

sphere, to sense the vertical distribution of atmospheric constituents, or of their temperatures, and to peer down through the atmosphere from a satellite to sense earth resources.

With the new remote-sensing instruments probing the atmosphere (or attempting to see through it), there has also occurred a vigorous revival in the atmospheric sciences.

The last half dozen years have seen the appearance of several good reference books (those by Goody and by Kondratyev for example) that deal with atmospheric radiation processes—chiefly the processes of emission, transmission, and radiative transfer—in which light is absorbed and reemitted. The present book addresses itself primarily to optical scattering, the process during which light rays are changed in direction by reflection from the particles or molecules of the atmosphere: the light is not absorbed, it is scattered. Optical scattering is a complex phenomenon that depends on the wavelength of the incident light and on the abundance of the particles, their sizes and shapes, and the range of size distributions. When the size of the scattering particles is small relative to the wavelength of the light, the scattering is described by a classical theory worked out by Rayleigh in 1871 and called Rayleigh scattering. When the wavelength of the light is of the same order of magnitude as the diameter of the scattering particles, a much more complicated theory applies. It is generally ascribed to Gustav Mie and is called Mie scattering. When the scattering particles are larger than the wavelength of the light, as with raindrops or fog particles, the classical laws of optical reflection from surfaces can be applied, and we can speak of white clouds reflecting sunlight or light diffused by rain and fog. It is hard to believe that until Rayleigh introduced his theory just over a hundred years ago we had no proper understanding of or explanation for even such everyday matters as why the sky is blue or why sunsets are red. (Optical scattering theory also explains why on hazy days in places like Los Angeles the sky is brown and the sunsets murky.)

This is the first book I have seen that includes a systematic treatment of Rayleigh scattering, Mie scattering, and scattering by nonspherical particles such as ice crystals or atmospheric haze. The standard theory is covered in some detail, and the author has read and digested the vast literature on atmospheric aerosols, haze, smokes, and pollutants, much of it empirical and in need of inter-

pretation by someone versed in scattering theory. The book is well documented, with references as recent as 1975. It is intended not for the casually interested layman but for those who are engaged in research on the environment, atmospheric phenomena, remote sensing, meteorology, or just plain optical physics, who will find it authoritative and useful.

JOHN N. HOWARD

*Air Force Geophysics Laboratory,  
Hanscom Air Force Base,  
Massachusetts*

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**Advances in Cancer Research.** Vol. 24. George Klein and Sidney Weinhouse, Eds. Academic Press, New York, 1977. xiv, 350 pp., illus. \$29.50.

**Advances in Catalysis.** Vol. 26. D. D. Eley, Herman Pines, and Paul B. Weisz, Eds. Academic Press, New York, 1977. xx, 420 pp., illus. \$39.50.

**Advances in Immunology.** Vol. 24. Frank J. Dixon and Henry G. Kunkel, Eds. Academic Press, New York, 1976. xii, 344 pp., illus. \$27.50.

**Air Monitoring Survey Design.** Kenneth E. Noll and Terry L. Miller. Ann Arbor Science Publishers, Ann Arbor, Mich., 1977. viii, 296 pp., illus. \$22.50.

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**Applied Solid State Science.** Advances in Materials and Device Research. Vol. 6. Raymond Wolfe, Ed. Academic Press, New York, 1976. xii, 264 pp., illus. \$27.

**The Articulate Mammal.** An Introduction to Psycholinguistics. Jean Aitchison. Universe Books, New York, 1977. 256 pp., illus. \$10.

**Assessment of the Arctic Environment.** Selected Topics. Papers from a symposium, Fairbanks, Alaska, Aug. 1975. D. W. Hood and D. C. Burrell, Eds. University of Alaska Institute of Marine Science, Fairbanks, 1976. xii, 468 pp., illus. \$25. Institute of Marine Science Occasional Publication No. 4.

**Attachment and Loss.** John Bowlby. Basic, New York, 1977. Two volumes. Vol. 1, Attachment. xx, 428 pp. Paper, \$4.95. Vol. 2, Separation: Anxiety and Anger. xviii, 456 pp. Paper, \$4.95. Reprint of the 1973 editions.

