. Prospects for an Ever-Repeating Universe. Paul Halpern. Plenum, New York, 1995. xviii, 300 pp., illus. \$27.95.

Cystic Fibrosis. Current Topics. Vol. 2. J. A. Dodge, D. J. H. Brock, and J. H. Widdicombe, Eds. Wiley, New York, 1995. xiv, 354 pp., illus. \$99.95.

Dynamic Systems of Development. Change between Complexity and Chaos. Paul van Geert. Harvester Wheatsheaf (Simon and Schuster), Hemel Hempstead, UK, 1994. xii, 300 pp., illus. Paper, \$27.95.