**Biochemical Toxicology of Environmental Agents.** A. de Bruin. Elsevier, New York, 1976. x, 1544 pp., illus. \$130.75.

**Calcareous Algae.** John L. Wray. Elsevier, New York, 1977. xiv, 186 pp., illus. \$28.75.

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**Classification and Nomenclature of Viruses.** Second Report of the International Committee on Taxonomy of Viruses. Frank Fenner. Karger, Basel, 1976. 116 pp. Paper, \$11.

**Climates of the Soviet Union.** Paul E. Lydolph. Elsevier, New York, 1977. xii, 444 pp., illus. \$81.75. World Survey of Climatology, vol. 7.

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**Contraceptives of the Future.** Papers from a meeting, London, Feb. 1976. The Royal Society, London, 1976. iv, 224 pp., illus. £5.40.

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**Decarceration.** Community Treatment and the Deviant: A Radical View. Andrew T. Scull. Prentice-Hall, Englewood Cliffs, N.J., 1977. viii, 184 pp. Cloth, \$8.95; paper, \$3.95.

**Electronic Inventions 1745-1976.** G. W. A. Dummer. Pergamon, New York, 1977. vi, 158 pp., illus. \$7.50.

**Entertaining with Insects.** Or: The Original Guide to Insect Cookery. Ronald L. Taylor and Barbara J. Carter. Illustrated by John Gregory Tweed. Woodbridge Press, Santa Barbara, Calif., 1977. 160 pp. Paper, \$3.95.

**Environmental Impact Statements.** A Guide to Preparation and Review. Martin S. Baker, Joseph S. Kaming, and Richard E. Morrison. Practising Law Institute, New York, 1977. xiv, 334 pp. \$30.

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**Genetics and Biogenesis of Chloroplasts and Mitochondria.** Papers from a conference, Munich, Germany, Aug. 1976. Th. Bücher, W. Neupert, W. Sebald, and S. Werner, Eds. North-Holland, Amsterdam, 1976 (U.S. distributor, Elsevier, New York). xiv, 896 pp., illus. \$71.50.

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**Introduction to Hilbert Space.** Sterling K. Berberian. Chelsea, New York, ed. 2, 1976. xii, 206 pp. \$7.50.

**An Introduction to Survey Research and Data Analysis.** Herbert F. Weisberg and Bruce D. Bowen. Freeman, San Francisco, 1977. xii, 244 pp., illus. Cloth, \$10; paper, \$3.95.

**Introductory Biophysics.** F. R. Hallett, P. A. Speight, R. H. Stinson, and W. G. Graham. Halsted (Wiley), New York, 1977. xii, 244 pp., illus. Paper, \$12.95.

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**Logical Abilities in Children.** Vol. 4, Reasoning and Concepts. Daniel N. Osherson. Erlbaum, Hillsdale, N.J., 1976 (distributor, Halsted [Wiley], New York). viii, 248 pp. \$14.95.

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**Magnetism.** Selected Topics. Simon Foner, Ed. Gordon and Breach, New York, 1976. xx, 748 pp., illus. \$77.

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**Mankind's Future in the Pacific.** Papers from a congress, Vancouver, B.C., Canada, Aug. 1975. Robert F. Scagel, Ed. University of British Columbia Press, Vancouver, 1977. x, 198 pp. Paper, \$6.95.

**Manual of Solid State Circuit Design and Troubleshooting.** Vester Robinson. Reston (Prentice-Hall), Reston, Va., 1977. xiv, 414 pp., illus. \$18.95.

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**The Moon and the Ghetto.** Richard R. Nelson. Norton, New York, 1977. 160 pp. Cloth, \$7.95; paper, \$2.95. The Fels Lectures on Public Policy Analysis.

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**Psychology.** Making Sense. David A. Statt. Harper and Row, New York, 1977. xii, 228 pp., illus. Paper, \$4.95.

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**The Realm of the Extra-Human: Agents and Audiences.** Papers from a congress, Chicago, 1973. Agehananda Bharati, Ed. Mouton, The (Continued on page 1127)

## BOOKS RECEIVED

(Continued from page 1086)

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**The Realm of the Extra-Human: Ideas and Actions.** Papers from a congress, Chicago, 1973. Agehananda Bharati, Ed. Mouton, The Hague, 1976 (U.S. distributor, Aldine, Chicago). xii, 522 pp. \$24.50. World Anthropology.

**Ring Theory.** Proceedings of a conference, Athens, Ohio, May 1976. S. K. Jain and Klaus E. Eldridge, Eds. Dekker, New York, 1977. viii, 246 pp. Paper, \$24.50. Lecture Notes in Pure and Applied Mathematics, vol. 25.

**The Science of Life.** Robert Day Allen and 13 others. Harper and Row, New York, 1977. xxvi, 438 pp., illus. \$14.95.

**Seawater Desalination.** Proceedings of a symposium, Oholo, Mar. 1975. David Hasson and Amiel Dickmann, Eds. National Council for Research and Development, Jerusalem, 1976. 298 pp., illus. Paper, \$10.

**Sedimentary Basins of Continental Margins and Cratons.** Papers from a symposium, Durham, England, Apr. 1976. M. H. P. Bott, Ed. Elsevier, New York, 1976. vi, 314 pp., illus. \$36.75. Inter-Union Commission on Geodynamics Scientific Report No. 27. Developments in Geotectonics 12. Reprinted from *Tectonophysics*, vol. 36.

**Sequency Theory.** Foundations and Applications. Henning F. Harmuth. Academic Press, New York, 1977. xiv, 506 pp., illus. \$39.50. Advances in Electronics and Electron Physics Supplements, 9.

**Statistical Methods for Social Scientists.** Eric A. Hanushek and John E. Jackson. Academic Press, New York, 1977. xiv, 374 pp., illus. \$19. Quantitative Studies in Social Relations.

**A Structured Approach to Programming.** Joan K. Hughes and Jay I. Michtom. Prentice-Hall, Englewood Cliffs, N.J., 1977. viii, 264 pp., illus. \$15.95.

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**Theory and Practice of Biological Control.** C. B. Huffaker and P. S. Messenger, Eds. Academic Press, New York, 1976. xxii, 788 pp., illus. \$42.50.

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**Was wird aus Afrika?** Rassismus, Neo-Kolonialismus, Entwicklungshilfe. Heinz-Dietrich Ortlieb. A. Fromm, Osnabrück, 1976. 112 pp. Paper, DM 8. Texte + Thesen, 74.

**Welt ohne Geldsystem?** Aufsätze zur internationalen Währungs- und Finanzlage. Franz Aschinger. A. Fromm, Osnabrück, 1975. 84 pp. Paper, DM 8. Texte + Thesen, 64.

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**Winter Birds of the Carolinas and Nearby States.** Michael A. Godfrey. Blair, Winston-Salem, N.C., 1977. xxxiv, 136 pp., illus. \$24.95.

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**Wohlstands-Kriminalität.** Die neue Herausforderung. Walter Kerber, Ed. A. Fromm, Osnabrück, 1976. 96 pp. Paper, DM 8. Texte + Thesen, 78.

**Your Memory.** How It Works and How to Improve It. Kenneth L. Higbee. Prentice-Hall, Englewood Cliffs, N.J., 1977. xiv, 208 pp. Cloth, \$9.95; paper, \$3.95. A Spectrum Book.

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**Fluid Dynamicist.** Ph.D. 1965. Broad analytical/numerical modeling expertise. Journal publications in fluid physics, meteorology, and oceanography. Enthusiastic teacher. Eight years in research project management. Seeks research/teaching position. Box 239, SCIENCE. X

Certified consulting **Meteorologist,** M.S., 20 years of experience-contract research. Areas: environment, energy, military. Skills: technical program development, management. Seeks position in theoretical and/or experimental research. Box 225, SCIENCE.

**Plant Ecologist,** Ph.D. Seeks teaching position in college or university. Eight years of university teaching experience in ecology, botany, and environmental science. Publications on community classification and environmental assessment. Box 240, SCIENCE. X

**Senior Microbiologist,** Ph.D., SM (A.A.M.); broad experience in teaching, research, and industry; 40 publications. Desires academic, research, or industrial position. Well-versed in general and pathogenic microbiology, water microbiology, microbial diagnostics, clean room microbiology, and CGMP. Box 241, SCIENCE. X